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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–HQ–ES–2018–0097; FF09E22000 FXES1113090FEDR 212]

RIN 1018–BD60

Endangered and Threatened Wildlife and Plants; Removing the Gray Wolf (*Canis lupus*) from the List of Endangered and Threatened Wildlife

AGENCY: Fish and Wildlife Service, Interior.

ACTIONS: Final rule and notification of petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service or USFWS), have evaluated the classification status of the gray wolf (*Canis lupus*) entities currently listed in the lower 48 United States and Mexico under the Endangered Species Act of 1973, as amended (Act). Based on our evaluation, we are removing the gray wolf entities in the lower 48 United States and Mexico, except for the Mexican wolf (*C. l. baileyi*), that are currently on the List of Endangered and Threatened Wildlife. We are taking this action because the best available scientific and commercial data available establish that the gray wolf entities in the lower 48 United States do

not meet the definitions of a threatened species or an endangered species under the Act. The effect of this rulemaking action is that *C. lupus* is not classified as a threatened or endangered species under the Act. This rule does not have any effect on the separate listing of the Mexican wolf subspecies (*Canis lupus baileyi*) as endangered under the Act. In addition, we announce a 90-day finding on a petition to maintain protections for the gray wolf in the lower 48 United States as endangered or threatened distinct population segments. Based on our review, we find that the petition does not present substantial scientific or commercial information indicating that the petitioned actions may be warranted. Therefore, we are not initiating status reviews of the petitioned entities in response to the petition.

DATES: This rule is effective [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: This final rule, the post-delisting monitoring plan, and the summary of the basis for the petition finding contained in this document are available on the internet at *http://www.regulations.gov* under Docket No. FWS–HQ–ES–2018–0097 or *https://ecos.fws.gov*. Comments and materials we received, as well as some supporting documentation we used in preparing this rule, are available for public inspection at *http://www.regulations.gov*.

FOR FURTHER INFORMATION CONTACT: Bridget Fahey, Chief, Division of Classification and Conservation, Ecological Services, U.S. Fish and Wildlife Service, Headquarters Office, MS: ES, 5275 Leesburg Pike, Falls Church, VA 22041–3803; telephone

(703) 358–2163. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Relay Service at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Act and our regulations, if we determine that a species is no longer threatened or endangered throughout all or a significant portion of its range, we must remove the species from the Lists of Endangered and Threatened Wildlife and Plants in title 50 of the Code of Federal Regulations (50 CFR 17.11 and 17.12). The Act requires us to issue a rule to remove a species from the List ("delist" it) (16 U.S.C. 1533(c)).

What this document does. This rule removes from the List gray wolves that are currently listed as threatened or endangered species in the lower 48 United States and Mexico. This rule does not have any effect on the separate listing of the Mexican wolf subspecies as endangered under the Act (80 FR 2487, January 16, 2015).

The basis for our action. Under the Act, we determine whether a species is an endangered or threatened species based on any one or more of five factors or the cumulative effects thereof: (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 (16 U.S.C. 1533(a)(1(A)). We have determined that the gray wolf entities currently listed in the lower 48 United States and Mexico (not including the Mexican wolf subspecies) do not meet the definition of an endangered species or threatened species under the Act.

Peer review and public comment. We sought comments on the proposed delisting rule from independent specialists to ensure that this rule is based on reasonable assumptions and scientifically sound data and analyses. We also considered all comments and information we received during the proposed delisting rule's comment period.

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Previous Federal Actions

Gray wolves were originally listed as subspecies or as regional populations[1] of subspecies in the lower 48 United States and Mexico. Early listings were under legislative predecessors of the 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. The *Federal Register* citations for all the rulemaking actions described in the following paragraphs are provided in table 1, below.

In 1978, we published a rule reclassifying the gray wolf throughout the lower 48 United States and Mexico, subsuming the earlier listings of subspecies or regional populations of subspecies. In that rule, we classified gray wolves in Minnesota as a threatened species and gray wolves elsewhere in the lower 48 United States and Mexico as an endangered species (table 1). At that time, we considered the gray wolves in Minnesota to be a listable entity under the Act, and we considered the gray wolves in the lower 48 United States and Mexico, other than Minnesota, to be another listable entity (43 FR 9607 and 9610, respectively, March 9, 1978). The earlier subspecies listings thus were subsumed into two listed entities: the gray wolf in Minnesota; and the gray wolf in the rest of the lower 48 United States and Mexico.

The 1978 reclassification was undertaken to address changes in our understanding of gray wolf taxonomy and protect all gray wolves in the lower 48 United States and Mexico (43 FR 9607, March 9, 1978). In addition, we also clarified that the gray wolf was only listed south of the Canadian border.

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[1] A group of fish or wildlife in the same taxon below the subspecific level, in common spatial arrangement that interbreed when mature (50 CFR 17.3).

The 1978 reclassification rule stipulated that "biological subspecies would continue to be maintained and dealt with as separate entities" (43 FR 9609), and offered "the firmest assurance that [the Service] will continue to recognize valid biological subspecies for purposes of its research and conservation programs" (43 FR 9610). Accordingly, we implemented three gray wolf recovery programs in three regions of the country—the northern Rocky Mountains, the Southwestern United States, and the Eastern United States (including the Great Lakes States). The recovery programs were pursued to establish and prioritize recovery criteria and actions appropriate to the unique local circumstances of the gray wolf (table 1). Recovery in one of these regions (Southwestern United States) included reintroduction of gray wolves in an experimental population (table 1). Recovery in a second region (northern Rocky Mountains) included reintroduction of gray wolves in an experimental population (table 1) and natural recolonization. Recovery in the third region (Eastern United States) relied on natural recolonization and population growth.

Between 2003 and 2015, we published several rules revising the 1978 listed entities to acknowledge new information regarding taxonomy, comport with current policy and practices, and recognize the biological recovery of gray wolves in the northern Rocky Mountains (NRM) and Eastern United States. Previous rules were challenged and subsequently invalidated or vacated by various courts based, in part, on their determinations that our distinct population segment (DPS) designations were legally flawed (table 1).

Of particular relevance to this rule is our 2011 final rule addressing wolf recovery in the western Great Lakes (WGL) area of the Eastern United States (76 FR 81666, Dec. 28, 2011). In that rule, we recognized the expansion of the Minnesota wolf population by revising the previously listed Minnesota entity to include all or portions of six surrounding States, classified

the expanded population as the WGL DPS, and determined that the WGL DPS did not meet the definition of a threatened or an endangered species due to recovery. Also in 2011, we published a final rule that implemented section 1713 of Public Law 112-10, reinstating our 2009 delisting rule for the NRM DPS and, with the exception of Wyoming, removed gray wolves in that DPS from the List. In 2012, we finalized a rule removing gray wolves in Wyoming from the List. That rule was later vacated by the U.S. District Court for the District of Columbia. In 2013, we published a proposed rule to: (1) delist *C. lupus* in the remaining listed portions of the United States and Mexico outside of the delisted NRM and WGL DPSs; and (2) keep Mexican wolf (*C. l baileyi*; occurring in the Southwestern United States and Mexico) listed as an endangered subspecies (table 1).

In 2014, the U. S. District Court for the District of Columbia vacated the December 28, 2011, final rule identifying the WGL DPS and removing it from the List (table 1). The district court's decision was based, in part, on its conclusion that the Act does not allow the Service to use its authority to identify a DPS solely for the purpose of delisting it (*Humane Soc'y of the U.S.* v. *Jewell*, 76 F. Supp. 3d 69, 112-13 (D.D.C. 2014)). The U.S. Court of Appeals disagreed, ruling in 2017 that the Service had the authority to designate a DPS from a larger listed entity and delist it in the same rule (table 1). That court nonetheless upheld the district court's vacatur of the rule, concluding that the Service failed to analyze or consider two significant aspects of the rule: the impacts of delisting the DPS on the rest of the listed entity and the impacts of the loss of historical range (*Humane Soc'y of the U.S.* v. *Zinke*, 865 F.3d 585, 602-03, 605-07).

In 2015, we finalized the portion of the 2013 proposed rule listing the Mexican wolf as an endangered subspecies (table 1). In 2017, the D.C. Circuit reversed the district court's decision and reinstated the delisting of gray wolves in Wyoming (*Defenders of Wildlife* v. *Zinke*, 849 F.3d

1077 (D.C. Cir. 2017)). Thus, wolves are currently delisted in the entire northern Rocky Mountains DPS (figure 1).

As a result of the above actions, the *C. lupus* listed entities in 50 CFR 17.11 currently include: (1) *C. lupus* in Minnesota listed as threatened, and (2) *C. lupus* in all or portions of 44 U.S. States and Mexico, listed as endangered (figure 1). In the United States, this includes: all of Alabama, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Massachusetts, Maryland, Maine, Michigan, Missouri, Mississippi, North Carolina, North Dakota, Nebraska, New Hampshire, New Jersey, Nevada, New York, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Virginia, Vermont, West Virginia, and Wisconsin; and portions of Arizona, New Mexico, Oregon, Utah, and Washington (figure 1).

On March 15, 2019, we published a proposed rule to delist the two currently listed *C. lupus* entities in the *Federal Register* (84 FR 9648). The publication of the proposed delisting rule opened a 60-day public comment period, which was scheduled to close on May 14, 2019. Based on several requests from the public to extend the comment period, we published a document on May 14, 2019, extending the comment period 60 days, to July 15, 2019 (84 FR 21312). We announced a public information open house and public hearing on our proposed rule and the availability of the final peer review report in the *Federal Register* on June 6, 2019 (84 FR 26393). The public events were held in Brainerd, Minnesota, on June 25, 2019.

For additional information on these Federal actions and their associated litigation history, refer to the relevant associated rules or the Previous Federal Actions sections of our recent gray wolf actions (see table 1).

Table 1. Key Federal regulatory actions under the Act and predecessor legislation[1] pertaining to gray wolf and, where applicable, outcomes of court challenges to these actions. E = endangered species, T = threatened species, DPS = Distinct Population Segment, NRM = Northern Rocky Mountains, WGL = Western Great Lakes.

Entity	Year of Action	Type of Action	*Federal Register* Citation	Litigation History
C. lupus lycaon	1967[1]	List	32 FR 4001, March 11, 1967	
C. lupus irremotus	1973[1]	List	38 FR 14678, June 4, 1973	
C. l. lycaon	1974	List	39 FR 1171, January 4, 1974	
C. l. irremotus	1974	List	39 FR 1171, January 4, 1974	
C. l. baileyi	1976	List (E)	41 FR 17736, April 28, 1976	
C. lupus monstrabilis[2]	1976	List (E)	41 FR 24064, June 14, 1976	
C. lupus in lower 48 U.S. (except Minnesota) & Mexico	1978	Reclassify (E)	43 FR 9607, March 9, 1978[3]	
C. lupus in Minnesota	1978	Reclassify (T)	43 FR 9607, March 9, 1978[3]	
C. lupus	1978 (revised 1992)	Recovery Plan for Eastern Timber Wolf (eastern gray wolf)	n.a.	
C. lupus	1980 (revised	Recovery Plan for NRM Gray Wolf	n.a.	

	1987)			
C. lupus	1982 (revised 2017)	Recovery Plan for Mexican Gray Wolf (*C. l. baileyi*)	n.a.	
C. lupus	1994	Establish experimental population (southeastern Idaho, southern Montana, and Wyoming)	59 FR 60266, November 22, 1994	
C. lupus	1994	Establish experimental population (central Idaho & southwest Montana)	59 FR 60252, November 22, 1994	Upholding reintroduction in the NRM region (*Wyoming Farm Bureau* v. *Babbitt*, 199 F.3d 1224 (10th Cir. 2000))
C. lupus	1998	Establish experimental population (Arizona & New Mexico)	63 FR 1752, January 12, 1998	
C. lupus DPSs: –Eastern DPS –Western DPS –Southwestern U.S. & Mexico DPS	2003	Designate DPS & classify/reclassify as: –Eastern DPS (T) –Western DPS (T) –Southwestern U.S. & Mexico DPS (E) Delist in unoccupied non-historical range	68 FR 15804, April 1, 2003	Rule vacated (*Defenders of Wildlife* v. *Norton*, 354 F. Supp. 2d 1156 (D. Or. 2005); *National Wildlife Federation* v. *Norton*, 386 F. Supp. 2d 553 (D. Vt. 2005))
C. lupus WGL DPS	2007	Designate DPS & delist	72 FR 6052, February 8, 2007	Rule vacated (*Humane Society of the United States* v. *Kempthorne*, 579 F. Supp. 2d 7 (D. D.C. 2008))
C. lupus	2008	Designate DPS &	73 FR 10514,	Rule enjoined

NRM DPS		delist	February 27, 2008	(*Defenders of Wildlife* v. *Hall*, 565 F. Supp. 2d 1160 (D. Mont. 2008)), and subsequently vacated and remanded
C. lupus DPSs: –WGL DPS –NRM DPS	2008	Reinstatement of protections—NRM & WGL DPSs	73 FR 75356, December 11, 2008	
C. lupus WGL DPS	2009	Designate DPS & delist	74 FR 15070, April 2, 2009	Rule vacated (*Humane Society of the United States* v. *Salazar*, 1:09-CV-1092-PLF (D.D.C. 2009))
C. lupus NRM DPS (except Wyoming)	2009	Designate DPS & delist (except in Wyoming)	74 FR 15123, April 2, 2009	Rule vacated (*Defenders of Wildlife* v. *Salazar*, 729 F. Supp. 2d 1207 (D. Mont. 2010))
C. lupus WGL DPS	2009	Reinstatement of protections—WGL	74 FR 47483, September 16, 2009	
C. lupus NRM DPS	2010	Reinstatement of protections—NRM DPS	75 FR 65574, October 26, 2010	
C. lupus NRM DPS	2011	Reissuance of 2009 NRM DPS delisting rule (as required by Public Law 112-10—The Department of Defense and Full-Year Continuing Appropriations Act, 2011)	76 FR 25590, May 5, 2011	Upholding Section 1713 (*Alliance for the Wild Rockies* v. *Salazar*, 672 F.3d 1170 (9th Cir. 2012))
C. lupus WGL DPS	2011	Revise 1978 listing, designate DPS & delist	76 FR 81666, December 28, 2011	Rule vacated (*Humane Society of the U.S.* v. *Jewell*, 76 F. Supp. 3d 69, 110 (D.D.C. 2014)) Vacatur upheld on

				appeal (*Humane Society of the U.S.* v. *Zinke*, 865 F.3d 585 (D.C. Cir. 2017))
C. lupus in lower 48 U.S. and Mexico, as revised	2012	5-Year Review	n.a.	
C. lupus in Wyoming	2012	Delist in Wyoming	77 FR 55530, September 10, 2012	Rule vacated (*Defenders of Wildlife* v. *Jewell*, 68 F. Supp. 3d 193 (D.D.C. 2014) Vacatur reversed on appeal (*Defenders of Wildlife* v. *Zinke*, 849 F.3d 1077 (D.C. Cir. 2017))
C. lupus in lower 48 U.S. (except NRM & WGL DPSs) and Mexico	2013	Propose delist in lower 48 U.S. & list *C. l. baileyi* (E); status review of wolves in Pacific Northwest	78 FR 35664, June 13, 2013	
C. l. baileyi	2015	List E	80 FR 2488, January 16, 2015	
C. l. baileyi	2015	Revised 1998 *C. lupus* experimental population and associated it with *C. l. baileyi* listing	80 FR 2512, January 16, 2015	
C. lupus WGL DPS and *C. lupus* in Wyoming	2015	Reinstatement of protections—WGL DPS & Wyoming	80 FR 9218, February 20, 2015	
C. lupus in Wyoming	2017	Reinstatement of 2012 delisting—Wyoming	82 FR 20284, May 1, 2017	

[1]Action taken under the Endangered Species Preservation predecessor legislation (Endangered Species Act of 1966, Endangered Species Conservation Act of 1969).
[2] Later subsumed into *C. l. baileyi* due to taxonomic changes.
[3] In this rule we also identified critical habitat in Michigan and Minnesota and promulgated special regulations under section 4(d) of the Act for operating a wolf-management program in Minnesota. The special regulation was later modified (50 FR 50793, December 12, 1985).

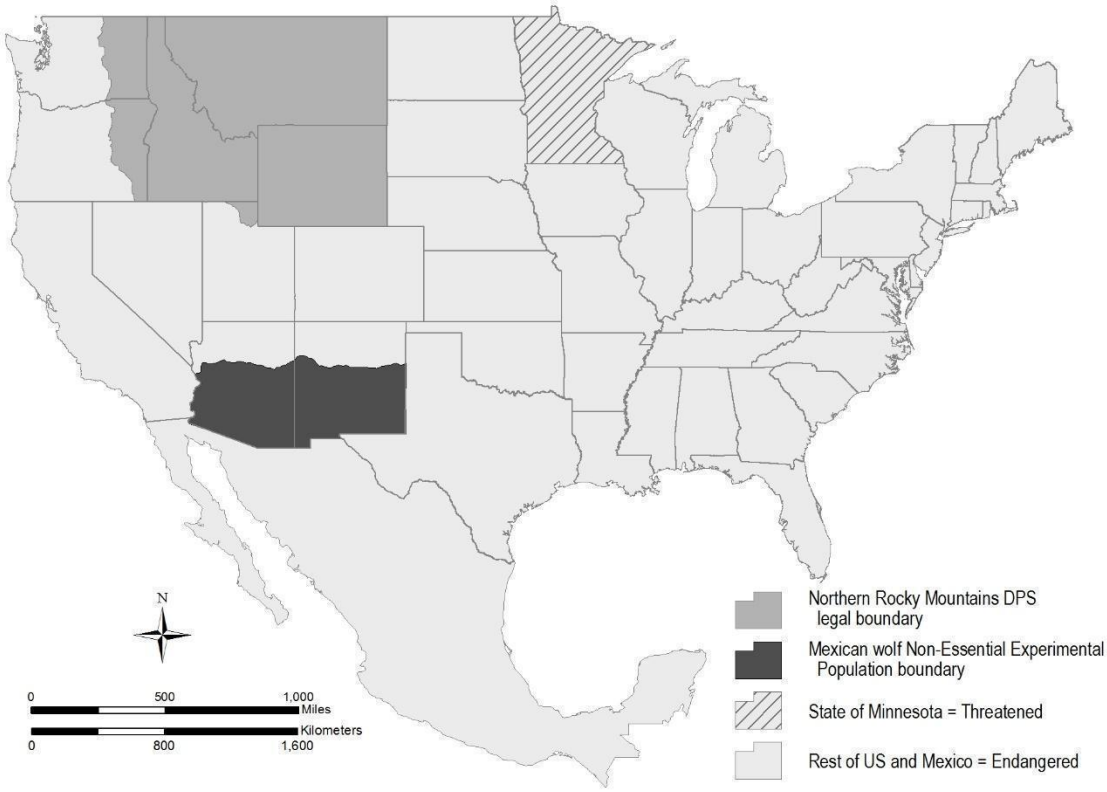

Figure 1: Current legal status of *C. lupus* under the Act. Northern Rocky Mountains DPS and Mexican Wolf Non-Essential Experimental Population are not part of the currently listed entities. All map lines are approximations; see 50 CFR 17.11 and 17.84(k) for exact boundaries.

General Background

The 1978 Reclassification

When the gray wolf (*C. lupus*) was reclassified in March 1978 (replacing multiple subspecies entities with two *C. lupus* population entities as described further in **Previous Federal Actions)**, it had been extirpated from much of its historical range in the lower 48 United

States. Although the 1978 reclassification listed two gray wolf entities (a threatened population in Minnesota and an endangered population throughout the rest of the lower 48 United States and Mexico), these entities were not predicated upon a formal DPS analysis, because the reclassification predated the November 1978 amendments to the Act, which revised the definition of "species" to include DPSs of vertebrate fish or wildlife, and our 1996 DPS Policy.

As indicated in **Previous Federal Actions**, the 1978 reclassification was undertaken to address changes in our understanding of gray wolf taxonomy and to ensure the gray wolf was protected wherever it was found (as described in 47 FR 9607, March 9, 1978) in the lower 48 United States and Mexico, rather than an indication of where gray wolves actually existed or where recovery efforts were considered necessary. Thus, the 1978 reclassification resulted in inclusion of large areas of the lower 48 United States where gray wolves were extirpated, as well as the mid-Atlantic and southeastern United States, areas where long-held differences of opinion regarding the precise boundary of the species' historical range remain (Young and Goldman 1944, pp. 413–416, 478; Hall 1981, p. 932; Nowak 1995, p. 395, Fig. 20; Nowak 2009, p. 242; Mech and Boitani 2003, p. 251, Fig. 9.7). While this generalized approach to the gray wolf listing facilitated recovery of wolves in the northern Rocky Mountains and western Great Lakes, it also erroneously included areas outside the species' historical range and was misread by some members of the public as an expression of a more expansive gray wolf recovery effort not required by the Act and never intended by the Service. In fact, our longstanding approach to recovery has focused on reestablishing wolf populations in three specific regions of the country: the Eastern United States (including the Great Lakes States), the northern Rocky Mountains, and the Southwestern United States. We have consistently focused our recovery efforts on

reestablishing wolf populations in these specific regions (see table 1 and **Gray Wolf Recovery Plans and Recovery Implementation**).

National Wolf Strategy

Although not required by the Act, in 2011 we described our national wolf strategy in our proposed rule to revise the List for the gray wolf in the Eastern United States (76 FR 26089–26090, May 5, 2011). This strategy was intended to: (1) lay out a cohesive and coherent approach to addressing wolf conservation needs, including protection and management, in accordance with the Act's statutory framework; (2) ensure that actions taken for one wolf population do not cause unintended consequences for other populations; and (3) be explicit about the role of historical range in the conservation of extant wolf populations.

Our strategy focused on the continued conservation of three extant gray wolf entities (the Great Lakes population, the northern Rocky Mountains population, and the southwestern population of Mexican wolves) and consideration of conservation of a fourth, wolves in the Pacific Northwest. In 2013 we completed a status review for gray wolves in the Pacific Northwest (western Washington, western Oregon, and northern California) (table 1) and determined that, under our DPS policy, these wolves are not discrete from wolves in the recovered NRM DPS (Idaho, Montana, Wyoming, eastern Oregon, eastern Washington, and north-central Utah) (see 78 FR 35707–35713). Therefore, since that time, our strategy has been consistent with a focus on the western Great Lakes, the northern Rocky Mountains, and the southwestern population of Mexican wolves (see **Previous Federal Actions**).

The Currently Listed *C. lupus* Entities Do Not Meet the Statutory Definition of a "Species"

The gray wolf entities that are currently on the List do not meet the Act's definition of a "species" (16 U.S.C. 1532(16)). The original listing of certain gray wolf subspecies predated the Act. In 1967, under a precursor to the Act, we listed *C. l. lycaon* (Eastern timber wolf) in the Great Lakes region (table 1). In 1973, under the same precursor to the Act, we listed *C. l. irremotus* (Northern Rocky Mountain wolf) (table 1). In 1974, these subspecies were listed under the Act (table 1). In 2015, we subsequently listed *C. l. baileyi* (Mexican wolf) as endangered in the Southwestern United States and Mexico (table 1). Finally, on June 14, 1976, we listed a fourth gray wolf subspecies, *C. l. monstrabilis* (table 1), which was later subsumed within *C. l. baileyi*.

In 1978, we concluded that "this listing arrangement has not been satisfactory because the taxonomy of wolves is out of date, wolves may wander outside of recognized subspecific boundaries, and some wolves from unlisted subspecies may occur in certain parts of the lower 48 states" (43 FR 9607, March 9, 1978). We wanted to clarify that *C. lupus* was listed as threatened or endangered south of the Canadian border, and we determined that the "most convenient" way to do so was to list the entity at the species level rather than by subspecies (43 FR 9607, March 9, 1978). The separate subspecies listings were subsumed into two entities that were defined geographically: (1) threatened in Minnesota; and (2) endangered throughout the rest of the lower 48 United States and Mexico (43 FR 9612, March 9, 1978). The 1978 rule treated these entities as distinct "species" under the statutory definition of the term that was in effect at that time (43 FR 9610, March 9, 1978).

When the Act was adopted in 1973, the term "species" was defined to include species, subspecies or "any other group of fish or wildlife of the same species or smaller taxa in common spatial arrangement that interbreed when mature" (Pub. L. 93–205, 87 Stat. 884, 886 (1973)). In November 1978, the Act was amended to introduce the concept of DPSs (16 U.S.C. 1532(16)). Unlike species and subspecies, DPS is not a taxonomic term. Rather, it refers to certain populations of vertebrates (i.e., less than the entire range of a taxonomic vertebrate species or subspecies). We issued a policy in 1996, in conjunction with the National Marine Fisheries Service, to explain how we would apply this statutory term (61 FR 4722–4725, February 7, 1996).

Since the concept of DPSs was introduced, we have attempted to revise the lower 48 United States and Mexico listings to account for the biological recovery of gray wolves in the Western Great Lakes (WGL) and Northern Rocky Mountains (NRM). We published rules identifying recovered DPSs, but some of those actions did not survive legal challenges. For example, our 2007 and 2011 rules designating and delisting a WGL DPS were vacated by the reviewing courts. Thus, wolves in the WGL are part of the currently listed gray wolf entities. By contrast, although our rules designating and delisting the NRM DPS were also challenged in court, after several rounds of litigation and congressional action the NRM DPS was delisted and remains so today (see **Previous Federal Actions**).

The two currently listed entities are: (1) *C. lupus* in Minnesota (listed as threatened); and (2) *C. lupus* in all or portions of 44 U.S. States and Mexico (listed as endangered). Neither of the entities encompasses an entire species, or a subspecies, of gray wolf. Thus, the currently listed entities would only constitute listable entities (i.e., meet the statutory definition of "species") if they qualified as DPSs.

To constitute a DPS, a vertebrate population must be both discrete from and significant to the remainder of the taxon (i.e., taxonomic species or subspecies) (61 FR 4725, February 7, 1996). We consider first whether the population is discrete and, if so, then we evaluate its biological and ecological significance (61 FR 4725, February 7, 1996). A population segment may be considered discrete if it "is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors" (61 FR 4725). For the reasons set forth below, the gray wolf entities currently on the List do not meet this standard.

The two entities are not markedly separated from other populations of the same taxon. The threatened Minnesota listed entity is not discrete from the endangered listed entity where they abut in the Great Lakes area because gray wolves in Minnesota are not discrete from gray wolves in Wisconsin and Michigan. In 1978, gray wolves were largely confined to northern Minnesota, with some wolves occupying Isle Royale and possibly other individuals scattered in Wisconsin and Michigan (43 FR 9608). Wolves in northern Minnesota subsequently dispersed and recolonized Wisconsin and Michigan, resulting in a metapopulation[2] in the Great Lakes area (Mech 2010, p. 130). There are no significant physical barriers separating Minnesota wolves from those in Wisconsin and Michigan, as evidenced by frequent movement of wolves among the three States (Treves *et al.* 2009, entire). In addition, genetic analyses demonstrate that Wisconsin and Michigan wolves are mostly of the same genetic makeup as Minnesota wolves and there is effective interbreeding among wolves in the three States (Wheeldon *et al.* 2010, p. 4438; Wheeldon and White 2009, p. 104; Fain *et al.* 2010, p. 1758; see also *Taxonomy of Gray*

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[2] A metapopulation is a population that exists as partially isolated sets of subpopulations that "interact" when individuals move from one subpopulation to another. 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 individuals. A metapopulation is more secure 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.

Wolves in North America). Thus, gray wolves in the Minnesota entity are not "markedly separated" from wolves in the Great Lakes portion of the endangered listed entity.

Likewise, the endangered listed entity is not discrete from other populations of gray wolves. As noted above, gray wolves in the Great Lakes portion of the endangered listed entity are connected to gray wolves in Minnesota. And gray wolves in the West Coast States that are part of the endangered listed entity are not discrete from the recovered NRM population (78 FR 35664, June 13, 2013, pp. 35707–35713; see also *Current Distribution and Abundance*). We removed most of the NRM DPS from the List, most recently, in 2011 (ID, MT, the eastern one-third of OR and WA, and a small portion of north-central UT) and the remainder, most recently, in 2017 (WY) (table 1). As we explained in our 2019 proposed rule, the NRM population has continued to expand and wolves from that population have now dispersed and become established in parts of the West Coast States (84 FR 9656, March 15, 2019). Genetic analysis shows that all gray wolves currently occupying Oregon descended from NRM wolves and those wolves expanded into California (Hendricks *et al.* 2018, pp. 142–143; California Department of Fish and Wildlife 2020, entire). Wolves in Washington in both the endangered listed entity and the NRM include individuals descended from NRM wolves as well as wolves from Canada (Hendricks et al. 2018, pp. 142–143). Thus, listed wolves in the West Coast States are not genetically distinct from the NRM wolves. Nor is there marked separation resulting from physical factors. Wolf habitat models show that there is little separation between occupied wolf habitat in the NRM DPS and suitable habitat in western Washington, western Oregon, and northern California (see 78 FR 35712, June 13, 2013). Any gaps in suitable habitat are unlikely to preclude dispersal because gray wolves are capable of traveling long distances through a variety of habitats (78 FR 35712, June 13, 2013; ODFW 2016, p. 10; Jimenez et al. 2017, entire).

In sum, listed wolves in the West Coast States are not discrete from wolves in the delisted NRM DPS portion of the gray wolf taxon.

Because the two currently listed entities are not discrete, we need not evaluate their significance (61 FR 4725, February 7, 1996). Neither of the listed entities is a DPS, and thus neither entity is a "species" as that term is defined under the Act.

As we noted in our proposed rule, the currently listed gray wolf entities could be removed from the List because they do not meet the statutory definition of a "species" (84 FR 9686, March 15, 2019). This independent basis for delisting, which is based on the plain language of the Act, was explained in our 2019 revisions to the Act's implementing regulations. We distinguish between a "listed entity" and a "species," and reiterate that an entity that is not a "species" as defined under the Act should be removed from the List. See 50 CFR 424.11(e)(3) (providing that the Secretary shall remove an entity from the List if, among other things, "[t]he listed entity does not meet the statutory definition of a species"). In the preamble to the rule we explained that this is not a new interpretation, but "merely reflects the text and intent of the Act, i.e., only 'species,' as defined in section 3 of the Act, may be listed under the Act" (84 FR 45037, August 27, 2020).

However, before proceeding with delisting, we may consider whether any populations of gray wolves covered by the listed entities meet the definition of a threatened species or an endangered species. Thus, instead of removing the listed entities solely because they do not meet the statutory definition of a "species," in this rule, we consider the status of gray wolves in several configurations, as explained below, to eliminate the possibility of removing protections for any gray wolves that might meet the Act's definition of a "species" and might be endangered or threatened.

Approach for this Rule

The Gray Wolf Entities Addressed in this Rule

As described above, two gray wolf entities are currently listed: *C. lupus* in Minnesota, listed as threatened; and *C. lupus* in all or portions of 44 U.S. States and Mexico, listed as endangered (figure 1). We refer to these entities simply as "Minnesota" and the "44-State entity" throughout this rule.

While our past status reviews have focused on gray wolf DPSs and taxonomic units that align with our national wolf strategy (see table 1), we have revised our approach in this rule to take into account the unique listing history of the gray wolf, as well as multiple court opinions regarding our prior actions to designate and delist gray wolf DPSs (see table 1). The two currently listed gray wolf entities are largely vestiges of a 42-year-old action (the 1978 reclassification (see **General Background**)) that occurred prior to formulation and implementation of our DPS policy. As explained above, the gray wolf entities that are currently on the List are not species, subspecies, or distinct population segments (DPSs) (see **The Currently Listed *C. lupus* Entities Do Not Meet the Statutory Definition of a "Species"**), and as such should be delisted. However, in recognition of the unique listing history of the gray wolf, our many prior actions to designate and delist DPSs (table 1), and related court opinions, we have adopted a conservative approach to delisting in this rule. Rather than focus on gray wolf DPSs and taxonomic units, we focus on the currently listed entities. We do so by evaluating the conservation status of the currently listed entities under three different configurations, as explained below.

In our proposed rule, we focused on the status of listed gray wolves by assessing the two listed entities in combination. In response to peer review and public comments, we have expanded our analysis to consider the conservation status of gray wolves in three different configurations. Specifically, we assess: (1) each of the two currently listed gray wolf entities separately; (2) the two currently listed entities combined into a single entity (the approach in our proposed rule); and (3) a single gray wolf entity that includes all gray wolves in the lower 48 state and Mexico except for the Mexican wolf. We explain our reasoning for analyzing these specific configurations below.

Why and How We Address Each Configuration of Gray Wolf Entities

We consider the status of gray wolves in each of the following configurations to determine whether wolves should be included on the List in their current status, be reclassified from their current status (e.g., upgraded to endangered or downgraded to threatened), or be removed from the List. For a summary of these configurations, see table 2.

The Two Listed Entities Assessed Separately

In this configuration, we assess the status of gray wolves occurring within the geographic area outlined by each of the two currently listed *C. lupus* entities separately, as they are listed. We do so because they are the entities that are currently on the List. Evaluating the entities as they are listed is consistent with section 4(c) of the Act, which authorizes the Secretary to review species included on the List and determine on the basis of the review whether changes to the listing status are warranted (16 U.S.C. 1533(c)(2)). We do not consider the delisted NRM DPS wolves as part of the 44-State entity under analysis in this configuration because they are recovered and no longer listed. However, we include information on the NRM DPS, as

appropriate, to provide context and to inform our analysis and conclusions about the status of wolves comprising the 44-State entity.

The Two Listed Entities Assessed in Combination

In this configuration, we assess the status of gray wolves occurring within the geographic area outlined by the two currently listed *C. lupus* entities combined into a single entity. We do so because: (1) these are the entities that are currently on the List and it is clear that neither listed entity would qualify as a DPS under our 1996 DPS policy due to their lack of discreteness from each other (see **The Currently Listed *C. lupus* Entities Do Not Meet the Statutory Definition of a "Species"**), and (2) it makes sense, biologically, to combine them for analysis in light of their lack of discreteness. We do not consider the delisted NRM DPS wolves as part of the listed entity under analysis in this configuration because they are recovered and no longer listed. However, we include information on the NRM DPS, as appropriate, to provide context and to inform our analysis and conclusions about the status of wolves comprising this combined entity.

We assessed the two listed entities in combination in our proposed rule. In that rule, we referred to the resulting entity as the "gray wolf entity." For clarity, in this final rule, we refer to the resulting entity as the "combined listed entity" (table 2).

The Two Listed Entities and the NRM DPS Assessed in Combination

In this configuration, we assess the status of gray wolves occurring within the geographic area of the lower 48 United States and Mexico (excluding the Mexican gray wolf; see *How We Address the C. l. baileyi Listing* below), a single entity that includes the two currently listed entities and the delisted NRM DPS combined. We do so because: (1) it includes the two entities

that are currently on the List and neither listed entity qualifies as a DPS under our 1996 DPS policy because the two listed entities are not discrete from each other and the 44-State entity is not discrete from the NRM DPS (see **The Currently Listed *C. lupus* Entities Do Not Meet the Statutory Definition of a "Species")**, and (2) it makes sense, biologically, to combine the two currently listed entities and the NRM DPS for analysis in light of their lack of discreteness. We refer to this entity as the "lower 48 United States entity." Although we include the NRM wolves in this configuration due to their connection to currently listed wolves, we reiterate that wolves in the NRM DPS are recovered, and we are not reexamining or revisiting our 2009 and 2012 delisting rules (74 FR 15123, April 2, 2009; 77 FR 55530, September 10, 2012). For additional information regarding our rationale for analyzing the lower 48 United States entity, see **Summary of Changes from the Proposed Rule.**

Table 2. Summary of analyses in this rule.

Configuration	Description of entity assessed	Name given to the entity in this rule	Why we assess the entity
1. The separate listed entities	State of Minnesota	Minnesota	It is a currently listed entity
	Lower 48 States and Mexico[1] outside of the NRM DPS and Minnesota	44-State entity	It is a currently listed entity
2. The combined listed entities	Lower 48 States and Mexico[1] outside of the NRM DPS	combined listed entity	Includes the two currently listed entities, but these two entities are not discrete from one another; it makes sense, biologically, to combine them in light of their lack of discreteness. We do not include the NRM wolves because they are delisted.
3. The combined listed entities and the NRM DPS	Lower 48 States and Mexico[1]	lower 48 United States entity	Includes the two currently listed entities, but these two entities are not discrete from one another, and one

			(the 44-State entity) is not discrete from the delisted NRM DPS; it makes sense, biologically, to combine them in light of their lack of discreteness

[1]But see *How We Address the C. l. baileyi Listing.*

How We Address the C. l. baileyi Listing

As indicated above (see **Previous Federal Actions**), in 2015 we revised the listing for the gray wolf by reclassifying the subspecies *C. l. baileyi* as a separately listed entity with the status of endangered, wherever found. Although the rulemaking does not include language expressly excluding *C. l. baileyi* from the previously listed *C. lupus* entity, we indicated in our 2015 final rule listing the subspecies that the effect of the regulation was to revise the List by making a separate entry for the Mexican wolf (80 FR 2511, January 16, 2015). Therefore, because we already assessed the status of, and listed, the Mexican wolf separately, we do not assess individuals or populations of the Mexican wolf in this rule. In other words, we do not consider individuals or populations of Mexican wolves to be among the wolves under analysis in this rule. Further, the Mexican wolf is the only subspecies of *C. lupus* known to currently occupy the Mexican wolf experimental population area (that covers portions of Arizona and New Mexico) and Mexico. Therefore, based on the best available information, the experimental population area and Mexico are unoccupied by and, consequently, outside the range of, the gray wolves under analysis in this rule (see *Definition and Treatment of Range*).

How We Address Taxonomic Uncertainties in this Rule

The taxonomy and evolutionary history of wolves in North America are complex and controversial, particularly with respect to the taxonomic assignment of wolves historically

present in the Northeastern United States and those that occur in portions of the Great Lakes region (eastern wolves; see *Taxonomy of Gray Wolves in North America*). Available information indicates ongoing scientific debate and a lack of resolution on the taxonomy of eastern wolves. (see *Taxonomy of Gray Wolves in North America*). Further, none of these viewpoints is more supported by the scientific evidence or more widely accepted by the scientific community than others. In other words, there is no standard taxonomy indicating that eastern wolves are a distinct species, and no agreement among the scientific community regarding the taxonomic assignment of eastern wolves.

We originally listed the gray wolf subspecies *C. l. lycaon,* the eastern timber wolf, in 1967. We continued to recognize this subspecies—and the Northeastern United States as part of its historical range—for years, as evidenced by both our original (1978) and revised (1992) Recovery Plan for the Eastern Timber Wolf. In 2013, we proposed recognizing the species *C. lycaon,* occurring in southeastern Canada and, historically, the Northeastern United States, in our proposed rule to delist *C. lupus* and list *C. l. baileyi* as endangered (table 1). However, all peer reviewers of that proposed rule considered the scientific basis for recognizing *C. lycaon* as a species to be insufficient. They noted that this is an area of active scientific research with new studies published yearly, and stated that the proposed recognition of these wolves as a species was premature (National Center for Ecological Analysis and Synthesis 2014, unpaginated). New information published on the topic since publication of our 2013 rule indicates the taxonomy and evolutionary history of eastern wolves remains unresolved (USFWS 2020, pp. 1–5). The uncertainty of the existence of a separate species is reflected in the fact that *C. lycaon* is not recognized by authoritative taxonomic organizations such as the American Society of Mammalogists or the International Commission on Zoological Nomenclature. Therefore, based

on our review of the best available scientific and commercial information, in this rule we continue to recognize wolves in the Northeastern United States as members of the species *C. lupus*.

Because we recognize wolves in the Northeastern United States as members of the species *C. lupus* in our assessment of the status of gray wolf entities in this rule, we include eastern wolves and eastern wolf range that occurs within the geographical boundaries of the gray wolf entities we assess. This approach ensures our analysis takes into account the possibility that gray wolves historically occurred throughout most of the lower 48 United States. In other words, because we also consider eastern wolf historical range, our analysis assumes a larger historical range for the gray wolf species in the lower 48 United States and, as a result, a greater loss of such range (see Historical Range).

Scientists also disagree on the taxonomic assignment of wolves in the southeastern United States generally recognized as "red wolves." However, a recent consensus study by the National Academies of Sciences, Engineering, and Medicine concluded that available evidence supports species (*C. rufus*) status for the extant red wolf (National Academies of Sciences, Engineering, and Medicine (NASEM) 2019, pp. 51–72). We recognize the red wolf as the species *C. rufus* (USFWS 2018, pp. 15–17) and note that it is listed as endangered where found (32 FR 4001, March 11, 1967). We do not consider red wolves further in this rule and the red wolf listing is not affected by this rule.

Definition and Treatment of Range

We interpret the term "range" as used in the Act's definitions of "threatened species" and "endangered species" to refer to the area occupied by the species at the time we make a status

determination under section 4 of the Act (79 FR 37583, July 1, 2014). In this rule, we consider the latest wolf distribution maps (inclusive of wolf packs, breeding pairs, and areas of persistent activity by multiple wolves) and other information obtained from State agencies as the best available information on wolf occupancy and, therefore, wolf range. Gray wolf range based on this information is shown in figure 2. Because we do not consider Mexican wolves to be among the wolves under analysis in this rule, we do not include the Mexican wolf experimental population area (that covers portions of Arizona and New Mexico) or Mexico within current gray wolf range (*See How We Address the C. l. baileyi Listing*).

Wolves occur periodically in the lower 48 United States as lone dispersers in places that otherwise lack evidence of persistent wolf presence or suitable habitat for supporting a resident wolf population (see *Current Distribution and Abundance*). While dispersal plays an important role in recolonization of suitable habitat, individual dispersers that do not settle in an area, survive, and reproduce do not substantively contribute to the wolf's viability (i.e., the ability of a species to sustain populations in the wild over time). Therefore, we did not include the areas in which only these lone dispersers are occasionally found in our definition of current range.

Summary of Our Approach

In this rule, we assess the status of gray wolves in three different configurations. We do not include in our assessment individuals or populations of the Mexican wolf (*C. l. baileyi*) (wolves that occur in Mexico and the nonessential experimental population area in the Southwestern United States). Also, for the purposes of this rule, we consider any eastern wolves within the geographic boundaries of the entities we evaluated to be members of the species *C.*

lupus. Further, we consider the range of the gray wolf to be the current distribution of gray wolves (as shown in figure 2) within the geographic boundaries of the entities we evaluated.

Species Information

We provide detailed background information on gray wolves in the lower 48 United States in a separate Gray Wolf Biological Report (see USFWS 2020, entire). This document can be found along with this rule at http://regulations.gov in Docket No. FWS–HQ–ES–2018–0097 (see *Supplemental Documents*). We summarize relevant information from this report below. For additional information, including sources of the information presented below, see USFWS (2020, entire) and references therein.

Biology and Ecology

Gray wolves are the largest wild members of the canid (dog) family and have a broad circumpolar range. Adults range in weight from 18 to 80 kilograms (40 to 175 pounds), depending on sex and geographic locale. Gray wolves are highly territorial, social animals that live and hunt in packs. They are well adapted to traveling fast and far in search of food, and to catching and eating large mammals. In North America, they are primarily predators of medium to large mammals, including deer, elk, and other species, and are efficient at shifting their diet to take advantage of available food resources (USFWS 2020, p. 6).

Gray wolves are a highly adaptable species. They can successfully occupy a wide range of habitats provided adequate prey exists and human-caused mortality is sufficiently regulated. Scientific models generally depict high-quality suitable habitat as areas with sufficient prey where human-caused mortality is relatively low due to limited human access, or high amounts of escape cover, or relatively low risk of wolf–livestock conflicts (USFWS 2020, pp. 8–9).

Established gray wolf populations are remarkably resilient as long as their food supply is adequate and human-caused mortality is not too high. Where human-caused mortality is low or nonexistent, gray wolf populations are regulated by the distribution and abundance of prey on the landscape, though considerable evidence indicates density-dependent, intrinsic mechanisms (e.g., social strife, territoriality, disease) may limit populations when ungulate densities are high. High levels of reproduction and immigration in gray wolf populations can compensate for high mortality rates in established populations (USFWS 2020, pp. 7–8). Pack social structure is very adaptable—in many instances, breeding members can be quickly replaced from within or outside the pack, and pups can be reared by other pack members should their parents die. Consequently, wolf populations can rapidly overcome severe disruptions, such as pervasive human-caused mortality or disease; and they can increase rapidly after severe declines if the source of mortality is reduced. The species' dispersal capabilities allow wolf populations to quickly expand and recolonize vacant habitats as long as rates of human-caused mortality are not excessive; although, the rate of recolonization can be affected by the extent of intervening unoccupied habitat between the source population and newly recolonized area (USFWS 2020, p. 7).

Taxonomy of Gray Wolves in North America

The gray wolf is a member of the canid family (*Canidae*) in a genus (*Canis*) that includes domestic dogs (*C. familiaris*), coyotes (*C. latrans*), and several other species (USFWS 2020, p. 1). Taxonomic relationships among *Canis* species found in North America have been studied extensively, though with a notable lack of consensus on various phylogenetic issues (USFWS 2020, p. 1). Consequently, wolf taxonomy and evolutionary history in North America are complex and controversial (USFWS 2020, p. 5).

In North America, scientists generally recognize a "red wolf" phenotype (morphological form), and an "eastern wolf" phenotype that is distinct from wolves further west ("western gray wolves"), but disagree on the correct taxonomic assignment of these two entities or on their evolutionary origin (USFWS 2020, p. 1). As indicated above (see *How We Address Taxonomic Uncertainties in this Rule*), we continue to recognize the red wolf as the species *C. rufus* and do not discuss the taxonomy of the species further in this rule (for more information, see our 2018 Red Wolf Species Status Assessment). We discuss the eastern wolf further, below.

The eastern wolf has been the source of perhaps the most significant disagreement on North American canid taxonomy among scientists. The eastern wolf has been variously described as a species, a subspecies of gray wolf, an ecotype of gray wolf, the product of introgressive hybridization between gray wolves and coyotes, the same species as the red wolf, or the product of introgressive hybridization between red wolves and gray wolves (USFWS 2020, p. 1). Morphologically, eastern wolves have long been considered distinct from gray wolves and coyotes. Many scientists have generally found the eastern wolf to be consistently intermediate between the gray wolf and the coyote, both morphologically and genetically (USFWS 2020, p. 2).

Regardless of viewpoint on the correct taxonomic status of the eastern wolf, hybridization and introgression is widely recognized to have played, and continue to play, an important role among eastern wolves. However, there is scientific disagreement on the role of hybridization between eastern wolves and coyotes, eastern wolves and gray wolves, and gray wolves and coyotes. Minnesota appears to be the western edge of a hybrid zone between gray wolves in the west and eastern wolves—wolves in western Minnesota appear to be western gray wolves based on morphological and genetic analysis while wolves in eastern Minnesota and

much of the Great Lakes area appear to be eastern wolf, introgressed with western gray wolf to varying degrees. Scientists who support the eastern wolf as a distinct species report that the only area in which eastern wolves are not currently experiencing admixture with either gray wolves or coyotes is in Algonquin Provincial Park in Ontario, Canada (USFWS 2020, pp. 2–3). Even among those who hypothesize a hybrid origin of eastern wolves, meaning they are the result of ancient or more recent hybridization between gray wolves and coyotes, eastern wolves are viewed as genetically distinct (USFWS 2020, pp. 2–3).

Despite the ongoing debate about taxonomy and evolutionary history, there is general agreement that wolves currently found in the Great Lakes area and neighboring provinces in Canada are genetically distinct to some degree from wolves further west in the Rocky Mountains or the Pacific northwest (USFWS 2020, pp. 1–2). Although there is some debate about the degree of genetic difference between the wolves that occupy the Great Lakes area versus the Western United States, wolves in the Great Lakes area are generally smaller, occupy habitat dominated by mixed deciduous-coniferous forests with relatively little elevation change, and their primary prey is white-tailed deer; whereas wolves in the Western United States are larger and occupy montane forests that also contain larger prey such as elk and moose (USFWS 2020, pp. 28–29).

All wolves in the Western United States are widely recognized as gray wolves (*C. lupus*) (USFWS 2020, pp. 3–4). However, the science pertaining to gray wolf subspecies designations, unique evolutionary lineages, ecotypes, and admixture of formerly isolated populations continues to develop (USFWS 2020, pp. 3–5)—except for the Mexican wolf, where there is strong scientific evidence supporting its subspecies status. For example, coastal and inland wolves in western Canada and Alaska have been identified as genetically and morphologically distinct, and

display distinct habitat and prey preferences, despite relatively close proximity. There have been attempts to assess whether any wolves recolonizing western States possess genetic markers indicative of coastal wolf ancestry. Genetic analysis of wolves recolonizing Washington revealed the presence of individuals primarily from the northern Rocky Mountains. However, two individuals were an admixture of wolves with inland wolf ancestry (wolves from the northern Rocky Mountains or inland western Canada) and coastal wolf ancestry (wolves from coastal British Columbia and coastal Alaska), although it is not clear whether the admixture of coastal and inland wolves happened in Washington, or whether already admixed individuals dispersed there. All wolves recolonizing Oregon and California appear to be descended from inland wolves dispersing from the northern Rocky Mountains (USFWS 2020, pp. 3–5).

Range and Population Trends Prior to 1978 Reclassification

Historical Range

We view the historical range to be the range of gray wolves within the lower 48 United States at the time of European settlement. We determined that this timeframe is appropriate because it precedes the major changes in range in response to excessive human-caused mortality (USFWS 2020, pp. 9–13).

At the time of the 1978 reclassification, the historical range of the gray wolf was generally believed to include most of North America and, consequently, most of the lower 48 United States. We acknowledge that the historical range of the gray wolf is uncertain and the topic of continued debate among scientists. However, based on our review of the best available information, we view the historical range of the gray wolf within the lower 48 United States to be consistent with that presented in Nowak (1995, p. 395, fig. 20) and depicted in figure 2. This

includes all areas within the lower 48 United States except western California, a small portion of southwestern Arizona, and the southeastern United States (see figure 2 and USFWS 2020, pp. 9–13). While some authorities question the absence of gray wolves in parts of California, limited preserved physical evidence of wolves in California exists (USFWS 2020, p. 11). Therefore, we rely on early reports of wolves in the State that describe the species as occurring in the northern and Sierra Nevada Mountain regions of California. Further, while recognizing that the extent of overlap of red wolf and gray wolf ranges is uncertain (USFWS 2020, pp. 9–10), we chose Nowak (1995) as the historical range boundary in the East to encompass the largest reasonable historical distribution in the northeast and, consequently, the lower 48 United States. Also, although included in the 44-state listing, because the southeastern United States are generally recognized as within the range of the red wolf (USFWS 2020, pp. 9–10), we consider it to be generally outside the range of the gray wolf.

Historical Abundance

Historical abundance of gray wolves within the lower 48 United States is largely unknown. Based on the reports of European settlers, gray wolves were common in much of the West. While historical (at the time of European settlement) estimates are notoriously difficult to verify, one study estimates that hundreds of thousands of wolves occurred in the Western United States and Mexico (USFWS 2020, pp. 10–11). In the East, in the Great Lakes area, there may have been 4,000 to 8,000 wolves in Minnesota, 3,000 to 5,000 in Wisconsin, and fewer than 6,000 in Michigan (USFWS 2020, p. 12). No estimates are available for historical wolf abundance in the Northeast (USFWS 2020, p. 13).

Historical Trends in Range and Abundance

Gray wolf range and numbers throughout the lower 48 United States declined significantly during the 19th and 20th centuries as a result of humans killing wolves through poisoning, unregulated trapping and shooting, and government-funded wolf-extermination efforts (USFWS 2020, pp. 9–14). By the time subspecies were first listed under the Act in 1974 (table 1), the gray wolf had been eliminated from most of its historical range within the lower 48 United States. Aside from a few scattered individuals, wolves occurred in only two places within the lower 48 United States. A population persisted in northeastern Minnesota, and a small, isolated group of about 40 wolves occurred on Isle Royale, Michigan. The Minnesota wolf population was the only major U.S. population in existence outside Alaska at this time and numbered about 1,000 individuals (USFWS 2020, pp. 12–14).

Distribution and Abundance at the Time of the 1978 Reclassification

By 1978, when several gray wolf subspecies were consolidated into two listed entities, a lower 48 United States and Mexico entity and a separate Minnesota entity, the gray wolf population in Minnesota had increased to an estimated 1,235 wolves in 138 packs (in the winter of 1978–79) and had an estimated range of 14,038 square miles (mi^2) (36,500 square kilometers (km^2)) (USFWS 2020, p. 20) (figure 2). Although, prior to this time, wolves were occasionally reported in Wisconsin, it was not until 1978 that wolf reproduction was documented in the State (USFWS 2020, p. 21). In the West, occasional sightings were documented, but there was no indication that reproducing wolf packs occurred in the West at the time (USFWS 2020, p. 14; 59 FR 60266, November 22, 1994; USFWS 1987, pp. 3–6).

Current Distribution and Abundance

During the years since the species was reclassified in 1978, gray wolves within the lower 48 United States increased in number (figure 3) and expanded in distribution (figure 2). Gray wolves within the lower 48 United States now exist primarily in two large, stable or growing metapopulations in two geographic areas in the lower 48 United States—the Western United States and the Great Lakes area in the Eastern United States (USFWS 2020, p. 27). Gray wolf populations within each of these areas are connected as evidenced by movements between States and genetic data (USFWS 2020, p. 27). The Great Lakes metapopulation consists of more than 4,200 individuals broadly distributed across the northern portions of three States in the Great Lakes area (USFWS 2020, p. 27). This metapopulation is also connected, via documented dispersals, to the large and expansive population of about 12,000–14,000 wolves in eastern Canada. As a result, gray wolves in the Great Lakes area do not function as an isolated metapopulation of 4,200 individuals in three States, but rather as part of a much larger "Great Lakes and eastern Canada" metapopulation that spans across those three States and two Canadian Provinces (USFWS 2020, pp. 27–28).

Gray wolves in the Western United States are distributed across the NRM DPS and into western Oregon, western Washington, northern California, and most recently in northwest Colorado (USFWS 2020, p. 28). The Western United States metapopulation consisted of more than 1,900 gray wolves in 2015 (at least 1,880 in the NRM DPS and at least 26 outside the NRM DPS boundary), the final year of a combined northern Rocky Mountain wolf annual report (USFWS 2020, p. 28, Appendix 2). At the end of 2015, the post-delisting monitoring period ended for Idaho and Montana. After the post-delisting monitoring period ended for Idaho and Montana, these States transitioned away from using minimum counts to document wolf numbers

and developed other techniques to estimate population size or evaluate population trends (or both) which are not directly comparable to minimum counts (USFWS 2020, pp. 15–16). Based on the most current estimates, approximately 1,000 gray wolves occur in Idaho and 819 wolves were estimated in Montana (USFWS 2020, Appendix 2). In addition, the most recent year-end minimum counts indicate at least 311 gray wolves occur in Wyoming and 310 in the States of Oregon, Washington, and California (256 in the delisted NRM DPS and 54 in the endangered listed entity) (USFWS 2020, p. 16, Appendix 2). While the current estimates for Idaho and Montana are not directly comparable to year-end minimum counts, indications from mortality data are that the number of individuals in these States remains similar to the number of individuals that were in these States in 2015, when all of the States were reporting year-end minimum counts (see table 3). In addition, in January of 2020, Colorado Parks and Wildlife personnel confirmed the presence of a group of at least six wolves in extreme northwest Colorado (USFWS 2020, pp. 19, 28).

Similar to the metapopulation in the Great Lakes area, the gray wolf metapopulation in the Western United States is connected to a large and expansive population of about 15,000 wolves in western Canada (USFWS 2020, p. 28). As a result, gray wolves in the Western United States function as part of a larger "western United States and western Canada" metapopulation that spans several States of the United States and two Provinces of Canada. Further, effective dispersal has been documented between West Coast States where gray wolves are federally protected (California, western Oregon, and western Washington), as well as between these areas, the NRM DPS where wolves are delisted (Idaho, Montana, Wyoming, eastern Oregon, eastern Washington, and north-central Utah), and Canada (USFWS 2020, pp. 5, 17–18, 28). Thus, wolves outside the NRM DPS boundary in western Washington, western Oregon, and northern

California are an extension of the metapopulation of wolves in the northern Rocky Mountains and western Canada. Although their specific place of origin remains unknown at this time, the group of wolves in Colorado are assumed to be related to NRM wolves based on proximity and the fact that dispersing wolves of known origin documented in Colorado since the early 2000s all originated from the NRM, including the lone individual that dispersed from Wyoming to Colorado and has resided in North Park, Colorado, since at least July 2019 (USFWS 2020, p. 19). Little information is currently available regarding the movements or territory use of the group in northwest Colorado but, to date, all confirmed reports have been in Colorado.

Finally, a number of lone long-distance dispersing wolves have been documented outside core populations[3] of the Great Lakes area and Western United States. For example, over the years, dispersing wolves have been detected in all States within historical gray wolf range west of the Mississippi River except Oklahoma and Texas (USFWS 2020, pp. 26, 28–29). Since the early 2000s, confirmed records of individual gray wolves have been reported from Vermont, Massachusetts, New York, Indiana, Illinois, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas, Colorado, Utah, Arizona, and Nevada. The total number of confirmed records in each of these States, since the early 2000s, ranges from 1 to at least 27, the latter occurring in North Dakota, which also has an additional 45 probable but unverified reports (USFWS 2020, pp. 25–26).

In sum, gray wolves in the lower 48 United States today exist primarily as two large metapopulations: one spread across northern Minnesota, Michigan, and Wisconsin, and the other

[3] A population that inhabits a larger, more continuous, higher quality habitat patch within a species' distribution and, consequently, is larger in size and more genetically diverse (due to higher gene flow), and has greater evolutionary potential and resilience to stochastic events than a population that inhabits smaller, more isolated, lower quality habitat patches.

consisting of the recovered and delisted NRM DPS wolf population that is biologically connected to a small number of colonizing wolves in western Washington, western Oregon, northern California, and, most likely, Colorado (USFWS 2020, pp. 27–29) (figure 2). In addition, a number of lone dispersers have been documented outside of core populations in several States.

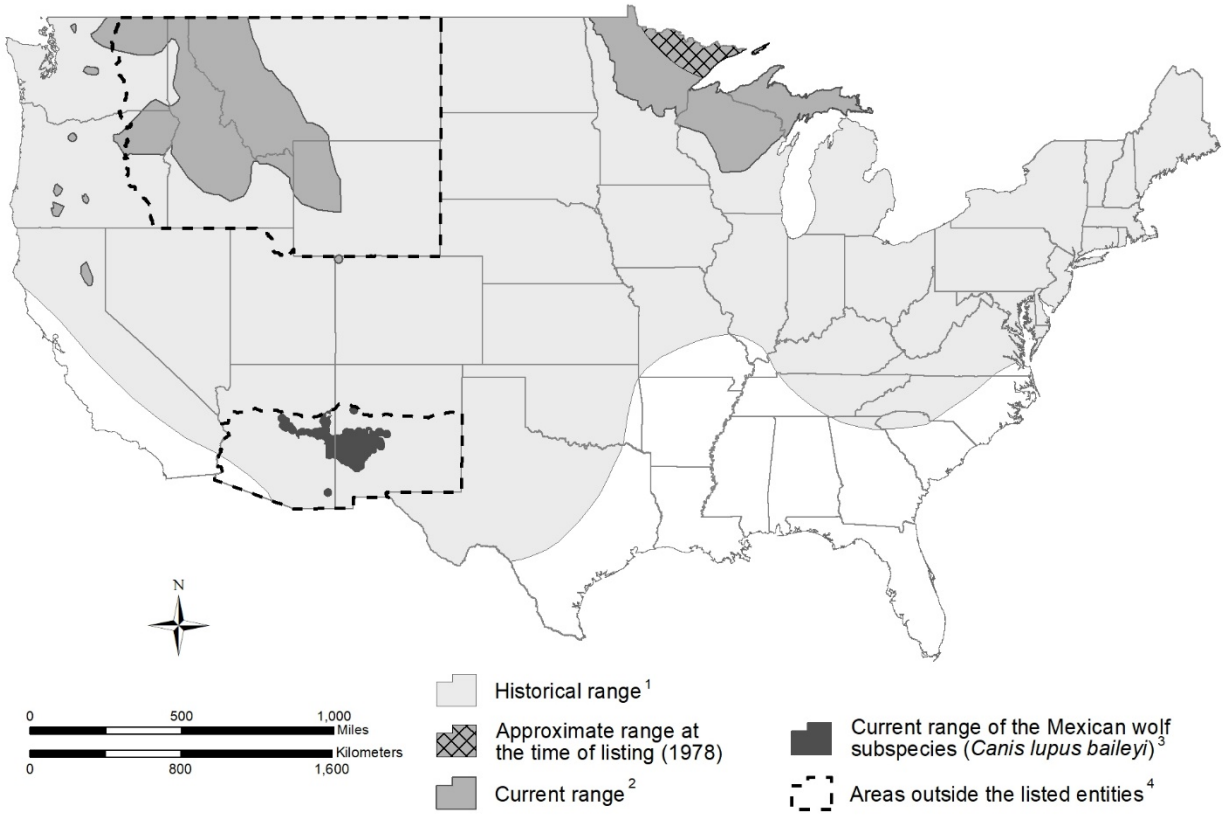

Figure 2. Historical range and current range of the gray wolf (*Canis lupus*) in the lower 48 United States.

[1]Based on Nowak (1995)—recognizing that the exact extent of historical range is uncertain, we chose Nowak (1995) as the historical range boundary in the East to encompass the largest reasonable historical distribution in the lower 48 United States, assuming that red wolves, and not gray wolves, occupied the Southeastern United States.

[2]Based on State data.

[3]United States portion of range only.

[4]NRM DPS and Mexican wolf nonessential experimental population area boundaries.

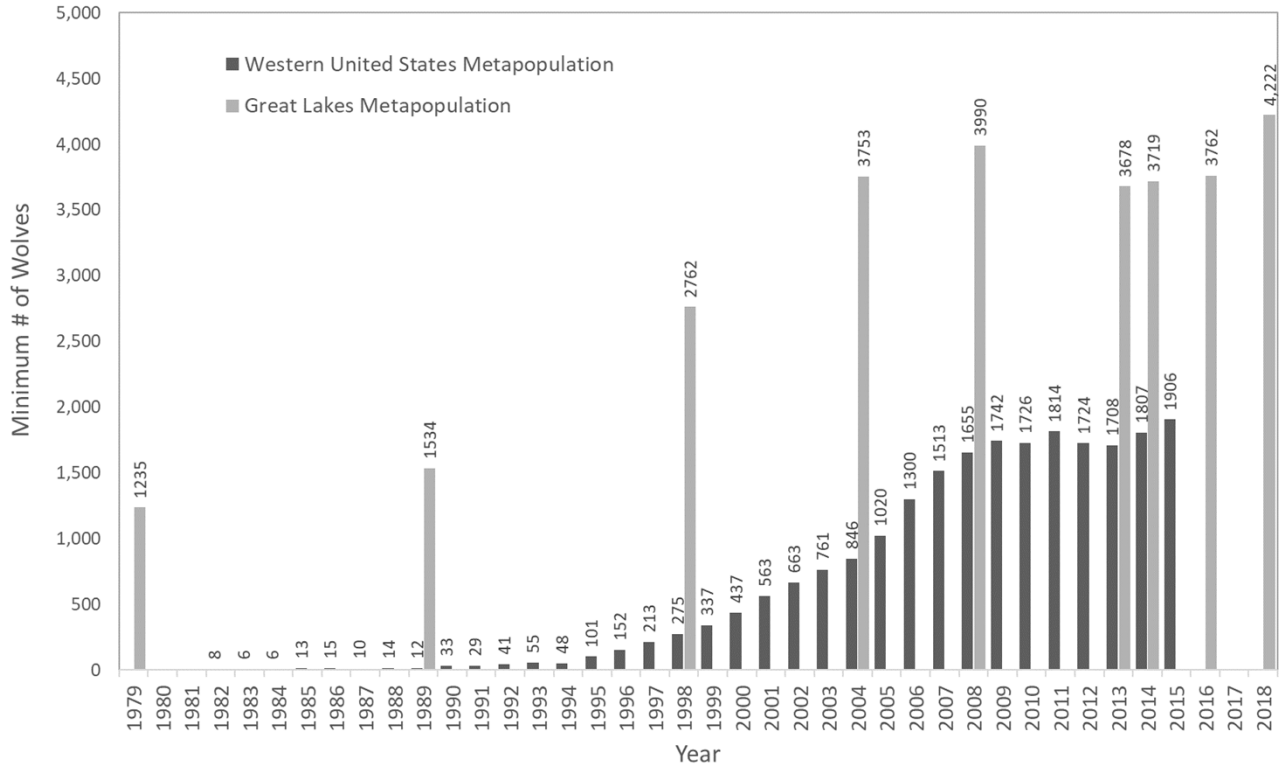

Figure 3. Minimum number of gray wolves (*Canis lupus*) counted in the lower 48 United States, 1979–2018. Does not include Mexican wolves. Great Lakes metapopulation counts are only given for years when data were available for all States in that region. Minimum counts for the entire Western United States metapopulation are not available after 2015 due to changes in State monitoring strategies (see USFWS 2020, pp. 15–17, Appendix 1 and 2 for more details).

Gray Wolf Recovery Plans and Recovery Implementation

Section 4(f) of the Act directs us to develop and implement recovery plans for the conservation and survival of endangered species and threatened species unless we determine that such a plan will not promote the conservation of the species (16 U.S.C. 1533(f)(1)). Recovery plans are non-regulatory documents that identify management actions that may be necessary to achieve conservation and survival of the species. They also identify objective, measurable criteria (recovery criteria) which, when met, may result in a determination that the species should

be removed from the List. Methods for monitoring recovery progress may also be included in recovery plans.

Recovery plans provide a roadmap for us and our partners on methods of enhancing conservation and minimizing threats to listed species, as well as measurable criteria against which to evaluate progress towards recovery and assess the species' likely future condition. However, they are not regulatory documents and do not substitute for the determinations and promulgation of regulations required under section 4(a)(1) of the Act. A decision to revise the status of a species, or to delist a species is ultimately based on an analysis of the best scientific and commercial data available to determine whether a species is no longer an endangered species or a threatened species, regardless of whether that information differs from the recovery plan.

There are many paths to recover a species, and recovery may be achieved without all recovery criteria being fully met. For example, one or more criteria may be exceeded while other criteria may not yet be accomplished. In that instance, we may determine that the threats are minimized sufficiently and that the species is robust enough that it no longer meets the definition of an endangered species or a threatened species. In other cases, we may discover new recovery opportunities after having finalized the recovery plan. Parties seeking to conserve the species may use these opportunities instead of methods identified in the recovery plan. Likewise, we may learn new information about the species after we finalize the recovery plan. The new information may change the extent to which existing criteria are appropriate for identifying recovery of the species. The recovery of a species is a dynamic process requiring adaptive management that may, or may not, follow all of the guidance provided in a recovery plan.

The Act does not describe recovery in terms of the proportion of historical range that must be occupied by a species, nor does it imply that restoration throughout the entire historical

range is required to achieve conservation. In fact, the Act does not contain the phrase "historical range." Thus, the Act does not require us to restore the gray wolf (or any other species) to its entire historical range, or any specific percentage of currently suitable habitat. For some species, expansion of their distribution or abundance may be necessary to achieve recovery. The amount of expansion necessary is driven by the biological needs of the species for viability (ability to sustain populations in the wild over time) and sustainability. Thus, there is no specific percentage of historical range or currently suitable habitat that must be occupied by the species to achieve recovery. Many other species may be recovered in portions of their historical range or currently suitable habitat by removing or addressing the threats to their continued existence. And some species may be recovered by a combination of range expansion and threat reduction.

As indicated in **Previous Federal Actions**, following our 1978 reclassification, we drafted recovery plans and implemented recovery programs for gray wolves in three regions of the lower 48 United States (table 1). Wolves in one of these regions—*C. l. baileyi*, in the Southwestern United States and Mexico—are listed separately as an endangered subspecies and are not assessed in this rule (see **Approach for this Rule**). Below, we discuss recovery of wolves in the other two regions—the Eastern United States and the northern Rocky Mountains.

Recovery Criteria for the Eastern United States

The 1978 Recovery Plan (hereafter Recovery Plan) and the 1992 Revised Recovery Plan for the Eastern Timber Wolf (hereafter Revised Recovery Plan) were developed to guide recovery of the eastern timber wolf subspecies in the Eastern United States. Those recovery plans contain the same two recovery criteria, which are meant to indicate when recovery of the eastern timber wolf throughout its historical range in the Eastern United States has been

achieved. These criteria are: (1) the survival of the wolf in Minnesota is assured, and (2) at least one viable population of eastern timber wolves outside Minnesota and Isle Royale in the lower 48 States is reestablished.

The first recovery criterion, assuring the survival of the wolf in Minnesota, addresses a need for reasonable assurances that future State, Tribal, and Federal wolf management and protection will maintain a viable recovered population of wolves within the borders of Minnesota for the foreseeable future. Although the recovery criteria predate identification of the conservation biology principles of representation (conserving the adaptive diversity of a taxon), resiliency (ability to withstand demographic and environmental variation), and redundancy (sufficient populations to provide a margin of safety), the recovery criteria for the gray wolf in the Eastern United States are consistent with those principles. The Recovery Team concluded that the remnant Minnesota wolf population must be maintained and protected to achieve wolf recovery in the Eastern United States. Maintenance of the Minnesota wolf population is important in terms of representation because these wolves include both western gray wolves and wolves that are admixtures of western gray wolves and eastern wolves (see *Taxonomy of Gray Wolves in North America*) and are comparable to wolf populations that were present in the area historically. The successful growth of the remnant Minnesota population has maintained and maximized the representation of that genetic diversity among wolves in the Great Lakes area.

Maintenance of the Minnesota wolf population is also important in terms of resiliency. Although the Revised Recovery Plan did not establish a specific numerical criterion for the Minnesota wolf population, it did identify, for planning purposes, a population goal of 1,251–1,400 animals for the Minnesota population (USFWS 1992, p. 28). A population of this size not only increases the likelihood of maintaining its genetic diversity over the long term, but also

reduces the adverse impacts of unpredictable demographic and environmental events. Furthermore, the Revised Recovery Plan recommends a wolf population that is spread across about 40 percent of Minnesota (Zones 1 through 4) (USFWS 1992, p. 28), adding a geographic component to the resiliency of the Minnesota wolf population.

The second recovery criterion states that at least one viable wolf population should be reestablished within the historical range of the eastern timber wolf outside of Minnesota and Isle Royale, Michigan (USFWS 1992, pp. 24–26). The reestablished population enhances both the resiliency and redundancy of the Great Lakes metapopulation.

The Revised Recovery Plan provides two options for reestablishing this second population. If it is an isolated population, that is, located more than 100 miles (mi) (160 kilometers (km)) from the Minnesota wolf population, the second population should consist of at least 200 wolves for at least 5 years, based upon late-winter population estimates, to be considered viable. Late-winter estimates are made at a time when most winter mortality has already occurred and before the birth of pups; thus, the count is made at the annual low point of the population. Alternatively, if the second population is located within 100 mi (160 km) of a self-sustaining wolf population (for example, the Minnesota wolf population), it should be maintained at a minimum of 100 wolves for at least 5 years, based on late-winter population estimates, to be considered viable. A nearby second population would be considered viable at a smaller size because it would be closely tied with the Minnesota population, and by occasional immigration of Minnesota wolves, would retain sufficient genetic diversity to cope with environmental fluctuations.

The original Recovery Plan did not specify where in the Eastern United States the second population should be reestablished. Therefore, the second population could have been

established anywhere within the triangular Minnesota-Maine-Florida area covered by the Recovery Plan and the Revised Recovery Plan, except on Isle Royale (Michigan) or within Minnesota. The Revised Recovery Plan identified potential gray wolf reestablishment areas in northern Wisconsin, the Upper Peninsula of Michigan, the Adirondack Forest Preserve of New York, a small area in eastern Maine, and a larger area of northwestern Maine and adjacent northern New Hampshire (USFWS 1992, pp. 56–58). Neither the 1978 nor the 1992 recovery criteria indicate that the establishment of gray wolves throughout all or most of what was thought to be its historical range in the Eastern United States, or within all of the identified potential reestablishment areas, is necessary to achieve recovery under the Act.

Recovery Progress in the Eastern United States

Wolves in the Great Lakes area greatly exceed the recovery criteria (USFWS 1992, pp. 24–26) for (1) a secure wolf population in Minnesota, and (2) a second population outside Minnesota and Isle Royale consisting of 100 wolves within 100 mi (160 km) of Minnesota for 5 successive years. Based on the surveys conducted since 1998, the wolf population in Minnesota has exceeded 2,000 individuals over the past 20 years, and populations in Michigan and Wisconsin, which are less than 100 mi (160 km) from the Minnesota population, have exceeded 100 individuals every year since 1994 (USFWS 2020, Appendix 1). Based on the criteria set by the Eastern Wolf Recovery Team in 1992 and reaffirmed in 1997 and 1998 (Peterson in litt. 1997, Peterson in litt. 1998, Peterson in litt. 1999a, Peterson in litt. 1999b), this region contains sufficient wolf numbers and distribution to ensure the long-term survival of gray wolves in the Eastern United States.

The maintenance and expansion of the Minnesota wolf population has allowed for the preservation of the genetic diversity that remained in the Great Lakes area when its wolves were first protected in 1974. The Wisconsin–Michigan wolf population far exceeds the numerical recovery criterion, even for a completely isolated second population. Therefore, even in the unlikely event that this two-State population were to become totally isolated and wolf immigration from Minnesota and Ontario completely ceased, it would still remain a viable wolf population for the foreseeable future, as defined by the Revised Recovery Plan (USFWS 1992, pp. 25–26). Finally, each of the wolf populations in Wisconsin and Michigan has exceeded 200 animals for about 20 years, so if either were somehow to become isolated, they would remain viable. Furthermore, each State has committed to manage its wolf population above viable population levels (see **Post-delisting Management**). The wolf's numeric and distributional recovery criteria for the Eastern United States have been met.

Recovery Criteria for the NRM

The NRM Wolf Recovery Plan was approved in 1980 (USFWS 1980, p. i) and revised in 1987 (USFWS 1987, p. i). The wolf recovery goal for the NRM was reevaluated and, when necessary, modified as new scientific information warranted (USFWS 1987, p. 12; USFWS 1994, Appendix 8 and 9; Fritts and Carbyn 1995, p. 26; Bangs 2002, p. 1; 73 FR 10514, February 27, 2008; 74 FR 15130–15135, April 2, 2009). The Service's resulting recovery goal for the NRM gray wolf population was: 30 or more breeding pairs comprising at least 300 wolves equitably distributed among Montana, Idaho, and Wyoming for 3 consecutive years, with genetic exchange (either natural or, if necessary, agency managed) between subpopulations. To provide a buffer above these minimum recovery levels, each State was to manage for at least 15

breeding pairs and 150 wolves in mid-winter (77 FR 55538–55539, September 10, 2012; 74 FR 15132, April 2, 2009). Further, the post-delisting monitoring plan stipulated that three scenarios could lead us to initiate a status review and analysis of threats to determine if relisting was warranted: (1) if the wolf population in Idaho, Montana, or Wyoming fell below the minimum NRM wolf population recovery level of 10 breeding pairs and 100 wolves at the end of any one year; (2) if the portion of the wolf population in Montana, Idaho, or Wyoming 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. For additional information on NRM wolf recovery goals and their evolution over time, see 74 FR 15130–15135 and references therein.

Recovery Progress in the NRM DPS

As indicated in **Previous Federal Actions**, wolves in the NRM DPS have recovered and were delisted (table 1). The NRM wolf population achieved its numerical and distributional recovery goals at the end of 2000 (USFWS et al. 2008, table 4). The temporal portion of the recovery goal was achieved in 2002 when the numerical and distributional recovery goals were exceeded for the 3rd successive year (USFWS et al. 2008, table 4). In 2009, we concluded that wolves in the NRM DPS far exceeded recovery goals. We also concluded that "The NRM wolf population: (1) Has at least [45] reproductively successful packs and [450] individual wolves each winter (near the low point in the annual cycle of a wolf population); (2) is equitably distributed within the 100,000 mi^2 (250,000 km^2) area containing 3 areas of large core refugia (National Parks, wilderness areas, large blocks of remote secure public land) and at least 65,725 mi^2 (170,228 km^2) of suitable wolf habitat; and (3) is genetically diverse and has demonstrated

successful genetic exchange through natural dispersal and human-assisted migration management between all three core refugia" (74 FR 15133, April 2, 2009). Post-delisting and subsequent monitoring, and the expansion of the NRM population into western Washington, western Oregon, northern California, and, likely, Colorado (USFWS 2020, pp. 15–19, 28; see also *Current Distribution and Abundance*), indicate that the wolf population in the NRM DPS remains well above minimum recovery levels (see *Current Distribution and Abundance*).

Historical Context of Our Analysis

When reviewing the current status of a species, it is important to understand and evaluate the effects of lost historical range on the viability of the species. In fact, 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 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 redundancy, resiliency, and representation of a species in its current range, such that a species may meet the definition of an "endangered species" or "threatened species" under the Act. Thus, 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. 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, then that loss is also relevant as evidence of the effects of an ongoing threat.

As indicated above, gray wolves historically occupied a large portion of the lower 48 United States (see figure 2). 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 (USFWS 2020, pp. 10–13). Further, many historical habitats were converted into agricultural land (Paquet and Carbyn 2003, p. 483), and natural food sources such as deer and elk were reduced, eliminated, or replaced with domestic livestock, which can become anthropogenic food sources for gray wolves (Young 1944 *in* Fritts et al. 1997, p. 8). The resulting reductions in range and population were dramatic—by the 1970s, gray wolves occupied only a small fraction of their historical range (figure 2). Although the range of the gray wolf in the lower 48 United States has significantly expanded since 1978, its size and distribution remain below historical levels. The alterations to gray wolf historical range in the lower 48 United States increased the vulnerability of gray wolves in the lower 48 United States to a wide variety of threats that would not be at issue without such range reduction. We analyze these potential threats to gray wolves in the lower 48 United States below (see **Summary of Factors Affecting the Species**).

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 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; and

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

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

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

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an "endangered species" or a "threatened species." In

determining whether a species meets either definition, we must evaluate all identified threats by considering the species' expected response, 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 in the foreseeable future.

The Act does not define the term "foreseeable future," which appears in the statutory definition of "threatened species." Since publication of our proposed rule (84 FR 9648, March 15, 2019), the Service codified its understanding of foreseeable future at 50 CFR 424.11(d) (84 FR 45020). In those regulations, we explain the term "foreseeable future" extends only so far into the future as the Services can reasonably determine that both the future threats and the species' responses to those threats are likely. The Service will describe the foreseeable future on a case-by-case basis, using the best available data and taking into account considerations such as the species' life-history characteristics, threat-projection timeframes, and environmental variability. The Service need not identify the foreseeable future in terms of a specific time period. These regulations did not significantly modify the Service's interpretation; rather they codified a framework that sets forth how the Service will determine what constitutes the foreseeable future based on our longstanding practice. Accordingly, though these regulations do not apply to the determinations for the entities assessed in this final rule because it was proposed

prior to their effective date, they do not change the Service's assessment of foreseeable future for the entities assessed in our proposed rule and in this determination.

It is not always possible or necessary to define 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.

For the purposes of this rule, and consistent with our proposed rule, we define the "foreseeable future" to be the extent to which, given the amount and substance of available data, we can anticipate events or effects, or reliably extrapolate threat trends that relate to the status of wolves within the lower 48 United States. The Great Lakes States of Minnesota, Wisconsin, and Michigan have an established history of cooperating with and assisting in wolf recovery and have made a commitment, through legislative actions, to continue these activities. Washington, Oregon, California, Colorado, and Utah are also committed to wolf conservation, as demonstrated by development of management plans and/or codification of laws and regulations protecting wolves (see **Post-delisting Management**). The best available information indicates that the Great Lakes States, West Coast States, and central Rocky Mountain States (Colorado and Utah) are committed to gray wolf conservation, and, therefore, we conclude that this commitment is likely to continue into the foreseeable future. Further, the NRM States have, for years, demonstrated their commitment to managing their wolf populations at or above recovery levels and the best available information indicates that this commitment will continue into the foreseeable future.

Summary of Factors Affecting the Species

Wolves within the lower 48 United States are currently listed as endangered under the Act, except wolves in Minnesota, which are listed as threatened, and wolves in the NRM DPS, which were delisted due to recovery (74 FR 15123, April 2, 2009, and 77 FR 55530, September 10, 2012). In this analysis we evaluate threat factors currently affecting wolves within the lower 48 United States and those that are reasonably likely to have a negative effect on the viability of wolves within the lower 48 United States if the protections of the Act are removed. As explained in our significant portion of the range (SPR) final policy (79 FR 37578, July 1, 2014), we take into account the effect lost historical range may have on the current and future viability of a species in the range it currently occupies and also evaluate whether the causes of that loss are evidence of ongoing or future threats to the species. We do this through our analysis of the five factors described in section 4(a)(1) of the Act. A species' current condition reflects the effects of historical range loss, and, because threat factors are evaluated in the context of the species' current condition, historical range contraction may affect the outcome of our analysis.

Based on our review of the best available scientific and commercial information, we have identified several factors that could be significant threats to wolves within the lower 48 United States. We summarize our analysis of these factors, and factors identified at the time of listing, below. Due to recent information confirming the presence of a group of six wolves in extreme northwest Colorado, and their proximity to and potential use of habitats within Utah, we included these States in our analysis.

Human-caused Mortality

At the time of listing, human-caused mortality was identified as the main factor responsible for the decline of gray wolves (43 FR 9611, March 9, 1978). An active eradication program is the sole reason that wolves were extirpated from much of their historical range in the United States (Weaver 1978, p. i). European settlers attempted to eliminate the wolf entirely, primarily due to the real or perceived threats to livestock, and the U.S. Congress passed a wolf bounty that covered the Northwest Territories in 1817. Bounties on wolves subsequently became the norm for States across the species' range (Hampton 1997, pp. 107–108; Beyer et al. 2009, p. 66; Erb and DonCarlos 2009, p. 50; Wydeven et al. 2009b, p. 88; USFWS 2020, pp. 10–13). For example, in Michigan, an 1838 wolf bounty became the ninth law passed by the First Michigan Legislature.

After the gray wolf was listed under the Act, its protections, along with State endangered-species statutes, prohibited the intentional killing of wolves except under very limited circumstances. Such circumstances included defense of human life, scientific or conservation purposes, and special regulations intended to reduce wolf depredations of livestock or other domestic animals. Aside from the reintroduction of wolves into portions of the northern Rocky Mountains, the regulation of human-caused wolf mortality is the primary reason wolf numbers have significantly increased and their range has expanded since the mid-to-late 1970s (Smith et al. 2010, entire; O'Neil et al. 2017, entire; Stenglein et al. 2018, entire).

The regulation of human-caused mortality has long been recognized as the most significant factor affecting the long-term conservation of wolves. Human-caused mortality includes both controllable and uncontrollable sources of mortality. Controllable sources of

mortality are discretionary, can be limited by the managing agency, and include permitted take, sport hunting, and direct agency control. Sources of mortality that will be difficult to limit, or may be uncontrollable, occur regardless of population size and include things such as natural mortalities, illegal take, and accidental deaths (e.g., vehicle collisions, capture-related mortalities). However, if population levels and controllable sources of mortality are adequately regulated, the life-history characteristics of wolf populations provide natural resiliency to high levels of human-caused mortality.

Two Minnesota studies provide some limited insight into the extent of human-caused wolf mortality before and after the species' listing. Examining bounty data from a period that predated wolf protection under the Act by 20 years, Stenlund (1955, p. 33) found an annual human-caused mortality rate of 41 percent. Fuller (1989, pp. 23–24) evaluated data from a north-central Minnesota study area and found an annual human-caused mortality rate of 29 percent from 1980 through 1986, which includes 2 percent mortality from legal depredation-control actions. However, it is difficult to draw conclusions from comparisons of these two studies because of differences in habitat quality, exposure to humans, prey density, time periods, and study design. Nonetheless, these figures indicate that human-caused mortality decreased significantly once the wolf became protected under the Act.

Humans kill wolves for a number of reasons. In locations where people, livestock, and wolves coexist, some wolves are killed to resolve conflicts with livestock and pets (Fritts et al. 2003, p. 310; Woodroffe et al. 2005, pp. 86–107, 345–347). Occasionally, wolves are killed accidentally by vehicles, mistaken for coyotes and shot, caught in traps set for other animals, or subject to accidental capture-related mortality during conservation or research efforts (Bangs et al. 2005, p. 346). A few wolves have been killed by people who believed their physical safety

was being threatened. Many wolf killings, however, are intentional, illegal, and never reported to authorities.

Although survival can be highly variable across populations (Fuller et al. 2003, pp. 176–181), recent estimated annual mortality rates for wolves greater than 1 year of age are relatively consistent among some U.S. populations and range between 20 to 25 percent (Adams et al. 2008, pp. 11–12; Smith et al. 2010, p. 625; Cubaynes et al. 2014, p. 5; O'Neil et al. 2017, p. 9523; Stenglein et al. 2018, p. 104). Outside of very remote areas and large protected areas such as Yellowstone and Isle Royale National Parks, anthropogenic causes are the greatest source of mortality for most wolves in the lower 48 United States. Such causes are estimated to account for 60–70 percent of all mortalities in the NRM wolf population (Murray et al. 2010, p. 2518), Michigan (O'Neil 2017, p. 214) and Wisconsin (Treves et al. 2017a, p. 27; Stenglein et al. 2018, p. 108) and nearly 80 percent in Minnesota (Fuller 1989, p. 24). The risk of human-caused mortality is not uniform, however, and tends to be highest for dispersing animals (Smith et al. 2010, pp. 630–631) and for wolves that occupy less suitable habitats generally found on the peripheries of occupied wolf range (Smith et al. 2010, pp. 630–631; O'Neil et al. 2017, pp. 9524–9528; Stenglein et al. 2018, p. 109).

In the absence of high levels of human-caused mortality, for example in Yellowstone and Isle Royale National Parks, wolf populations tend to be regulated by density-dependent, intrinsic mechanisms (Fuller et al. 2003, pp. 187–188; Cubaynes et al. 2014, pp. 9–11). Outside of such areas, where anthropogenic influences are greater, the influence of human-caused mortality on wolf populations may be considered either additive (mortality in excess of the number of deaths that would have occurred naturally) or compensatory (mortality that replaces deaths that would have occurred naturally). Some studies have concluded that anthropogenic mortality may be

super-additive (increased additive mortality beyond the effect of direct killing itself) due to the effects increased take may have on the reproductive dynamics of wolves and packs (Creel and Rotella 2010, p. 3). Another study implied super-additive mortality occurred through increased legal take, which prompted a concurrent increase in illegal take that reduced reproductive output and population growth rates (Chapron and Treves 2016, p. 5); however, the claims of that study have been questioned (Olson et al. 2017, entire; Pepin et al. 2017, entire; Stein 2017, entire). Another study documented that harvest mortality was largely additive to natural mortality and that evidence for super-additive mortality was weak in Idaho (Horne et al. 2019a, pp. 40–41). Murray et al. (2010, pp. 2522–2523) noted anthropogenic mortality was partially compensatory in the NRM wolf population; however, as population density increased, human-caused mortality became increasingly additive (Murray et al. 2010, pp. 2522–2523), a trend that was also observed in Michigan (O'Neil 2017, pp. 201–229). In Wisconsin, Stenglein et al. (2018, pp. 106–108) noted a different trend in which mortality was largely additive prior to 2004, whereas it became partially compensatory after 2004 as wolves began to occupy most of the available suitable habitat in the State. Borg et al. (2014, pp. 7–9) documented that strong compensatory mechanisms buffered against long-term population-level impacts of breeder loss and pack dissolution in Denali National Park. Fuller et al. (2003, p. 186) concluded that human-caused mortality can replace up to 70 percent of natural mortality in wolf populations. Increased levels of human-caused mortality in wolf populations can be compensated for by a reduction in natural mortality (O'Neil 2017, pp. 201–229), dispersal to fill social openings (Fuller et al. 2003, p. 186; Adams et al. 2008, pp. 20–21; Smith et al. 2010, pp. 630–633; Bassing et al. 2019, pp. 585–586), or reproduction (Gude et al. 2012, pp. 113–114; Schmidt et al. 2017, p. 25). Similarities in survival rates among wolf populations subject to different levels of human-caused and other

forms of mortality (see above for discussion about survival/mortality rates) indicates a moderate level of compensation in mortality occurs in wolf populations. It further indicates that moderate increases in human-caused mortality may not have a large effect on annual wolf survival (O'Neil 2017, p. 220).

Increased human-caused mortality may either increase or decrease wolf dispersal rates depending on various factors. For example, if wolf harvest is significant, it can reduce wolf densities leading to an overall decline in dispersal events due to a reduction in the number of individuals available to disperse, reduced competition for resources within the pack, or through direct removal of dispersing animals (Packard and Mech 1980, p. 144; Gese and Mech 1991, p. 2949; Adams et al. 2008, pp. 16–18). Trapping, in particular, may remove the age classes most likely to disperse because younger, less experienced wolves are often more vulnerable to this form of harvest. In a heavily harvested population with a significant portion of the harvest from trapping, long open seasons, and no bag limits, dispersal rates were observed to be up to 50 percent less than in unexploited populations (Webb et al. 2011, pp. 748–749). However, there appears to be considerable variability in dispersal rates from harvested populations that likely depends on a number of factors, including prey availability, pack size, harvest rates, and whether or not harvest was biased toward certain age-classes (Hayes and Harestad 2000, pp. 43–44; Webb et al. 2011, pp. 748–749). Jimenez et al. (2017, p. 588) found that increased human-caused mortality (illegal take and agency lethal control) removed individual wolves and entire packs, and thereby provided a constant source of social openings or vacant habitat for wolves to recolonize. However, long-distance dispersals still occurred at low wolf density even when vacant habitat was nearby. Using data from 197 GPS-collared wolves from 65 wolf packs in Idaho to construct an integrated population model, Horne et al. (2019a, p. 40) found that

variation in harvest rates did not translate to changes in the propensity for wolves to disperse. The authors speculated that harvest rates in their study were not high enough to cause widespread breeding vacancies and increased dispersal behavior.

In wolf populations that are not hunted, lethal control of depredating wolves (see below for discussion) and illegal take are the two primary anthropogenic causes of mortality. In the NRM, Smith et al. (2010, p. 625) estimated that illegal take accounted for 24 percent of all mortalities (or approximately 6 percent of the population); however, 12 percent of the documented mortalities were attributed to unknown causes, so it is highly plausible that the number of wolves illegally taken may have been higher (Liberg et al. 2012, p. 914; O'Neil 2017, pp. 220–221; Treves et al. 2017b, p. 7). Ausband et al. (2017a, p. 7) used radio-collared wolves to estimate that 8.2 percent of the Idaho wolf population was illegally killed annually while the annual rate of illegal take in Michigan was estimated at approximately 9 percent (O'Neil 2017, p. 214). In Wisconsin, it was estimated that 9 percent of wolves were killed illegally (Stenglein et al. 2018; p. 104) while Stenglein et al. (2015b, p. 1183) concluded that as many as 400 wolves were illegally killed but were not detected between 2003 and 2012. Another study conducted outside of the lower 48 United States estimated the percentage of unknown illegal take that occurred and estimated that approximately 69 percent of all poaching incidents were undocumented (Liberg et al. 2012, p. 912). Similarly, Treves et al. (2017b, entire) concluded that illegal take was the primary cause of wolf mortality and that the relative risk of poaching was grossly underestimated in both the NRM and Wisconsin. We acknowledge the challenges of documenting and estimating illegal take, and note that illegal take may have slowed wolf population growth in the lower 48 United States to some extent (Liberg et al. 2012, entire; Stenglein et al. 2018, p. 105). However, based on wolf minimum counts and population

estimates (USFWS 2020, Appendix 1 and 2), illegal take, whether documented or not, has not prevented recovery of the species, the maintenance of viable wolf populations, or the continued recolonization of vacant, suitable habitat.

Vehicle collisions also contribute to wolf mortality. The total number of wolf mortalities associated with vehicle collisions is expected to rise with increasing wolf populations as wolves attempt to colonize more human-dominated areas that contain a denser network of roads and vehicular traffic. However, mortalities associated with vehicle collisions are unlikely to increase as a percentage of the total wolf population if increases occur concurrently. Regardless, mortalities from vehicle collisions will likely continue to constitute a small proportion of total wolf mortalities.

Neither scientific research nor the use of wolves for educational purposes are significant sources of human-caused mortality. Each of the States in the current range of gray wolves in the lower 48 United States conduct scientific research and monitoring of wolf populations. Even the most intensive and disruptive of these activities (ground or aerial capture for the purpose of radio-collaring) involves a very low rate of mortality for wolves (73 FR 10542, February 27, 2008). We expect that capture-related mortality during wolf monitoring, nonlethal control, and research activities will remain low, and will have an insignificant impact on population dynamics.

The best available information does not indicate any wolves have been removed from the wild solely for educational purposes in recent years. Wolves that are used for such purposes are typically privately held, captive-reared offspring of wolves that were already in captivity for other reasons. However, States may get requests to place wolves that would otherwise be euthanized in captivity for research or educational purposes. Such requests have been and will

continue to be rare, would be closely regulated by the State wildlife-management agencies through the requirement for State permits for protected species, and would not substantially increase human-caused wolf mortality rates.

Some federally listed wolves have been legally removed by private citizens in the lower 48 United States through defense of life or property statutes. It is a rare occurrence for non-habituated wild wolves in North America to pose a threat to humans (McNay 2002, pp. 836–837); nonetheless, on rare occasions, humans have killed wolves due to a real or perceived threat to their safety or the safety of others, which is permissible even under the Act's protections. For example, since wolves began recolonizing the West Coast States in 2008, a single wolf has been killed by a private individual who claimed self-defense in the federally listed portion of Washington. Under the rules that governed Federal wolf management for nonessential experimental populations under section 10(j) of the Act in portions of the NRM DPS (59 FR 60252 and 59 FR 60266, November 22, 1994; 70 FR 1286, January 6, 2005; 73 FR 4720, January 28, 2008), private individuals were lawfully allowed to kill a wolf in defense of property provided the incident was immediately reported to the Service and an investigation confirmed evidence of an attack. To our knowledge, most States within occupied wolf range already have rules and regulations related to the taking of wildlife when life or property are threatened and the taking of wolves under these circumstances will be regulated under the same rules post-delisting. Although the number of wolves lawfully killed in defense of human life and property by private individuals may be slightly higher in areas with greater human or livestock density and may increase after delisting as authority for this action expands, overall this type of mortality is rare and is not expected to have a significant impact on gray wolf populations in the lower 48 United States. For information related to defense of life or property mortalities, refer to

the **Post-delisting Management** section of this rule for the Great Lakes area and the Human-caused Mortality in the NRM DPS section for the NRM DPS.

The use of lethal depredation control to mitigate wolf–human conflicts or to minimize risk associated with repeated livestock depredations will likely increase in the lower 48 United States after delisting. Although most wolf conflicts are rare or one-time incidents that do not require management action or may be resolved using preventative or nonlethal methods, in some instances lethal control by wildlife management agencies or private individuals is used to resolve imminent threats to human life or property or to minimize the risk of recurrent conflicts. The number of wolves killed for this purpose in the lower 48 United States is small when compared to the greater population (see information in subsequent paragraph). With respect to the area of the lower 48 United States currently listed as endangered (see figure 1), lethal control of depredating wolves is not currently authorized; however, after delisting, State and Tribal wildlife agencies may choose to use lethal control as a mitigation response.

Human-caused Mortality in the Currently Listed Entities

Lethal control of depredating wolves was authorized in Minnesota while wolves were listed under the authority of 50 CFR 17.40(d) pursuant to section 4(d) of the Act. However, such control was not authorized in Michigan or Wisconsin, except (1) as authorized under section 4(d) when the population was reclassified to threatened (from April 13, 2003, to January 31, 2005), (2) by special permits (from April 1, 2005, to September 13, 2005, and from April 24, 2006, to August 10, 2006), and (3) when delisted (from March 12, 2007, to September 29, 2008, May 4, 2009, to July 1, 2009, and January 27, 2012, to December 19, 2014). The depredation control program in Minnesota killed between 6 and 216 wolves annually from 1979 to 2006. The 5-year

annual average of statewide populations for wolves killed ranged from 26 (2 percent of the estimated population) to 152 (7 percent of the estimated population) during that time period (Ruid et al. 2009, p. 287). During the periods when wolves were managed under the 4(d) rule in the State, the Minnesota wolf population continued to grow or remain stable. During the times that lethal control of depredating wolves was authorized in Wisconsin and Michigan, there was no evidence of resulting adverse impacts to the maintenance of a viable wolf population in those States. In Wisconsin, during the almost 5 years (cumulative over three different time periods) that lethal depredation control was allowed in the State, a total of 256 wolves were killed for this purpose, including 46 legally shot by private landowners. A total of 64 wolves were killed in Michigan (half of these (32) were legally killed by private landowners) in response to depredation events during the same nearly 5-year period (cumulative over three different time periods). Following delisting, we anticipate that wolf depredation control would occur in Wisconsin and Michigan consistent with their State management plans. We anticipate the level of mortality due to depredation control would be similar to what was observed during previous periods when wolves were delisted. See the **Post-delisting Management** section for a more detailed discussion of legal control of problem wolves (primarily for depredation control).

Regulated public harvest is another form of human-caused mortality that has occurred in the Great Lakes area during periods when wolves were delisted, and will likely occur in Minnesota, Wisconsin, and Michigan if wolves are delisted again. Using an adaptive-management approach that adjusts harvest based on population estimates and trends, the initial objectives of States may be to reduce or stabilize wolf populations and then manage for sustainable populations, similar to how States manage all other hunted species. See the **Post-delisting Management** section for a more detailed discussion of legal harvest.

Regulation of human-caused mortality has significantly reduced the number of wolf mortalities caused by humans and, although illegal and accidental killing of wolves is likely to continue with or without the protections of the Act, at current levels those mortalities have had minimal impact on wolf abundance or distribution. We assume that legal human-caused mortality will increase when wolves are delisted as State managers continue or have the ability to implement lethal control to mitigate repeated conflicts with livestock and decide whether to incorporate regulated public harvest to assist in achieving wolf management objectives in their respective States. However, the high reproductive potential of wolves, and their innate behavior to disperse and locate social openings or vacant suitable habitats, allows wolf populations to withstand relatively high rates of human-caused mortality (USFWS 2020, pp. 8–9).

The States of Minnesota, Michigan, and Wisconsin have committed to continue to regulate human-caused mortality so that it does not reduce the wolf population below recovery levels. We conclude that the States have adequate laws and regulations to fulfill those commitments and ensure that the wolf population in the Great Lakes area remains above recovery levels (See **Post-delisting Management**). Washington, Oregon, California, Colorado, and Utah are also committed to conserving wolves as demonstrated by the development of management plans and/or codification of laws and regulations that protect wolves. Furthermore, each post-delisting management entity (State, Tribal, and Federal) has experienced and professional wildlife staff to ensure those commitments can be accomplished.

Human-caused Mortality in the NRM DPS

After gray wolves were afforded Federal protections under the Act in 1974, an interagency team began recovery planning for wolves in the West. The team identified three

recovery areas in the NRM that included northwest Montana, central Idaho, and the Greater Yellowstone Area (GYA; USFWS 1987, pp. v, 13). These areas were selected because they contained large contiguous blocks of Federal public lands, had abundant ungulate populations, and relatively low numbers of livestock that were seasonally grazed on Federal allotments. It was further recognized that control of depredating wolves would be an important aspect of the recovery planning process and the eventual management of gray wolves (USFWS 1980, pp. 14–15; USFWS 1987, pp. v–vi, 9, 14–15, 33–35; USFWS 1994, entire; Bangs et al. 2009, p. 97). In 1994, the Service designated portions of Idaho, Montana, and Wyoming as two nonessential experimental population areas for the gray wolf under section 10(j) of the Act, which facilitated the 1995 and 1996 reintroduction of gray wolves into these areas and offered more flexibility to manage conflicts than was otherwise allowed for an endangered species (USFWS 1994; 59 FR 60252 and 59 FR 60266, November 22, 1994). Wolves in northwest Montana retained their classification as endangered because natural recolonization from Canada had already begun in the 1980s (USFWS 1994; 59 FR 60252 and 59 FR 60266, November 22, 1994). In 2005 and again in 2008, section 10(j) rules governing management of the nonessential experimental wolf populations were revised to clarify terms and allow limited increases in management flexibility to mitigate wolf conflicts (for further information see 70 FR 1286, January 6, 2005; 73 FR 4720, January 28, 2008). The information provided below for the delisted NRM wolf population includes wolves that inhabit the three wolf recovery areas in the NRM States of Idaho, Montana, and Wyoming and does not include wolves that have naturally recolonized portions of Oregon and Washington within the NRM unless specifically noted.

After wolf reintroduction, a rapid increase in the number and distribution of wolves occurred due to the availability of high-quality, suitable wolf habitat in the NRM. Between 1995

and 2008, wolf populations in the NRM increased an average of 24 percent annually (USFWS et al. 2016, table 6b) while from 1999 to 2008, total wolf mortality (includes all forms of known wolf mortality) averaged approximately 16 percent of the minimum known wolf population each year (USFWS et al. 2000–2009, entire). Wolf numbers and distribution stabilized after 2008 as suitable habitat became increasingly saturated (74 FR 15160, April 2, 2009). Between 2009 and 2015, some or all of the NRM States (depending upon the Federal status of wolves at that time; see table 1) began to manage wolves with the objective of reversing or stabilizing population growth while continuing to maintain wolf populations well above Federal recovery targets. The primary method used to manage wolf populations and achieve management objectives is through regulated public harvest. As a result, during those years when legal harvest occurred, total wolf mortality in the NRM increased to an average of 29 percent of the minimum known population (USFWS et al. 2010–2016, entire), while population growth declined to an average of approximately 1 percent annually (USFWS et al. 2010–2016, entire). Where high levels of wolf mortality occur, the species' reproductive capacity and dispersal capability can compensate for mortality rates of 17 to 48 percent (USFWS 2020, pp. 8–9), this appears to be the case in the NRM. As of 2015, the final year of a combined NRM wolf count due to the end of federally required post-delisting monitoring in Idaho and Montana, wolf populations in the NRM remained well above minimum recovery levels with a minimum known population of 1,704 wolves distributed across Idaho, Montana, and Wyoming. An additional 177 wolves were documented in the NRM portions of Oregon and Washington at the end of 2015.

Non-human related wolf mortalities may be biased low because a relatively small percentage of wolves in the NRM had known fates. Nonetheless, an average of 3 percent of known wolf mortalities were due to non-human causes (e.g., natural and unknown causes)

through 2008 (USFWS et al. 2000–2009, entire). Although the variability in the range of non-human related wolf mortalities declined, the percent of non-human related wolf mortalities dropped slightly to an average of 2 percent of the minimum known population annually between 2009 and 2015 (USFWS et al. 2010–2016, entire). Given the low level of non-human related wolf mortalities documented in the NRM, even assuming the estimate is biased low, we conclude that the effects of this type of mortality on wolf populations are not significant.

Outside of very remote or large protected areas, human-caused mortality accounts for the majority of the documented wolf mortalities annually, and wolves in the NRM are no exception. Between 1999 and 2008, when gray wolves were federally listed (with the exception of February to July 2008), documented human-caused wolf mortality averaged 13 percent of the minimum known NRM wolf population annually (USFWS et al. 2000–2009, entire) with lethal control of depredating wolves (which includes legal take by private individuals) and illegal take (discussed previously) being the primary mortality factors. As expected, human-caused mortality increased after 2008 as NRM States, dependent on the Federal status of wolves, began to manage wolf populations. As a result, human-caused mortality increased to an average of 27 percent of the minimum known NRM wolf population annually between 2009 and 2015 (USFWS et al. 2010–2016, entire). Since 2009, regulated public harvest and lethal control of depredating wolves have been the two primary mortality factors removing an average of 17 percent and 9 percent of the minimum known NRM wolf population annually, respectively (USFWS et al. 2010–2016, entire). As part of post-delisting monitoring in the NRM, the Service conducted annual assessments of the NRM wolf population and noted that it remained well above Federal recovery levels with no identifiable threats that imperiled its recovered status under State

management in 2009 (Bangs 2010, entire) and 2011 to 2015 (Jimenez 2012, 2013a, 2014, 2015, 2016, entire).

In addition to the annual post-delisting assessments, previous rules (74 FR 15123, April 2, 2009, and 77 FR 55530, September 10, 2012) have adequately described wolf population-level responses to various mortality factors in the NRM up through 2008. Regulated harvest and lethal control of depredating wolves account for the majority of the known wolf mortalities in the NRM since 2009 (see above); therefore, the following discussion focuses on these two types of mortality. The management of wolf populations through regulated harvest had never been attempted in the lower 48 United States until 2009 when the NRM States of Idaho and Montana conducted the first regulated wolf hunts. To highlight the adaptive style of management that Idaho, Montana, and Wyoming use to maintain a recovered wolf population in the NRM DPS, even though State objectives include reducing wolf population growth rates, we have included a significant amount of detail regarding the regulatory framework the States have used to regulate wolf harvest. This information also demonstrates wolf population-level responses and that harvest levels generally do not increase under gradually less restrictive regulations in some States. Lethal take of depredating wolves by private individuals accounts for a relatively small percentage of total wolves removed in the NRM annually for conflict-related issues. Thus, in addition to agency control of depredating wolves, the total number of wolves lethally removed for depredating livestock includes wolves killed legally by private individuals in depredation situations unless specifically noted. Although most of the wolves in Oregon and Washington inhabit the NRM DPS portion of each State and account for the majority of the wolf mortalities in any given year, mortality rates presented below for these States are based on statewide totals unless specified otherwise. For further information related to the regulatory framework within

each State in the NRM, see the **Management in the NRM DPS** and the Post-Delisting Management in the West Coast States sections of this rule as well as previous rules (74 FR 15123, April 2, 2009; 77 FR 55530, September 10, 2012).

Regulated Harvest in Idaho—The Idaho Department of Fish and Game (IDFG) has expressed its commitment to maintaining a viable, self-sustaining wolf population above minimum Federal recovery levels, while minimizing conflicts (Idaho Legislative Wolf Oversight Committee [ILWOC] 2002, p. 4). Additional goals of wolf management in Idaho are to ensure connectivity with wolf populations in neighboring States and Provinces and to manage wolves as part of the native resident wildlife resource, similar to management of other large carnivores in the State (ILWOC 2002, p. 18). The State has indicated that it will only allow wolf harvest as long as wolves remain federally delisted and as long as 15 or more packs are documented in the State. Wolves were removed from Federal protections in Idaho in 2009 (74 FR 15123, April 2, 2009), and IDFG determined that the first regulated, public hunt of wolves could begin later that fall.

IDFG provided recommendations for the 2009–2010 wolf hunting season to the IDFG Commission, which approved the recommendations. The total statewide harvest limit was 220 wolves distributed across 12 wolf management zones (WMZ). Hunting was the only legal form of take, and the bag limit was one wolf per hunter. Successful hunters were required to report the harvest of a wolf within 24 hours of take and present the skull and hide to an IDFG regional office or conservation officer for inspection and to have the hide tagged with an official State export tag within 5 days of harvest. Seasons began in two WMZs on September 1, another two WMZs opened on September 15, and the remaining eight WMZs opened October 1, 2009; all

WMZs remained open until March 31, 2010, or until harvest limits were reached in that specific WMZ. By the end of 2009, 5 of the 12 WMZs were closed after harvest limits were met. An additional two WMZs met harvest limits prior to the season closing on March 31, 2010. A total of 181 wolves were harvested during the 2009–2010 season, and a minimum count of 870 wolves were documented at the end of calendar year 2009 (see table 3).

Prior to the start of the 2010–2011 wolf hunting season, a court order placed wolves back under Federal protections (75 FR 65574, October, 26, 2010), so no wolf hunting occurred during that hunting season.

Wolves were again delisted in Idaho in May 2011 (76 FR 25590, May 5, 2011). Similar to the 2009–2010 hunting season, a primary objective with harvest was to reverse wolf population growth at the State level while limiting harvest in some WMZs to conserve wolves and maintain adequate connectivity to wolf populations in Montana and Wyoming. As a result, some WMZ modifications occurred, as well as significant changes to season rules and regulations that were approved by the IDFG Commission. Harvest regulations in WMZs that bordered Montana and Wyoming were conservative compared to other WMZs in Idaho to limit potential harvest effects during peak periods of wolf dispersal. Harvest limits were established in five WMZs where IDFG expected high hunter success based on results and experience gained during the 2009–2010 season and where it was important to maintain connectivity between wolf populations in adjacent States. In the eight remaining WMZs, where IDFG expected lower hunter success based on results and experience gained during the previous season or where high levels of wolf-ungulate or wolf-livestock conflicts occur, no harvest limits were set. Seasons in all WMZs opened on August 30, 2011, and closed when the harvest limit was reached in any of the 5 WMZs that had harvest limits or (1) on March 31 of the following year for 9 of 13 WMZs;

(2) on December 31, 2011, in the Beaverhead and Island Park WMZs; and (3) on June 30, 2012, in the Lolo and Selway WMZs. Hunting bag limits were increased to two wolves per calendar year. Trapping was also approved by the IDFG Commission as a legal form of take and was permitted in five WMZs. Trappers were required to attend a wolf trapper education class prior to purchasing wolf trapping tags. Trapping seasons began November 15, 2011, and were open through March 31, 2012. Certified trappers could purchase up to three wolf trapping tags per season, and trappers were permitted to use hunting tags on trapped wolves. Regardless of method of take, the mandatory reporting period for successful hunters and trappers was extended to 72 hours, and they still had to present the hide and skull to an IDFG conservation officer or regional office within 10 days for inspection and tagging. As part of post-delisting monitoring for Idaho, the Service evaluated regulatory changes to Idaho's wolf harvest seasons to assess the level of impact to wolves in the State and determined that, although harvest would likely increase over the first year of regulated take, these changes did not pose a significant threat to wolves in Idaho and would ensure wolf numbers remained well above minimum recovery levels (Cooley 2011, entire). From this point forward in this section of the rule, Idaho wolf harvest totals are presented based on the calendar year rather than the hunting/trapping season. In calendar year 2011, 200 wolves were legally harvested in Idaho (173 by hunting and 27 by trapping), and 768 wolves were documented in the State as of December 31, 2011 (see table 3).

Regulatory changes for the 2012–2013 wolf season were designed to increase take, especially in those areas that had lower hunter/trapper success and where high levels of wolf-ungulate or wolf-livestock conflicts occur. Trapping was permitted in one additional WMZ in the 2012–2013 season for a total of six WMZs where trapping was permitted. Bag limits were increased in 6 of 13 WMZs from 2 to 5 hunting tags per hunter per calendar year and from 3 to 5

trapping tags per trapper per season. The remaining WMZs continue to permit two hunting tags per individual (trapping is not permitted in these WMZs). Season structure was similar to the previous season except that the season was extended in the Beaverhead and Island Park WMZs to January 31 (from December 31) and the start of the hunting season on private land in the Panhandle WMZ was changed to begin on July 1 rather than August 31. Although the Service expected harvest to increase over previous years, we determined it was unlikely that these regulatory changes would result in Idaho's wolf population nearing minimum recovery levels (Cooley 2012, entire). During calendar year 2012, 329 wolves were legally harvested in Idaho, and 722 wolves were documented in the State at the end of 2012 (see table 3).

Relatively minor changes were approved for the 2013–2014 wolf season and included harvest on private land year-round in one WMZ and the extension of the season end date to June 30 in 2 WMZs (a total of four WMZs now close on this date). Trapping seasons were permitted in 3 additional WMZs, resulting in 9 out of 13 WMZs that allowed trapping. The Service determined no official review was necessary for these regulatory changes because they would not likely result in a significant increase in harvest (Cooley 2013, entire). A total of 356 wolves were harvested during the 2013 calendar year, a modest increase over 2012 totals, with 659 wolves documented in the State at the end of 2013 (see table 3).

Idaho regulations were changed for the 2014–2015 wolf season to increase harvest. The Service determined that the changes would not threaten Idaho's wolf population (Cooley 2014, entire). Bag limits were increased statewide to five tags per hunter per calendar year or five tags per trapper per season; trappers were permitted to use hunting tags for trapped wolves. Five WMZs had year-round hunting seasons on private property only, and hunting seasons closed on June 30 for three WMZs and portions of two other WMZs. Trapping was permitted in 12 of 13

WMZs (with specific regulations for most WMZs), and trap start dates were moved up to October 10 (from November 15) for 3 WMZs. Harvest limits remained for 5 of 13 WMZs. A total of 256 wolves were legally harvested in Idaho during the 2014 calendar year, with 770 wolves documented in the State at the end of 2014 (see table 3).

Beginning with the 2015–2106 season, regulations were set for 2-year periods, although the IDFG Commission could make emergency regulatory changes anytime during that period if necessary. Very few, minor changes occurred during this biennium compared to the previous season. As a result, harvest was very similar to 2014 with 256 wolves harvested during calendar year 2015 and 267 wolves harvested during 2016. A minimum count of 786 wolves was documented in Idaho at the end of 2015 (see table 3). IDFG transitioned away from providing minimum counts beginning in 2016 and experimented with other metrics to evaluate population trends (see *Wolf Population and Human-Caused Mortality In Idaho Summary* section). One of these techniques estimated that a minimum of 81 packs was extant in Idaho during 2016 (IDFG 2017, p. 6).

The 2017–2018 and 2018–2019 wolf seasons saw additional changes, some of which were designed to reduce the population by increasing the number of wolves that could be harvested in Idaho. Some changes that occurred were: extending the mandatory reporting period for successful hunters and trappers from 3 days to 10 days; removal of wolf harvest limits statewide; and no longer using WMZs to set regulations for specific regions of the State (instead, hunt units are grouped based on season start and end dates as well as any special regulations that pertain to specific units). Idaho contains a total of 99 hunt units, and 25 of these had year-round hunting seasons on private land only; most other hunting seasons began on August 1 or 30 and ended on March 31, April 30, or June 30. Trapping seasons began either October 10 or

November 15 and closed on March 15 or 31. Trapping was not permitted in 38 of the 99 hunt units in Idaho. Harvest increased slightly over previous years, with 281 wolves harvested in 2017 and 329 wolves during calendar year 2018. No minimum counts or wolf abundance estimates were collected during 2017 and 2018.

The 2019–2020 and 2020–2021 wolf seasons saw minor adjustments to hunting and trapping regulations. Hunting and trapping seasons were similar to the previous 2 seasons; however, trapping was permitted in all hunt units except 2 (down from 38 hunt units previously). Bag limits also changed from the previous two seasons and again within the 2019–2020 hunting season. Current bag limits are a harvest limit of 15 wolves per hunter per calendar year and 15 wolves per trapper per trapping season; trappers continue to be permitted to use hunting tags for trapped wolves. Wolf harvest totals for calendar year 2019 were not available as of this writing; however, using an array of remote cameras and a modeling framework, IDFG estimated that approximately 1,000 wolves existed in the State at the end of 2019 (IDFG, *pers. comm.*, 2020, USFWS 2020, p. 16), which is well above the recovery target of 10 breeding pairs and 100 wolves.

On average, harvest has removed approximately 21 percent of Idaho's known wolf population annually between 2009 and 2015. Although annual variations in minimum counts were documented, and Ausband et al. (2015, pp. 418–420) noted a decline in pup survival that may have affected recruitment after wolf hunts began in Idaho, the implementation of regulated harvest has stabilized wolf population growth in the State, at least between the years of 2009 to 2015 (mean population growth rate: 0 percent; range: -11 percent to 17 percent). While minimum counts were not conducted by IDFG after 2015, metrics that estimated the number of packs in the State in 2016 (IDFG 2017, p. 6), similarities in total harvest in 2016 and 2017, along

with a slight increase in 2018, combined with regulations providing for increased hunter/trapper opportunities, indicates that the wolf population in Idaho has not deviated significantly from the 786 wolves that were documented in the State at the end of 2015 (see table 3). Although not directly comparable to a minimum count, IDFG estimated that approximately 1,000 wolves existed in Idaho at the end of 2019 (IDFG, *pers. comm.*, 2020).

In an analysis of Idaho wolf harvest statistics through 2014, hunting removed more male than female wolves, pups were trapped in equal proportions to other age classes, hunting removed a greater proportion of wolves than trapping, and there was little change in hunter/trapper effort over time (Ausband 2016, entire). Another analysis noted that most wolves in Idaho were harvested in October, incidental to deer and elk hunting seasons, and that more harvest opportunities through increased bag limits and extended season lengths did not necessarily result in increased harvest between 2012 and 2016 because most hunters harvested a single wolf (IDFG 2017, entire).

The levels of harvest mortality experienced by Idaho's wolf population through 2016 appears to be additive to other forms of mortality, which indicates that it can be an effective tool to manipulate wolf abundance in the state (Horne et al. 2019a, p. 40). However, after initial high rates of harvest post-delisting, wolf harvest rates moderated between 2012 and 2016, resulting in average pack sizes similar to those observed pre-delisting (Horne et al. 2019a, pp. 38–41). Similarly, both recruitment and dispersal rates did not change appreciably from pre-harvest levels (Horne et al. 2019a, pp. 38–41). Harvest regulations were changed in Idaho during the years of this study and beyond in an attempt to increase harvest. However, increased hunter opportunity has not resulted in significant and continuous increases in wolf harvest. In fact, following an initial period of high harvest rates that had some effect on wolf demographics (see

above for discussion), wolf harvest has subsequently had minimal overall effect on the dynamics of wolf populations in Idaho through 2016 (Horne et al. 2019a, pp. 37–41).

Depredation Control in Idaho—Wolf-livestock depredation management in Idaho is guided by Idaho Statute (I.S.) 36-1107 and the provisions in the Idaho Wolf Conservation and Management Plan (ILWOC 2002). 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. Section (c) of the statute applies specifically to wolves and encourages the use of nonlethal methods to prevent or minimize conflict risk. It also permits owners of livestock or domestic animals, their employees, agents, or agency personnel to lethally remove wolves molesting or attacking livestock without the need for a permit from IDFG. A permit is needed from IDFG to lethally remove wolves not attacking or molesting livestock or domestic animals or pursuant to IDFG wolf harvest rules. Any wolf taken under this authority must be reported to IDFG within 10 days and becomes the property of the state.

Under the IDFG Policy for Avian and Mammalian Predator Management (IDFG 2000), where there is evidence that predation is a significant factor inhibiting 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 predator effects are most significant. To date, predator management plans have been developed for five elk management zones in Idaho with wolves

being one of, if not the primary, targeted predator (IDFG 2011, IDFG 2014a, IDFG 2014b, IDFG 2014c).

Between 2008 and 2011, the Federal status of wolves in Idaho changed on several occasions. While wolves in Idaho were under Federal management authority, they were managed under a nonessential experimental population regulation in the central Idaho (south of I–90) and the GYA recovery areas (73 FR 4720, January 28, 2008). In addition to agency-directed lethal control, this designation allowed for opportunistic harassment of wolves by livestock producers and allowed lethal take of wolves that were observed attacking livestock or dogs on private or lawfully occupied public lands. Wolves that occupied the northwest Montana recovery area in the NRM, which includes a portion of Idaho north of U.S. Interstate 90, were classified as endangered and were afforded full protections under the Act.

The total number of wolves removed in lethal control actions includes take from agency actions to mitigate conflicts, take by private citizens under a permit or when wolves were killed in the act of attacking or molesting livestock, and wolves removed under the IDFG Policy for Avian and Mammalian Predator Management (2000) when wolves were under State management authority unless otherwise specified. Minimum wolf counts are available for Idaho only through 2015, while records of wolves lethally removed in conflicts are available through 2016 (see table 3). Although the total number of wolves removed in conflict situations was higher in Idaho under State authority (2009 and 2011–2015; n = 465) when compared to a similar time period under Federal management (2004–2008 and 2010; n = 325), the annual average percent of wolves lethally removed did not change and remained at 7 percent of the minimum known population. Between 2011 and 2016, 107 wolves were removed under predation management plans to benefit ungulate populations. Wolf-caused sheep depredations

dominate Idaho wolf-livestock conflicts, and although there has been annual variability, a general downward trend in the number of wolf-sheep conflicts has occurred since 2009 (IDFG 2016, pp. 12–14). Cattle depredations have also generally declined since 2009.

Wolf Population and Human-caused Mortality in Idaho Summary—Between 1999 and 2008, the rate of human-caused mortality in Idaho was 9 percent, which allowed the wolf population to increase at a rate of approximately 22 percent annually. Since 2009, when wolves were federally delisted and primarily under State management authority (the exception being August 2010 to May 2011), human-caused mortality increased to 29 percent annually, which was one of a multitude of factors that likely contributed to the stabilization of the wolf population in Idaho between 2009 and 2015. Although some variation in annual wolf abundance was documented, minimum counts of wolves in Idaho ranged from 659 to 786 wolves between 2010 and 2015 (see table 3).

Beginning in 2016, after Idaho's post-delisting monitoring period ended, IDFG transitioned away from providing minimum counts of known wolves and towards the use of multiple other methods to track population trends. These include genetic sampling of wolves for genetic analysis at den and rendezvous sites (Stansbury et el. 2014, entire), mandatory checks of all harvested wolves, incidental observations by the public and agency personnel, monitoring the location and number of lethal control actions authorized by IDFG, and limited wolf tracking via radio transmitters (IDFG 2017, pp. 5–6). More recently, a novel application of genetic data used biological samples collected from harvested wolves to estimate a minimum number of reproductive packs that existed in the State in a given year (Clendenin et al. 2020, entire). A minimum of 52 and 63 reproductive packs were subjected to harvest in Idaho in 2014 and 2015, respectively, which was similar to what was documented by IDFG during those years (Clendenin

et al. 2020, pp. 6–10). Additional analyses conducted by IDFG using remote cameras deployed across the State during summer indicated that 81 packs existed in the State in 2016 (IDFG 2017, p. 6). Comparing these results to those of Clendenin et al. (2020, entire) indicates that not all Idaho packs are subjected to harvest in all years.

More recently, using an array of remote cameras and a modeling framework, IDFG estimated that approximately 1,000 wolves existed in the State at the end of 2019 ((IDFG, *pers. comm.* 2020). Although not comparable to previous wolf surveys that used minimum counts, continued refinement of the methodology and estimation of the abundance of wolves in the State using the modeling framework will allow for annual evaluations of abundance and trends over time. Based on these more recent methods that evaluate population trends (genetic analysis of harvested wolves) and provide a population estimate (modeling), the wolf population in Idaho appears to be resilient to the increased level of human-caused mortality in the State, indicating that Idaho wolves remain well above recovery levels of 10 breeding pairs and 100 wolves and continue to be widely distributed across the state.

Regulated Harvest in Montana—Regulated public harvest of wolves in Montana was first endorsed by the Governor's Wolf Advisory Council in 2000 and included in Montana's Wolf Conservation and Management Plan. Wolf hunting in Montana can be implemented only when wolves are federally delisted and under State management authority and when greater than 15 breeding pairs were documented in the State the previous year. Montana Fish, Wildlife, and Parks (MFWP) developed wolf harvest strategies that maintain a recovered wolf population, maintain connectivity with other subpopulations of wolves in Idaho, Wyoming and Canada, minimize wolf-livestock conflicts, reduce wolf impacts on low or declining ungulate populations and ungulate hunting opportunities, and effectively communicate to all parties the relevance and

credibility of the harvest while acknowledging the diversity of opinions and values among interested parties. The Montana public has the opportunity for input regarding wolf harvest recommendations throughout a public season-setting process prior to adoption of season regulations by the MFWP Commission.

To prepare for the potential that wolves would be delisted and legal public harvest could be implemented, MFWP developed wolf harvest recommendations that would achieve desired management objectives. The recommendations were approved, with some modifications, by the MFWP Commission in early 2008. Three wolf management units (WMU), and one subunit, were established each with a harvest limit or quota. Wolf hunting seasons opened September 15 and remained open until December 31 or until harvest limits were reached, whichever occurred first. Hunters could harvest one wolf per calendar year. Successful hunters were required to report their kill within 12 hours of harvest and present the skull and hide for inspection by MFWP within 10 days. MFWP Commission had authority to initiate emergency season closures if conditions warranted.

Hunting quotas were developed through an evaluation of population parameters including wolf population status and trends, pack distribution, pup production, and all mortality factors. Modeling exercises assessed risk and harvest effects on Montana's wolf population, and all assumptions were made conservatively. Resulting harvest limits were considered biologically conservative (Sime et al. 2010, p. 18) and included a statewide total of 75 wolves distributed across the three WMUs.

Due to litigation resulting from Federal delisting efforts in 2008 (see 73 FR 10514, February 27, 2008), no public harvest occurred in 2008. Wolves were again removed from Federal protections in Montana in 2009 (74 FR 15123, April 2, 2009), and MFWP conducted the

first regulated, public hunt of wolves that fall using the same regulations that were developed for the 2008 season described above. A total of 72 wolves were harvested, and seasons closed statewide on November 16. Post-hunt evaluations indicated no biological threats to the wolf population in Montana resulted from the harvest, and, as expected, most hunters harvested wolves opportunistically while deer and/or elk hunting (MFWP 2010, entire). Year-end counts by MFWP documented a minimum of 524 wolves in the State, while patch occupancy modeling estimated that 847 wolves existed across Montana at the end of 2009 (see table 3; also see USFWS 2020, p. 16 and the final paragraph of this section for an explanation of why minimum wolf counts and modeled estimates differed).

Prior to the 2010 season, wildlife managers in Montana refined the WMU structure in the State to better distribute harvest resulting in the creation of 14 WMUs, primarily distributed across the western half of Montana where wolves exist. With input provided from regional personnel, a general consensus resulted in a desired objective to reduce wolf numbers within biological limits without jeopardizing Federal recovery targets of at least10 breeding pairs and 100 wolves. Using similar modeling exercises as previous years and an objective of reversing wolf population growth, a total quota of 186 wolves distributed across the 14 WMUs was approved by the MFWP Commission. Prior to the start of the 2010 wolf hunting season, a court order placed wolves back under Federal protections (75 FR 65574, October 26, 2010), so no wolf hunting season took place.

Wolves were again delisted in Montana in May 2011 (76 FR 25590, May 5, 2011). Similar to previous years, a primary objective with harvest was to reverse wolf population growth. As a result, archery-only and early back-country rifle seasons were proposed, and a quota increase to 220 wolves distributed across all WMUs was recommended by MFWP and

approved by the MFWP Commission. Wolf harvest was not progressing as expected during the early parts of the hunting seasons (121 wolves harvested and 2 of 14 WMU quotas met by December 31, 2011), so MFWP proposed a season extension through January 31, 2012, or until WMU quotas were met. After a public comment period, the MFWP Commission approved and adopted a season extension through February 15, 2012. A total of 166 wolves were harvested during the 2011–2012 season, equaling 75% of the total quota, with 3 of 14 WMUs closing due to quotas being met (MFWP 2012, entire). Year-end counts by MFWP documented a minimum of 653 wolves in the State, while patch occupancy modeling estimated that 971 wolves existed across Montana at the end of 2011 (see table 3).

The 2012–2013 wolf hunting season saw significant changes to season structure and regulations that were designed to increase harvest and reduce wolf numbers in the State to a management goal of 425 wolves, more than twice the Federal recovery goal. First, some hunt areas were reorganized to better direct or limit harvest in certain locations increasing the total number of WMUs to 17. Other changes included a statewide general season rather than a statewide quota with quotas remaining in WMU 110 and 316 only, which border Glacier and Yellowstone National Parks, respectively; a hunting season closing date of February 28; a trapping season that would be open from December 15 through February 28; an increase in the overall bag limit to three wolves per hunter/trapper per season; consistent with State statute, the use of electronic calls to take wolves; and a change in the mandatory reporting period from 12 to 24 hours after harvest or upon returning to the trailhead for backcountry hunters/trappers. All wolf trappers were required to attend a wolf trapping educational course to become certified prior to purchasing a wolf trapping license and were required to have a minimum pan tension of 8 pounds in MFWP Regions 1 and 2 to minimize nontarget captures. In February 2013, the

Governor signed House Bill 73, which included language that authorized the use of electronic calls and the sale of multiple wolf hunting licenses. As a result, these MFWP Commission provisions that were approved earlier became effective immediately upon the Governor's signing. As part of post-delisting monitoring for Montana, the Service evaluated these regulatory changes to Montana's wolf hunting and trapping seasons to assess the level of impact to wolves in the State and determined that, although harvest would likely increase over previous years, these changes did not pose a significant threat to wolves in Montana and would ensure wolf numbers remained well above minimum recovery levels (Sartorius 2012, entire; Jimenez 2013b, entire). A total of 225 wolves were harvested during the 2012–2013 wolf season, with the majority of hunters and trappers harvesting a single wolf (MFWP 2013, entire). Year-end counts by MFWP documented a minimum of 625 wolves in the State, while patch occupancy modeling estimated that 915 wolves existed across Montana at the end of 2012 (see table 3).

The 2013–2014 wolf hunting and trapping season saw some minor changes to seasons that included the general (hunting) season being extended to March 15, an increased bag limit of five wolves in any combination of general or trapping per hunter/trapper per season, and the creation of WMU 313 (with a separate quota) north of Yellowstone National Park. Trappers were also required to have a minimum pan tension of 10 pounds in MFWP Regions 1–5 to reduce incidental capture of nontarget species. A total of 230 wolves were harvested during the 2013–2014 season, with hunters taking 143 wolves and trappers taking another 87. Even with the increased bag limits, the majority of successful hunters and trappers took one wolf (MFWP 2014, entire). Year-end counts by MFWP documented a minimum of 627 wolves in the State, while patch occupancy modeling estimated that 1,088 wolves existed across Montana at the end of 2013 (see table 3).

Other than some minor quota changes to those WMUs that border Glacier and Yellowstone National Parks, the only significant change that has occurred since the 2013–2014 wolf hunting and trapping season was the decision by the MFWP Commission prior to the 2017–2018 seasons to visit wolf season structure every other year rather than every year to allow for discussion of ungulate and wolf seasons at the same Commission meeting. Wolf harvest in Montana remained similar to the previous two seasons when 206 and 210 wolves were harvested during the 2014–2015 and 2015–2016 seasons, respectively (MFWP 2015, entire; MFWP 2016, entire). A slight upward trend has been observed since with 247 wolves being harvested in the 2016–2017 season, 255 in 2017–2018, and 295 in 2018–2019 (MFWP 2017, entire; MFWP 2018, pp. 13–14; Inman et al. 2019, pp. 9–10). Meanwhile, the minimum known number of wolves in Montana has ranged between 477 and 633 animals since 2014, while patch occupancy modeling estimates have ranged between 814 and 981 wolves during the same time period (see table 3 for further information). The overall general trend in method of take was similar to previous years with hunters taking approximately two-thirds and trappers taking one-third of all harvested wolves in Montana.

The Confederated Salish and Kootenai Tribes (CSKT) of the Flathead Reservation regulate wolf harvest on their Tribal lands. The CSKT defined three wolf hunting and trapping zones on their reservation where, according to the 2018–2019 regulations, seasons begin on September 1 and end on either March 31 or April 30 of the following year, or until harvest limits are reached in each zone, whichever occurs first. Bag and harvest limits are 1 wolf per hunter/trapper, with a maximum harvest of 5 wolves total in the Mission Mountain Zone and 2 wolves per hunter/trapper with a maximum harvest of 10 wolves in the Northwest and South Zones. Trappers are required to complete a Wolf Trapper Training Class prior to obtaining a

Tribal trapping permit. Successful hunters/trappers must present the hide and skull for inspection and sample collection within 7 days of take. Wolves harvested on the Flathead Reservation are included in Montana totals described above and in table 3.

The Blackfeet Nation provides gray wolf hunting opportunities for its Tribal members and descendants. The Blackfeet Nation is divided into 4 hunting zones and wolf hunting is allowed in Zones 2 and 3 only; no wolf hunting is permitted in Zones 1 or 4, and wolf trapping is not authorized in any hunting zone. Hunters may purchase up to three gray wolf hunting licenses each season. Seasons start on the third Saturday in October and close on March 31 of the following year. Successful hunters must report harvest and have animals inspected by a game warden within 24 hours of take. All harvest totals from the Blackfeet Nation are included in the Montana totals described above and in table 3.

Regulated public harvest of wolves in Montana has removed an average of 22 percent (range: 10–31 percent) of Montana's minimum known wolf population during those years that harvest occurred and minimum counts were documented (2009, 2011–2017 in table 3). The minimum known number of wolves in Montana also gradually declined as regulations became less restrictive with the objective of reversing wolf population growth in Montana. Although harvest may have been a contributing factor, it is also possible that reduced wolf monitoring in the State resulted in lower minimum counts. When wolf harvest was evaluated using patch occupancy modeling estimates, which were not influenced by changes to MFWP survey effort over time, harvest accounted for the removal of between 7 and 22 percent of the population annually. Despite less restrictive harvest regulations, total wolf harvest has remained relatively consistent since 2013 (range: 205–259 wolves), and the patch occupancy modeled estimated wolf population appears to have stabilized around 800 to 900 wolves since 2014.

Depredation Control in Montana—The 2001 Montana Legislature passed Senate Bill 163 (SB163), which amended several statutes in Montana Title 87 pertaining to fish and wildlife species and oversight and Title 81 related to the Montana Department of Livestock (MDOL) and their responsibilities related to predator control (MFWP 2002, pp. 6–9). SB163 called for the removal of wolves from the Montana list of endangered species concurrent with Federal delisting. After removal as State endangered, wolves were classified as a species in need of management, which allowed MFWP and the MFWP Commission to establish regulations to guide management of the species. SB163 amended Montana Statute 87-3-130, which relieved a person from liability for the taking of a wolf if it was attacking, killing, or threatening to kill a person, livestock, or a domestic dog. SB163 also removed wolves from the list of species classified as "predatory in nature," which are systematically controlled by MDOL. As a result, MDOL would work cooperatively with MFWP to control wolves in a manner consistent with a wolf management plan approved by both agencies.

The primary goal of wolf management in Montana is to maintain a viable wolf population and address wolf-livestock conflicts (MFWP 2002, p. 50). MFWP encourages the use of preventative and nonlethal methods and actively participates and cooperates in many preventive conflict reduction programs (Inman et al. 2019, p. 14; Wilson et al. 2017, p. 247). Current rules and regulations to address wolf-livestock conflicts provide more opportunity for livestock producers and/or private landowners to address wolf-related conflicts. Nonlethal harassment is allowed at all times; however, if nonlethal methods do not discourage wolves from harassing livestock, landowners may request a special kill permit from MFWP that is valid on lawfully occupied public and private lands. SB163 also provides authorization for livestock producers to kill a wolf without a permit if it is threatening, attacking, or killing livestock on either public or

private lands. If private citizens kill a wolf with or without a permit, they are required to report the incident to MFWP as soon as possible, or within 72 hours, and surrender the carcass to MFWP authorities. If a livestock depredation is documented, nonlethal or lethal control may be implemented, as appropriate, by providing recommendations to the livestock producer or through agency actions.

Between 2008 and 2011, the Federal status of wolves in Montana changed on several occasions. While wolves were under Federal management authority, wolves throughout most of Montana were managed under a revised section 10(j) rule for the central Idaho and GYA nonessential experimental wolf population in the NRM (73 FR 4720, January 28, 2008). In addition to agency-directed lethal control, this allowed for opportunistic harassment of wolves by livestock producers and allowed take of wolves that were observed attacking livestock or dogs on private or lawfully occupied public lands. Wolves that occupied the northwest Montana recovery area in the NRM were classified as endangered and were afforded full protections under the Act.

The Blackfeet Nation and CSKT wolf management plans each provide similar management responses based on potential wolf conflict scenarios that may occur on their respective reservations (see table 1 in Blackfeet Tribal Business Council [BTBC] 2008, p. 7; see table 1 in CSKT 2015, p. 11). In most instances, initial management responses will emphasize preventative and nonlethal methods to resolve conflicts (BTBC 2008, pp. 6–7; CSKT 2015, 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. Wolves removed through lethal control actions to resolve livestock conflicts on these reservations have been included in the Montana totals referenced below.

In Montana, most livestock depredations occur on private land (Inman et al. 2019, p. 11; DeCesare et al. 2018, pp. 5–11), and, although a slight increase has occurred in recent years, a general overall downward trend in the number of verified wolf depredations has occurred since 2009 (Inman et al. 2019, p. 1). This general downward trend in the number of depredations has tracked closely with the time period wolves have been under State management authority in Montana. A concurrent decline in the percentage of Montana wolves lethally removed in depredation control actions (includes agency and private citizen removals) has also occurred in Montana. Between the years of 2002 to 2008 plus 2010, corresponding to the years wolves were primarily under Federal authority, 512 wolves were removed to address conflicts with livestock. As a percentage of the minimum known population during that time period, an average of 15 percent of Montana's wolf population was removed to address wolf-livestock conflicts annually. When wolves were primarily under State management authority, 597 wolves were removed between 2009 and 2017 (excluding 2010; MFWP switched to reporting wolf population estimates based on patch occupancy modeling estimators only beginning in 2018 so no minimum count was available for 2018). Although a greater number of wolves were lethally removed under State authority, the average percentage of wolves removed annually declined to 9 percent of the minimum known wolf population during this time period. Since 2013, the percent of Montana's wolf population removed for depredation control has not exceeded 8 percent, and was as low as 5 percent of the minimum known population in 2015. Using population estimates based on patch occupancy modeling, the percentage of the wolf population removed annually to resolve wolf-livestock conflicts has not exceeded 5 percent since 2013 and has been as low as 3 percent in 2015.

Wolf Population and Human-caused Mortality in Montana Summary—Since 2009, despite increases in both human-caused and total mortality, the wolf population in Montana has continued to increase on average 2 percent annually based on both minimum counts and patch occupancy modeling (POM) estimates. Between 2009 and 2017, the rate of human-caused mortality in Montana was 32 percent and ranged between 23 and 41 percent of the minimum known population. When other causes of mortality were included, total mortality generally equaled 1 to 2 percentage points higher than human-caused mortality. Wolf abundance estimates using POM was higher than minimum counts of known individuals, and as a result, estimated mortality rates were lower for the POM estimated wolf population in Montana (table 3). Based on POM estimates, the rate of human-caused mortality ranged between 17 and 29 percent and averaged 23 percent since 2009. When other forms of mortality were included, total mortality in Montana averaged 24 percent since 2009 based on POM population estimates. The wolf population in Montana appears to be resilient to these levels of human-caused and total mortality and, based on POM, has stabilized between 800–900 animals in 4 of the past 5 years (the outlier being an estimate of 981 wolves in 2015).

Regulated Harvest in Wyoming—Wyoming Statute 23-1-304 provides authority for the Wyoming Game and Fish Commission (WGFC) to promulgate rules and regulations related to the management of wolves in Wyoming where they are classified as trophy game animals. Per WGFC Chapter 21 regulations that govern the management of wolves in Wyoming, wolves are classified as trophy game animals in the northwest part of the State, where the majority of the wolves reside, and predators in the remainder of Wyoming. Wolf harvest is regulated by WGFC Chapter 47 regulations in the wolf trophy game management area (WTGMA), whereas wolves may be taken by any legal means year-round and without limit in the predator area as provided

by Wyoming Statute 23-2-303(d), 23-3-103(a), 23-3-112, 23-3-304(b), 23-3-305, and 23-3-307. Wolf hunting regulations within the WTGMA are evaluated and revised annually based on current population objectives and past years' demographic and mortality information. An internal review and an extensive public input process occur prior to finalization of WGFC Chapter 47 regulations.

Wolves were federally delisted in the NRM on March 28, 2008 (73 FR 10514, February 27, 2008). In anticipation of the first regulated wolf hunt in Wyoming history, the Wyoming Game and Fish Department (WGFD) drafted Chapter 47 regulations to guide the 2008 wolf hunting season. A total mortality limit of 25 wolves was distributed across 4 wolf hunt areas in the WTGMA, and seasons began October 1 and ended November 15 in 1 hunt area and November 30 in the remaining 3 hunt areas, or when the mortality limit was reached in that specific hunt area, whichever occurred first. Firearms and archery were the only legal forms of take, and the bag limit was one wolf per hunter per calendar year. Successful hunters were required to report their take within 24 hours of harvest and were also required to present the hide and skull to a WGFD employee within 5 days of harvest for inspection and sample collection. On July 18, 2008, the U.S. Federal Court in Missoula, Montana, issued a preliminary injunction that immediately reinstated the protections of the Act for gray wolves in the NRM, pending the issuance of a court opinion. On October 14, 2008, the court vacated the final delisting rule and remanded it back to the Service. As a result, no regulated wolf hunting occurred in Wyoming during the 2008 season. However, when wolves were federally delisted between March 28 and July 18, 11 wolves were taken in the predator area (Jimenez et al. 2009, p. 31).

Wolves remained under Federal protections and were managed by the Service in Wyoming until 2012 when they were removed from the List (77 FR 55530, September 10,

2012). In anticipation of potential delisting in 2012, Chapter 47 regulations for wolf hunting seasons were approved by the WGFC in April 2012. To better direct harvest to areas with a greater potential for wolf-livestock or wolf-ungulate conflict while concurrently providing for lower harvest in core areas where potential conflict was low, WGFD designated 11 wolf hunt areas within the WTGMA along with a 12th hunt area as a seasonal WTGMA where wolves are classified as a trophy game animal from October 15 through the last day of February, but are classified as predators outside of this time period. Mortality limits were developed for each hunt area with an objective to reduce the Wyoming wolf population, outside of national parks and the Wind River Indian Reservation (WRR), to approximately 172 wolves and 15 breeding pairs by the end of the calendar year. A total WTGMA mortality limit of 52 wolves was distributed across the 12 wolf hunt areas, and both legal and illegal harvest during open seasons counted towards mortality quotas. Wolf hunting seasons opened in most hunt areas on October 1 (October 15 in the seasonal WTGMA) and ended on December 31 or when the mortality quota was reached, whichever came first, in all hunt areas. Although take was not regulated in the predator area, successful hunters were required to report the take of any wolf or wolves in this area within 10 days of harvest. Bag limits, method of take, and reporting requirements were the same as under the 2008 wolf hunting regulations. Mortality limits were reached in 6 of 12 wolf hunt areas prior to season end dates, and a total of 42 wolves (41 legal, 1 illegal) was harvested in the WTGMA (WGFD et al. 2013, p. 19). Twenty-five additional wolves were harvested in the predator area (WGFD et al. 2013, p. 21). In the WTGMA, the age distribution of harvested wolves was nearly equal between adults, subadults, and pups, and approximately equal numbers of males and females were harvested (WGFD et al. 2013, p. 19). A minimum of 186 wolves were documented in Wyoming outside of YNP and the WRR, with an additional 91 wolves

documented in YNP and WRR for a total of 277 wolves documented in the entirety of Wyoming at the end of 2012 (see table 3).

Chapter 47 regulations for the 2013 wolf hunting season were approved by the WGFC in July 2013. Total mortality limits within the WTGMA were designed to reduce the Wyoming wolf population, outside national parks and the WRR, to 160 wolves by the end of the calendar year (WGFD et al. 2014, p. 19). Total mortality limits were again distributed across the 12 wolf hunt areas and, compared to 2012 mortality limits, were reduced by half to a total of 26 wolves that could legally be taken within the WTGMA. One hunt area had a mortality limit of zero and, thus, never opened during the 2013 season. All other regulations remained unchanged from the 2012 season. A total of 24 wolves (23 legal, 1 illegal) were harvested during the wolf hunting season, with 8 of 11 open wolf hunt areas reaching mortality limits and closing before the season end dates (WGFD et al. 2014, p. 21). Again, little difference was observed between the gender and sex of harvested wolves, but young wolves outnumbered adults in the 2013 harvest. An additional 39 wolves were taken in the predator zone, and voluntary submission of tissue samples was high (WGFD et al. 2014, p. 24). A minimum of 199 wolves were documented in Wyoming outside of YNP and the WRR, with an additional 107 wolves documented in YNP and WRR, for a total of 306 wolves documented in the entirety of Wyoming at the end of 2013 (see table 3).

On September 23, 2014, the United States District Court for the District of Columbia vacated the 2012 final rule (77 FR 55530, September 10, 2012), which delisted wolves in Wyoming. Thus, wolves in Wyoming were immediately placed back under the Federal protections of the Act and were again managed by the Service. On April 25, 2017, the U.S. Court of Appeals for the District of Columbia Circuit reversed the vacatur of the 2012 final rule for

wolves in Wyoming. In response, the Service published a direct final rule (82 FR 20284, May 1, 2017) again removing the protections of the Act for wolves in Wyoming and reverting management authority back to State, Tribal, and Federal authority dependent upon jurisdictional boundaries. As a result of the changes in legal status, no wolf hunting occurred in Wyoming between 2014 and 2016.

Regulations for the 2017 wolf hunting season were approved by the WGFC in July 2017. The primary objective was to reduce the wolf population to a total of 160 wolves outside of national parks and the WRR by the end of the calendar year. All other regulations being the same as previous years, a total wolf mortality limit of 44 wolves was distributed across 12 wolf hunt areas in the WTGMA. Mortality limits were met in 10 of 12 wolf hunt areas prior to wolf hunting end dates, and a total of 44 wolves were harvested (43 legal, 1 illegal; WGFD et al. 2018, p. 14). Mortality limits were exceeded in three hunt areas because two wolves were harvested on the same day when a quota of one wolf remained in those areas. More females than males were harvested, but sex and gender of harvested wolves were similar (WGFD et al. 2018, p. 14). An additional 33 wolves were harvested in the predator area where harvest of males and females was similar, but more adults were harvested compared to other age classes (WGFD et al. 2018, p. 16). A minimum of 238 wolves were documented in Wyoming outside of YNP and the WRR, with an additional 109 wolves documented in YNP and WRR, for a total of 347 wolves documented in the entirety of Wyoming at the end of 2017 (see table 3). As part of post-delisting monitoring, the Service evaluated the status of the wolf population in Wyoming and determined that wolf numbers remained well above recovery targets of at least 10 breeding pairs and 100 wolves statewide, and no significant threats were identified that would jeopardize the recovered status of wolves in Wyoming (Becker 2018a, entire).

The objective of the 2018 wolf hunting season was to reduce the wolf population in Wyoming, outside of national parks and the WRR, to 160 wolves by the end of the calendar year. A number of moderate changes to the 2018 wolf hunting regulations were approved by the WGFC in July 2018. To better direct hunter effort, two new hunt areas were delineated from existing hunt areas, which created a total of 14 hunt areas within the WTGMA. Mortality limits were combined for hunt areas 6 and 7 as well as hunt areas 8, 9, and 11 because packs that use these areas regularly cross back and forth across hunt area boundaries. Total wolf harvest limits within the WTGMA were increased to 58 wolves, and hunting seasons opened 1 month earlier on September 1 in all hunt areas, with the exception of the seasonal WTGMA. Hunters could purchase up to two wolf tags per calendar year, thus could harvest up to two wolves per calendar year. Reporting requirement changes included: (1) successful hunters have 3 days to present the skull and hide of a harvested wolf to a designated WGFD employee or location for registration and (2) if a wolf is harvested in a designated wilderness area, the pelt and skull will be presented to a designated WGFD employee or location within 3 days of returning from the wilderness or within 10 days of the harvest date, whichever occurs first.

The Service evaluated these regulatory changes and determined that they were unlikely to significantly increase harvest or jeopardize Wyoming's wolf population (Becker 2018b, entire). Four of 14 hunt areas met mortality limits prior to season ending dates with 2 hunt areas recording no harvest. A total of 43 wolves (39 legal, 4 illegal) were harvested during the hunting season with harvest distributed more equally across all 4 months when compared to previous seasons (WGFD et al. 2019, p. 17). Sex of harvested wolves was nearly equal, but a higher number of adults were taken in 2018 compared to younger age classes (WGFD et al. 2019, p. 17). Forty-two additional wolves were taken in the predator area of Wyoming with adults being

the primary age class of wolves taken (WGFD et al. 2019, p. 18). A minimum of 196 wolves were documented in Wyoming outside of YNP and the WRR, with an additional 90 wolves documented in YNP and WRR, for a total of 286 wolves documented in the entirety of Wyoming at the end of 2018 (see table 3). After evaluating wolf population parameters for 2018, the Service concluded that Wyoming's wolf population remained well above the recovery targets of at least 10 breeding pairs and 100 wolves statewide with no significant threats identified (Becker 2019, entire).

The objective of the 2019 wolf hunting season was to stabilize the wolf population in Wyoming, outside of national parks and the WRR, at 160 wolves by the end of the calendar year. The WGFC approved a mortality limit of 34 wolves distributed across the 14 hunt areas within the WTGMA. The only significant change was that the season in hunt area 13 was extended to March 31, 2020, or until the harvest limit was reached, whichever came first, to increase hunting opportunity. Twenty-six wolves were harvested (25 legal, 1 illegal) during the hunting season with similar numbers of male and female wolves as well as age classes taken. However, the temporal distribution of harvest was heavily skewed towards the months of September and October, with zero wolves taken in December (WGFD et al. 2020, pp. 15–17). Twenty-three additional wolves were taken in the predatory animal area during 2019. A minimum of 201 wolves were documented in Wyoming outside of YNP and the WRR, with an additional 110 wolves documented in YNP and WRR, for a total of 311 wolves documented in the entirety of Wyoming at the end of 2019 (see table 3).

Wyoming has done, and continues to do, a suitable job of adaptively managing harvest using wolf demographic information including minimum counts and levels of other mortality factors from past years. Adaptive management will continue to be an important part of wolf

management in Wyoming due to a lower abundance of wolves in the State compared to Idaho and Montana and because recent data indicates that a greater proportion of juvenile wolves have been harvested during the months of September and October compared to November and December when adults and subadults make up the majority of harvest (WGFD et al. 2020, p. 17). Contrary to what Ausband (2016, p. 501) demonstrated for juvenile wolves taken during the trapping season in Idaho, this indicates that juvenile wolves in Wyoming are more vulnerable to hunter harvest, at least during the early months of hunting seasons. Continued high rates of juvenile mortality could affect recruitment (Ausband et al. 2015, pp. 418–420), resulting in population declines if wolf populations are not monitored closely and adaptively managed to ensure they remain above minimum recovery levels. We anticipate monitoring by WGFD will be sufficient to detect significant changes in population status and that regulatory changes will be made to address any concerns as necessary.

Pending the Governor's signature, the WGFC recently approved Chapter 47 wolf harvest recommendations for the 2020–2021 season. The two primary regulatory changes for the upcoming season included an increase in the total harvest limit to 52 wolves within the WTGMA and a September 15 season start date for all hunt areas (with the exception of hunt area 12, which will continue to open October 15). Although increased harvest limits could result in continued high levels of juvenile harvest, later season start dates may reduce the number of juvenile wolves harvested during the initial months of the season. All other regulations are the same as previous years.

On the WRR, wolves are classified as a trophy game animal where legal take could occur during a regulated hunting or trapping season. Regulated take was not permitted on the WRR until 2019 when the Eastern Shoshone and Northern Arapaho Joint Business Council approved

the first regulated wolf hunting season. A total harvest limit of six wolves was distributed evenly across two hunt areas. The wolf hunting season began on December 1, 2019, and closed on February 28, 2020, or until the harvest limit was reached in either hunt area, whichever occurred first. Mandatory reporting was required within 48 hours of harvest. No wolves were harvested on the WRR during the 2019–2020 season (WGFD et al. 2020, p. 24).

As described previously, the Federal status of wolves in Wyoming has changed on several occasions since 2009. Overall, during those years when wolves were under State management authority (including 2008 and 2014 when wolves were legally harvested in the predator area, but no regulated hunting season occurred in the WTGMA due to litigation), an average of 12 percent of Wyoming's wolf population was removed annually through harvest. If 2008 and 2014 are removed (the years that harvest was limited to the predatory animal area) and we evaluate regulated harvest only, an average of 15 percent of the wolf population in Wyoming was removed annually through harvest. Based on WGFD's adaptive management approach to managing wolves and wolf harvest, wolf populations in Wyoming have remained well above minimum recovery levels since 2002, regardless of whether they have been under State or Federal management authority.

Depredation Control in Wyoming—Federal wolf management in Wyoming was guided by a nonessential experimental population special rule under section 10(j) of the Act (59 FR 60266, November 22, 1994). After wolves were relisted in 2008, wolf management in the central Idaho and GYA recovery areas of the NRM reverted back to special rules published for the nonessential experimental population of wolves (73 FR 4720, January 28, 2008) because all States and some Tribes within these recovery areas had Service-approved wolf plans (see description of take allowed under the 2008 10(j) rules described above). However, after

reexamining Wyoming's laws and wolf management plan, the Service deemed them unsatisfactory for the continued conservation of wolves in the State (74 FR 15123, April 2, 2009). As a result, Federal wolf management in Wyoming (outside of YNP and WRR) reverted back to the more restrictive special rules under section 10(j) of the Act published in 1994 (59 FR 42108, August 16, 1994). Under the 1994 10(j) rule, landowners on their private land and owners of domestic livestock (defined as cattle, sheep, horses, and mules) lawfully using public lands could opportunistically harass wolves in a non-injurious manner. Livestock producers were also able to legally take adult wolves on their private property if they were caught in the act of killing, wounding, or biting livestock, provided the incident was reported within 24 hours and there was evidence of the attack. If livestock depredations were documented, the Service could conduct lethal control actions or issue a permit to a livestock producer or permittee grazing public lands to take an adult wolf or wolves caught in the act of killing, wounding, or biting livestock. This section 10(j) rule applied to wolf management in Wyoming between April 2009 and September 2012 and again between September 2014 and April 2017.

When wolves were under State management authority in Wyoming, Wyoming Statute (W.S.) 23-1-304 provided 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. WGFC Chapter 21 regulations guide the management of wolves in the State within the WTGMA. Through education and outreach provided by WGFD, emphasis is directed towards conflict prevention and minimization of depredation risk (WGFC 2011, p. 30). However, when depredations do occur, agency response is evaluated 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. The use of lethal force to resolve wolf-livestock conflicts by WGFD and their designated agents or private citizens is authorized under W.S. 23-1-304, W.S.23-3-115, and WGFC Chapter 21 regulations. However, lethal control will not be used, and any take permits that have been issued may be revoked, if wolf removal threatens the recovered status of wolves in the State.

Under W.S. 23-3-115 and WGFC Chapter 21 Section 6(a), any wolf in the act of doing damage to private property may be taken and killed by the owner provided the carcass is not removed from the site of the kill so an investigation can be completed and take is reported within 72 hours. If livestock depredations have been confirmed, WGFD or their authorized agents may conduct lethal control efforts to mitigate conflicts. WGFD may also issue a lethal take permit to the owner of the livestock or domestic animals, or their designees. Permits may be issued for a period of up to 45 days or until the number of wolves specified on the permit, up to two wolves, are killed, whichever occurs first. Permits may be renewed if deemed necessary. Lethal take permits will be issued only within the WTGMA.

In Wyoming, lethal control of depredating wolves increased concurrent with increases in wolf numbers and distribution as wolves recolonized available suitable habitat and began to occupy more moderate to less suitable habitat. Under Service direction, management of depredating wolves became more aggressive towards chronically depredating packs in the mid to late 2000s, which moderated the number of depredations and subsequent wolf removals so that the number of depredations no longer tracked with wolf population growth. Between 1995 and 2008, as a percentage of the total wolf population, 8 percent of the known Wyoming wolf population was removed annually. From 2009 to the present, the percentage of Wyoming's known wolf population lethally removed to resolve conflicts with livestock has increased slightly

to 11 percent, but has been more variable with a slightly higher percentage of wolves removed under Federal authority (13 percent; range: 8–22 percent) when compared to State management authority (11 percent; range: 7–12 percent). As has been observed in Montana, since 2017 when Federal protections were most recently removed for wolves in Wyoming, the total number of wolves and the percentage of the population lethally removed to resolve livestock conflicts has declined to 30 wolves, which equals approximately 7 percent of the minimum known wolf population in 2019 (WGFD et al. 2020, p. 3). Similarly, the total number of damage claims and compensation payments for wolf-caused livestock losses has declined as wolves have been under State management authority (WGFD 2020a, p. 16).

Generally, Wyoming has a higher percentage of packs involved in livestock depredations annually with more depredations occurring on public lands than Idaho or Montana (WGFD et al. 2020, pp. 20–21). Seasonal trends in depredations are similar to other States that have a high percentage of livestock seasonally grazed on public lands where a slight increase in depredations occurs during early spring, coinciding with calving season, followed by a slight drop then an increase during the late summer months of July, August, and September (WGFD et al. 2020, pp. 21–22).

In addition to wolf control for livestock depredations, WGFC Chapter 21 Section 6(c) provides WGFD authorization to lethally remove wolves should it be determined that they are causing unacceptable impacts to wildlife or when wolves displace elk from State-managed feedgrounds. Displaced elk may result in damage to privately stored crops, commingling with domestic livestock, or human safety concerns due to their presence on public roadways. To date, no wolves have been removed in Wyoming under these provisions. However, in some cases,

WGFD has used regulated public harvest of wolves to better direct sportsmen and -women to areas where it was believed wolves may be causing negative impacts to wildlife.

Since 2008, dependent on the Federal status of wolves in Wyoming, wolf management on the WRR has been guided by the amended 2008 10(j) rules for the nonessential experimental population of wolves in the Greater Yellowstone Area (73 FR 4720, January 28, 2008) or the provisions of a Service-approved WRR wolf management plan (Eastern Shoshone and Northern Arapaho Tribes 2008, entire). Under Federal or Tribal management authority, lethal take by private citizens or agencies is authorized if a wolf or wolves are caught in the act or if it is deemed necessary to resolve repeated conflicts with livestock. To date, a single wolf has been removed within the external boundaries of the WRR to mitigate conflicts with livestock. This wolf was included in the above totals when discussing lethal wolf control in Wyoming.

Wolf Population and Human-caused Mortality in Wyoming Summary—As expected, during those years when wolves were removed from Federal protections, human-caused mortality increased in Wyoming as WGFD implemented regulated harvest to manage wolf populations within the WTGMA. The WGFD set a population objective of 160 wolves within the WTGMA and has adaptively managed harvest to achieve this objective. Since 2009, during those years when wolves were federally listed (including years when harvest occurred under predator status only), the average rate of human-caused mortality was 14 percent. The average rate increased to 28 percent annually during those years when WGFD managed wolf populations with regulated public harvest. This management resulted in an overall negative growth rate for the wolf population in Wyoming during those years wolves were under State authority (an approximate 5 percent population decline on average during those years when wolves were federally delisted). This gradual decline was expected as WGFD began to use harvest to meet

wolf population objectives within the WTGMA (77 FR 55553, September 10, 2012). However, the observed decline is not expected to last because WGFD will continue to adaptively manage harvest to stabilize the wolf population at 160 wolves within the WTGMA (WGFD et al. 2020, p. 14), as has been evidenced by a slight increase in the statewide minimum wolf count in 2019 (see table 3). Minor variations around the average number of wolves removed in agency control actions, combined with other forms of mortality (i.e., illegal take, natural causes, vehicle collisions, and unknown causes), can influence whether or not desired population objectives are achieved within the WTGMA, so annual adjustments to harvest limits will continue to be made accordingly in order to achieve WGFD management objectives and still maintain the recovered status of wolves in Wyoming.

Managers in YNP and the WRR have not set population objectives and have, for the most part, allowed wolves to naturally regulate. As a result, the number of wolves in YNP appear to have reached an equilibrium and have fluctuated slightly around 100 wolves for the past 10 years, while the number of wolves on the WRR has varied between 10 and 20 over the same time period. Regardless of how different agencies manage wolves, wolf populations have remained well above the Federal recovery targets of at least 10 breeding pairs and 100 wolves statewide, and we expect them to stay above this level because various jurisdictions in the State continue to coordinate to manage for a sustainable population of wolves in Wyoming.

Regulated Harvest in Oregon—No regulated hunting or trapping of wolves is authorized in Oregon.

Depredation Control in Oregon—In Oregon, an integrated approach to minimize wolf depredation risk has been implemented that incorporates both proactive and corrective measures. The primary objective of ODFW when addressing wolf-livestock conflicts is to continue to

implement a three-phased approach based on population objectives that minimizes conflicts with livestock while ensuring conservation of wolves in the State (ODFW 2019, p. 44). This phased approach to wolf management emphasizes preventive and nonlethal methods in Phase I and provides for increased management flexibility when the wolf population is in Phase III. Presently, wolves inhabiting the West Wolf Management Zone (WWMZ) are managed under Phase I guidelines in the Oregon Wolf Conservation and Management Plan and associated rules, whereas wolves in the East Wolf Management Zone (EWMZ) are managed under Phase II guidelines. Wolves remain federally protected in the entirety of the WWMZ, whereas wolves in the EWMZ are federally protected in half of the management zone and are under State management authority in the other half (see figure 1, ODFW 2020, p. 3). Nonlethal methods will be prioritized to address wolf conflicts with livestock regardless of wolf population status (ODFW 2019, p. 45); however, lethal control may be authorized only in the eastern half of the EWMZ where they are under State management authority per OAR 635-110-0030.

Under Phase III wolf management (OAR 635-110-0030), lethal force may be used by property owners, livestock producers, or their designated agents to kill a wolf that is in the act of biting, wounding, killing, or chasing livestock or working dogs. If nonlethal methods were implemented following depredation events, but were unsuccessful at deterring recurrent depredations, ODFW may also issue a lethal take permit of limited duration to a livestock producer to kill a wolf. Similarly, ODFW, or their agents, may conduct lethal removal on private and public lands to minimize recurrent depredation risk. If wolves are taken by private citizens, take must be reported to ODFW within 24 hours. The ODFW Commission may also authorize controlled take in specific areas to address long-term, recurrent depredations or significant wolf-ungulate interactions.

Since 2009, agency-directed lethal control has resulted in the removal of 16 wolves in Oregon over an 11-year period. Additionally, two wolves have been legally taken by livestock producers or their designated agents when they were caught in the act of attacking livestock in 2016 (ODFW 2017, p. 11) and a herding dog in 2019 (ODFW 2020, p. 11). As a percentage of the total population of wolves in Oregon, lethal control of depredating wolves has removed an average of 2 percent of Oregon's wolf population annually (range: 0 to 13 percent). This amount is much lower than was documented in Idaho, Montana, and Wyoming during Service-directed wolf recovery in the NRM. No wolves have been removed in Oregon as a result of ODFW issuing a permit to a landowner or a livestock producer after two confirmed depredations or by controlled take through Commission authorization.

Wolf Population and Human-caused Mortality in Oregon Summary—Known human-caused mortality from all causes has resulted in the death of 40 wolves in Oregon since 2009. On average, human-caused mortality, inclusive of all sources, removes approximately 4 percent of the total wolf population in Oregon each year (range: 0 to 13 percent), which represents the lowest rate of human-caused mortality among States in the NRM. Since 2010, human-caused mortality has not exceeded 10 percent of the statewide wolf population in any given year, which has provided Oregon wolves the opportunity to increase at an average rate of 27 percent annually. As suitable wolf habitat in the northeast part of the State has become increasingly saturated, population growth has slowed somewhat and has ranged between 10 to 15 percent growth since 2017. Dispersing wolves from resident Oregon packs have recolonized portions of western Oregon as well as northern California and southeastern Washington.

In 2015, using an individual-based population model and vital rate estimates obtained from the literature for established or exploited wolf populations, ODFW documented a 0, 3, and

5 percent chance of conservation failure (defined as fewer than 4 breeding pairs) over a 5-, 10-, and 50-year period, respectively (ODFW 2015a, pp. 30–33). Further simulations suggested that as the wolf population in Oregon continued to increase, the risk of conservation failure concurrently declined. Rates of human-caused mortality up to 15 percent resulted in positive population growth, while rates of 20 percent caused population declines (ODFW 2015a, pp. 30–33). These rates of human-caused mortality were in addition to natural and other causes of mortality that were held constant and estimated at 12 percent. This resulted in a total mortality rate of 27 to 32 percent with which Oregon's wolf population would continue to increase or slightly decrease, respectively. These total mortality rates and their effects on wolf population growth in Oregon are comparable to wolf populations elsewhere (see NRM discussion above and USFWS 2020, p. 8). The rates of human-caused and total mortality in Oregon's wolf population are currently well below the thresholds described above and are estimated at 4 and 5 percent, respectively (see table 3). Mortality rates at this level provide ample opportunity for continued positive population growth and recolonization of suitable habitat in the State.

Regulated Harvest in Washington—To date, the Washington Department of Fish and Wildlife (WDFW) has not authorized and implemented regulated wolf harvest in the delisted portion of the State; however, the Confederated Tribes of the Colville Reservation (CTCR) and Spokane Tribe of Indians (STI) initiated regulated wolf harvest for Tribal members on Tribal lands only beginning in 2012 and 2013, respectively. Seasons have gradually become less restrictive to allow for increased hunter opportunity on CTCR Tribal lands. In 2019, the CTCR adopted wolf hunting regulations that allowed for year-round harvest with no bag limits (CCT Code Title 4 Natural Resources and Environment, Chapter 4–1, and Resolution 2019–255). Trapping is also permitted and seasons begin on November 1 and close February 28 with no bag

limits on amount of take. As of December 31, 2019, 12 wolves have been legally harvested on CTCR lands since 2012.

Regulated wolf harvest is also allowed for Tribal members on the Spokane Indian Reservation in Washington. As stated previously, regulated wolf harvest began in 2013 and, similar to CTCR, has been designed to increase hunter opportunity, although the level of take has remained relatively low. At present, annual allowable take is a maximum of 10 wolves that may be harvested within the calendar year. If the maximum allowable take is reached, the season will close until the start of the next calendar year. Trapping and/or snaring on the Spokane Reservation is allowed by special permit only, issued by the STI Department of Natural Resources, and is open from October 1 through February 28. Between 2013 and 2019, 10 wolves have been legally harvested on the Spokane Indian Reservation.

Despite less restrictive regulations for harvest on Tribal lands in Washington, the total number of wolves legally harvested has been relatively low and has had minimal impact on wolf populations in the State (see table 3). Since 2012 when regulated take began, an average of 3 percent of the total statewide wolf population in Washington has been legally harvested annually (range: 0 to 4 percent).

Depredation Control in Washington—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). Nonlethal management of wolf conflicts is prioritized in the State (Wiles et al. 2011, p. 85; WDFW 2017, pp. 2–9). WDFW personnel work closely with livestock producers to implement conflict prevention measures suitable to each producers' operation. Interested livestock producers may

also enter into a Depredation Prevention Cooperative Agreement with WDFW, which provides a cost-share for the implementation of conflict prevention tools (WDFW et al. 2020, p. 24).

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) provides WDFW authority to implement lethal control to resolve repeated wolf-livestock conflicts when other methods were deemed unsuccessful in deterring depredations. The WDFW wolf-livestock and interaction protocol provides specific guidelines for when lethal control may be implemented (WDFW 2017, pp. 14–15). 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, p. 15).

Under State law (RCW 77.36.030 and RCW 77.12.240), administrative rule (WAC 220-440-080), and the provisions of the Wolf Conservation and Management Plan, WDFW may permit a livestock producer or their authorized employees in the federally delisted portion of the State to lethally remove wolves caught in the act of attacking livestock on private property or lawfully used public grazing allotments after a documented livestock depredation caused by wolves. Furthermore, WAC 220-440-080 provides authority for owners of domestic animals and their immediate family members or designated agents to kill one gray wolf without a permit in the delisted part of Washington if the wolf is attacking their animals (caught-in-the-act rule). Any wolf removed under these provisions must be reported to WDFW within 24 hours of take and the carcass must be surrendered to the agency.

Lethal control of depredating wolves was first used to mitigate wolf conflicts with livestock in 2012 when WDFW removed 7 wolves. Between 2013 and 2019, as Washington's wolf population continued to increase in number and expand in range, WDFW has used lethal

control to resolve wolf conflicts with livestock in 5 of 7 years. In total, 31 wolves have been removed by WDFW due to conflicts with livestock between 2008, when wolves were first documented in the State, and 2019.

No wolves have been legally removed under authority of a lethal take permit issued to a livestock producer after a documented depredation. However, four wolves have been killed by owners of domestic animals under the caught-in-the-act rule, two each in 2017 and 2019.

The goal of wolf-livestock conflict management on the Colville Reservation is to resolve conflicts before they become chronic (Colville Confederated Tribes Fish and Wildlife Department [CCTFWD] 2017, p. 24). Potential livestock depredations on the Colville Reservation will be investigated by CCTFWD personnel. The CCTFWD personnel will work with livestock owners proactively and reactively to prevent and/or resolve conflicts as they arise (CCTFWD 2017, p. 24). To date, no wolves have been removed to resolve conflicts with livestock on the Colville Reservation.

The effect of agency-directed and private individual lethal control on Washington's wolf population has been relatively minor to date. Overall, the percentage of wolves removed annually through lethal control in Washington is less than what was documented in the core of the NRM in the years following wolf reintroduction. In Washington, as a percent of the minimum known population, an average of 4 percent of the total statewide wolf population has been removed due to conflicts with livestock annually (range: 0 to 12 percent; see table 3).

Analyses of factors that contribute to wolf-livestock conflicts in Washington indicate that, in general, areas having a high abundance of livestock (Hanley et al. 2018a, pp. 8–10) or high densities of both wolves and livestock (Hanley et al. 2018b, pp. 8–11) are at higher risk for conflict. Also, persistent wolf presence has not been documented in some Washington counties

with the highest risk of wolf-livestock conflicts based on cattle abundance alone (Hanley et al. 2018a, p. 10), thus the potential exists for increased levels of conflict as wolves continue to recolonize portions of the State. Similar to Wyoming, but contrary to what has been documented in Montana and Idaho, most livestock depredations in Washington have occurred on public grazing allotments (Hanley et al. 2018a, pp. 8–10) where greater challenges exist to minimize conflict risk.

Wolf Population and Human-caused Mortality in Washington Summary—Since 2008 when wolves were first documented in Washington, human-caused mortality has been responsible for the average removal of 9 percent of the known wolf population annually; and has fluctuated between 6 percent and 11 percent of the known population annually since 2013 (see table 3). Over a similar time period, the mean total wolf mortality rate has been 10 percent and ranged between 7 percent and 13 percent since 2013 (see table 3). According to the Washington Wolf Conservation and Management Plan, wolf recovery will be achieved when a minimum of 15 breeding pairs are equitably distributed across 3 wolf recovery areas in the State for 3 consecutive years or when 18 breeding pairs are documented for a single year (Wiles et al. 2011, pp. 58–70). Analyses indicate that once recovery is achieved, Washington's wolf population would be relatively resilient to increases in human-caused mortality provided a low level of dispersal from outside the State continues (Maletzke et al. 2015, p. 7).

Concurrent with increased rates of human-caused mortality, wolf numbers and distribution have continued to increase in Washington, although the rate of increase has slowed somewhat in recent years (WDFW et al. 2020, pp. 12–20). Since 2010, wolf populations have increased an average of 26 percent annually as dispersing wolves originating from both inside and outside of Washington continue to recolonize vacant suitable habitat in the State. Population

growth has been most rapid in the eastern Washington recovery area due to its proximity to large wolf populations in the NRM and Canada. However, as suitable habitat in eastern Washington has become increasingly saturated with wolves, statewide population growth has declined in recent years (WDFW et al. 2020, pp. 12–20) and has ranged between 3 and 15 percent since 2017. Increases in wolf abundance and distribution continue at a moderate pace in the North Cascades recovery area. Documentation of dispersing individuals continues in the Southern Cascades and Northwest Coast recovery area, but, to date, confirmation of a resident pack has not occurred. Slow recolonization of this recovery area was anticipated by WDFW (Wiles et al. 2011, p. 69). Factors that may be contributing to the lack of documented, resident wolves in southwest Washington may include its distance from large wolf population centers and the availability of intervening suitable habitat between it and those population centers. However, with continued positive population growth and relatively low levels of human-caused mortality, substantial opportunities remain for dispersing wolves to recolonize vacant suitable habitat in Washington even though this may occur at a slower pace than some expect.

Table 3. Annual number of gray wolves known to have died by various causes, percent annual mortality, and statewide minimum wolf counts in the NRM DPS States from 2009–2019.

Year	Idaho					Montana							Wyoming					Oregon[1]				Washington				
	# Control	# Harvest	# Total Mortality[2]	% Total Mortality[3]	Yr. End Min. Count	# Control	# Harvest	# Total Mortality[2]	% Total Mortality[3] (Min. Count)	Yr. End Min. Count	% Total Mortality[3] (POM[4])	POM[4] Estimate	# Control	# Harvest[5]	# Total Mortality[2]	% Total Mortality[3]	Yr. End Min. Count	# Control	# Total Mortality[2]	% Total Mortality[3]	Yr. End Min. Count	# Control	# Harvest	# Total Mortality[2]	% Total Mortality[3]	Yr. End Min. Count
2009	93	135	272	24%	870	145	72	258	33%	524	23%	847	32	0	57	15%	320	2	2	13%	14	0	0	0	0%	14
2010	78	46	144	16%	777	141	0	179	24%	566	17%	862	40	0	69	17%	343	0	1	5%	21	0	0	0	0%	19
2011	63	200	296	28%	768	64	121	216	25%	653	18%	971	37	0	64	16%	328	2	3	9%	29	0	0	0	0%	35
2012	73	329	425	37%	722	108	175	324	34%	625	26%	915	43	67	136	33%	277	0	0	0%	48	7	0	9	15%	51
2013	94	356	473	42%	659	75	231	335	35%	627	24%	1,088	33	63	109	26%	306	0	3	4%	64	0	1	5	9%	52
2014	67	256	360	32%	770	57	213	306	36%	554	25%	898	37	12	78	19%	333	0	0	0%	81	1	0	10	13%	68
2015	75	256	357	31%	786	39	205	276	34%	536	22%	981	54	0	84	18%	382	0	7	6%	110	0	3	7	7%	90
2016	70	267	NA	NA	NA	52	255	334	41%	477	29%	814	113	0	132	26%	377	5	7	6%	112	7	3	14	11%	115
2017	NA	281	NA	NA	NA	57	233	305	33%	633	26%	854	62	77	168	33%	347	5	13	9%	124	5	3	14	10%	122
2018	NA	329	NA	NA	NA	60	259	341	NA	NA	29%	819	66	85	177	38%	286	3	7	5%	137	4	6	12	9%	126
2019	NA	NA	NA	NA	1,000[6]	NA	NA	NA	NA	NA	NA	NA	30	49	96	24%	311	1	7	4%	158	11	6	21	13%	145

[1]Legal harvest not authorized by the State.

[2]Total represents all known mortality during the associated calendar year.

[3]Annual percent total mortality based on known number of wolves and known total number of wolves that died that year of any cause. Derived by adding # Total Mortality to Year End Minimum Count (i.e., the minimum number of wolves known to be alive at some point during the year), and then dividing by the # Total Mortality the number known to be alive during that year.

[4]Patch occupancy modeling.

[5]Includes harvest in trophy game (i.e., WTGMA) and predatory animal areas.

[6]Estimate not derived using minimum population count method; thus, not directly comparable to prior year counts.

Effects on Wolf Social Structure and Pack Dynamics

Although wolf populations typically have a high rate of natural turnover (Mech 2006a, p. 1482), increased human-caused mortality may negatively affect the pack dynamics and social structure of gray wolves. However, we do not expect these effects will have a significant impact at the population level due to the life-history characteristics of gray wolves. In most instances, only the dominant male and female in a pack breed. Consequently, the death of one or both of the breeders may negatively affect the pack (via reduced pup survival/recruitment or pack dissolution) or the population as a whole (by reduced recruitment, reduced dispersal rates, or a reduction or reversal of population growth), but these effects are context-dependent. The availability of replacement breeders and the timing of mortality can moderate the consequences of breeder loss on both the pack and the population (Brainerd et al. 2008, entire; Borg et al. 2014, entire; Schmidt et al. 2017, entire; Bassing et al. 2019, entire). In populations that are at or near carrying capacity, where breeder replacement and subsequent reproduction occurs relatively quickly, population growth rate and pack distribution and occupancy is largely unaffected by breeder loss (Borg et al. 2014, pp. 6–7; Bassing et al. 2019, pp. 582–584). Breeder replacement and subsequent reproduction in colonizing populations greater than 75 wolves was similar to that of core populations at or near carrying capacity, whereas small recolonizing populations (≤75 wolves) took about twice as long to replace breeders and subsequently reproduce (Brainerd et al. 2008, pp. 89, 93). Therefore, the effects of breeder loss may be greatest on small recolonizing gray wolf populations. In some cases where extremely high rates of human-caused mortality were intentionally used to drastically reduce wolf populations, immigration from neighboring areas was found to be the most important determinant in the speed with which wolf populations

recovered (Bergerud and Elliot 1998, pp. 1554–1559, 1562; Hayes and Harestead 2000, pp. 44–46).

In the short term, increased human-caused mortality can result in lower natality rates (the number of pups produced) and pup survival in individual packs due to an overall reduction in pack size and the loss of one or both breeders (Schmidt et al. 2017, pp. 14–18; Ausband et al. 2017a, pp. 4–6). However, wolf populations respond to decreased densities resulting from increased human-caused mortality by increasing reproductive output (Schmidt et al. 2017, pp. 14–18). This could partially explain the fact that the reduction in pack sizes observed in Idaho after wolf hunts began was short-lived, as pack sizes rebounded to levels documented prior to the initiation of hunting seasons and mid-year recruitment of young was similar during periods of harvest versus without (Horne et al. 2019a, pp. 37–38). In another study, breeding female turnover increased polygamy within packs while breeding male turnover reduced recruitment of female pups, although the mechanisms for the latter were unknown (Ausband et al. 2017b, pp. 1097–1098). Mortality of breeding gray wolves was more likely to lead to pack dissolution and reduced reproduction when mortality occurred very near to, or during, the breeding season (Borg et al. 2014, p. 8, Ausband et al. 2017a, pp. 4–5) and when pack sizes were small (Brainerd et al. 2008, p. 94; Borg et al. 2014, pp. 5–6). Nonetheless, harvest had no effect on the frequency of breeder turnover in Idaho (Ausband et al. 2017b, p. 1097) and little evidence of pack dissolution was found in a heavily harvested wolf population with frequent breeder loss in southwestern Alberta (Bassing et al. 2019, pp. 584–585).

Bryan et al. (2015, pp. 351–354) indicated that high rates of human-caused mortality resulted in physiological changes to wolves that increased levels of cortisol as well as reproductive hormones. The authors suggest these results were indicative of social disruptions to

the pack that affected the rate of female pregnancy or psuedopregnancy and the number of interindividual interactions among male wolves (Bryan et al. 2015, pp. 351–352). However, it was unknown if these physiological changes affected overall fitness (i.e., reproductive and population performance) of the affected wolf population or if other factors contributed equally to, or more than, wolf harvest (Bryan et al. 2015, pp. 351–354). Boonstra (2012, entire) suggested that chronic stress in wildlife was rare, but could be considered adaptive in that it benefits the affected species, which allows it to adapt to changing conditions to maintain, or improve, long-term fitness. Indeed, Bryan et al. (2015, p. 351) suggested that the physiological changes observed in the stressed wolf population could be considered adaptive and beneficial to the wolf when dealing with the specific stressors. Due to the inherent challenges associated with interpreting the specific causes and effects of stress in wildlife, experimental field studies that evaluate potential factors contributing to observed increases in stress and their associated positive or negative effects on wildlife populations are warranted (Boonstra 2012, p. 10).

Overall, gray wolf pack social structure is very adaptable and resilient. Breeding members can be quickly replaced from either within or outside the pack, and pups can be reared by another pack member should their parents die (USFWS 2020, p. 7). Consequently, wolf populations can rapidly overcome severe disruptions, such as intensive human-caused mortality or disease, provided immigration from either (or both) within the affected population or from adjacent populations occurs (Bergerud and Elliot 1998, pp. 1554–1559; Hayes and Harestad 2000, pp. 44–46; Bassing et al. 2019, entire). Although we acknowledge that breeder loss can and will occur in the future regardless of Federal status, we conclude that the effects of breeder loss on gray wolves in the lower 48 United States is likely to be minimal as long as adequate regulatory mechanisms are in place to ensure a sufficiently large population is maintained.

The Role of Public Attitudes

In general, human attitudes toward wolves vary depending upon how individuals value wolves in light of real or perceived risks and benefits (Bruskotter and Wilson 2014, entire). An individual who views wolves as threatening is likely to have a more negative perception than an individual who believes wolves are beneficial. This perception may be directly influenced by an individual's proximity to wolves (Houston et al. 2010, pp. 399–401; Holsman et al. 2014, entire; Carlson et al. 2020, pp. 4–6), personal experiences with wolves (Houston et al. 2010, pp. 399–401; Browne-Nunez et al. 2015, pp. 62–69), or indirect factors such as social influences (e.g., news and social media, internet, friends, relatives) and governmental policies (Houston et al. 2010, pp. 399–401; Treves and Bruskotter 2014, p. 477, Browne-Nunez et al. 2015, pp. 62–69; Olson et al. 2014, entire; Chapron and Treves 2016, p. 5; Lute et al. 2016, pp. 1208–1209; Carlson et al. 2020, pp. 4–6). Consequently, wolves often invoke deep-seated issues related to identity, fear, knowledge, empowerment, and trust that are not directly related to the issues raised in this rulemaking (Naughton-Treves et al. 2003, pp. 1507–1508; Madden 2004, p. 250; Madden and McQuinn 2014, pp. 100–102; Browne-Nunez et al. 2015, p. 69; Carlson et al. 2020, pp. 4–6). Due to these known human attitudes, in our 1978 rule reclassifying wolves, we acknowledged that regulations prohibiting the killing of wolves, even wolves that may be attacking livestock and pets, could create negative sentiments about wolves and their recovery under the protections of the Act. We acknowledge that public attitudes towards wolves vary with demographics, change over time, and can affect human behavior toward wolves, including poaching (illegal killing) of wolves (See Kellert 1985, 1990, 1999; Nelson and Franson 1988; Kellert et al. 1996; Wilson 1999; Browne-Nuñez and Taylor 2002; Williams et al. 2002;

Manfredo et al. 2003; Naughton-Treves et al. 2003; Madden 2004; Mertig 2004; Chavez et al. 2005; Schanning and Vazquez 2005; Beyer et al. 2006; Hammill 2007; Schanning 2009; Treves et al. 2009; Wilson and Bruskotter 2009; Shelley et al. 2011; Treves and Martin 2011; Treves et al. 2013; Madden and McQuinn 2014; Hogberg et al. 2016; Lute et al. 2016).

Surveys have indicated that overall public support for legal, regulated wolf hunting is relatively high, but negative attitudes about wolves persist and overall tolerance for wolves remains low (Browne-Nunez 2015 pp. 62–69; Hogberg et al. 2016, pp. 49–50; Lute et al. 2016, pp. 1206–1208; Lewis et al. 2018, entire). Hogberg et al. (2016, p. 50) documented an overall decline in tolerance for wolves after public harvest occurred in Wisconsin, which indicates that hunting may not be the most effective policy to increase tolerance for the species (Epstein 2017, entire). However, Hogberg et al. (2016, p. 50) also documented that 36 percent of respondents self-reported an increase in their tolerance towards wolves after wolf hunting began in Wisconsin. Similarly, a survey conducted in Montana (Lewis et al. 2018, entire) found that while overall tolerance remained low compared to a similar survey from 2012, it had slightly increased over time as the State has continued to manage wolves primarily through public harvest. Furthermore, statements made by interviewees regarding hunting and trapping of wolves in Montana indicate that, if those management options were no longer available to them, their tolerance and acceptance of the species would likely decline, resulting in increased polarization of opinions about wolves (Mulder 2014, p. 68). These studies suggest that the passage of time (which may be considered equivalent to an individual getting used to having wolves on the landscape even though wolves may still be disliked) and the belief that State management provides more opportunities for an individual to assist with wolf population management are two factors, of many, that may slowly increase tolerance for wolves. Although general trends in

overall attitudes towards wolves are most often obtained through surveys, Browne-Nunez et al. (2015, p. 69) cautioned that these surveys often do not capture the complexity of attitudes that more personal survey techniques, such as focus groups, allow. Furthermore, Decker et al. (2006, p. 431) stressed the importance of providing details about situational context when evaluating human attitudes towards specific wildlife management actions.

Human attitudes may be indicative of behavior (Bruskotter and Fulton 2012, pp. 99–100). Thus, it has been theorized that if tolerance for a species is low or declining, the likelihood for illegal activity towards that species may increase. Individual attitudes and behaviors may then be manifested by actions directed towards the species. In the case of wolves, if an individual feels they have limited management options to mitigate a real or perceived conflict, they may be more likely to act illegally in an attempt to address the conflict. Indeed, using empirical data from Wisconsin, researchers studied trends in the illegal killing of wolves and documented that rates of illegal take of wolves in the State was higher during periods of less management flexibility (e.g., during periods when wolves were federally protected) when compared to more flexible State management that permitted lethal control of depredating wolves as a mitigation response (Olson et al. 2014, entire). Another study contradicted these results and indicated that illegal take of wolves increased during periods of State management in Wisconsin and Michigan because, the authors argued, the perceived value of wolves declined as agencies increased culling activities (Chapron and Treves 2016, entire). However, this analysis has since been refuted by Olson et al. (2017, entire) and Pepin et al. (2017, entire). Furthermore, Stein (2017, entire) reanalyzed the same data but included variation in reproductive rates and concluded that the use of lethal depredation control to mitigate wolf-livestock conflicts decreased the likelihood of illegal take.

Strong emotions and divergent viewpoints about wolves and wolf management will continue regardless of the Federal status of the species. We expect that some segments of the public will be more tolerant of wolf management at the State level because it may be perceived by some as more flexible than Federal regulation, whereas other segments may continue to prefer Federal management due to a perception that it is more protective. State wildlife agencies have professional staff dedicated to disseminating accurate, science-based information about wolves and wolf management. They also have experience in managing wildlife to maintain long-term sustainable populations with enforcement staff to enforce State wildlife laws and regulations. To be more inclusive of constituents with different values, several States, including Washington and Wisconsin, have convened advisory committees to engage multiple stakeholder groups in discussing and addressing present and future management in their respective States (WDFW 2020, entire; WI DNR 2020, entire). As the status and management of the gray wolf evolves, continued collaboration between managers and researchers to monitor public attitudes toward wolves and their management will help guide State conservation actions.

Human-caused Mortality Summary

Despite human-caused wolf mortality, wolf populations have continued to increase in both number and range since the mid-to-late 1970s (Smith et al. 2010, entire; O'Neil et al. 2017, entire; Stenglein et al. 2018, entire). Although legal mortality (primarily in the form of legal harvest and lethal control) will increase in the Great Lakes area after delisting, as has occurred within the NRM states of Idaho, Montana, and Wyoming, we do not expect that this will have a significant effect on the wolf population in this area. We also do not expect to see significant increases in human-caused mortality in the West Coast States primarily because those States

have regulatory mechanisms in place that balance wolf management and wolf conservation. Similarly, we do not expect that current, or potentially increased, levels of human-caused mortality post-delisting will have a significant effect on the recolonization and establishment of wolves in the central Rocky Mountain States due to the life- history characteristics of wolves and their ability to recolonize vacant suitable habitat. Furthermore, the central Rocky Mountain States have existing laws and regulations to conserve wolves, and Utah has a management plan that will be implemented post-delisting to guide wolf management in the State. Based on knowledge gained about wolf population responses to increases in human-caused mortality during past delisting efforts in the Great Lakes area, as well as the currently delisted NRM wolf population, we expect to see an initial population decline followed by fluctuations around an equilibrium resulting from slight variations in birth and death rates. Further, compensatory mechanisms in wolf populations provide some resiliency to perturbations caused by increased human-caused mortality. Wolves have evolved mechanisms to compensate for increased mortality, which makes populations resilient to perturbations.

Minnesota, Wisconsin, and Michigan will use adaptive management to respond to wolf population fluctuations to maintain populations at sustainable levels well above Federal recovery requirements defined in the Revised Recovery Plan. Because wolf population numbers in each of these three States are currently much higher than Federal recovery requirements, we expect to see some reduction in wolf populations in the Great Lakes area when they are delisted as States implement lethal depredation control and decide whether to institute wolf hunting seasons with the objective of stabilizing or reversing population growth. However, the States have plans in place to achieve their goal of maintaining wolf populations well above Federal recovery targets (see **Post-delisting Management**).

The 2019 State management plan for Oregon and the 2016 plan for California do not include population-management goals (Oregon Department of Fish and Wildlife (ODFW) 2019, p. 17; California Department of Fish and Wildlife (CDFW) 2016a, p. 12). While the 2011 Washington State management plan does not include population-management goals, it includes recovery objectives intended to ensure the reestablishment of a self-sustaining population of wolves in Washington (Wiles et al. 2011, p. 9). We expect these States will manage wolves through appropriate laws and regulations to ensure recovery objectives outlined in their respective wolf management plans are achieved. The State management plan for Utah, which will be implemented when wolves are federally delisted statewide, will guide management of wolves until 2030 or until at least two breeding pairs occur in the State for two consecutive years, or until the assumptions of the plan change. For additional information on management plans and objectives in California, Oregon, Washington, and Utah, see **Post-delisting Management**.

Habitat and Prey Availability

Gray wolves are habitat generalists (Mech and Boitani 2003, p. 163) and once occupied or transited most of the United States, except the Southeast. To identify areas of suitable wolf habitat in the lower 48 United States, researchers have used models that relate the distribution of wolves to characteristics of the landscape. These models have shown the presence of wolves is correlated with prey density, livestock density, landscape productivity, winter rainfall, snow, topography, road density, human density, land ownership, habitat patch size, and forest cover (e.g., Mladenoff et al. 1995, pp. 284–292; Mladenoff et al. 1999, pp. 41–43; Carroll et al. 2006, p. 542; Oakleaf et al. 2006, pp. 558–559; and Hanley et al. 2018a, pp. 6–8). Aside from direct

and indirect measures of prey availability and livestock density, these environmental variables are proxies for the likelihood of wolf–human conflict and the ability of wolves to escape human-caused mortality. Therefore, predictions of suitable habitat generally depict areas with sufficient prey, where human-caused mortality is likely to be relatively low due to limited human access, high amounts of escape cover, or relatively low numbers of wolf–livestock conflicts. We consider suitable habitat to be areas containing adequate wild ungulate populations (e.g., elk and deer), adequate habitat cover, and areas with low enough wolf–human conflict (which generally precipitates human-caused wolf mortality) to allow populations to persist (see Mech 2017, pp. 312–315).

Much of the area currently occupied by wolves corresponds to what is considered suitable wolf habitat in the lower 48 United States as modeled by Oakleaf et al. (2006, entire), Carroll et al. (2006, entire), Mladenoff et al. (1995, entire), and Mladenoff et al. (1999, entire). Habitat and population models indicate that, if human-caused wolf mortality can be sufficiently limited, wolves will likely continue to recolonize areas of the Pacific Northwest (Maletzke et al. 2015, entire; ODFW 2015b, entire) and California (Nickel and Walther 2019, pp. 386–389); and could become established in the central and southern Rocky Mountains (Carroll et al. 2006, pp. 27, 31–32), and the Northeast (Mladenoff and Sickley 1998, p. 3). While it is also possible for wolves to recolonize other non-forested portions of their historical range in the Midwest (Smith et al. 2016, entire), relatively high densities of livestock and limited hiding cover for wolves (forests) in this region are likely reasons that wolves have failed to recolonize this area (Smith et al. 2016, pp. 560–561).

In addition to suitable habitat, we assessed prey availability based on population estimates and population targets provided by State wildlife agencies, as well as land management

activities that might affect prey populations (see below). Prey availability is a primary factor in sustaining wolf populations. Each State within wolf-occupied range manages its wild ungulate populations sustainably. States employ an adaptive-management approach that adjusts hunter harvest in response to changes in big game population numbers and trends when necessary, and predation is one of many factors considered when setting seasons. We acknowledge the continued spread of chronic wasting disease (CWD) among cervids in North America and provide some additional information here regarding our current state of knowledge of this emerging disease and potential impacts to wolf prey. CWD is a contagious prion disease that affects hoofed animals, such as deer, elk, and moose, is neurodegenerative, rapidly progressive, and always fatal (reviewed by Escobar et al. 2020, entire). Prions are the proteinaceous infection agents responsible for prion diseases (Escobar et al. 2020, p. 2) that are hardy in the environment and can remain infective for years to decades (reviewed by Escobar et al. 2020, p. 8). CWD was first identified in a Colorado research facility in the 1960s, and in wild deer in 1981 (CDC 2020, unpaginated). CWD continues to spread in North America (Escobar et al. 2020, p. 24) and is currently confirmed in 24 States (CDC 2020, unpaginated). Within the current range of the gray wolf, CWD has been confirmed in Montana, Wyoming, Colorado, Minnesota, Wisconsin, and Michigan (CDC 2020, unpaginated).

While CWD has caused population declines of deer and elk in some areas (e.g., Miller et al. 2008, pp. 2–6; Edmunds et al. 2016, p. 12; DeVivo et al. 2017, entire), the prevalence of the disease across the landscape is not evenly distributed and there is still much to learn about CWD prevalence, the spatial distribution of the disease, transmission, and the elusive properties of prions (Escobar et al. 2020, pp. 7–13). State wildlife agencies—all of whom have a vested interest in maintaining robust populations of deer, elk, and moose—have developed surveillance

strategies and management response plans to minimize and mitigate this threat to cervids to the maximum extent practicable (CPW 2018, entire; MFWP 2019a, entire; WGFD 2020b, entire; MI DNR and MDARD 2012, entire; WI DNR 2010, entire; MN DNR 2019, entire; IDFG 2018, entire). Simulation models predict that predation by wolves and other carnivores can lead to a significant reduction in the prevalence of CWD infections across the landscape (see Hobbs 2006, p. 8; Wild et al. 2011, pp. 82–88), thereby slowing its spread, partially because large carnivores selectively prey on CWD-infected individuals (Krumm et al. 2010, p. 210). However, in areas of high disease prevalence, prion epidemics can negatively affect local prey populations even with selective predation pressure (Miller et al. 2008, p. 2). How prey populations are altered by the emergence of CWD at larger geographic scales remains to be determined (Miller et al. 2008, p. 2). While some have speculated that wolves and other carnivores may be vectors for spreading the disease—or, conversely, slowing the spread of the disease—neither has been empirically shown in the wild (Escobar et al. 2020, p. 10).

Great Lakes Area: Suitable Habitat

Various researchers have investigated habitat suitability for wolves in the central and eastern portions of the United States. Most of these efforts have focused on using a combination of human density, density of agricultural lands, deer density or deer biomass, and road density, or have used road density alone to identify areas where wolf populations are likely to persist or become established (Mladenoff et al. 1995, pp. 284–285; 1997, pp. 23–27; 1999, pp. 39–43; Harrison and Chapin 1997, p. 3; 1998, pp. 769–770; Mladenoff and Sickley 1998, pp. 1-8; Wydeven et al. 2001, pp. 110–113; Erb and Benson 2004, p. 2; Potvin et al. 2005, pp. 1661–1668; Mladenoff et al. 2009, pp. 132–135; Smith et al. 2016, pp. 559–562).

To a large extent, road density has been adopted as the best predictor of habitat suitability in the Midwest due to the connection between roads and human-caused wolf mortality. Several studies demonstrated that wolves generally did not maintain breeding packs in areas with a road density greater than about 0.9 to 1.1 linear mi per mi^2 (0.6 to 0.7 km per km^2) (Thiel 1985, pp. 404–406; Jensen et al. 1986, pp. 364–366; Mech et al. 1988, pp. 85–87; Fuller et al. 1992, pp. 48–51). Work by Mladenoff and associates indicated that colonizing wolves in Wisconsin preferred areas where road densities were less than 0.7 mi per mi^2 (0.45 km per km^2) (Mladenoff et al. 1995, p. 289). Later work showed that during early colonization wolves selected some of the lowest road density areas, but as the wolf population grew and expanded, wolves accepted areas with higher road densities (Mladenoff et al. 2009, pp. 129–136). Research in the Upper Peninsula of Michigan indicates that, in some areas with low road densities, low deer density appears to limit wolf occupancy (Potvin et al. 2005, pp. 1667–1668) and may prevent recolonization of portions of the Upper Peninsula. In Minnesota, a combination of road density and human density is used by Minnesota Department of Natural Resources (MN DNR) to model suitable habitat. Areas with a human density up to 20 people per mi^2 (8 people per km^2) are suitable if they also have a road density less than 0.8 mi per mi^2 (0.5 km per km^2). Areas with a human density of less than 10 people per mi^2 (4 people per km^2) are suitable if they have road densities up to 1.1 mi per mi^2 (0.7 km per km^2) (Erb and Benson 2004, table 1). Smith et al. (2016, p. 560) relied mainly on road density and human population density to assess potential wolf habitat across the central United States, and thus may show exaggerated potential for wolf colonization, especially in the western Great Plains that lack forest cover.

Road density is a useful parameter because it is easily measured and mapped, and because it correlates directly and indirectly with various forms of other human-caused wolf

mortality. A rural area with more roads generally has a greater human density, more vehicular traffic, greater access by hunters and trappers, more farms and residences, and more domestic animals. As a result, there is a greater likelihood that wolves in such an area will encounter humans, domestic animals, and various human activities. These encounters may result in wolves being hit by motor vehicles, being subjected to government control actions after becoming involved in depredations on domestic animals, being shot intentionally by unauthorized individuals, being trapped or shot accidentally, or contracting diseases from domestic dogs (Mech et al. 1988, pp. 86–87; Mech and Goyal 1993, p. 332; Mladenoff et al. 1995, pp. 282, 291). Stenglein et al. (2018, p. 106) demonstrated that in the core of wolf range and in high-quality habitat, survival rate ranged 0.78–0.82. At the edge of wolf range and into more marginal habitat, survival rates declined to 0.49–0.61 (Stenglein et al. 2018, p. 106). Also, natural mortality was more prevalent in core habitat, whereas there was a shift to a prominence of human-caused mortality in more marginal habitat (Stenglein et al. 2018, p. 107).

Some researchers have used a road density of 1 mi per mi^2 (0.6 km per km^2) of land area as an upper threshold for suitable wolf habitat. However, the common practice in more recent studies is to use road density to predict probabilities of persistent wolf pack presence in an area. Areas with road densities less than 0.7 mi per mi^2 (0.45 km per km^2) are estimated to have a greater than 50 percent probability of wolf pack colonization and persistent presence, and areas where road density exceeded 1 mi per mi^2 (0.6 km per km^2) have less than a 10 percent probability of occupancy (Mladenoff et al. 1995, pp. 288–289; Mladenoff and Sickley 1998, p. 5; Mladenoff et al. 1999, pp. 40–41). The predictive ability of this model was questioned (Mech 2006b, entire; Mech 2006c, entire) and responded to (Mladenoff et al. 2006, entire), and an updated analysis of Wisconsin pack locations and habitat was completed (Mladenoff et al. 2009,

entire). This model maintains that road density is still an important indicator of suitable wolf habitat; however, lack of agricultural land is also a strong predictor of habitat that wolves occupy.

Wisconsin researchers view areas with greater than 50 percent probability of wolf pack colonization and persistence as "primary wolf habitat," areas with 10 to 50 percent probability as "secondary wolf habitat," and areas with less than 10 percent probability as unsuitable habitat (Wisconsin Department of Natural Resources (WI DNR) 1999, pp. 47–48).

The territories of packs that do occur in areas of high road density, and hence with low expected probabilities of occupancy, are generally near areas of more suitable habitat that are likely serving as a source of wolves, thereby assisting in maintaining wolf presence in the higher road density areas (Mech 1989, pp. 387–388; Wydeven et al. 2001, p. 112). It appears that essentially all suitable habitat in Minnesota is now occupied, range expansion has slowed, and the wolf population within the State has stabilized (Erb and Benson 2004, p. 7; Erb and DonCarlos 2009, pp. 57, 60; Erb et al. 2018, pp. 5, 8). This suitable habitat closely matches the areas designated as Wolf Management Zones 1 through 4 in the Revised Recovery Plan (USFWS 1992, p. 72), which are identical in area to Minnesota Wolf Management Zone A (MN DNR 2001, appendix III).

Recent surveys for Wisconsin wolves and wolf packs show that wolves have recolonized the areas predicted by habitat models to have low, moderate, and high probability of occupancy (primary and secondary wolf habitat). The late-winter 2017–2018 Wisconsin wolf survey identified packs occurring throughout the central Wisconsin forest area (Wolf Management Zone 2) and across the northern forest zone (Zone 1), with highest pack densities in the northwest and north-central forest (WI DNR 2018, entire). In Michigan, wolf surveys in winter 2017–2018

continue to show wolf pairs or packs (defined by Michigan DNR as two or more wolves traveling together) in every Upper Peninsula County (MI DNR 2018, entire).

Habitat suitability studies in the Upper Midwest indicate that the only large areas of suitable or potentially suitable habitat areas that are currently unoccupied by wolves are located in the northern Lower Peninsula of Michigan (Mladenoff et al. 1997, p. 23; Mladenoff et al. 1999, p. 39; Potvin 2003, pp. 44–45; Gehring and Potter 2005, p. 1239). One published Michigan study (Gehring and Potter 2005, p. 1239) estimates that this area could support 46 to 89 wolves while another study estimated that 110–480 wolves could exist in the northern Lower Peninsula (Potvin 2003, p. 39). A recent study that assessed potential den habitat and dispersal corridors in the northern Lower Peninsula determined that 736 mi^2 (1,906 km^2) of high-quality den habitat existed in the region, but the landscape has low permeability for wolf movement (Stricker et al. 2019, pp. 87–88). The northern Lower Peninsula is separated from the Upper Peninsula by the Straits of Mackinac, whose 4-mile (6.4-km) width freezes during mid- and late-winter in some years. In recent years there have been two documented occurrences of wolves in the northern Lower Peninsula, but there has been no indication of persistence beyond several months. Prior to those occurrences, the last recorded wolf in the Lower Peninsula was in 1910.

These northern Lower Peninsula patches of potentially suitable habitat contain a great deal of private land, are small in comparison to the occupied habitat on the Upper Peninsula and in Minnesota and Wisconsin, and are intermixed with agricultural areas and areas of higher road density (Gehring and Potter 2005, p. 1240). The Gehring and Potter study (2005, p. 1239) predicted 850 mi^2 (2,198 km^2) of suitable habitat (areas with greater than a 50 percent probability of wolf occupancy) in the northern Lower Peninsula. Potvin (2003, p. 21), using deer density in addition to road density, believes there are about 3,090 mi^2 (8,000 km^2) of suitable habitat in the

northern Lower Peninsula. Gehring and Potter (2005, p. 1239) exclude from their calculations those northern Lower Peninsula low-road-density patches that are less than 19 mi^2 (50 km^2), while Potvin (2003, pp. 10–15) does not limit habitat patch size in his calculations. Both of these area estimates are well below the minimum area described in the Revised Recovery Plan, which states that 10,000 mi^2 (25,600 km^2) of contiguous suitable habitat is needed for a viable isolated gray wolf population, and half that area (5,000 mi^2 or 12,800 km^2) is needed to maintain a viable wolf population that is subject to wolf immigration from a nearby population (USFWS 1992, pp. 25–26). Therefore, continuing wolf immigration from the Upper Peninsula may be necessary to maintain a future northern Lower Peninsula population.

Based on the above-described studies and the guidance of the 1992 Revised Recovery Plan, the Service has concluded that suitable habitat for wolves in the western Great Lakes area can be determined by considering four factors: road density, human density, prey base, and area. An adequate prey base is an absolute requirement. In much of the western Great Lakes area, with the exception of portions of the Upper Peninsula of Michigan where deep snow causes deer to congregate (yard-up) during winter, thereby limiting deer distribution and availability, white-tailed deer densities are well above management objectives set forth by the States, causing the other factors to become the determinants of suitable habitat. Road density and human density frequently are highly correlated; therefore, road density is often used as a predictor of habitat suitability. However, areas with higher road density may still be suitable if the human density is very low, so a consideration of both factors is sometimes useful (Erb and Benson 2004, p. 2). Finally, although the territory of individual wolf packs can be relatively small, packs are not likely to establish territories in areas of small, isolated patches of suitable habitat.

Great Lakes Area: Prey Availability

Deer (prey) decline, due to succession of habitat and severe winter weather, was identified as a threat at the time of listing. Wolf density is heavily dependent on prey availability (for example, expressed as ungulate biomass, Fuller et al. 2003, pp. 170–171), and the primary prey of wolves in the Great Lakes area is white-tailed deer, with moose being the second most important prey (DelGiudice et al. 2009, pp. 162–163). Prey availability is high in the Great Lakes area; white-tailed deer populations in the region have fluctuated (in response to natural environmental conditions) throughout the wolf recovery period, but have been consistently at relatively high densities (DelGiudice et al. 2009, p. 162).

Conservation of white-tailed deer and moose in the Great Lakes area is a high priority for State conservation agencies. As MN DNR points out in its wolf-management plan (MN DNR 2001, p. 25), it manages ungulates to ensure a harvestable surplus for hunters, nonconsumptive users, and to minimize conflicts with humans. To ensure a harvestable surplus for hunters, MN DNR must account for all sources of natural mortality, including loss to wolves, and adjust hunter harvest levels when necessary. For example, after severe winters in the 1990's, MN DNR modified hunter harvest levels to allow for the recovery of the local deer population (MN DNR 2001, p. 25). In addition to regulating the human harvest of deer and moose, MN DNR also plans to continue to monitor and improve habitat for these species.

Land management activities carried out by other public agencies and by private landowners in Minnesota's wolf range, including timber harvest and prescribed fire, incidentally and significantly improves habitat for deer, the primary prey for wolves in the State. Approximately one-half of the Minnesota deer harvest is in the Forest Zone, which encompasses most of the occupied wolf range in the State (Cornicelli 2008, pp. 208–209). There is no

indication that harvest of deer and moose or management of their habitat will significantly depress abundance of these species in Minnesota's primary wolf range.

In Wisconsin, the statewide post-hunt white-tailed deer population estimate for 2017 was approximately 1,377,100 deer, approximately 2 percent higher than in 2016 (Stenglein 2017, pp. 1–4). In the Northern Forest Zone of the State, the post-hunt population estimate has ranged from approximately 250,000 deer to more than 400,000 deer since 2002, with an estimate of 405,300 in 2017. Three consecutive mild winters and limited antlerless harvest may explain the population growth in the northern deer herd in 2017. The Central Forest Zone post-hunt population estimates have been largely stable since 2009 at 60,000–80,000 deer on average, with an estimate of 79,000 in 2017. The Central Farmland Zone deer population has increased since 2008, and the 2017 post-hunt deer population estimate was 368,100. For a third year in a row, the 2017 post-hunt deer population estimate in the Southern Farmland Zone exceeded 250,000 deer.

Because of severe winter conditions (persistent, deep snow) in the Upper Peninsula, deer populations can fluctuate dramatically from year to year. In 2016, the MI DNR finalized a new deer-management plan to address ecological, social, and regulatory shifts. An objective of this plan is to manage deer at the appropriate scale, considering impacts of deer on the landscape and on other species, in addition to population size (MI DNR 2016, p. 16). Additionally, the Michigan wolf-management plan addresses maintaining a sustainable population of wolf prey (MI DNR 2015, pp. 29–31). Short of a major, and unlikely, shift in deer-management and harvest strategies, there will be no shortage of prey for Wisconsin and Michigan wolves for the foreseeable future.

NRM DPS: Suitable Habitat

We refer the reader to our 2009 and 2012 final delisting rules (74 FR 15123, April 2, 2009; 77 FR 55530, September 10, 2012), which contain detailed analyses of suitable wolf habitat in the northern Rocky Mountains. A summary of those analyses is provided below.

The northern Rocky Mountains contain some of the best remaining suitable habitat for wolves in the Western United States (Carroll *et al.* 2006, figure 6). The region contains relatively large blocks of undeveloped public lands and some of the largest blocks of wilderness in the coterminous United States. Suitable wolf habitat in the region is characterized by public land with mountainous, forested habitat that contains abundant year-round wild ungulate populations, low road density, low numbers of domestic livestock that are only present seasonally, few domestic sheep, low agricultural use, and few people (Carroll *et al.* 2006, pp. 536–548; 2006, pp. 27–31; Oakleaf *et al.* 2006, pp. 555–558). Unsuitable wolf habitat is typically the opposite (i.e., private land, flat open prairie or desert, low or seasonal wild ungulate populations, high road density, high numbers of year-round domestic livestock including many domestic sheep, high levels of agricultural use, and many people).

Based on a wolf habitat model (Oakleaf *et al.* 2006, pp. 555–559) that considered roads accessible to two-wheel and four-wheel drive vehicles, topography (slope and elevation), land ownership, relative ungulate density (based on State harvest statistics), cattle (*Bos* sp.) and sheep density, vegetation characteristics (ecoregions and land cover), and human density, there is an estimated 65,725 mi^2 (170,228 km^2) of suitable habitat in Montana, Idaho, and Wyoming. Generally, suitable habitat is located in western Montana west of I–15 and south of I–90; Idaho north of I–84; and northwest Wyoming (see figure 1 in 73 FR 63926, October 28, 2008). The current distribution of wolves in the northern Rocky Mountains generally mirrors Oakleaf *et al.*'s

(2006, p. 559) prediction of suitable habitat, indicating that it is a reasonable approximation of where suitable habitat exists.

NRM DPS: Prey Availability

We refer the reader to our 2009 and 2012 final delisting rules (74 FR 15123, April 2, 2009; 77 FR 55530, September 10, 2012), which contain analyses of prey availability in the northern Rocky Mountains. A summary of those analyses, with updated information on ungulate numbers and references to ungulate management plans, is provided below.

Wild ungulate prey in the NRM is composed mainly of elk, but also includes deer, moose, and—in the Greater Yellowstone Area—bison. Bighorn sheep, mountain goats, and pronghorn antelope also are common but relatively unimportant as wolf prey. In total, State population estimates indicate that, in Idaho, there are approximately 100,000 elk (IDFG 2014d, p. 1), between 250,000 to 325,000 mule deer (IDFG 2019a, p. 1), and an unknown, but large, number of white-tailed deer (IDFG 2019b, entire); in Montana, there are approximately 134,000 elk (MFWP 2020a, p. 3), over 300,000 mule deer (MFWP 2020b, p. 1), and almost 200,000 white-tailed deer (MFWP 2020c, p. 1); and, in Yellowstone National Park, there are approximately 10,000–20,000 elk in summer, 4,000 elk in winter (NPS 2020a, entire), tens of thousands of elk outside of YNP in northwest Wyoming (WGFD 2019a, b, c, d, entire), 5,000 bison (NPS 2020b, entire), and an additional 396,000 mule deer in the State (Mule Deer Working Group 2018, p. 1). The States in the NRM have successfully managed resident ungulate populations for decades. Since we delisted the NRM, these States have continued to maintain relatively high densities of ungulate populations along with a large, well distributed, and recovered wolf population. State ungulate management plans commit them to maintaining

ungulate populations at densities that will continue to support a recovered wolf population well into the foreseeable future (For examples of State ungulate management plans and adaptive harvest strategies, see IDFG 2014d, 2019a, 2019b, entire; MFWP 2001, 2014, entire).

West Coast States: Suitable Habitat

In Washington, wolves are expected to persist in habitats with similar characteristics to those identified by Oakleaf et al. (2006 in Wiles et al. 2011, p. 50) and as described above. Several modeling studies have estimated potentially suitable wolf habitat in Washington with most predicting suitable habitat in northeastern Washington, the Blue Mountains, the Cascade Mountains, and the Olympic Peninsula. Total area estimates in these studies range from approximately 16,900 mi^2 (43,770 km^2) to 41,500 mi^2 (107,485 km^2) (Wiles et al. 2011, pp. 51, 53; Maletzke et al. 2015, p. 3).

The Oregon Department of Fish and Wildlife (ODFW) developed a map of "potential gray wolf range" as part of its recent status review of wolves in Oregon (ODFW 2019, Appendix D). The model used predictors of wolf habitat including land-cover type, elk range, human population density, road density, and land types altered by humans; they chose to exclude public land ownership because wolves will use forested cover on both public and private lands (ODFW 2019, p. 147). Approximately 41,256 mi^2 (106,853 km^2) were identified as potential wolf range in Oregon. The resulting map coincides well with the current distribution of wolves in Oregon. The ODFW estimates that wolves occupy 31.6 percent of the potential wolf range in the east management zone (the majority of wolves here are under State management) and 2.7 percent of potential wolf range in the western management zone (all wolves here are under Federal management) (ODFW 2019, p. 153).

Habitat models developed for the northern Rocky Mountains (e.g., Oakleaf et al. 2006, entire; Larsen and Ripple 2006, entire; Carroll et al. 2006, entire) may have limited applicability to California due to differences in geography, distribution of habitat types, distribution and abundance of prey, potential restrictions for movement, and human habitation (CDFW 2016b, pp. 154, 156). Despite these challenges, CDFW used these models to determine that wolves are most likely to occupy three general areas: (1) the Klamath Mountains and portions of the northern California Coast Ranges; (2) the southern Cascades, the Modoc Plateau, and Warner Mountains; and (3) the Sierra Nevada Mountain Range (CDFW 2016b, p. 20). These areas were identified as having a higher potential for wolf occupancy based on prey abundance, amount of public land ownership, and forest cover, whereas other areas were less suitable due to human influences (CDFW 2016b, p. 156). Using a different approach and modeling technique, Nickel and Walther (2019, pp. 387–398) largely affirmed CDFW's conclusions regarding areas maintaining a high potential for wolf recolonization. As wolves continue to expand into California, models may be refined to better estimate habitat suitability and the potential for wolf occupancy.

West Coast States: Prey Availability

The Washington Department of Fish and Wildlife recently conducted a Wildlife Program 2015–2017 Ungulate Assessment to identify ungulate populations that are below management objectives or may be negatively affected by predators (WDFW 2016, entire). The assessment covers white-tailed deer, mule deer, black-tailed deer, Rocky Mountain elk, Roosevelt elk, bighorn sheep, and moose (WDFW 2016, p. 12). Washington defines an at-risk ungulate population as one that falls 25 percent below its population objective for 2 consecutive years

and/or one in which the harvest decreases by 25 percent below the 10-year-average harvest rate for 2 consecutive years (WDFW 2016, p. 13). Based on available information, the 2016 report concludes that no ungulate populations in Washington were considered to be at-risk (WDFW 2016, p. 13).

In Oregon, 20 percent of Roosevelt elk populations are at or above management objectives; however, the populations within the western two-thirds of Oregon are generally stable (ODFW 2019, p. 66). Rocky Mountain elk are above management objectives in 63 percent of populations and are considered to be stable or increasing across the State (ODFW 2019, p. 66). Mule deer and black-tailed deer populations peaked in the mid-1900s and have since declined, likely due to human development, changes in land use, predation, and disease (ODFW 2019, p. 66). White-tailed deer populations, including Columbian white-tailed deer, are small, but are increasing in distribution and abundance (ODFW 2019, p. 69). In Oregon, deer are a secondary prey item when elk are present (ODFW 2019, pp. 57, 61).

In California, declines of historical ungulate populations were the result of overexploitation by humans dating back to the 19th century (CDFW 2016b, p. 147). However, elk distribution and abundance have increased due to implementation of harvest regulations, reintroduction efforts, and natural expansion (CDFW 2016b, p. 147). Mule deer also experienced overexploitation, but were also more likely subject to fluctuations in habitat suitability as a result of logging, burning, and grazing. Across the West, including California, mule deer populations have been declining since the late 1960s due to multiple factors including loss of habitat, drought, predation, and competition with livestock, but, as noted above, deer are a secondary prey when elk are present (CDFW 2016b, p. 147).

Central Rocky Mountains: Suitable Habitat

Models developed to assess habitat suitability and the probability of wolf occupancy indicate that Colorado contains adequate habitat to support a population of wolves, although the number of wolves the State could support is variable. –Based on mule deer and elk biomass, a pack size of between 5 and 10 wolves, and a reduction in available winter range due to increased snow depths, Bennett (1994, pp. 112, 275–280) estimated that the probable wolf population size in Colorado would range between 407 and 814 wolves. Carroll et al. (2003, entire) examined multiple models to evaluate suitable wolf habitat, occupancy, and the probability of wolf persistence given various landscape changes and potential increases in human density in the southern Rocky Mountains, which included portions of southeast Wyoming, Colorado, and northern New Mexico. Using a resource selection function (RSF) model developed for wolves in the Greater Yellowstone Ecosystem and projecting it to Colorado, Carroll et al. (2003, pp. 541–542) identified potential wolf habitat across north-central and northwest Colorado and also in the southwestern part of the State. RSF model predictions indicate that Colorado could support an estimated 1,305 wolves with nearly 87 percent of wolves occupying public lands in the State. Carroll et al. (2003, entire) also used a dynamic model that incorporated population viability analysis to evaluate wolf occupancy and persistence based on current conditions as well as potential changes resulting from increased road and human densities in the future. The dynamic model based on current conditions predicted similar distribution and wolf population estimates as the RSF model; however, as predicted, as road and human densities increased in Colorado, the availability of suitable habitat and the estimated number of wolves that habitat could support declined (Carroll et al. 2003, pp. 541–543).

An evaluation by Switalski et al. (2002, p. 9) indicated that the most likely avenues for dispersing wolves to enter Utah from Idaho and Wyoming were via the Bear River Range and Flaming Gorge National Recreation Area in the northern part of the State. A wolf habitat suitability model was developed for Utah to identify areas most likely to support wolf occupancy in the State (Switalski et al. 2002, pp. 11–15). The model evaluated five habitat characteristics that included estimates of prey abundance, estimates of road density, proximity to year-round water sources, elevation, and topography. Although the resulting model identified primarily forested and mountainous areas of Utah as suitable wolf habitat, an area over 13,900 mi^2 (36,000 km^2), it was highly fragmented as a result of high road densities. Nonetheless, six relatively large core areas of contiguous habitat were identified that ranged in size from approximately 127 mi^2 to 2,278 mi^2 (330 km^2 to 5,900 km^2) (Switalski et al. 2002, p. 13). Although these estimates should be considered maximums, it was estimated that the six core areas have the potential to support up to 214 wolves and the entirety of Utah could theoretically support over 700 wolves (Switalski et al. 2002, pp. 15–16). Without concerted efforts to minimize human-caused mortality and with low levels of immigration from neighboring populations, wolves recolonizing Utah would likely exist in small numbers and increase slowly, which could elevate local extinction risk (Switalski et al. 2002, p. 16).

An analysis similar to that of Carroll et al. (2003, entire) was conducted for the entirety of the Western United States and indicated that high-quality wolf habitat exists in Colorado and Utah, but that wolves recolonizing Colorado and Oregon would be most vulnerable to landscape changes because these areas lack, and are greater distances from, large core refugia (Carroll et al. 2006, pp. 33–36). The authors proposed that habitat improvements, primarily in the form of road removal or closures, could mitigate these effects (Carroll et al. 2006, p. 36). Switalski et al.

(2002, pp. 12–13) and Carroll et al. (2003, p. 545) also cautioned that model predictions may be inaccurate because they did not account for the presence of livestock and the potential use of lethal removal to mitigate wolf conflicts, which may affect wolf persistence and distribution in some areas of Colorado and Utah.

Central Rocky Mountains: Prey Availability

Colorado Parks and Wildlife manages ungulate populations using Herd Management Plans which establish population objective minimums and maximums for each ungulate herd in the State (Colorado Parks and Wildlife 2019, unpaginated). The Herd Management Plans consider both biological and social factors when setting herd objective ranges. All of the following information on ungulates is from the 2019 Colorado Parks and Wildlife ungulate summary report (Colorado Parks and Wildlife 2019, entire). Similar to other western States, mule deer in Colorado have declined due to a multitude of factors since the 1970s to a statewide population estimate of 433,100 animals in 2018, which was well below the minimum statewide population objective of 500,450. In 2018, of 54 mule deer herds in the State, 23 were below their population objective minimum with the western part of the State being the most affected. In contrast, elk populations in Colorado are stable with a winter population estimate of 287,000 elk in 2018. Although 22 of 42 elk herds are above the maximum population objective, the ratio of calves per 100 cows (a measure of overall herd fitness) has been on the decline in some southwestern herd units, and research has been initiated to determine potential causes. Moose are not native to Colorado, so to create hunting and wildlife viewing opportunities, Colorado Parks and Wildlife transplanted moose to the State beginning in 1978 and has since transplanted moose on four other occasions through 2010. In 2018, the moose population was estimated at 3,200

animals and continues to increase as moose expand into new areas of the State. In summary, while deer and elk numbers are down from their peak populations in some parts of Colorado, they still number in the hundreds of thousands of individuals, and the State is actively managing populations to meet objectives. In addition, as of the latest estimates, elk numbers exceed their population objectives in 22 of 42 herds (Colorado Parks and Wildlife 2019, p. 8). Introduced moose provide an additional potential food resource for wolves in some parts of the State.

The Utah Division of Wildlife Resources manages ungulate populations by establishing population objectives at the herd unit level and directing management efforts, primarily through public harvest, to achieve population goals for each herd unit. The summation of herd unit objectives can be considered a statewide objective for the species. Since a population decline during the winter of 1992–1993, mule deer populations in Utah have shown a generally increasing overall trend with a 2018 estimate of 372,500 animals in the State, an average increase of 1.6 percent annually (Utah Division of Wildlife Resources 2019, unpaginated). This estimate is 82 percent of the long-term statewide objective of 453,100 mule deer. The biggest threats to mule deer in Utah are habitat degradation and loss combined with unfavorable weather conditions (Utah Division of Wildlife Resources 2019, unpaginated). Elk populations in Utah have increased from an average of slightly over 60,000 from 1995 to 2005 to an average estimate of slightly over 80,000 between 2012 and 2017 (Bernales et al. 2018, pp. 104–105). The 2017 statewide elk population estimate was 80,955 elk, which is marginally higher than the population objective of 78,215 elk. Moose are relatively recent migrants to Utah, first being documented in the early 1900s. Since that time, moose have dispersed, or been transplanted, to occupy suitable habitats primarily in the north half of the State. In Utah, moose are susceptible to habitat limitations caused by increasing densities and, as a result, are proactively managed at appropriate

densities to prevent population declines caused by habitat limitations due to high moose densities (Utah Division of Wildlife Resources 2017, unpaginated). Moose populations in Utah are estimated on a 3-year cycle, and as of 2016, an estimated 2,469 moose inhabited the State. Switalski et al. (2002, p. 18) suggested that a wolf population of 200 animals would not have a significant effect on ungulate populations in Utah; however, although the magnitude of effects would be difficult to predict, some local herd units may be disproportionately affected by wolves. In summary, deer and elk populations in Utah are increasing (Bernales et al. 2018, pp. 104–105; Utah Division of Wildlife Resources 2019, unpaginated), and habitat models estimate that the State is theoretically capable of supporting several hundred wolves if wolf-human conflicts can be addressed (Switalski et al. 2002, pp. 15–16).

Habitat and Prey Availability Summary

Sufficient suitable habitat exists in the Lower 48 United States to continue to support wolves into the future. Current land-use practices throughout the vast majority of the species' current range in the United States do not appear to be affecting the viability of wolves. We do not anticipate overall habitat changes will occur at a magnitude that would affect gray wolves across their range in the lower 48 United States, because wolves are broadly distributed in two large metapopulations and are able to withstand high levels of mortality due to their high reproductive capacity and vagility (the ability of an organism to move about freely and migrate) (Fuller *et al*. 2003, p. 163; Boitani 2003, pp. 328–330). Further, much of the area occupied by gray wolves occurs on public land where wolf conservation is a priority and conservation plans have been adopted to ensure continued wolf persistence (see Federal Lands discussion under

Management in the NRM DPS and **Post-delisting Management**) (73 FR 10538, February 27, 2008).

Prey availability is an important factor in maintaining wolf populations. Native ungulates (e.g., deer, elk, and moose) are the primary prey within the range of gray wolves in the lower 48 United States. Each State within wolf-occupied range manages its wild ungulate populations sustainably. States employ an adaptive-management approach that adjusts hunter harvest in response to changes in big game population numbers and trends when necessary, and predation is one of many factors considered when setting seasons. While we are aware of CWD as an emerging contagious disease threat to deer and elk, the ultimate impact of CWD and its prevalence across the landscape are still largely unknown. To address this emerging threat, States have developed robust surveillance and response plans for CWD to minimize and mitigate impacts.

Disease and Parasites

Although disease and parasites were not identified as a threat at the time of listing, a wide range of diseases and parasites has been reported for the gray wolf, and several of them have had temporary impacts during the recovery of the species in the lower 48 United States (Brand et al. 1995, p. 419; WI DNR 1999, p. 61, Kreeger 2003, pp. 202–214; Bryan et al. 2012, pp. 785–788; Stronen et al. 2011, entire). Although some diseases may be destructive to individuals, most of them seldom have long-term, population-level effects (Fuller et al. 2003, pp. 176–178; Kreeger 2003, pp. 202–214). All States that presently have wolf populations also have some sort of disease-monitoring program that may include direct observation of wolves to assess potential disease indicators or biological sample collection with subsequent analysis at a laboratory.

Although Washington has not submitted biological samples for analysis, samples have been collected and laboratory analysis is planned for the future (Roussin 2018, pers. comm.). Also, in the central Rocky Mountain States, Colorado Parks and Wildlife adopted the recommendations of the Colorado Wolf Management Working Group (see **Post De-listing Management**) to conduct basic monitoring and surveillance of wolf health via general assessments of captured wolves, necropsies performed on dead wolves, and analysis of biological samples (Colorado Wolf Management Working Group 2004, p. 37). The Utah Division of Wildlife Resources developed guidelines to ensure the proper collection and preservation of biological samples, which can be used to assess overall wolf health, disease, and parasite loads (UDWR 2020, pers comm).

Canine parvovirus (CPV) infects wolves, domestic dogs (*Canis familiaris*), foxes (*Vulpes vulpes*), coyotes, skunks (*Mephitis mephitis*), and raccoons (*Procyon lotor*). Canine parvovirus has been detected in nearly every wolf population in North America including Alaska (Bailey et al. 1995, p. 441; Brand et al. 1995, p. 421; Kreeger 2003, pp. 210–211; Johnson et al. 1994, pp. 270–272; ODFW 2014, p. 7), and exposure in wolves is thought to be almost universal. Nearly 100 percent of the wolves handled in Montana (Atkinson 2006, pp. 3–4), Yellowstone National Park (Smith and Almberg 2007, p. 18), Minnesota (Mech and Goyal 1993, p. 331), and Oregon (ODFW 2017, p. 8) had blood antibodies indicating nonlethal exposure to CPV. Clinical CPV is characterized by severe hemorrhagic diarrhea and vomiting, which leads to dehydration, electrolyte imbalances, debility, and shock and may eventually lead to death.

Based on data collected 1973–2004 in northeastern Minnesota, Mech et al. (2008, p. 824) concluded that CPV reduced pup survival, subsequent dispersal, and the overall rate of population growth of wolves in Minnesota (a population near carrying capacity in suitable

habitat). After the CPV became endemic in the population (around 1979), the population developed immunity and was able to withstand severe effects from the disease (Mech and Goyal 1993, pp. 331–332). These observed effects are consistent with results from studies in smaller, isolated populations in Wisconsin and on Isle Royale, Michigan (Wydeven et al. 1995, entire; Peterson et al. 1998, entire), but indicate that CPV also had only a temporary effect in a larger population.

Canine distemper virus (CDV) is an acute disease of carnivores that has been known in Europe since the sixteenth century and infects canids worldwide (Kreeger 2003, p. 209). This disease generally infects pups when they are only a few months old, so mortality in wild wolf populations might be difficult to detect (Brand et al. 1995, pp. 420–421). There have been few documented cases of mortality from CDV among wild wolves; for example, it has been documented in two littermate pups in Manitoba (Carbyn 1982, pp. 111–112), in two Alaskan yearling wolves (Peterson et al. 1984, p. 31), in seven Wisconsin wolves (five adults and two pups) (Thomas in litt. 2006; Wydeven and Wiedenhoeft 2003, p. 20; Wiedenhoeft et al. 2018, p. 5), and in at least two wolves in Michigan (Beyer 2019, pers. comm.). Carbyn (1982, pp. 113–116) concluded that CDV was partially responsible for a 50-percent decline in the wolf population in Riding Mountain National Park (Manitoba, Canada) in the mid-1970s. Studies in Yellowstone National Park have shown that CDV outbreaks can contribute to short-term population effects through significantly reduced pup survivorship, though these effects may be offset by other factors influencing reproductive success (Almberg et al. 2009, p. 5; Almberg et al. 2012, p. 2848; Stahler et al. 2013, pp. 227–229). Serological evidence indicates that exposure to CDV is high among some wolf populations—29 percent in northern Wisconsin and 79 percent in central Wisconsin from 2002 to 2003 (Wydeven and Wiedenhoeft 2003, pp. 23–24, table 7)

and 2004 (Wydeven and Wiedenhoeft 2004, pp. 23–24, table 7), and similar levels in Yellowstone National Park (Smith and Almberg 2007, p. 18). Exposure to CDV was first documented in Oregon in 2016 (n=3; ODFW 2017, p. 8), but no mortalities or clinical signs of the disease were observed. The continued strong recruitment in Wisconsin and elsewhere in North American wolf populations, however, indicates that while distemper may cause population-level decreases in the short term, it is not likely a significant cause of mortality over longer periods (Almberg et al. 2009, p. 9; Brand et al. 1995, p. 421).

Lyme disease, caused by a spirochete bacterium, is spread primarily by deer ticks (*Ixodes dammini*). Host species include humans, horses (*Equus caballus*), dogs, white-tailed deer, mule deer, elk, white-footed mice (*Peromyscus leucopus*), eastern chipmunks (*Tamias striatus*), coyotes, and wolves. A study of wolves in Wisconsin found exposure to Lyme disease in 65.6 percent of individuals, with exposure increasing during the period from 1985 to 2011 (Jara et al. 2016, pp. 5–9). Clinical symptoms have not been reported in wolves, but based on impacts seen in other mammals, individuals can likely experience debilitating conditions, perhaps contributing to their mortality; however, Lyme disease is not considered to be a significant factor affecting wolf populations (Kreeger 2003, p. 212; Jara et al. 2016, p. 13).

Mange has been detected in wolves throughout North America (Brand et al. 1995, pp. 427–428; Kreeger 2003, pp. 207–208). Mange mites (*Sarcoptes scabeii*) infest the skin of the host, causing irritation due to feeding and burrowing activities. This causes intense itching that results in scratching and hair loss. Mortality may occur due to exposure, primarily in cold weather, emaciation, or secondary infections (Almberg et al. 2012, pp. 2842, 2848; Knowles et al. 2017, entire; Kreeger 2003, pp. 207–208). Mange mites are spread from an infected individual through direct contact with others or through the use of common areas. In a long-term

Alberta wolf study, higher wolf densities were correlated with increased incidence of mange, and pup survival decreased as the incidence of mange increased (Brand et al. 1995, pp. 427–428). Mange has been shown to temporarily affect wolf population growth-rates in some areas (Kreeger 2003, p. 208), but not others (Wydeven et al. 2009b, pp. 96–97). In Montana and Wyoming, the percentage of packs with mange fluctuated between 3 and 24 percent annually from 2003 to 2008 (Jimenez et al. 2010, pp. 331–332; Atkinson 2006, p. 5; Smith and Almberg 2007, p. 19). In packs with the most severe infestations, pup survival appeared low, and some adults died (Jimenez et al. 2010, pp. 331–332); however, evidence indicates infestations do not normally become chronic because wolves often naturally overcome them.

Dog-biting lice (*Trichodectes canis*) commonly feed on domestic dogs, but can infest coyotes and wolves (Schwartz et al. 1983, p. 372; Mech et al. 1985, p. 404). The lice can attain severe infestation levels, particularly in pups. The worst infestations can result in severe scratching, irritated and raw skin, substantial hair loss particularly in the groin, and poor condition. While no wolf mortality has been confirmed, death from exposure and/or secondary infection following self-inflicted trauma caused by inflammation and itching may be possible. Dog-biting lice were confirmed on two wolves in Montana in 2005, on a wolf in south-central Idaho in early 2006 (USFWS et al. 2006, p. 15; Atkinson 2006, p. 5; Jimenez et al. 2010, pp. 331–332), and in 4 percent of Minnesota wolves in 2003 through 2005 (Paul in litt. 2005), but their infestations were not severe. Dog-biting lice infestations are not expected to have a significant impact even at a local scale.

Other diseases and parasites, including rabies, canine heartworm, blastomycosis, bacterial myocarditis, granulomatous pneumonia, brucellosis, leptospirosis, bovine tuberculosis, hookworm, coccidiosis, canine hepatitis, canine adenovirus-1, canine herpesvirus, anaplasmosis,

ehrlichiosis, echinococcus granulosus, and oral papillomatosis have been documented in wild wolves, but their impacts on future wild wolf populations are not likely to be significant (Almberg et al. 2009, p. 4; Almberg et al. 2012, pp. 2847, 2849; Brand et al. 1995, pp. 419–429; Bryan et al. 2012, pp. 785–788; Hassett in litt. 2003; Jara et al. 2016, p. 13; Johnson 1995, pp. 431, 436–438; Knowles et al. 2017, entire; Mech and Kurtz 1999, pp. 305–306; Thomas in litt. 1998, Thomas in litt. 2006, WI DNR 1999, p. 61; Foreyt et al. 2009, p. 1208; Kreeger 2003, pp. 202–214).

Genetic Diversity and Inbreeding

There were no genetic concerns for the gray wolf identified at the time of listing. Improved genetic techniques since then 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 wild populations, with potentially serious implications for population viability (Frankham 2010, entire). Inbreeding is caused by the mating of close relatives and can result in increased prevalence or expression of deleterious mutations within a population, leading to various negative effects on fitness, referred to as inbreeding depression (see Robinson et al. 2019, entire, and references therein).

Inbreeding depression, as evidenced by physiological anomalies or other effects on fitness, has been documented in wild wolf populations, including Scandinavian wolves (Vila et al. 2003, entire; Raikkonen et al. 2013, entire; Akesson et al. 2016, p. 4746), Mexican wolves (Asa et al. 2007, entire; Fredrickson et al. 2007, entire; Robinson et al. 2019, entire), and Isle Royale wolves (Hedrick et al. 2019, entire; Robinson et al. 2019, entire). In each of these cases,

the population size or number of founders was very small, and the population was completely or nearly completely isolated over several generations.

Although inbreeding depression has been documented in wolves, there are signs that wolves are adept at avoiding inbreeding when possible (vonHoldt et al. 2008, entire). Reintroduced and naturally expanding populations in the northern Rocky Mountains showed low levels of inbreeding even in the Yellowstone and Idaho populations, which were begun with a limited number of founders (vonHoldt et al. 2008, entire; vonHoldt et al. 2010, pp. 4416–4417). Moreover, in both the Scandinavian wolves and Mexican wolves, many of the effects of inbreeding depression were mitigated by relatively small influxes of additional wolves (i.e., new genetic material) into the population (Vila et al. 2003, entire; Fredrickson et al. 2007, entire; vonHoldt et al. 2008, p. 262; von Holdt et al. 2010, p. 4421; Akesson et al. 2016, entire; Wayne and Hedrick 2011, entire). Harding et al. (2016, p. 154), in an examination of recovery goals for Mexican wolves, provides a list of wolf populations that experienced notably low numbers but later recovered and are increasing or stable.

Aside from the unique situation on Isle Royale, where infrequent migrations to the island appear to have been too limited to reduce the effects of inbreeding depression (Hedrick et al. 2014, entire; Hedrick et al. 2019, entire), we are not aware of any instances of inbreeding or inbreeding depression within the lower 48 United States, though there are indications that inbreeding may have occurred during the course of recovery in the Great Lakes area (Fain et al. 2010, p. 1760). Although Leonard et al. (2005, entire) examined historical genetic diversity and concluded that a significant amount has likely been lost, current populations have high levels of genetic diversity in the Great Lakes area (Koblmüller 2009, p. 2322; Fain et al. 2010, p. 1758; Gomez-Sanchez et al. 2018, p. 3602), including an analysis of samples from Minnesota that

indicated large effective population sizes[4] over a long period (Robinson et al. 2019. p. 2). In fact, likely due to connectivity with wolves in Canada, there is no evidence of a population bottleneck in Minnesota. Instead, the range reduction and subsequent expansion seems to more accurately resemble contraction of a larger range rather than an isolated bottleneck (Koblmüller et al. 2009, p. 2322; Rick et al. 2017, p. 1101). Similarly, wolves in Washington, Oregon, and California can trace most of their ancestry to populations in the northern Rocky Mountains that have been shown to have high genetic diversity, low levels of inbreeding, and connectivity with the large Canadian wolf population to the north (Forbes and Boyd 1996, entire; Gomez-Sanchez et al. 2018, p. 3602; vonHoldt et al. 2008, entire; vonHoldt et al. 2010, entire).

An important factor for maintaining genetic diversity can be connectivity or effective dispersal between populations or subpopulations (Raikonnen et al. 2013, entire; Wayne and Hedrick 2011, entire). As noted in the final delisting rule for the northern Rocky Mountains, connectivity was an important factor in ensuring the long-term viability of that metapopulation (74 FR 15123, April 2, 2009). Similarly, the potential lack of connectivity between Wyoming's population and the rest of the metapopulation in the northern Rocky Mountains was noted as a concern in the subsequent delisting rule for Wyoming (77 FR 55530, September 10, 2012). To address those concerns, Idaho and Montana each signed a Memorandum of Understanding (MOU) with the Service that committed to monitoring and managing the population to ensure sufficient connectivity (Groen et al. 2008, entire). Wyoming signed a nearly identical MOU in 2012, prior to the final rule delisting wolves there (Talbott and Guertin 2012, entire). With each MOU, a range of management options, up to and including translocation of individual wolves,

[4] Effective population size is the size of an idealized, randomly mating population that experiences genetic drift, or the random loss of alleles, at the same rate as the population of interest.

was made available to address any noted deficiencies in effective dispersal, thereby mitigating concerns of negative genetic effects due to delisting those wolves. Such measures have not been necessary since the MOUs were signed, and are unlikely to become necessary in the future, as natural dispersal within the metapopulation has been and is expected to remain sufficient.

Connectivity has been investigated in other parts of the species' range as well. In the Great Lakes area, dispersal and interbreeding appears to be occurring both among Minnesota, Wisconsin, and Michigan and also between these States and the population in Canada (Fain et al. 2010, p. 1758; Wheeldon et al. 2010, p. 4438). In the West Coast States, wolves have dispersed from Montana, Idaho, and the Greater Yellowstone area to form packs in Oregon and Washington (Jimenez et al. 2017, entire; Hendricks et al. 2018, entire), while individuals from Oregon and Washington have dispersed both within and across their respective State borders as well as to California, other northern Rocky Mountains States, and Canada to join existing packs or to find a mate and form a new pack (USFWS 2020, pp. 16–18). In addition, the presence of admixed coastal/northern Rocky Mountain individuals in Washington indicates that coastal wolves or their admixed progeny have dispersed successfully from Canada into the State (Hendricks et al. 2018, entire) and are living in Washington's interior.

Delisting the gray wolf in the lower 48 United States may have the effect of reducing connectivity among the more central areas of the large metapopulations in the Great Lakes area or the Western United States and more peripheral areas in those or other States. Such a reduction might be caused by increased mortality of dispersing individuals (Smith et al. 2010, p. 627) or of individuals in established packs on the periphery of occupied range (O'Neil et al. 2017b, p. 9525; Stenglein et al. 2018, pp. 104–106; Mech et al. 2019, pp. 62–63) and could result in decreased genetic diversity and increased likelihood of inbreeding in those peripheral packs if they become

isolated. Rick et al. (2017, entire) examined genetic diversity and structuring in Minnesota prior and then following a year of harvest during the period when wolves were delisted in the State. The results showed no difference in genetic diversity, a slight increase in large-scale genetic structuring, and some differences in the geography of effective dispersal. Because the study contained only 2 years of data, however, it is difficult to draw conclusions about long-term effects or to discern the cause or causes of the observed differences.

We acknowledge that some level of genetic effects to wolf populations is likely to occur following delisting and may include changes in genetic diversity or population structuring (Allendorf et al. 2008, entire). These changes, however, are not likely to be of such a magnitude that they pose a significant threat to the species. Available evidence indicates that continued dispersal, even at a lower rate, within and among areas of the lower 48 United States should be adequate to maintain sufficient genetic diversity for continued viability. Increased effects to smaller, peripheral populations are certainly possible as wolves continue to disperse and recolonize areas within their historical range, but evidence of inbreeding avoidance (vonHoldt et al. 2008, entire) and the demonstrated benefits of even relatively low numbers of effective dispersers (Wayne and Hedrick 2011, entire; Vila et al. 2003, entire; Akesson et al. 2016, entire) indicate that instances of inbreeding depression would not likely be widespread or impact the larger population. The maintenance of genetic diversity could also be enhanced in core populations due to moderate increases in human-caused mortality that results in more social openings being created and filled by dispersing individuals. Moreover, the genetic isolation of peripheral packs or individual wolves is not likely to impact the larger metapopulations from which those individuals originated. Management plans in place in States in the Great Lakes area,

for example, will likely ensure that connectivity within those areas remains sufficiently high to avoid potential genetic impacts.

Effects of Climate Change

Effects of climate change were not identified as threats at the time of listing. There is research indicating that climate change could affect gray wolves through impacts to prey species (Hendricks et al. 2018, unpaginated; Weiskopf et al. 2019, entire) or increased exposure to diseases such as Lyme disease (Jara et al. 2016, p. 13), but the best available information does not indicate that climate change is causing negative effects to the viability of the gray wolf in the lower 48 United States, or that it is likely to do so in the future.

Vulnerability to climate change is often gauged by factors such as physiological tolerance, habitat specificity, and adaptive capacity, which includes dispersal capability (Dawson et al. 2011, p. 53). Throughout their circumpolar distribution, gray wolves persist in a variety of ecosystems with temperatures ranging from -70 °F to 120 °F (-57 °C to 49 °C) (Mech and Boitani 2003, p. xv). Gray wolves are highly adaptable animals and are efficient at exploiting food resources available to them. Although Weiskopf et al. (2019, entire) noted that the ungulate community in the Great Lakes area may shift as moose decline and deer increase due to climate change, there is no indication that prey would become limiting for wolves. In assessing climate change impacts to wildlife in the northern Rocky Mountains, McKelvey and Buotte (2018, p. 360) note that wolves, because of their generalist, adaptable life history, are not likely to be strongly affected by climate. Despite the likelihood of wolves being exposed to the effects of climate change, due to their life history and plasticity or adaptability, we do not expect that gray wolves will be negatively impacted. For a full discussion of potential impacts of climate change on wolves, see the final delisting rule for the gray wolf in Wyoming (77 FR 55597–55598,

September 10, 2012). The best available information does not indicate that any research conducted since the 2012 rule significantly changes that analysis.

Cumulative Effects

When threats occur together, one may exacerbate the effects of another, causing effects not accounted for when threats are analyzed individually. Many of the threats to the gray wolf in the lower 48 United States and gray wolf habitat discussed above are interrelated and could be synergistic, and thus may cumulatively affect the gray wolf in the lower 48 United States beyond the extent of each individual threat. For example, a decline in available wild prey could cause wolves to prey on more livestock, resulting in a potential increase in human-caused mortality. However, although the types, magnitude, or extent of cumulative impacts are difficult to predict, the best available information does not demonstrate that cumulative effects are occurring at a level sufficient to negatively affect gray wolf populations within the lower 48 United States. We anticipate that the threats described above will be sufficiently addressed through ongoing management measures that are expected to continue post-delisting and into the future. The best scientific and commercial data available indicate that the vast majority of gray wolves occur within one of two widespread, large, and resilient metapopulations and that threat factors—either individually or cumulatively—are not currently resulting, nor are they anticipated to result, in reductions in gray wolf numbers or habitat at a level sufficient to significantly affect gray wolf populations within the lower 48 United States.

Ongoing and Post-delisting State, Tribal, and Federal Wolf Management

In addition to considering threats to the species, our analysis of a species status under section 4 of the Act must also account for those efforts made by States, Tribes, or others to

protect the species. Evaluating these efforts is particularly important for the gray wolf because the primary threat to their viability is unregulated human-caused mortality. States, Tribes, and Federal land management agencies have extensive authorities to regulate human-caused mortality of wolves. Below, we evaluate ongoing State, Tribal, and Federal management of wolves in the recovered NRM DPS, as well as anticipated State, Tribal, and Federal management of wolves that we are delisting in this final rule. Due to recent information confirming the presence of a group of six wolves in extreme northwest Colorado, and their proximity to and potential use of habitats within Utah, we include evaluations of the Colorado Wolf Management Recommendations and the Utah Wolf Management Plan.

Management in the NRM DPS

As part of both the 2009 and 2012 delisting rules (74 FR 15123, April 2, 2009; 77 FR 55530, September 10, 2012), the Service determined that the States of Idaho, Montana, and Wyoming had laws, regulations, and management plans in place that met the requirements of the Act to maintain their respective wolf populations within the NRM DPS above recovery levels into the foreseeable future. Similarly, Tribal and Federal agency plans were also determined to contribute to the recovery of the gray wolf in those States. In this section we provide a brief summary of past and present management of gray wolves in the NRM States of Idaho, Montana, and Wyoming. We also include relevant updates to Tribal plans that apply exclusively to the eastern one-third of both Washington and Oregon, areas previously delisted due to recovery. Other State and Federal management that applies statewide in Washington and Oregon is included in the *Post-delisting Management* section of this final rule. Specific information on

regulated harvest and other sources of human-caused mortality are described in the *Human-Caused Mortality* section of this final rule.

State Management

Before the delisting of wolves in the NRM DPS, it was long recognized that the future conservation of a delisted wolf population in the NRM depended almost solely on State regulation of human-caused mortality. In 1999, the Governors of Idaho, Montana, and Wyoming agreed that regional coordination in wolf management planning among the States, Tribes, and other jurisdictions was necessary. They signed a memorandum of understanding (MOU) to facilitate cooperation among the three States to develop adequate State wolf management plans so that delisting could proceed. In this agreement, which was renewed in April 2002, all three States committed to maintain at least 10 breeding pairs and 100 wolves per State.

In 2009, the Service determined that Idaho and Montana had State laws, management plans, and regulations that met the requirements of the Act to maintain their respective wolf populations within the NRM DPS above recovery levels into the foreseeable future (74 FR 15123, April 2, 2009). A similar determination was made for Wyoming in 2012 (77 FR 55530, September 10, 2012). The three States agreed to manage above the recovery level, and to adapt their management strategies and adjust allowable rates of human-caused mortality should the population be reduced to near recovery levels per their management objectives. State management has maintained wolf numbers well above minimal recovery levels and, combined with wolves' reproductive and dispersal capabilities, has maintained the recovered status of the NRM DPS. The State laws and management plans balance the level of wolf mortality, primarily

human-caused mortality, with the wolf population growth rate to achieve desired population objectives. Management by the NRM States maintains a robust wolf population in each core recovery area because they each contain manmade or natural refugia from human-caused mortality (e.g., National Parks, wilderness areas, and remote Federal lands) that guarantee those areas remain the stronghold for wolf breeding pairs and source of dispersing wolves in each State. Similarly, State ungulate management plans provide a commitment to maintain ungulate populations at densities that will continue to support a recovered wolf population, as well as recreational opportunities for the public, well into the future.

Idaho—Wolves in Idaho are managed under the 2002 Idaho Wolf Conservation and Management Plan (IWCMP; Idaho Wolf Legislative Wolf Oversight Committee 2002, entire). The gray wolf was classified as endangered by the State until March 2005, when the Idaho Fish and Game Commission (IDFG Commission) reclassified the gray wolf as a big game animal (74 FR 15168, April 2, 2009). Hunting and trapping are both legal means of taking gray wolves throughout Idaho (IDFG 2017, p. 4). The IWCMP states that wolves will be protected against illegal take as a big game animal in Idaho (Idaho Wolf Legislative Wolf Oversight Committee 2002, p. 19).

Under the IWCMP, IDFG is the primary manager of wolves, and as such, will maintain a minimum of 15 packs of wolves to maintain a margin of safety over the Service's minimum recovery target of 10 breeding pairs and 100 wolves. IDFG is committed to managing wolves as a native species in the State to maintain a viable self-sustaining population that will not require relisting under the Act. Public harvest is used as a management tool when there are 15 or more packs in Idaho to help mitigate conflicts with livestock producers or big game populations.

The IDFG manages both ungulates and carnivores, including wolves, to maintain viable populations of each. Ungulate harvest focuses on maintaining sufficient prey populations to sustain quality hunting and healthy, viable wolf and other carnivore populations. In addition, the Mule Deer Initiative and the Clearwater Elk Initiative were implemented in the mid-2000s to improve populations of both species. These improvements provide benefits to carnivores and hunters.

Idaho's regulatory framework of State laws, wolf management plans, and implementing regulations maintains the wolf population well above recovery minimums, assuring maintenance of the State's numerical and distributional share of a recovered NRM wolf population well into the future.

Montana—In Montana, statutes and administrative rules categorize the gray wolf 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). Classification as a "Species in Need of Management" and the associated administrative rules under Montana State law create the legal mechanism to protect wolves and regulate human-caused mortality (including regulated public harvest) beyond the immediate defense of life/property situations. Illegal human-caused mortality is prosecuted under State law and regulations issued by Montana's Fish, Wildlife, and Parks (MFWP) Commission. At present, the MFWP Commission evaluates wolf hunting regulations every other year to allow for discussion of ungulate and wolf seasons at the same Commission meeting (see **Human-Caused Mortality** section of this final rule).

In August 2003, MFWP completed a Final EIS pursuant to the Montana Environmental Policy Act and recommended that the Updated Advisory Council alternative be selected as Montana's Final Gray Wolf Conservation and Management Plan (MFWP 2003, entire). The

Record of Decision (ROD) was amended in 2004, to select the “Contingency” alternative to allow flexibility while wolves were still federally listed and to provide a transition to State management upon Federal delisting (MFWP 2004, entire).

Under the management plan, the wolf population is maintained above the recovery level of 10 breeding pairs and 100 wolves by managing for at least 15 breeding pairs and 150 wolves. Wolves are not deliberately confined to any specific geographic areas of Montana, nor is the population size deliberately capped at a specific level. However, wolf numbers and distribution are managed adaptively based on ecological factors, wolf population status, conflict mitigation, and social tolerance. The plan and Administrative Rules commit MFWP to implement its management framework in a manner that encourages connectivity among resident wolves in Montana as well as wolf populations in Canada, Idaho, and Wyoming to maintain metapopulation structure in the NRM. Overall, wolf management 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.

The MFWP has and will continue to manage wild ungulates according to Commission-approved policy direction and species management plans. MFWP strives to manage ungulates in a way that continues to provide for recreational hunting opportunities yet maintains sufficient prey to support the full suite of large carnivores in the State including a recovered wolf population.

The Montana wolf plan and regulatory framework is designed to maintain a recovered wolf population and minimize conflicts with other traditional activities in Montana's landscape.

Montana continues to implement the commitments it has made in its current laws, regulations, and wolf plan to provide the necessary regulatory mechanisms to assure maintenance of the State's numerical and distributional share of a recovered NRM wolf population well into the future.

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 (WGFC 2011, entire), as amended in 2012 (WGFC 2012, entire). Under this plan, wolves in the northwestern portion of the State are managed as trophy game animals year-round in the Wolf Trophy Game Management Area (WTGMA), which encompasses approximately 15,000 mi^2 (38,500 km^2). Wolves are designated as predatory animals in the remainder of the State.

Wolf harvest in the WTGMA is regulated by WGFC Chapter 47 regulations. Because wolf management in northwest Wyoming falls under different Federal, State, and Tribal jurisdictions, the Service agreed to allow WGFD to maintain a minimum of 10 breeding pairs and 100 wolves within the WTGMA. Yellowstone National Park (YNP) and the Wind River Indian Reservation combined would maintain at least 5 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 the buffer above the 10 breeding pair and 100 wolf recovery level). Further, Wyoming wolf management regulations commit to the management of wolves so that genetic diversity and connectivity issues do not threaten 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 to facilitate natural dispersal of wolves between Wyoming and Idaho (WGFC 2011, figure 1, pp. 2, 8, 52).

Wolves that are classified as predators are regulated by the Wyoming Department of Agriculture under title 11, chapter 6 of the Wyoming Statutes. Under this statute, wolves may be taken year-round by any legal means without a license, but any harvest must be reported to WGFD within 10 days of take. As we have previously concluded (73 FR 10514, February 27, 2008; 74 FR 15123, April 2, 2009; 77 FR 55530, September 10, 2012), wolf packs are unlikely to persist in portions of Wyoming where they are designated as predatory animals. However, the WTGMA is large enough to support Wyoming's management goals and a recovered wolf population.

To ensure the goal of at least 10 breeding pairs and at least 100 individuals in the area directly under State management is not inadvertently compromised, Wyoming maintains an adequate buffer above minimum population objectives. A large portion of Wyoming's wolf population exists in areas outside the State's control (e.g., YNP and the Wind River Indian Reservation). The wolf populations in YNP and the Wind River Indian Reservation further buffer the population above the minimum recovery goal, ensuring the State meets the required management level of 15 breeding pairs and 150 wolves.

The Wyoming wolf plan is used by WGFD and WGFC in setting annual hunting quotas and limiting controllable sources of mortality (see **Human-Caused Mortality** section). Wyoming's regulatory framework, including the wolf plan, State statutes, and regulations, assures maintenance of the State's numerical and distributional share of a recovered NRM wolf population well into the future.

Tribal Management and Conservation of Wolves

In the NRM DPS, there are approximately 20 Tribes and about 12,719 mi^2 (32,942 km^2) (3 percent) of the area is Tribal land. Of the Tribes within the NRM DPS, the Wind River, Blackfeet, Flathead, and The Confederated Tribes of the Colville Indian Reservations have wolf management plans. Currently, a small number of wolf packs have their entire territories on Tribal lands in the NRM DPS. While Tribal lands provide habitat for wolf packs in the NRM, these lands represent a small proportion of the overall recovered wolf population in the NRM DPS. However, Tribes have various treaty rights, such as wildlife harvest, in areas of public land where many wolf packs live. The NRM States agreed to incorporate Tribal harvest into their assessment of the potential surplus of wolves available for public harvest in each State, each year, to ensure that the wolf population is maintained above recovery levels. The exercise of Tribal treaty rights to harvest wolves does not significantly impact the wolf population or reduce it below recovery levels due to the small portion of the wolf population that could be affected by Tribal harvest or Tribal harvest rights. Specific information on regulated harvest and other sources of human-caused mortality on Tribal lands are described in the **Human-Caused Mortality** section of this final rule. Below we describe past and present management of gray wolves on Tribal lands in the NRM States of Idaho, Montana, and Wyoming. We also include relevant updates to Tribal plans that apply exclusively to the eastern one-third of both Washington and Oregon, areas previously delisted due to recovery.

Wind River Indian Reservation—The Wind River Indian Reservation (WRR) typically contains a small number of wolves relative to the remainder of Wyoming (approximately 10–20 wolves annually for the past 10 years). The WRR adopted a wolf management plan in 2007

(Eastern Shoshone and Northern Arapaho Tribes, 2007, entire) and updated it in 2008 (Eastern Shoshone and Northern Arapaho Tribes, 2008, entire). Wolves are managed as game animals on the Wind River Indian Reservation (Eastern Shoshone and Northern Arapaho Tribes 2008, pp. 3, 9). The Eastern Shoshone and Northern Arapaho Tribes govern this area and the Shoshone and Arapaho Tribal Fish and Game Department manage wildlife on the WRR with assistance from the Service's Fish and Wildlife Conservation Office in Lander, Wyoming.

Wyoming claims management authority of non-Indian fee title lands and on Bureau of Reclamation lands within the external boundaries of the WRR. Thus, wolves are classified as game animals within about 80 percent of the reservation and as predators on the remaining 20 percent (Hnilicka in litt. 2020). To date, predator status has had minimal impact on wolf management and abundance on the WRR because these inholdings tend to be concentrated on the eastern side of the reservation in habitats that are less suitable for wolves (Eastern Shoshone and Northern Arapaho Tribes 2008, p. 5, figure 1).

Under the plan, any enrolled member can shoot a wolf in the act of attacking livestock or dogs on Tribal land, provided the enrolled member supplies evidence of livestock or dogs recently (less than 24 hours) wounded, harassed, molested, or killed by wolves, and a designated agent is able to confirm that the livestock or dogs were wounded, harassed, molested, or killed by wolves (Eastern Shoshone and Northern Arapaho Tribes 2008, p. 8). The plan also allows the Tribal government to remove "wolves of concern" defined as wolves that attack livestock, dogs, or livestock herding and guarding animals once in a calendar year or any domestic animal twice in a calendar year (Eastern Shoshone and Northern Arapaho Tribes 2008, p. 8).

As described above, the WRR alone is not considered essential to maintaining a recovered wolf population in Wyoming, but through cooperative management among the tribes, WGFD, and YNP, the goal is to continue to maintain a recovered wolf population into the future.

Blackfeet Indian Reservation—Wolves on the Blackfeet Indian Reservation exist on the Reservation's western boundary, which has a high predicted probability of use (MFWP 2019b, p. 8). The Blackfeet Tribe Wolf Management Plan was finalized in 2008 (BTBC 2008, entire). Wolves on the Blackfeet Reservation are classified as big game animals and are managed by Blackfeet Fish and Wildlife Department similar to other wildlife species on the reservation (BTBC 2008, p. 4). The plan does not specify maximum or minimum population sizes. Rather it is driven by wolf behavior and the level of conflict. The goal of the plan is to manage wolves on the Blackfeet Reservation in Montana to provide for their long-term persistence. This is accomplished by minimizing wolf-human conflict while incorporating cultural values and beliefs (BTBC 2008, p. 3). For example, low levels of conflict with a high wolf population will be tolerated without resulting in efforts to reduce the wolf population (BTBC 2008, p. 4). Lethal control may be used for wolves that repeatedly kill livestock (BTBC 2008, pp. 4–5).

The objectives of the plan are: (1) provide training for Tribal game wardens and Blackfeet Fish and Wildlife Department personnel; (2) incorporate culture and traditions into wolf management; (3) educate Blackfeet Reservation residents on wolf biology, ecology, and management; (4) investigate and resolve wolf-human conflicts; (5) report and record wolf-human conflicts; (6) mitigate losses associated with wolf activity; (7) conduct effective monitoring of the wolf plan and revise as needed; and (8) collect wolf population status and health information (BTBC 2008, pp. 3–4). These objectives appear to be consistent with the goal of the plan for long-term persistence of wolves on the Blackfeet Reservation.

Flathead Indian Reservation —The Confederated Salish and Kootenai Tribes Tribal Wildlife Management Program finalized a wolf management plan for the Flathead Indian Reservation in western Montana in 2015 (CSKT 2015, entire). Wolf activity on the reservation is concentrated in the western half and southern boundary (CSKT 2015, p. 7), with at least three packs using portions of the reservation. These wolves are included in totals reported in Montana's annual reports. The management of wolves is coordinated with State and Federal agencies with the goal of long-term persistence of wolves in Montana and preventing the need for Federal relisting, while minimizing conflicts between wolves and humans and adverse impacts to big game (CSKT 2015, p. 8).

The objectives of the plan are: (1) include cultural beliefs of Tribes into wolf management; (2) develop management prescriptions with wolf ecology and behavior in mind; (3) educate residents of the reservation on wolf ecology and management; (4) work cooperatively with State and Federal agencies to monitor and manage wolf conflicts regionally; (5) monitor and manage wolf impacts on ungulates; (6) monitor, manage, and minimize wolf-livestock conflicts; and (7) include human safety as a potential management concern (CSKT 2015, p. 8)

Similar to management on the Blackfeet Indian Reservation, the Flathead Indian Reservation wolf plan does not specify maximum or minimum population sizes. Rather it is driven by wolf behavior and the level of conflict. For example, low levels of conflict with a high wolf population will be tolerated without efforts to reduce the wolf population (CSKT 2015, p. 9). Lethal control may be used for wolves that threaten human safety or kill livestock or domestic animals (CSKT 2015, p. 9). However, trapping and hunting of wolves is not part of the management plan, but it may be considered by the Tribal Council in the future (CSKT 2015, p. 9).

The Flathead Indian Reservation wolf management plan will be reviewed at the end of 5 years of implementation (CSKT 2015, p. 15). We are not aware of any updates or revisions to the

plan at this time. Management of wolves on the Flathead Indian Reservation, in coordination with State and Federal agencies, is expected to continue to contribute to the long-term persistence of wolves in Montana.

Confederated Tribes of the Colville Reservation—The Confederated Tribes of the Colville Reservation is located in north-central Washington. At the end of 2019, the minimum wolf count was 37 wolves in five packs on the Colville Reservation (WDFW et al. 2020, p. 3). The CCTFWD Gray Wolf Management Plan was finalized in 2017 and guides management and conservation of gray wolf populations and their prey on the Colville Reservation (CCTFWD 2017, p. 5). The goals of the 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 plan also seeks to resolve wolf-livestock conflicts early to avoid escalation (CCTFWD 2017, p. 24).

Under the CCTFWD wolf plan, management actions include: (1) monitor gray wolf populations; (2) monitor ungulate response to gray wolf recolonization; (3) educate Tribal members and general public about wolves; (4) use population goals to develop an annual harvest allocation; (5) investigate, document, provide support to reduce resource or property damage; (6) report annual wolf management; (7) establish a wildlife parts distribution protocol; (8) coordinate on regional wolf management concerns; and (9) review and/or modify Tribal Codes to actively manage gray wolves (CCTFWD 2017, pp. 30–32).

With the subsistence culture of the Colville Tribal members, the impacts of wolves on ungulate populations are an important aspect of the plan (CCTFWD 2017, p. 20). As such, if wolves are determined to be a significant source of reduced ungulate population growth, measures will be considered to preserve the subsistence culture of Colville Tribal Members

(CCTFWD 2017, p. 22). Implementation of the CCTFWD gray wolf management plan promotes informed decision making to balance the benefits wolf recovery and maintenance of existing ungulate populations that are important to Colville Tribal members.

Management on Federal Lands

Federal lands in the NRM States of Idaho, Montana, and Wyoming are primarily lands managed by National Park Service, National Wildlife Refuge System, U.S. Forest Service, and Bureau of Land Management. Wolf management on these lands is similar to that described previously in our 2009 and 2012 delisting rules (74 FR 15123, April 2, 2009; 77 FR 55530, September 10, 2012) and elsewhere in this final rule.

The National Park Service Organic Act and National Park Service policies provide protection following Federal delisting for wolves located within park boundaries. Within National Park System units, hunting is not allowed unless the authorizing legislation specifically provides for hunting. National Wildlife Refuges operate under individual Comprehensive Conservation Plans, which guide their management. Hunting wolves is not allowed on National Wildlife Refuge lands (https://www.fws.gov/refuges/hunting/map/). Wolves occurring in National Parks and on National Wildlife Refuges in the NRM States are monitored in coordination with the wildlife agencies in those States. Some wolves in protected areas, such as National Park Service land or the National Wildlife Refuge System, may be vulnerable to hunting and other forms of human-caused mortality when they leave these Federal land management units. Overall, National Park Service and National Refuge Lands manage their lands in such a way to provide sufficient habitat for wildlife, including wolves and their prey,

and these lands will continue to be adequately managed for multiple uses including for the benefit of wildlife.

Federal law indicates land managed by the Forest Service and the Bureau of Land management shall be managed to provide habitat for fish and wildlife. Wilderness areas are afforded the highest protections of all Forest Service lands. Within Forest Service lands, including Wilderness Areas and Wilderness Study Areas (which are generally Forest Service lands), the Forest Service typically defers to States on hunting decisions (16 U.S.C. 480, 528, 551, 1133; 43 U.S.C. 1732(b)). The primary exception to this deference is the Forest Service's authority to identify areas and periods when hunting is not permitted (43 U.S.C. 1732(b)). However, even these decisions must be developed in consultation with the States. Thus, most State-authorized hunting occurs on State and Federal public lands like National Forests, Wilderness Areas, and Wilderness Study Areas. Bureau of Land Management lands are managed similarly to Forest Service lands. This final rule does not alter the current management on lands under the jurisdiction of the Forest Service or Bureau of Land Management. The Forest Service and Bureau of Land Management have a demonstrated capacity and a proven history of providing sufficient habitat for wildlife, including wolves and their prey, and these lands will continue to be adequately managed for multiple uses including for the benefit of wildlife.

Summary of Management in the NRM DPS

Past and ongoing State, Tribal, and Federal management has provided, and continues to provide, long-term maintenance of the recovered NRM wolf population. Montana, Idaho, and Wyoming implement wolf management in a manner that also encourages connectivity among wolf populations (Groen et al. 2008, entire; WGFC 2011, pp. 26–29, 52, 54; Talbott and Guertin 2012, entire). The coordination and management of wolves above population targets by State,

Tribal, and Federal agencies provides protections against potential unforeseen or uncontrollable sources of mortality such that they do not compromise the gray wolf's recovered status in the NRM.

Post-delisting Management

State Management in Minnesota, Wisconsin, and Michigan

During the 2000 legislative session, the Minnesota Legislature passed wolf-management provisions addressing wolf protection, taking of wolves, and directing the Minnesota Department of Natural Resources (MN DNR) to prepare a wolf-management plan. The MN DNR revised a 1999 draft wolf-management plan to reflect the legislative action of 2000, and completed the Minnesota Wolf Management Plan in early 2001 (MN DNR 2001, entire). The MN DNR plans to update the Wolf Management Plan in the near future, and will create a new advisory committee and use a public process to help inform the update.

The Wisconsin Natural Resources Board approved the Wisconsin Wolf Management Plan in October 1999. In 2004 and 2005 the Wisconsin Wolf Science Advisory Committee and the Wisconsin Wolf Stakeholders group reviewed the 1999 Plan, and the Science Advisory Committee subsequently developed updates and recommended modifications to the 1999 Plan. The updates were completed and received final Natural Resources Board approval on November 28, 2006 (WI DNR 2006a, entire).

In late 1997, the Michigan Wolf Recovery and Management Plan was completed and received the necessary State approvals. That plan focused on recovery of a small wolf population, rather than long-term management of a large wolf population, and addressing the conflicts expected to result as a consequence of successful wolf restoration. The Michigan

Department of Natural Resources (MI DNR) revised its original wolf plan and created the 2008 Michigan Wolf Management Plan in recognition of a shift in its focus from the recovery of an endangered species to the management of wolf–human conflicts. The 2008 plan addressed the biological and social issues associated with wolf management in Michigan at that time. Since then, wolf management in Michigan has continued to evolve, and the MI DNR again updated its wolf-management plan in 2015 (MI DNR 2015, entire). The 2015 updates reflect the biological and social issues associated with the increased population size and distribution of wolves in the State, although the four principal goals of the 2008 plan remain the same. The complete text of the Wisconsin, Michigan, and Minnesota wolf-management plans can be found on our Website (see **FOR FURTHER INFORMATION CONTACT**).

The following sections discuss the individual state management plans and depredation control that took place while gray wolves were listed in the State, as well as expected post-delisting depredation control and potential public harvest. Wolves have also been removed for health and human safety concerns while they were listed. The number of wolves taken for this purpose is few in any given year, however, thus it will not be discussed for individual state summaries.

The Minnesota Wolf Management Plan—The Minnesota Plan is based, in part, on the recommendations of a State wolf-management roundtable (MN DNR 2001, Appendix V) and on a State wolf-management law enacted in 2000 (MN DNR 2001, Appendix I). In 2000, the Minnesota legislature passed the Wolf Management Act (Minn. Stat. sections 97B.645–48). That statute specifically requires the MN DNR to adopt a wolf management plan that includes, among other factors, the goal of ensuring the "long-term survival of wolves in Minnesota." It requires preparation of a wolf management plan, establishes gray wolf zones, prohibits the taking of

wolves in violation of Federal law, prohibits the harassment of gray wolves, and authorizes the destruction of individual wolves threatening human life and posing imminent threats to cattle or domestic pets. Finally, the Act establishes a civil penalty for the unlawful take, transport, or possession of a wolf in violation of Minnesota's game and fish laws. The Wolf Management Act and the Minnesota Game and Fish Laws constitute the basis of the State's authority to manage wolves. The Plan's stated goal is "to ensure the long-term survival of wolves in Minnesota while addressing wolf–human conflicts that inevitably result when wolves and people live in the same vicinity" (MN DNR 2001, p. 2). It establishes a minimum goal of 1,600 wolves in the State. Key components of the plan are population monitoring and management, management of wolf depredation of domestic animals, management of wolf prey, enforcement of laws regulating take of wolves, public education, and increased staffing to accomplish these actions. Following Federal delisting, MN DNR's management of wolves would differ from that which occurred while wolves were listed as threatened under the Act. Most of these differences relate to two aspects of wolf management: the control of wolves that attack or threaten domestic animals and the implementation of a regulated wolf harvest season.

The Minnesota Plan divides the State into two wolf-management zones—Zones A and B (see map in MN DNR 2001, Appendix 3). Zone A corresponds to Federal Wolf Management Zones 1 through 4 (approximately 30,000 mi^2 (77,700 km^2) in northeastern Minnesota) in the Service's Revised Recovery Plan for the Eastern Timber Wolf, whereas Zone B constitutes Zone 5 in that recovery plan (the rest of the State (approximately 57,000 mi^2 (147,600 km^2)) (MN DNR 2001, pp. 19–20 and appendix III; USFWS 1992, p. 72). Within Zone A, wolves would receive strong protection by the State, unless they were involved in attacks on domestic animals. The rules governing the take of wolves to protect domestic animals in Zone B would be less

protective of wolves than in Zone A (see *Post-delisting Depredation Control in Minnesota*, below).

The Minnesota Department of Natural Resources plans to allow wolf numbers and distribution to naturally expand, with no maximum population goal. If any winter population estimate is below 1,600 wolves, MN DNR would take actions to "assure recovery" to 1,600 wolves (MN DNR 2001 p. 19). The MN DNR plans to continue to monitor wolves in Minnesota to determine whether such intervention is necessary. In response to the 2011 delisting of the WGL DPS, in 2013 the MN DNR increased the frequency of population surveys from every 5 years to every year. Although the agency is evaluating wolf-monitoring methods and optimal frequencies, in the short term it plans to continue annual population-size estimates. In addition to these statewide population surveys, MN DNR annually reviews data on depredation-incident frequency and locations provided by Wildlife Services and winter track-survey indices (see Erb 2008, entire) to help ascertain annual trends in wolf population or range (MN DNR 2001, pp. 18–19).

Minnesota (MN DNR 2001, pp. 21–24, 27–28) plans to reduce or control illegal mortality of wolves through education, increased enforcement of the State's wolf laws and regulations, discouraging new road access in some areas, and maintaining a depredation-control program that includes compensation for livestock losses. The MN DNR plans to use a variety of methods to encourage and support education of the public about the effects of wolves on livestock, wild ungulate populations, and human activities and the history and ecology of wolves in the State (MN DNR 2001, pp. 29–30). These are all measures that have been in effect for years in Minnesota, although increased enforcement of State laws against take of wolves would replace enforcement of the Act's take prohibitions. Financial compensation for livestock losses has

increased to the full market value of the animal, replacing previous caps of $400 and $750 per animal (MN DNR 2001, p. 24). We do not expect the State's efforts to result in the reduction of illegal take of wolves from existing levels, but we anticipate that these measures will help prevent a significant increase in illegal mortality after Federal delisting.

Under Minnesota law, the illegal killing of a wolf is a gross misdemeanor and is punishable by a maximum fine of $3,000 and imprisonment for up to 1 year. The restitution value of an illegally killed wolf is $2,000 (MN DNR 2001, p. 29). The MN DNR has designated three conservation officers who are stationed in the State's wolf range as the lead officers for implementing the wolf-management plan (MN DNR 2001, pp. 29, 32; Stark in litt. 2018).

Depredation Control in Minnesota—Although federally protected as a threatened species in Minnesota, wolves that attacked domestic animals have been killed by designated government employees under the authority of a regulation (50 CFR 17.40(d)) under section 4(d) of the Act. However, no control of depredating wolves was allowed in Federal Wolf Management Zone 1, comprising about 4,500 mi^2 (7,200 km^2) in extreme northeastern Minnesota (USFWS 1992, p. 72). In Federal Wolf Management Zones 2 through 5, employees or agents of the Service (including USDA–APHIS–Wildlife Services) have taken wolves in response to depredations of domestic animals within one-half mile (0.8 km) of the depredation site. Young-of-the-year (young produced in one reproductive year) captured on or before August 1 must be released. The regulations that allow for this take (50 CFR 17.40(d)(2)(i)(C)) do not specify a maximum duration for depredation control, but, per State rules, a site may be worked for no more than 60 days after a verified depredation event. .

During the period from 1980–2018, the Federal Minnesota wolf-depredation-control program euthanized between 20 (in 1982) and 215 (in 2012) wolves annually. The annual

averages and the percentage of the statewide wolf population for 5-year periods are presented in table 4.

Table 4. Average annual number of wolves euthanized under Minnesota wolf depredation control and the percentage of the statewide wolf population for 5-year periods during 1980–2017 (final time period represents 4, rather than 5 years) (Erb 2008, p. 4; USDA–Wildlife Services 2010, p. 3; USDA–Wildlife Services 2011, p. 3; USDA–Wildlife Services 2017, p. 3; USDA–Wildlife Services 2018, p. 2).

	1980–1984	1985–1989	1990–1994	1995–1999	2000–2004	2005–2009	2010–2014	2015–2018
Average annual # wolves euthanized	30	49	115	152	128	157	194	194
Average annual % of wolf population	2.2	3.0	6.0	6.7	4.2	5.4	7.6	7.5

Since 1980, the lowest annual percentage of Minnesota wolves killed under this program was 1.5 percent in 1982; the highest percentage was 9.4 in both 1997 and 2015 (Paul 2004, pp. 2–7; Paul 2006, p. 1; USDA–Wildlife Services 2017, p. 3; USDA–Wildlife Services 2018, p. 2). The periods during which the depredation-control program was taking its highest percentages of wolves was during the 1990s and the 2010s. During the 1990s, when wolves euthanized for depredation control averaged around 6 percent of the wolf population, Minnesota wolf numbers continued to grow at an average annual rate of nearly 4 percent (Paul 2004, pp. 2–7). Wolf populations in the State fluctuated during the 2010s, when wolves euthanized for depredation control averaged around 7 percent of the wolf population. Although wolf populations in the State did decline while wolves were delisted from 2011–2014, other management techniques in addition to depredation control were also implemented during that time (e.g., regulated harvest), aimed at reducing wolf numbers while maintaining a minimum population level. The past level of wolf removal for depredation control has not interfered with wolf recovery in Minnesota.

Under a Minnesota statute, the Minnesota Department of Agriculture (MDA) compensates livestock owners for full market value of livestock that wolves have killed or severely injured. An authorized investigator must confirm that wolves were responsible for the depredation. The Minnesota statute also requires MDA to periodically update its Best Management Practices to incorporate new practices that it finds would reduce wolf depredation (Minnesota Statutes 2018, Section 3.737, subdivision 5).

Post-delisting Depredation Control in Minnesota—When wolves in Minnesota are delisted, depredation control will be authorized under Minnesota State law and conducted in conformance with the Minnesota Wolf Management Plan (MN DNR 2001). The Minnesota Plan divides the State into Wolf Management Zones A and B, as discussed above. The statewide survey conducted during the winter of 2003–2004 estimated that there were approximately 2,570 wolves in Zone A and 450 in Zone B (Erb in litt. 2005). As discussed in Recovery Criteria for the Eastern United States above, the Federal planning goal is 1,251–1,400 wolves for Zones 1–4 and there is no minimum population goal for Zone 5 (USFWS 1992, p. 28).

In Zone A, wolf depredation control will be limited to situations of (1) immediate threat and (2) following verified loss of domestic animals. In this zone, if a state-authorized entity verifies that a wolf destroyed any livestock, domestic animal, or pet, and if the owner requests wolf control be implemented, trained and certified predator controllers or Wildlife Services may take wolves (specific number to be determined on a case-by-case basis) within a 1-mile (1.6-km) radius of the depredation site (depredation-control area) for up to 60 days. In contrast, in Zone B, predator controllers or Wildlife Services may take wolves (specific number to be determined on a case-by-case basis) for up to 214 days after MN DNR opens a depredation-control area, depending on the time of year. Under State law, the MN DNR may open a control area in Zone B

anytime within 5 years of a verified depredation loss upon request of the landowner, thereby providing more of a preventative approach than is allowed in Zone A, in order to avoid repeat depredation incidents (MN DNR 2001, p. 22).

Depredation control will be allowed throughout Zone A, which includes an area (Federal Wolf Management Zone 1) where such control has not been permitted under the Act's protection. Depredation by wolves in Zone 1, however, has been limited to two to four reported incidents per year, mostly of wolves killing dogs. In 2009, there was one probable and one verified depredation of a dog near Ely, Minnesota, and in 2010, Wildlife Services confirmed three dogs killed by wolves in Zone 1 (USDA–Wildlife Services 2009, p. 3; USDA–Wildlife Services 2010, p. 3). There are few livestock in Zone 1; therefore, the number of verified future depredation incidents in that Zone is expected to be low, resulting in a correspondingly low number of depredating wolves being killed there after delisting.

State law and the Minnesota Plan will also allow for private wolf depredation control throughout the State. Any person can shoot or destroy a wolf that poses "an immediate threat" to livestock, guard animals, or domestic animals on lands that he or she owns, leases, or occupies. Immediate threat is defined as "in the act of stalking, attacking, or killing." This does not include trapping because traps cannot be placed in a manner such that they trap only wolves in the act of stalking, attacking, or killing. Owners of domestic pets can also kill wolves posing an immediate threat to pets under their supervision on lands that they do not own or lease, although such actions are subject to local ordinances, trespass law, and other applicable restrictions. To protect their domestic animals in Zone B, individuals do not have to wait for an immediate threat or a depredation incident in order to take wolves. At any time in Zone B, persons who own, lease, or manage lands may shoot wolves on those lands to protect livestock, domestic animals, or pets.

They may also employ a predator controller or request assistance from Wildlife Services to trap a wolf on their land or within 1 mile (1.6 km) of their land (with permission of the landowner) to protect their livestock, domestic animals, or pets (MN DNR 2001, pp. 23–24). The MN DNR will investigate any private taking of wolves in Zone A (MN DNR 2001, p. 23). The Minnesota Plan will also allow persons to harass wolves anywhere in the State within 500 yards of "people, buildings, dogs, livestock, or other domestic pets or animals." Harassment may not include physical injury to a wolf.

As discussed above, landowners or lessees will be allowed to respond to situations of immediate threat by shooting wolves in the act of stalking, attacking, or killing livestock or other domestic animals in Zone A. We conclude that this action is not likely to result in the killing of many additional wolves, as opportunities to shoot wolves "in the act" will likely be few and difficult to successfully accomplish, a conclusion shared by a highly experienced wolf-depredation agent (Paul in litt. 2006, p. 5).

State law and the Minnesota Plan will provide broad authority to landowners and land managers to shoot wolves at any time to protect their livestock, pets, or other domestic animals on land owned, leased, or managed by the individual in Zone B (as described above). Such takings can occur in the absence of wolf attacks on the domestic animals. Thus, the estimated 450 wolves in Zone B could be subject to substantial reduction in numbers. At the extreme, wolves could be eliminated from Zone B, but this is highly unlikely—the Minnesota Plan states that "Although depredation procedures will likely result in a larger number of wolves killed, as compared to previous ESA management, they will not result in the elimination of wolves from Zone B." (MN DNR 2001, pp. 22–23). While wolves were under State management in 2007–2008 and in 2011–2014, landowners in Zone B shot six and eight wolves under this authority,

respectively. Fourteen additional wolves were trapped and euthanized in Zone B by State-certified predator controllers and Wildlife Services, 1 in 2009, and 13 in 2013 (Stark in litt. 2009; Stark in litt. 2018).

The limitation of this broad take authority to Zone B is fully consistent with the advice in the Revised Recovery Plan that wolves should be restored to the rest of Minnesota but not to Zone B (Federal Zone 5) (USFWS 1992, p. 20). The Revised Recovery Plan for the Eastern Timber Wolf envisioned that the Minnesota numerical planning goal would be achieved solely in Zone A (Federal Zones 1–4) (USFWS 1992, p. 28), and that has occurred. Wolves outside of Zone A are not necessary to the establishment and long-term viability of a self-sustaining wolf population in the State, and, therefore, there is no need to establish or maintain a wolf population in Zone B. Accordingly, there is no need to maintain significant protection for wolves in Zone B in order to maintain a Minnesota wolf population that continues to satisfy the Federal recovery criteria after Federal delisting.

This expansion of depredation-control activities would not threaten the continued survival of wolves in the State or the long-term viability of the wolf population in Zone A, the majority of wolf range in Minnesota. Significant changes in wolf depredation control under State management will primarily be restricted to Zone B, which is outside of the area necessary for wolf recovery (USFWS 1992, pp. 20, 28). Furthermore, wolves are highly likely to persist in Zone B despite the likely increased take there. With respect to Zone A, the Eastern Timber Wolf Recovery Team concluded that the changes in wolf management would be “minor” and would not likely result in “significant change in overall wolf numbers.” They found that, despite an expansion of the individual depredation-control areas, depredation control would remain “very localized” in Zone A. The requirement that such depredation-control activities be conducted only

in response to verified wolf depredation in Zone A played a key role in the team's evaluation (Peterson in litt. 2001). While wolves were under State management in 2007 and 2008, the number of wolves killed for depredation control (133 wolves in 2007 and 143 wolves in 2008) remained consistent with those killed under the special regulation under section 4(d) of the Act while wolves were federally listed (105 in 2004; 134 in 2005; and 122 in 2006). The number of wolves killed for depredation control while wolves were under State management for the second time (2011–2014) was slightly higher (203 wolves in 2011; 262 in 2012; 114 in 2013; and 197 in 2014) than during 2007 and 2008, but was still consistent with those killed under section 4(d) in the surrounding years (192 wolves in 2010 and 213 in 2015).

Minnesota will continue to monitor wolf populations throughout the State and will also monitor all depredation-control activities in Zone A (MN DNR 2001, p. 18). We expect that these and other activities contained in their plan will be effective in meeting their population goal of a minimum statewide winter population of 1,600 wolves, well above the planning goal of 1,251 to 1,400 wolves that the Revised Recovery Plan identifies as sufficient to ensure the wolf's continued survival in Minnesota (USFWS 1992, p. 28).

Post-delisting Regulated Harvest in Minnesota—The Minnesota Department of Natural Resources will consider wolf population-management measures, including public hunting and trapping seasons and other methods, when wolves are federally delisted. In 2011, the Minnesota Legislature authorized the MN DNR to implement a wolf season following the Federal delisting and classified wolves as small game in State statute (Minnesota Statutes 2018 97B.645 Subd. 9). Following Federal delisting, the 2012 Legislature established wolf hunting and trapping licenses, clarified the authority for the MN DNR to implement a wolf season, and required the start of the season to be no later than the start of firearms deer season each year. Three regulated harvest

seasons (in 2012, 2013, and 2014) were subsequently implemented in the State while wolves were federally delisted. The harvest was divided into three segments: An early hunting season that coincided with the firearms deer season, a late hunting season, and a concurrent late trapping season. In 2012, the MN DNR established a total target harvest of 400 wolves (the close of the harvest season is to be initiated when that target is met) (Stark and Erb 2013, pp. 1–2). During that first regulated season, 413 wolves were harvested. Based on the results of the 2012 harvest season, the MN DNR adjusted the target to 220 wolves for 2013; that year 238 wolves were harvested. The 2014 target harvest was 250 wolves and 272 were harvested.

The Minnesota management plan requires that population-management measures be implemented in such a way to maintain a statewide late-winter wolf population of at least 1,600 animals (MN DNR 2001, pp. 19–20), well above the planning goal of 1,251 to 1,400 wolves for the State in the Revised Recovery Plan (USFWS 1992, p. 28). Therefore, we expect the management measures implemented under that requirement will ensure the wolf's continued survival in Minnesota.

The Wisconsin Wolf Management Plan—The Wisconsin Plan allows for differing levels of protection and management within four separate management zones (see WI DNR 2006a, figure 8). The Northern Forest Zone (Zone 1) and the Central Forest Zone (Zone 2) contain most of the State's wolf population, with approximately 6 percent of the Wisconsin wolves in Zones 3 and 4 (Wydeven and Wiedenhoeft 2009, table 1). Zones 1 and 2 contain all the larger unfragmented areas of suitable habitat, so we anticipate that most of the State's wolf packs will continue to inhabit those parts of Wisconsin. At the time the 1999 Wisconsin Plan was completed, it recommended immediate reclassification from State-endangered to State-

threatened status, because Wisconsin's wolf population had already exceeded its reclassification criterion of 80 wolves for 3 years; thus, State reclassification occurred that same year.

The Wisconsin Plan contains a management goal of 350 wolves outside of Native American reservations, and specifies that the species should be delisted by the State once the population reaches 250 animals outside of reservations. The species was proposed for State delisting in late 2003, and the State delisting process was completed in 2004. Upon State delisting, the species was classified as a "protected nongame species," a designation that continues State prohibitions on sport hunting and trapping of the species (Wydeven and Jurewicz 2005, p. 1; WI DNR 2006b, p. 71). The Wisconsin Plan includes criteria for when State relisting to threatened (a decline to fewer than 250 wolves for 3 years) or endangered status (a decline to fewer than 80 wolves for 1 year) should be considered. The Wisconsin Plan will be reviewed annually by the Wisconsin Wolf Advisory Committee and will be reviewed by the public every 5 years.

The Wisconsin Plan was updated between 2004 and 2006 to reflect current wolf numbers, additional knowledge, and issues that have arisen since its 1999 completion. This update was not a major revision; rather, it included text changes, revisions to two appendices, and the addition of a new appendix to the 1999 plan. Several components of the plan that are key to our delisting evaluation were not changed. The State wolf-management goal of 350 animals and the boundaries of the four wolf-management zones remain the same as in the 1999 Plan. The updated 2006 Plan continues to recommend access management on public lands and the protection of active den sites. Protection of pack-rendezvous sites, however, is no longer considered necessary in areas where wolves have become well established, due to the transient nature of these sites and the larger wolf population. The updated Plan states that rendezvous sites

may need protection in areas where wolf colonization is still under way or where pup survival is extremely poor, such as in northeastern Wisconsin (WI DNR 2006a, p. 17). The guidelines for the wolf depredation-control program (see *Post-delisting Depredation Control in Wisconsin*) did not undergo significant alteration during the update process. The only substantive change to depredation-control practices is to expand the area of depredation-control trapping in Zones 1 and 2 to 1 mi (1.6 km) outward from the depredation site, replacing the previous 0.5-mi (0.8-km) radius trapping zone (WI DNR 2006a, pp. 3–4).

An important component of the Wisconsin Plan is the annual monitoring of wolf populations by radio collars and winter track surveys in order to provide comparable annual data to assess population size and growth for at least 5 years after Federal delisting. The Wisconsin Plan also includes a hierarchical approach to wolf health monitoring that is predicated on the species' conservation status. Following Federal delisting, the Wisconsin DNR will assume responsibility for all health monitoring, which will include examination of all dead wolves found, necropsy of suspicious deaths to identify the mortality agent responsible, and health monitoring of wild wolves captured for research purposes in coordination with the Wisconsin DNR Wildlife Health Team (WI DNR 2006a, p. 13). The 2006 update to the Wisconsin Wolf Management Plan did not change the WI DNR's commitment to annual wolf population monitoring, and ensures accurate and comparable data (WI DNR 1999, pp. 19–20).

Cooperative habitat management will be promoted with public and private landowners to maintain existing road densities in Zones 1 and 2, protect wolf dispersal corridors, and manage forests for deer and beaver (WI DNR 1999, pp. 4, 22–23; 2006a, pp. 15–17). Furthermore, in Zone 1, a year-round prohibition on tree harvest within 330 feet (100 m) of active den sites and seasonal restrictions to reduce disturbance within one-half mile (0.8 km) of dens will be WI

DNR policy on public lands and will be encouraged on private lands (WI DNR 1999, p. 23; 2006a, p. 17).

The 1999 Wisconsin Plan contains, and the 2006 update retains, other components that will protect wolves and help maintain a viable wolf population in the State following delisting. Namely, the plan: (1) continues the protection of the species as a "protected wild animal" with penalties similar to those for unlawfully killing large game species (fines of up to $1,000–$2,000 and possible loss of hunting privileges for 3 years); (2) requires State permits to possess a wolf or wolf–dog hybrid; and (3) establishes a restitution value to be levied in addition to fines and other penalties for wolves that are illegally killed (WI DNR 1999, pp. 21, 27, 30–31; 2006a, pp. 3–4).

The 2006 update of the Wisconsin Plan continues to emphasize the need for public education efforts that focus on living with a recovered wolf population, ways to manage wolves and wolf–human conflicts, and the ecosystem role of wolves. The Plan implements the State law requiring reimbursement for depredation losses (including dogs and missing calves), citizen stakeholder involvement in the wolf-management program, and coordination with the Tribes in wolf management and investigation of illegal killings (WI DNR 1999, pp. 24, 28–29; 2006a, pp. 22–23).

Depredation Control in Wisconsin—Lethal depredation control has not been authorized in Wisconsin (due to the listed status of wolves there as endangered) except for several years when such control was authorized under a permit from the Service or while wolves were delisted under previous actions. The rapidly expanding Wisconsin wolf population has resulted in an increased need for depredation control, however. From 1979 through 1989, there were only five cases (an average of 0.4 per year) of verified wolf depredations in Wisconsin, but the number of

incidents has steadily increased over the subsequent decades. During the 1990s there were an average of approximately 4 incidents per year, increasing to an average of approximately 38 per year during the 2000s and to an average of approximately 69 per year since 2010 (WI DNR data files and summary of wolf survey and depredation reports).

A significant portion of depredation incidents in Wisconsin involve attacks on dogs. In most cases, these have been hunting dogs that were being used for, or being trained for, hunting bears, bobcats, coyotes, and snowshoe hare (Ruid et al. 2009, pp. 285–286). It is believed that the dogs entered the territory of a wolf pack and may have been close to a den, rendezvous site, or feeding location, thus triggering an attack by wolves defending their territory or pups. The frequency of attacks on hunting dogs has increased as the State's wolf population has grown. Of the 206 dogs killed by wolves during the 25 years from 1986–2010, more than 80 percent occurred during the period from 2001–2010, with an average of 17 dogs killed annually during that 10-year period (WI DNR files). Data on depredations from 2013 to 2017 show a continued increase in wolf attacks on dogs, with an average of 23 dogs killed annually (with a high of 41 dogs in 2016). While the WI DNR compensates dog owners for mortalities and injuries to their dogs, the DNR takes no action against the depredating pack unless the attack was on a dog that was leashed, confined, or under the owner's control on the owner's land. Instead, the WI DNR issues press releases to warn bear hunters and bear-dog trainers of the areas where wolf packs have been attacking bear dogs (WI DNR 2008, p. 5) and provides maps and advice to hunters on the WI DNR website (see https://dnr.wi.gov/topic/WildlifeHabitat/wolf/dogdeps.html).

During the first periods that wolves were federally delisted in Wisconsin (from March 2007 through September 2008 and from April through early July 2009), 92 wolves were killed for depredation control in the State, including 8 legally shot by private landowners (Wydeven

and Wiedenhoeft 2008, p. 8; Wydeven et al. 2009b, p. 6; Wydeven et al. 2010, p. 13). When wolves were again delisted from January 2012 through December 2014, depredation control resulted in 164 wolves being killed, including 38 legally shot by private landowners (McFarland and Wiedenhoeft 2013, p. 9; Wiedenhoeft et al, 2014, p. 10; Wiedenhoeft et al. 2015, p. 10).

Post-delisting Depredation Control in Wisconsin—Following Federal delisting, wolf depredation control in Wisconsin will be carried out according to the 2006 Updated Wisconsin Wolf Management Plan (WI DNR 2006a, pp. 19–23), Guidelines for Conducting Depredation Control on Wolves in Wisconsin Following Federal Delisting (WI DNR 2014c). The 2006 updates did not significantly change the 1999 State Plan, and the State wolf management goal of 350 wolves outside of Indian reservations (WI DNR 2006a, p. 3) is unchanged. Verification of wolf depredation incidents will continue to be conducted by U.S. Department of Agriculture–Animal and Plant Health Inspection Service–Wildlife Services (hereafter Wildlife Services), working under a Cooperative Service Agreement with WI DNR, or at the request of a Tribe, depending on the location of the suspected depredation incident. If determined to be a confirmed or probable depredation by a wolf or wolves, one or more of several options will be implemented to address the depredation problem. These options include technical assistance, loss compensation to landowners, translocating or euthanizing problem wolves, implementation of nonlethal management methods, and private landowner or agency control of problem wolves in some circumstances (WI DNR 2006a, pp. 3–4, 20–22).

Technical assistance, consisting of advice or recommendations to prevent or reduce further wolf conflicts, will be provided. This may also include providing the landowner with various forms of noninjurious behavior-modification materials, such as flashing lights, noise makers, temporary fencing, and fladry (a string of flags used to contain or exclude wild animals).

Monetary compensation is also provided for all verified and probable losses of domestic animals and for a portion of documented missing calves (WI DNR 2006a, pp. 22–23). The compensation is made at full market value of the animal (up to a limit of $2,500 for dogs) and can include veterinarian fees for the treatment of injured animals (WI DNR 2006c 12.54). Current Wisconsin law requires the continuation of the compensation payment for wolf depredation regardless of Federal listing or delisting of the species (WI DNR 2006c 12.50). In recent years, annual depredation compensation payments have ranged from $91,000 (2009) to $256,000 (2017). From 1985 through April 2018, the WI DNR had spent over $2,378,000 on reimbursement for damage caused by wolves in the State, with 60 percent of that total spent over the last 10 years (since 2009) (https://dnr.wi.gov/topic/wildlifehabitat/wolf/documents/WolfDamagePayments.pdf).

For depredation incidents in Wisconsin Zones 1 through 3, where all wolf packs currently reside, wolves may be trapped by Wildlife Services or WI DNR personnel and, if feasible, translocated and released at a point distant from the depredation site. If wolves are captured adjacent to an Indian reservation or a large block of public land, the animals may be translocated locally to that area. Long-distance translocating of depredating wolves has become increasingly difficult in Wisconsin and is likely to be used infrequently in the future as long as the off-reservation wolf population is above 350 animals. In most wolf-depredation cases where technical assistance and nonlethal methods of behavior modification are judged to be ineffective, wolves will be shot or trapped and euthanized by Wildlife Services or WI DNR personnel. Trapping and euthanizing will be conducted within a 1-mi (1.6-km) radius of the depredation in Zones 1 and 2, and within a 5-mi (8-km) radius in Zone 3. There is no distance limitation for depredation-control trapping in Zone 4, and all wolves trapped in Zone 4 will be euthanized, rather than translocated (WI DNR 2006a, pp. 22–23).

Full authority to conduct lethal depredation control has not been allowed in Wisconsin (due to the listed status of the wolf as an endangered species) except for short periods of time. So we have evaluated post-delisting lethal depredation control based upon verified depredation incidents over the last decade and the impacts of the implementation of similar lethal control of depredating wolves under 50 CFR 17.40(d) for Minnesota, § 17.40(o) for Wisconsin and Michigan, and section 10(a)(1)(A) of the Act for Wisconsin and Michigan. Under those authorities, WI DNR and Wildlife Services trapped and euthanized 17 wolves in 2003; 24 in 2004; 29 in 2005; 18 in 2006; 37 in 2007; 39 in 2008; 9 in 2009; and 16 in 2010 (WI DNR 2006a, p. 32; Wydeven et al. 2009a, pp. 6–7; Wydeven et al. 2010, p. 15; Wydeven et al. 2011, p. 3).

Although these lethal control authorities applied to WI DNR for only a portion of 2003 (April through December) and 2005 (all of January for both States; April 1 and April 19, for Wisconsin and Michigan respectively, through September 13), they covered nearly all of the verified wolf depredations during 2003–2005, and thus provide a reasonable measure of annual lethal depredation control. For 2003, 2004, and 2005, this represents 5.1 percent, 6.4 percent, 7.4 percent (including the several possible wolf–dog hybrids), respectively, of the late-winter population of Wisconsin wolves during the previous winter. This level of lethal depredation control was followed by a wolf population increase of 11 percent from 2003 to 2004, 17 percent from 2004 to 2005, and 7 percent from 2005 to 2006 (Wydeven and Jurewicz 2005, p. 5; Wydeven et al. 2006, p. 10). Limited lethal-control authority was granted to WI DNR for 3.5 months in 2006 by a section 10 permit, resulting in removal of 18 wolves (3.9 percent of the winter wolf population) (Wydeven et al. 2007, p. 7).

Lethal depredation control was again authorized in the State while wolves were delisted in 2007 (9.5 months) and 2008 (9 months). During those times, 40 and 43 wolves, respectively, were killed for depredation control (by Wildlife Services or by legal landowner action), representing 7 and 8 percent of the late-winter population of Wisconsin wolves during the previous year. This level of lethal depredation control was followed by a wolf population increase of 0.5 percent from 2007 to 2008, and 12 percent from 2008 to 2009 (Wydeven and Wiedenhoeft 2008, pp. 19–22; Wydeven et al. 2009a, p. 6). Authority for lethal control on depredating wolves occurred for only 2 months in 2009. During that time, eight wolves were euthanized for depredation control by Wildlife Services, and one wolf was shot by a landowner; additionally, later in 2009 after relisting, a wolf was captured and euthanized by Wildlife Services for human safety concerns (Wydeven et al. 2010, p. 15). Thus in 2009, 10 wolves, or 2 percent of the winter wolf population, were removed in control activities.

In 2010, authority for lethal control of wolves depredating livestock was not available in Wisconsin, but 16 wolves or 2 percent of the winter population were removed for human-safety concerns (Wydeven et al. 2011, p. 3). The Wisconsin wolf population in winter 2010–2011 grew to 687 wolves, an increase of 8 percent from the wolf population in winter 2009–2010 (Wydeven et al. 2010, pp. 12–13). When wolves were again delisted from January 2012 through December 2014, a total of 164 wolves were killed under authorized lethal depredation control (McFarland and Wiedenhoeft 2013, p. 9; Wiedenhoeft et al. 2014, p. 10; Wiedenhoeft et al. 2015, p. 10). It is more difficult to evaluate the effects attributed specifically to depredation control over that time, as the State also implemented a regulated public harvest those years. However, information from previous years where depredation control was the primary change in management provides strong evidence that this form and magnitude of depredation control would not adversely affect

the viability of the Wisconsin wolf population. Furthermore, Stenglein et al. (2015a, pp. 17–21) demonstrates that regular removal of 10 percent of the wolf population for depredation controls has little impact on growth of the wolf population. The locations of depredation incidents provide additional evidence that lethal control will not have an adverse impact on the State's wolf population. Most livestock depredations are caused by packs near the northern forest–farm-land interface. Few depredations occur in core wolf range and in large blocks of public land. Thus, lethal depredation-control actions would not affect most of the Wisconsin wolf population (WI DNR 2006a, p. 30). Additionally, Olson et al. (2015, pp. 680–681) showed that only a small percentage of packs cause depredation on livestock, and several risk maps show that the potential locations with high risk of wolf depredations on livestock represent a small portion of wolf range in Wisconsin (Treves et al. 2011, entire; Treves and Rabenhorst 2017, entire).

One substantive change to lethal control that will result from Federal delisting is the ability of a small number of private landowners, whose farms have a history of recurring wolf depredation, to obtain limited-duration permits from WI DNR to kill a limited number of depredating wolves on land they own or lease, based on the size of the pack causing the local depredations (WI DNR 2008, p. 8). Such permits can be issued to: (1) landowners with verified wolf depredations on their property within the last 2 years; (2) landowners within 1 mile (1.6 km) of properties with verified wolf depredations during the calendar year; (3) landowners with vulnerable livestock within WI DNR-designated proactive control areas; (4) landowners with human safety concerns on their property; and (5) landowners with verified harassment of livestock on their property (WI DNR 2008, p. 8). Limits on the number of wolves that could be killed will be based on the estimated number of wolves in the pack causing depredation problems.

During the 19 months in 2007 and 2008 when wolves were federally delisted, the WI DNR issued 67 such permits, resulting in 2 wolves being killed. Some landowners received permits more than once, and permits were issued for up to 90 days at a time and restricted to specific calendar years. In addition, landowners and lessees of land statewide will be allowed to kill a wolf "in the act of killing, wounding, or biting a domestic animal" without obtaining a permit. The incident must be reported to a conservation warden within 24 hours, and the landowners are required to turn any dead wolves over to the WI DNR (WI DNR 2006a, pp. 22–23; WI DNR 2008, p. 6). During that same 19-month time period, landowners killed a total of five wolves under that authority. One wolf was shot in the act of attacking domestic animals during the 2 months when wolves were delisted in 2009. Another 38 wolves were legally shot by landowners during the 35 months that wolves were delisted from 2012 to 2014. The death of these 46 additional wolves—which accounted for less than 3 percent of the State's wolves in any year—did not affect the viability of the population.

Another potential substantive change after delisting will be proactive trapping or "intensive control" of wolves in sub-zones of the larger wolf-management zones (WI DNR 2006a, pp. 22–23). Triggering actions and types of controls planned for these "proactive control areas" are listed in the WI DNR depredation-control guidelines (WI DNR 2008, pp. 7–9). Controls on these actions would be considered on a case-by-case basis to address specific problems, and will be carried out only in areas that lack suitable habitat, have extensive agricultural lands with little forest interspersion, in urban or suburban settings, and only when the State wolf population is well above the management goal of 350 wolves outside Indian reservations in late-winter surveys. The use of intensive population management in small areas would be adapted as experience is gained with implementing and evaluating localized control

actions (Wydeven 2006, pers. comm.). We are confident that the number of wolves killed by these actions will not affect the long-term viability of the Wisconsin wolf population, because generally less than 15 percent of packs cause depredations that will initiate such controls, and "proactive" controls will be carried out only if the State's late-winter wolf population exceeds 350 animals outside Indian reservations.

The State's current guidelines for conducting depredation-control actions say that no control trapping would be conducted on wolves that kill "dogs that are free roaming, roaming at large, hunting, or training on public lands, and all other lands except land owned or leased by the dog owner" (WI DNR 2008, p. 5). Controls will be applied on wolves depredating pet dogs attacked near homes and wolves attacking livestock. Because of these State-imposed limitations, we conclude that lethal control of wolves depredating on hunting dogs will be rare and, therefore, will not be a significant additional source of mortality in Wisconsin. Lethal control of wolves that attack captive deer is included in the WI DNR depredation-control program, because farm-raised deer are considered to be livestock under Wisconsin law (WI DNR 2008, pp. 5–6; 2006c, 12.52). However, we expect that changes to Wisconsin regulations for deer farm fencing will result in reduced wolf depredations inside deer farms, thus decreasing the need for lethal control. Claims for wolf depredation compensation are rejected if the claimant is not in compliance with regulations regarding farm-raised-deer fencing or livestock-carcass disposal (Wisconsin Statutes 90.20 & 90.21, WI DNR 2006c 12.54).

Data from verified wolf depredations in recent years indicate that depredation on livestock is likely to increase as long as the Wisconsin wolf population increases in numbers and range. Wolf packs in more marginal habitat with high acreage of pasture land are more likely to become depredators (Treves et al. 2004, pp. 121–122). Most large areas of forest land and public

lands are included in Wisconsin Wolf Management Zones 1 and 2, and they have already been colonized by wolves. Therefore, new areas likely to be colonized by wolves in the future will be in Zones 3 and 4, where they will be exposed to much higher densities of farms, livestock, and residences. During 2008, of farms experiencing wolf depredation, 25 percent (8 of 32) were in Zone 3, yet only 4 percent of the State wolf population occurs in this zone (Wydeven et al. 2009a, p. 23). Further expansion of wolves into Zone 3 will likely lead to an increase in depredation incidents and an increase in lethal control actions against Zone 3 wolves. However, these Zone 3 mortalities will have a negligible impact on wolf population viability in Wisconsin because of the much larger wolf populations in Zones 1 and 2.

We anticipate that under the management laid out in the Wisconsin Wolf Management Plan the wolf population in Zones 1 and 2 will continue to greatly exceed the recovery goal in the Revised Recovery Plan of 200 late-winter wolves for an isolated population and 100 wolves for a subpopulation[5] connected to the larger Minnesota population, regardless of the extent of wolf mortality from all causes in Zones 3 and 4. Ongoing annual wolf population monitoring by WI DNR will provide timely and accurate data to evaluate the effects of wolf management under the Wisconsin Plan.

Post-delisting Regulated Harvest in Wisconsin—A regulated public harvest of wolves is acknowledged in the Wisconsin Wolf Management Plan and its updates as a potential management technique (WI DNR 1999, Appendix D; 2006c, p. 23). Wisconsin Act 169 was enacted in April 2012, following Federal delisting of wolves earlier that year. The law reclassified wolves in Wisconsin as a game species and directed the WI DNR to establish a harvest season in 2012. The harvest season was set from October 15 through February 28 with

[5] A population that is part of a larger population or metapopulation.

zones closing as individual quotas are met. The WI DNR holds the authority to determine harvest zones and set harvest quotas.

With the establishment of the first wolf hunting season in 2012, the WI DNR modified the four zones from the 1999 wolf plan into six harvest zones (WI DNR 2014a, p. 8). Much of the original Zone 1 (northern forest wolf range) from the 1999 plan was modified into four harvest zones, with harvest Zones 1 and 2 representing core wolf areas and Zone 3 and 4 representing transitional wolf habitat. Most of Zone 2 from the 1999 plan (central forest core wolf range) became harvest Zone 5. The remainder of the State is marginal or unsuitable wolf habitat and became wolf harvest Zone 6.

Harvest quotas for the 2012–2013 season were designed to begin reducing the population toward the established objective, and the harvest zones were designed to focus harvest in areas of highest human conflict with lower harvest rates in areas of primary wolf habitat. State-licensed hunters and trappers were not allowed permits within the reservation boundaries of the Bad River, Red Cliff, Lac Courte Oreilles, Lac Du Flambeau, and Menominee reservations or within the Stockbridge-Munsee wolf zone. A large portion of the zones open to wolf hunting in the State included ceded territories (lands outside reservations where Tribes continue to hold fishing, hunting, and gathering rights). Within ceded territories, the Tribes can request up to half of any allowable harvest of wildlife for their members. The ceded territories portions of wolf harvest zones included an allowable harvest of 170 wolves, and one half (or 85 wolves) was offered to the Tribes for harvest in 2012. The Tribes chose not to take part in the wolf harvest, and all Tribes in the State closed tribal lands to wolf hunting. Because the Tribes chose not to exercise their wolf hunting authority, the portions of the allowable harvest offered to Tribes declined in

subsequent years to 24 in 2013, and 6 in 2014 (WI DNR 2013 pp. 1, 2; WI DNR 2014b, p. 4; McFarland and Wiedenhoeft 2015, pp. 2, 4).

The Wisconsin Natural Resources Board established a total quota of 201 wolves (comprising a State-licensed quota of 116 wolves and a Tribal offer of 85 wolves). A total of 117 wolves were harvested during that first season, all under the State licenses (Tribes did not authorize Tribal members to harvest wolves within reservation boundaries). In 2013–2014, the total quota was 275 wolves: a State-licensed quota of 251, and a Tribal offer of 24. That year, 257 wolves were harvested. The 2014–2015 wolf quota was reduced to 156 (a 57-percent reduction from the 2013–2014 wolf quota), and 154 wolves were harvested that season (a 60-percent decrease from the 2013–2014 harvest.

Evidence from Wisconsin indicates that active management with public harvests and targeted lethal depredation controls could reduce wolf–human conflicts without causing major declines in wolf numbers in the State. The minimum count of wolves in Wisconsin when they were delisted in 2012 was 815 wolves. After 3 years of public hunting and trapping seasons, they had been reduced to a minimum count of 746 in 2015, or a reduction of only 8.5 percent. During that same time period, verified wolf kills on cattle and the number of farms with verified depredations declined significantly (Wiedenhoeft et al. 2015, pp. 4–5, 12), indicating that active management with public harvests and targeted lethal depredation controls could reduce conflicts without causing significant declines in wolf numbers (Wydeven 2019a, in litt.).

Regardless of the methods used to manage wolves in the State, WI DNR is committed to maintaining a wolf population of 350 wolves outside of Indian reservations, which translates to a statewide population of 361 to 385 wolves in late winter. No harvest will be allowed if the wolf population falls below this goal (WI DNR 1999, pp. 15, 16). Also, the fact that the Wisconsin

Plan calls for State relisting of the wolf as a threatened species if the population falls to fewer than 250 for 3 years provides a strong assurance that any public harvest is not likely to threaten the persistence of the population (WI DNR 1999, pp. 15–17). Based on wolf population data, the current Wisconsin Plan and the 2006 updates, we conclude that any public harvest plan will continue to maintain the State wolf population well above the Federal recovery goal of 100 wolves.

The Michigan Wolf Management Plan—The 2015 updated Michigan Plan describes the wolf recovery goals and management actions needed to maintain a viable wolf population in the Upper Peninsula of Michigan, while facilitating wolf-related benefits and minimizing conflicts. The updated Michigan Plan contains new scientific information related to wolf management, updated information on the legal status of wolves, clarifications related to management authorities and decisionmaking, and updated strategic goals, objectives, and management actions informed by internal evaluation and responses and comments received from stakeholders. The updated plan retains the four principal goals of the 2008 plan, which are to "1) maintain a viable Michigan wolf population above a level that would warrant its classification as threatened or endangered (more than 200 wolves); 2) facilitate wolf-related benefits; 3) minimize wolf-related conflicts; and 4) conduct science-based wolf management with socially acceptable methods" (MI DNR 2015, p. 16). The Michigan Plan details wolf-management actions, including public education and outreach activities, biennial wolf population and health monitoring, research, depredation control, ensuring adequate legal protection for wolves, and prey and habitat management. The Michigan Plan does not address wolf management within Isle Royale National Park, where the wolf population is fully protected by the National Park Service.

As with the Wisconsin Plan, the MI DNR has chosen to manage the State's wolves as though they are an isolated population that receives no genetic or demographic benefits from immigrating wolves, even though their population will continue to be connected with populations in Minnesota, Wisconsin, and Canada. The Michigan wolf population must exceed 200 wolves in order to achieve the Plan's first goal of maintaining a viable wolf population in the Upper Peninsula. This number is consistent with the Federal Revised Recovery Plan's definition of a viable, isolated wolf population (USFWS 1992, p. 25). The Michigan Plan, however, clearly states that 200 wolves is not the target population size, and that a larger population may be necessary to meet the other goals of the Plan. Therefore, the State will maintain a wolf population that will "provide all of the ecological and social benefits valued by the public" while "minimizing and resolving conflicts where they occur" (MI DNR 2015, p. 17). We strongly support this approach, as it provides assurance that a viable wolf population will remain in the Upper Peninsula regardless of the future fate of wolves in Wisconsin or Ontario.

The Michigan plan also addresses the need for wolf recovery and the strategic management direction in the Lower Peninsula. The plan states wolves will not be prevented from colonizing the Lower Peninsula, but their presence is not necessary to maintain a viable population in the State (Ml DNR 2015, p. 39). Additionally, if wolves occupy the Lower Peninsula, the higher density of human residences and livestock operations in that area relative to the Upper Peninsula would create a greater potential for wolf-related conflicts. The severity, immediacy, and frequency of conflicts would guide management responses in the Lower Peninsula (Ml DNR 2015, p. 39).

The Michigan Plan identifies wolf population monitoring as a priority activity, and specifically states that the MI DNR will monitor wolf abundance every other year for at least 5

years post-delisting (MI DNR 2015, p. 26). This includes monitoring to assess wolf presence in the northern Lower Peninsula. From 1989 through 2006, the MI DNR attempted to count wolves throughout the entire Upper Peninsula. As the wolf population increased, this method became more difficult. In the winter of 2006–2007, the MI DNR implemented a new sampling approach based on an analysis by Potvin et al. (2005, p. 1668) to increase the efficiency of the State survey. The new approach is based on a geographically based stratified random sample and produces an unbiased, regional estimate of wolf abundance. The Upper Peninsula was stratified into 21 sampling units; each sampling unit was assigned to one of three strata based on geographic location and relative wolf density. The MI DNR intensively surveys roughly 60 percent of the Upper Peninsula every other year. Computer simulations have shown that such a geographically stratified monitoring program would produce unbiased and precise estimates of the total wolf population (Beyer in litt. 2006, see attachment by Drummer; Lederle in litt. 2006; Roell et al. 2009, p. 3).

Another component of wolf population monitoring is monitoring wolf health. The MI DNR will continue to monitor the impact of parasites and disease on the viability of wolf populations in the State through necropsies of dead wolves and analyzing biological samples from captured live wolves. Prior to 2004, MI DNR vaccinated all captured wolves for canine distemper and parvovirus and treated them for mange. These inoculations were discontinued to provide more natural biotic conditions and to provide biologists with an unbiased estimate of disease-caused mortality rates in the population (Roell in litt. 2005). Since diseases and parasites are not currently a significant threat to the Michigan wolf population, the MI DNR is continuing the practice of not actively managing disease. If monitoring indicates that diseases or parasites

may pose a threat to the wolf population, the MI DNR would again consider more active management similar to that conducted prior to 2004 (MI DNR 2015, p. 35).

The Michigan Plan includes maintaining habitat and prey necessary to sustain a viable wolf population in the State as a management component. This includes maintaining prey populations required for a viable wolf population while providing for sustainable human uses, maintaining habitat linkages to allow for wolf dispersal, and minimizing disturbance at known, active wolf dens (MI DNR 2015, pp. 32–34).

To minimize illegal take, the Michigan Plan calls for enacting and enforcing regulations to ensure adequate legal protection for wolves in the State. Under State regulations, wolves could be classified as a threatened, endangered, game, or protected animal, all of which prohibit killing (or harming) the species except under a permit, license, or specific conditions. Michigan removed gray wolves from the State's threatened and endangered species list in 2009 and classified the species as a game animal in 2016. Game-animal status allows but does not require the establishment of a regulated harvest season. The Michigan Plan states that regulations would be reviewed, modified, or enacted as necessary to provide the wolf population with appropriate levels of protection with the following possible actions: (1) reclassify wolves as endangered or threatened under State regulations if population size declines to 200 or fewer wolves; (2) review, modify, recommend, and/or enact regulations, as necessary, to ensure appropriate levels of protection for the wolf population; and (3) if necessary to avoid a lapse in legal protection, amend the Wildlife Conservation Order to designate wolves as a protected animal (MI DNR 2015, p. 28).

The Michigan Plan emphasizes the need for public information and education efforts that focus on living with a recovered wolf population and ways to manage wolves and wolf–human

interaction (both positive and negative) (MI DNR 2015, pp. 22–25). The Plan also recommends continuing important research efforts, continuing reimbursement for depredation losses, minimizing the impacts of captive wolves and wolf–dog hybrids on the wild wolf population, and citizen stakeholder involvement in the wolf-management program (MI DNR 2015, pp. 27, 52–53, 55–56, 60).

The Michigan Plan calls for establishing a wolf-management stakeholder group that will meet annually to monitor the progress made toward implementing the Plan. Furthermore, the Plan will be reviewed and updated at 5-year intervals to address "ecological, social, and regulatory" changes (MI DNR 2015, pp. 60–61). The plan also addresses currently available and potential new sources of funding to offset costs associated with wolf management (MI DNR 2015, pp. 61–62). The MI DNR has long been an innovative leader in wolf-recovery efforts, exemplified by its initiation of the nation's first attempt to reintroduce wild wolves to vacant historical wolf habitat in 1974 (Weise et al. 1975). The MI DNR's history of leadership in wolf recovery and its repeated written commitments to ensure the continued viability of a Michigan wolf population above a level that would trigger State or Federal listing as threatened or endangered further reinforces that the 2015 Michigan Wolf Management Plan will provide adequate regulatory mechanisms for Michigan wolves. The DNR's primary goal remains to conduct management to maintain the wolf population in Michigan above the minimum size that is biologically required for a viable, isolated population and to provide for ecological and social benefits valued by the public while resolving conflicts where they occur (MI DNR 2015, p. 16).

Depredation Control in Michigan—Data from Michigan show a general increase in confirmed events of wolf depredations on livestock over the past two decades, with an average of 2.5 events annually from 1998 through 2002, an average of 8 annually in 2003–2007; an average

of 25 annually in 2008–2012; and an average of 14 annually in 2013–2017. Eighty-six percent of the depredation events were on cattle, with the rest on sheep, poultry, rabbits, goats, horses, swine, and captive deer (Roell et al. 2009, pp. 9, 11; Beyer in litt. 2018).

Michigan has not experienced as high a level of attacks on dogs by wolves as Wisconsin, although a slight increase in such attacks has occurred over the last decade (Ruid et al. 2009, pp. 284–285; Bump et al. 2013, pp. 1–2). Yearly losses vary, and actions of a single pack of wolves can be an important influence. In Michigan, there is not a strong relationship between wolf depredation on dogs and wolf abundance (Roell et al. 2010, p. 7). The number of dogs killed in the State during the 15 years from 1996 to 2010 totaled 34; that number increased to 55 during the 7-year period from 2011 through 2017 (Beyer in litt. 2018). The majority of the wolf-related dog deaths involved hounds used to hunt bears. The MI DNR guidelines for its depredation control program allow for lethal control as a management option on free-ranging hunting dogs when nonlethal methods are determined to be ineffective in specific areas where a wolf attack has been verified (MI DNR 2017, pp. 9–10). Lethal control of wolves will also be considered if wolves have killed confined pets and remain in the area where more pets are being held (MI DNR 2017, p. 10). In 2008, the Michigan Legislature passed a law that will allow dog owners or their designated agents to remove, capture, or, if deemed necessary, use lethal means to destroy a gray wolf that is in the act of preying upon the owner's dog, which includes dogs free roaming or hunting on public lands.

During the several years that lethal control of depredating wolves had been conducted in Michigan, there was no evidence of resulting adverse impacts to the maintenance of a viable wolf population in the Upper Peninsula. MI DNR and Wildlife Services killed 50 wolves in response to depredation events during the time period when permits or special rules were in

effect or while wolves were not on the Federal List of Endangered and Threatened Wildlife (Roell et al. 2010, p. 8). In 2008, Michigan passed two House bills that will become effective after Federal delisting. These bills authorize a livestock or dog owner (or a designated agent) to "remove, capture, or use lethal means to destroy a wolf that is in the act of preying upon" the owner's livestock or dog. During the 2 months that wolves were federally and State delisted in 2009, no wolves were killed under these authorizations; 15 wolves were killed under these authorities from 2012 through 2014 (Beyer in litt. 2018). The numbers of wolves killed each year for depredation control (livestock and dogs) are as follows: 4 (2003), 5 (2004), 2 (2005), 7 (2006), 14 (2007), 8 (2008), 1 (during 2 months in 2009), 18 (2012), 10 (2013), and 13 (2014) (Beyer et al. 2006, p. 88; Roell in litt. 2006, p. 1; Roell et al. 2010, p. 19; Beyer in litt. 2018). This represents 0.2 percent (2009) to 2.8 percent (2007) of the Upper Peninsula's late-winter population of wolves during the previous winter. During the years where depredation control took place absent a regulated public harvest, the wolf population increased from 2 percent (2007–2008) to 17 percent (2006–2007) despite the level of depredation control, demonstrating that the wolf population continues to increase at a healthy rate (Huntzinger et al. 2005, p. 6; MI DNR 2006, Roell et al. 2009, p. 4).

Post-delisting Depredation Control in Michigan—Following Federal delisting, wolf depredation control in Michigan will be carried out according to the 2015 Michigan Wolf Recovery and Management Plan (MI DNR 2015) and any Tribal wolf-management plans that may be developed in the future for reservations in occupied wolf range.

To provide depredation-control guidance when lethal control is an option, MI DNR has developed detailed instructions for incident investigation and response (MI DNR 2017). Verification of wolf depredation incidents will be conducted by MI DNR or Wildlife Services

personnel (working under a Cooperative Service Agreement or at the request of a Tribe, depending on the location) who have been trained in depredation investigation techniques. The MI DNR specifies that the verification process will use the investigative techniques that have been developed and successfully used in Minnesota by Wildlife Services (MI DNR 2017, Append. B, pp. 13–14). Following verification, one or more of several options will be implemented to address the depredation problem. Technical assistance, consisting of advice or recommendations to reduce wolf conflicts, will be provided. Technical assistance may also include providing to the landowner various forms of noninjurious behavior modification materials, such as flashing lights, noise makers, temporary fencing, and fladry.

Trapping and translocating depredating wolves has been used in the past, resulting in the translocation of 23 Upper Peninsula wolves during 1998–2003 (Beyer et al. 2006, p. 88), but as with Wisconsin, suitable relocation sites are becoming rarer, and there is local opposition to the release of translocated depredators. Furthermore, none of the past translocated depredators have remained near their release sites, making this a questionable method to end the depredation behaviors of these wolves (MI DNR 2005a, pp. 3–4). Therefore, reducing depredation problems by relocation is no longer recommended as a management tool in Michigan (MI DNR 2008, p. 57).

Lethal control of depredating wolves is likely to be the most common future response in situations when improved livestock husbandry and wolf-behavior-modification techniques (for example, flashing lights, noisemaking devices) are judged to be inadequate. In a previous application for a lethal take permit under section 10(a)(1)(A) of the Act, MI DNR received authority to euthanize up to 10 percent of the late-winter wolf population annually (MI DNR 2005b, p. 1). However, when Michigan had the authority to use lethal means to manage

depredations, not more than 3 percent of the population was removed in any year, indicating that it is likely that significantly less than 10 percent of the population will be removed annually over the next several years.

The Michigan Plan provides recommendations to guide management of various conflicts caused by wolf recovery, including depredation on livestock and pets, human safety, and public concerns regarding wolf impacts on other wildlife. We view the Michigan Plan's depredation and conflict control strategies to be conservative, in that they commit to nonlethal depredation management whenever possible, oppose preventative wolf removal where problems have not yet occurred, encourage incentives for best management practices that decrease wolf–livestock conflicts without affecting wolves, and support closely monitored and enforced take by landowners of wolves "in the act of livestock depredation" or under limited permits if depredation is confirmed and nonlethal methods are determined to be ineffective. Based on these components of the revised Michigan Plan and the stated goal for maintaining wolf populations at or above recovery goals, the Service concludes that any wolf-management changes implemented following delisting will not be implemented in a manner that results in significant reductions in Michigan wolf populations. The MI DNR remains committed to ensuring a viable wolf population above a level that would trigger relisting as either threatened or endangered in the future (MI DNR 2015, p. 8).

Michigan livestock owners are compensated when they lose livestock as a result of a confirmed wolf depredation. The Michigan Wildlife Depredations Indemnification Act (Public Act 487 of 2012) provides payment to livestock owners, but it may do so only if the MI DNR or its designated agent (Wildlife Services) verifies the depredation was caused by wolves, coyotes, or cougars. If the investigator cannot rule out wolves as the cause for the missing animals and the

farm has had “verified” wolf depredation in the past, the owner is eligible to receive indemnification payment from the Michigan Department of Agriculture and Rural Development (MI DNR 2017, p. 2). Compensation payments are made for livestock included in the claim at 100 percent of the fair market value not to exceed $4,000 for each animal. Livestock includes, but is not limited to, cattle, sheep, new world camelids, goats, bison, privately owned cervids, ratites, swine, equine, poultry, aquaculture, and rabbits. Livestock does not include dogs and cats (MI DNR 2017, pp. 2, 8).

Funding for depredation payments and, more recently, missing animal claims has changed over time. From 2001 through 2010 a supplemental fund provided by Defenders of Wildlife was used to make up the difference between State compensation and fair market value. This fund paid $10,053 to Michigan farmers. Currently, the State uses a general fund appropriate to pay depredation and missing animal claims. From 1998 through 2018, the State has paid $179,486 to Michigan farmers for losses due to wolves.

Post-delisting Regulated Harvest in Michigan—Although the Michigan Plan itself does not determine whether a public harvest will be used as a management strategy, it does discuss developing “socially and biologically responsible management recommendations regarding public harvest of wolves” (MI DNR 2015, p. 56). The Michigan Plan discusses developing recommendations regarding public harvest for two separate purposes: to reduce wolf-related conflicts and for reasons other than managing wolf-related conflicts (e.g., recreational and utilitarian purposes). With regard to implementing a public harvest for recreational or utilitarian purposes, the Michigan Plan identifies the need to gather and evaluate biological and social information, including the biological effects and the public acceptability of a general wolf harvest (MI DNR 2015, p. 60). A public harvest during a regulated season requires that wolves

be classified as game animals in Michigan (they were classified as such in 2016). With wolves classified as game animals, the Michigan Natural Resources Commission (NRC) has the exclusive authority to enact regulations pertaining to the methods and manner of public harvest. Although any decisions regarding establishment of a harvest season will be made by the NRC, the MI DNR would be called upon to make recommendations regarding socially and biologically responsible public harvest of wolves. Michigan held a regulated public hunting season in 2013 that took into consideration the recommendations of the MI DNR, which were based on the State management plan. From those recommendations, the Michigan NRC established quotas for that season based on zones in the Upper Peninsula, with a quota of 16 wolves in the far western part of the peninsula, 19 in 4 central counties, and 8 in the eastern part of the peninsula. Twenty-two wolves were taken during that 2013 season.

State Management in the West Coast States

Wolves are classified as endangered under the Washington State Endangered Species Act (WAC 220–610–010). Unlawful taking (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) of endangered fish or wildlife is prohibited in Washington (RCW 77.15.120). Wolves in California are similarly 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 section 86 and section 2080). Wolves in Oregon have achieved recovery objectives and were delisted from the State Endangered Species Act in 2015. Wolves in Oregon remain protected by the State Plan and its

associated regulation (Oregon Administrative Rule 665–110), and Oregon's wildlife policy. The wildlife policy guides long-term management and states "that wildlife shall be managed to prevent the serious depletion of any indigenous species" and includes seven management goals (ODFW 2019, p. 6, referencing ORS 496.012). There are no current plans to initiate a hunting season, and regulatory mechanisms remain in place through the State Plan and Oregon statute to ensure a sustainable wolf population. Controlled take of wolves, including a future hunting season, by the State of Oregon would require Oregon Fish and Wildlife Commission approval through a public rulemaking process (ODFW 2019, p. 31).

Oregon, Washington, and California also have adopted wolf-management plans intended to provide for the conservation and reestablishment of wolves in these States (ODFW 2019, entire; Wiles et al. 2011, entire; CDFW 2016a, entire; 2016b, entire). These plans include population objectives, education and public outreach goals, damage-management strategies, and monitoring and research plans. Wolves will remain on State endangered species lists in Washington and California until recovery objectives have been reached. Once recovery objectives have been achieved, we anticipate that the States will initiate processes for delisting wolves. Once the species is removed from State endangered species lists, the States will have the authority to consider the use of regulated harvest to manage wolf populations. All three State plans recognize that management of livestock conflicts is a necessary component of wolf management (ODFW 2019, pp. 33–55; Wiles et al. 2011, p. 72; CDFW 2016a, p. 4). Control options are currently limited to preventative and nonlethal methods within the federally listed portions of Oregon, Washington, and California. Following Federal delisting, guidelines outlined in each State's plan, or developed through a collaborative stakeholder process, will define the

conditions under which depredating wolves can be lethally removed by agency officials (CDFW 2016b, pp. 278–285; ODFW 2019, pp. 41–54; Wiles et al. 2011, pp. 72–94).

The Oregon Wolf Management Plan—The Oregon Wolf Conservation and Management Plan was developed prior to wolves becoming established in Oregon. The plan, first finalized in 2005, contains provisions that require it to be updated every 5 years. The first revision occurred in 2010, and a second revision was recently completed in June of 2019. The ODFW is required by State regulations to follow the Oregon Wolf Conservation and Management Plan. The Plan includes program direction, objectives, and strategies to manage gray wolves in Oregon and defines the gray wolf's special status game mammal designation (Oregon Administrative Rule 635–110). The Plan defines the following objectives for continued conservation of the gray wolf in Oregon:

- Continue to promote a naturally reproducing wolf population in suitable habitat within Oregon, which is connected to a larger source population of wolves, allowing for continued expansion into other areas of the State.
- Maintain a conservation population objective for both East and West Wolf Management Zones (WMZs) of four breeding pairs of wolves present for 3 consecutive years.
- Maintain a management population objective for each zone of a minimum of seven breeding pairs of wolves present for 3 consecutive years.
- Maintain a management regime in the West WMZ that simulates Oregon Endangered Species Act protections until the conservation population objective is met.
- Identify and monitor potential conservation threats to Oregon wolves and, if feasible, implement measures to reduce threats that can negatively affect Oregon's wolf population.

- Effectively and responsibly address conflict with competing human values while using management measures that are consistent with long-term wolf conservation in all phases of wolf management status under the Plan.
- Maintain accurate information on the population status and distribution of wolves in Oregon through a comprehensive monitoring program.
- Continue to coordinate with other agencies and organizations to achieve wolf conservation and management objectives.

The Oregon plan includes two management zones that roughly divide the State into western and eastern halves. This division line is further to the west of the line that delineates the listed and non-listed portions of Oregon. Each zone has a separate "management population objective" of seven breeding pairs (ODFW 2019, p. 8). Within each zone, management phases (Phase I, Phase II, and Phase III) are used to assess population objectives, which in turn influence conservation and management objectives.

Phase I includes a conservation population objective of obtaining four breeding pairs for 3 consecutive years; upon reaching this objective, delisting of wolves statewide may be initiated. The ODFW defines a breeding pair as a pack of wolves with an adult male, an adult female, and at least two pups surviving to the end of December (ODFW 2019, p. 1). This population objective was met in 2014 in the eastern WMZ, and wolves were State delisted in Oregon in 2015. Wolves in the eastern WMZ were then managed under Phase II (ODFW 2019, p. 6). Wolves in the western WMZ have yet to reach this conservation objective. Despite State delisting, wolves in the western WMZ (currently in Phase I) are still managed with a level of protection comparable to that of Oregon Endangered Species Act protections for wolves.

Phase II management actions work towards a management population objective of seven breeding pairs in the eastern management zone for 3 consecutive years. During this phase, populations are managed to prevent declines that could result in relisting under the Oregon ESA. This Phase II management population objective was met in 2016, which resulted in the transition of management to Phase III for the eastern WMZ in 2018 (ODFW 2019, p. 11).

Phase III acts to set a balance such that populations do not decline below Phase II objectives, but also do not reach unmanageable levels resulting in conflicts with other land uses. Phase III is a maintenance phase. While the 2019 plan does not include a minimum or maximum population level for wolves in Oregon, the plan leaves room for development of population thresholds in future planning efforts (ODFW 2019, pp. 10, 15–17). Phase III of the 2019 plan provides management flexibility in the case of depredating wolves (ODFW 2019, pp. 31–32). Currently, hunting of wolves is not permitted in Oregon and, as noted above, would require a public rulemaking process conducted by the Oregon Fish and Game Commission.

The Washington Wolf Management Plan—The 2011 Wolf Conservation and Management Plan for Washington was developed in response to the State endangered status for the species, and the expectations that the wolf population in Washington would continue to increase through natural dispersal of wolves from adjacent populations, and anticipation of the return of wolf management to the State after Federal delisting. The purpose of the 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. An advisory Wolf Working Group was appointed at the outset to give recommendations on the plan. In addition, the plan underwent extensive peer and public review prior to finalization.

The Washington Plan provides recovery goals for downlisting and delisting the species under Washington State law, and identifies strategies to achieve recovery and manage conflicts with livestock and ungulates. Recovery objectives are defined as numbers of successful breeding pairs that are maintained on the landscape for 3 consecutive years, with a set geographic distribution within three specified recovery regions: (1) Eastern Washington; (2) Northern Cascades; and (3) Southern Cascades and Northwest Coast (Wiles et al. 2011, p. 60 figure 9). A successful breeding pair of wolves is defined in the Washington Plan as an adult male and an adult female with at least two pups surviving to December 31 in a given year (Wiles et al. 2011, p. 58). Specific target numbers and distribution for downlisting and delisting within the three recovery regions identified in the Washington Plan are as follows:

- To reclassify from State endangered to State threatened status: a minimum of six successful breeding pairs with a minimum of two successful breeding pairs in each of the three recovery regions documented for 3 consecutive years.
- To reclassify from State threatened to State sensitive status: a minimum of 12 successful breeding pairs with a minimum of 4 successful breeding pairs in each of the 3 recovery regions documented for 3 consecutive years.
- To delist from State sensitive status: four successful breeding pairs documented for 3 consecutive years in each of the three recovery regions plus an additional three successful breeding pairs anywhere in the State.

In addition to the delisting objective of 15 successful breeding pairs distributed in the 3 geographic regions for 3 consecutive years, an alternative delisting objective was also established whereby the gray wolf will be considered for delisting when 18 successful breeding pairs are present, with 4 successful breeding pairs in the Eastern Washington region, 4 successful

breeding pairs in the Northern Cascades region, 4 successful breeding pairs distributed in the Southern Cascades and Northwest Coast region, plus an additional 6 successful breeding pairs anywhere in the State in a single year.

The WDFW recently initiated work to develop a post-recovery wolf management plan that would guide the long-term conservation and management of the species in the State. After wolves have reached recovery levels and are delisted at the State level, wolves could be reclassified as a game animal through the Washington Fish and Wildlife Commission's public process (Wiles et al. 2011, pp. 70–71). Any proposals to initiate a hunting season for wolves in Washington after State delisting would be consistent with maintaining a recovered wolf population in the State and would go through a public process with the Fish and Wildlife Commission (Wiles et al. 2011, pp. 70–71).

The California Wolf Management Plan—The 2016 *Conservation Plan for Gray Wolves in California* was developed in anticipation of the return of wolves to California (CDFW 2016a, p. 2). The CDFW worked with stakeholder groups in 2014 and 2015 during plan development (CDFW 2016a, pp. 2–3). Stakeholders included local government, nongovernmental organizations, State agencies and organizations, and Federal agencies. During the planning process, CDFW and the stakeholders identified sideboards (e.g., guidelines) and plan goals to direct development of the State plan (CDFW 2016a, p. 3). The sideboards included direction to develop alternatives for wolf management, specified that CDFW would not reintroduce wolves to California, and acknowledged that historical distribution and abundance 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 that the plan needs to be flexible to account for information that is gained during the expansion of wolves into the State (CDFW 2016a, pp. 19–24). Similar to plans for other States, the California Plan uses a three-phase strategy for wolf conservation and management.

Phase I is a conservation-based strategy to account for the reestablishment of wolves under both State and Federal Endangered Species Acts (CDFW 2016a, pp. 21–22). Phase I will end when there are four breeding pairs for 2 consecutive years in California. The CDFW defines a breeding pair as at least one adult male, one adult female, and at least two pups that survive to the end of December (CDFW 2016a, p. 21). California is currently in Phase I of the plan, with the Lassen Pack as the only breeding pair present for 2 consecutive years.

Phase II is expected to represent a point at which California's wolf population is growing more through reproduction of resident wolves than by dispersal of wolves from other States (CDFW 2016a, p. 22). This phase will conclude when there are eight breeding pairs for 2 consecutive years. During Phase II, CDFW anticipates gaining additional information and experience with wolf management, which will help inform future revisions to the State plan. During Phase II, managing wolves for depredation response or predation on wild ungulates may be initiated.

Phase III is less specific due to the limited information available to CDFW at the time of plan development (CDFW 2016a, p. 22). This phase moves toward longer term management of wolves in California. Specific aspects of Phase III are more likely to be developed during Phase II when more information on wolf distribution and abundance in the State are available. Towards

the end of Phase II and the beginning of Phase III, information should be available to inform a status review of wolves in California to determine if continued State listing as endangered is warranted (CDFW 2016a, p. 22). Currently, hunting of wolves is not permitted in California.

State Management in the Central Rocky Mountains

Post-Delisting Management in Colorado—Gray wolves are listed as an endangered species by the State of Colorado and receive protection under Colorado Revised Statutes (CRS) 33–6–109), thereby making it illegal for any person to hunt, take, or possess a gray wolf in the State. Wolves in Colorado will remain listed at the State level after they are federally delisted.

Recognizing the potential for increasing numbers of wolves to enter Colorado from growing populations in neighboring States, Colorado Parks and Wildlife convened a multidisciplinary 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; thus, no recovery objectives or thresholds were defined. The working group recommended that wolves that enter or begin to recolonize the State should be free to occupy available suitable habitat, but that wolf distribution should ultimately be defined by balancing the ecological needs of the wolf with the social aspects of wolf management (Colorado Wolf Management Working Group 2004, pp. 1, 3–5). The working group's recommendations provided information on all aspects of wolf management including monitoring, enforcement, research, information and education, the conservation and management of prey populations, and funding. Although the working group's recommendations are not a formal management plan, in 2005 they were adopted by the Colorado Parks and Wildlife Commission, a citizen board appointed by the Governor which develops

regulations and policies for State parks and wildlife programs. The working group's recommendations were reaffirmed in 2016 (CPWC, PWCR 16–01, 2016) and will be used to guide management of wolves that occur in or naturally enter Colorado post-delisting until a wolf conservation and management plan is developed.

In 2019, wolf proponents collected signatures in the hopes of getting an initiative on the 2020 ballot to reintroduce wolves into Colorado. Over 210,000 signatures were submitted to the Secretary of State in December 2019, and in January 2020, the Secretary of State determined that enough valid signatures were collected to place initiative 107 on the 2020 ballot. If passed, the Colorado Gray Wolf Reintroduction Initiative would require the Colorado Parks and Wildlife Commission to create and implement a plan to reintroduce gray wolves into Colorado west of the Continental Divide by December 2023. As a result of the pending ballot initiative and the fact that, until recently, no groups of wolves had been confirmed in Colorado, the Colorado Parks and Wildlife Commission chose not to initiate development of a wolf management plan until after the 2020 election, when it expects to have clearer management direction.

Under Title 35 of the Colorado Revised Statutes, the Colorado Department of Agriculture is responsible for the control of depredating animals in the State, with the exception of at-risk species such as gray wolves. Before the Colorado Department of Agriculture adopts any rules concerning the take of depredating, at-risk species, the rules must be approved by the Colorado Parks and Wildlife Commission.

There are currently no plans to initiate a wolf hunting season in Colorado after wolves are federally delisted. Regulated harvest may be considered during the future development of a wolf conservation and management plan. However, prior to implementing any hunting seasons, the

State of Colorado would require Colorado Parks and Wildlife Commission approval through a public rulemaking process.

Post-Delisting Management in Utah—Gray wolves are considered a Tier 1 sensitive species under Utah Administrative Rule (Rule R657–48) and receive protections under Utah Code (Section 23–20–3) that 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 or otherwise in violation of rules promulgated by the Wildlife Board. At present, there is no season or take authorized for wolves in the federally listed portion of Utah. However, authorized personnel may lethally control wolves to mitigate wolf conflicts with livestock in the federally delisted portion of the State.

In 2003, the Utah Legislature passed House Joint Resolution 12, which directed UDWR to draft a wolf management plan for review, modification, and adoption by the Utah Wildlife Board, through the Regional Advisory Council process. In April 2003, the Utah Wildlife Board directed UDWR to develop a proposal for a wolf working group to assist the agency in this endeavor. The UDWR created the Wolf Working Group in the summer of 2003. The Wolf Working Group was composed of 13 members that represented diverse public interests regarding wolves in Utah.

On June 9, 2005, the Utah Wildlife Board formally approved the Utah Wolf Management Plan (UDWR and Utah Wolf Working Group 2005). The goal of the 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. In 2010, to prevent the establishment of wolves in the federally listed portion of Utah, the Utah Legislature directed

the UDWR to prevent the establishment of any packs of wolves in the delisted portion of Utah until wolves are federally delisted in the entirety of the State (S.B. 36, Wolf Management Act). This law supersedes Utah's Wolf Management Plan. To comply with S.B. 36, the UDWR is tasked with preventing wolves from becoming established in the delisted portion of the State. The State of Utah intends to fully implement the Utah Wolf Management Plan when wolves are delisted across all of Utah (S.B. 36; UDWR and Utah Wolf Working Group 2005, p. 28).

Wolves were federally delisted in a small portion of north-central Utah, along with the remainder of the northern Rocky Mountain wolf population (with the exception of Wyoming), in 2011 (76 FR25590, May 5, 2011). In 2015, the Utah Wildlife Board extended the Plan through 2020 and it recently reapproved the Plan through 2030. However, the Plan will not be implemented until wolves are federally delisted statewide, at which time the Plan will guide management of wolves until 2030; until wolves become established (defined as at least two breeding pairs for two consecutive years) in Utah; or until the political, social, biological, or legal assumptions of the plan change, whichever occurs first.

The Utah Plan recognizes that concerns about livestock depredation by wolves can effectively be addressed using both nonlethal and lethal management tools (UDWR and Utah Wolf Working Group 2005, pp. 35–39). The Plan recommends a compensation program for livestock owners who experience loss due to wolves (UDWR and Utah Wolf Working Group 2005, pp. 35–39). At present, the UDWR may consider lethal control to mitigate wolf conflicts with livestock only in the federally delisted portion of the State. Under Utah Administrative Code (Rule R657–24), the State may compensate livestock producers for confirmed losses caused by wolves in those areas of the State where wolves are federally delisted.

Post-delisting, the provisions of Utah's Wolf Management Plan will be fully implemented. Gray wolves will be removed from the sensitive species list, but will remain classified as a furbearer species with a closed season. Regulated take of gray wolves may be considered when wolves have established themselves in the State (i.e., when there are at least two breeding pairs for two consecutive years). Any harvest recommendations will be vetted through the public process via the Regional Advisory Councils and must be approved by the Wildlife Board. Lethal control may be considered statewide to mitigate wolf conflicts with livestock and all livestock producers in the State that experience confirmed wolf-caused livestock losses would be eligible for compensation.

Tribal Management and Conservation of Wolves

In the western Great Lakes area, Native American Tribes and inter-Tribal resource-management organizations have indicated to the Service that they will continue to conserve wolves on most, and probably all, Native American reservations in the primary wolf areas. The wolf retains great cultural significance and traditional value to many Tribes and their members, and to retain and strengthen cultural connections, many Tribes oppose unnecessary killing of wolves on reservations and on ceded lands, even following any Federal delisting (Hunt in litt. 1998; Schrage in litt. 1998a; Schlender in litt. 1998). Some Native Americans view wolves as competitors for deer and moose, whereas others are interested in harvesting wolves as furbearers (Schrage in litt. 1998a). Many Tribes intend to sustainably manage their natural resources, wolves among them, to ensure that they are available to their descendants. The Red Lake Band of Chippewa (Minnesota), the Red Cliff Band of Lake Superior Chippewa (Wisconsin), the Bad River Band of Lake Superior Chippewa (Wisconsin), the Little Traverse Bay Band of Odawa

Indians (Michigan), the Fond du Lac Band of Lake Superior Chippewa (Minnesota), and the Keweenaw Bay Indian Community (Michigan) have developed wolf monitoring and/or management plans. The Service has also awarded a grant to the Ho-Chunk Nation to identify wolf habitat on Tribal lands. Although not all Tribes with wolves that visit or reside on their reservations have completed management plans specific to the wolf, several Tribes have passed resolutions or otherwise informed us that they have no plans or intentions to allow commercial or recreational hunting or trapping of the species on their lands after Federal delisting.

As a result of many contacts with, and recent and previous written comments from, the Midwestern Tribes and their inter-Tribal natural-resource-management agencies—the Great Lakes Indian Fish and Wildlife Commission, the 1854 Authority, and the Chippewa Ottawa Treaty Authority—it is clear that their predominant sentiment is strong support for the continued protection of wolves at a level that ensures occupancy of wolves on reservations and throughout the treaty-ceded lands surrounding the reservations. While several Tribes stated that their members may be interested in killing small numbers of wolves for spiritual or other purposes, we expect that these activities would have a negligible effect on reservation or ceded-territory wolf populations.

The Red Lake Band of Chippewa Indians (Minnesota) completed a wolf-management plan in 2010 (Red Lake Band of Chippewa Indians 2010). A primary goal of the management plan is to maintain wolf numbers at a level that will ensure the long-term survival of wolves on Red Lake lands. Key components of the plan are habitat management, public education, and law enforcement. To address human–wolf interactions, the plan outlines how wolves may be taken on Red Lake lands. Wolves thought to be a threat to public safety may be harassed at any time, and if they must be killed, the incident must be reported to Tribal law enforcement. Livestock are

not common on Red Lake lands, and wolf-related depredation on livestock or pets is unlikely to be a significant management issue. If such events do occur, Tribal members may protect their livestock or pets by lethal means, but "all reasonable efforts should be made to deter wolves using non-lethal means" (Red Lake Band of Chippewa Indians 2010, p. 15). Hunting or trapping of wolves on Tribal lands will be prohibited.

The Red Cliff Band (Wisconsin) has strongly opposed State and Federal delisting of the gray wolf. Red Cliff implemented a Wolf Protection Plan in 2015 (Red Cliff Band of Lake Superior Chippewa 2015, entire). The plan guides management of wolves on the Reservation and prohibits any hunting of wolves during any future harvests. The plan calls for increased research and monitoring of wolves on the Bayfield Peninsula, which may help guide the management and protection of gray wolves when delisted. The plan includes a 6-mile (9.7-km) buffer outside of Reservation boundaries, in which Red Cliff will work cooperatively to mitigate human–wolf conflicts. Implementation of the plan includes: collaring and monitoring local packs, seeking Federal grants for prevention and compensation for wolf depredation events on the Bayfield Peninsula, education, and outreach.

The Bad River Band of Lake Superior Chippewa established a Ma'iingan (Wolf) Management Plan for the Reservation in 2013 (Bad River Band of Chippewa Indians Natural Resource Department 2013, entire). The Bad River Band has been involved in wolf monitoring on the Reservation since 1997. During the period of 2010–2018, from 5 to 17 wolves were counted on the reservation in 2 or 3 packs (Bad River Band Natural Resource Department). The Tribe acknowledges the cultural significance of the Ma'iingan to the Anishinabe in all wolf management activities, and wolves (Ma'iingan) will be listed as a "Tribally Protected Species" on the Bad River Reservation after Federal delisting. The Tribe set a minimum wolf population

goal of two packs of at least three wolves on the Reservation and will manage wolves in a way that minimizes human–wildlife conflicts on and around the Reservation.

In 2009, the Little Traverse Bay Bands of Odawa Indians (LTBB) finalized a management plan for the 1855 Reservation and portions of the 1836 ceded territory in the northern Lower Peninsula of Michigan (Little Traverse Bay Bands of Odawa Indians Natural Resource Department 2009). The plan provides the framework for managing wolves on the LTBB Reservation with the goal of maintaining a viable wolf presence on the LTBB Reservation or within the northern Lower Peninsula should a population become established by (1) prescribing scientifically sound biological strategies for wolf management, research, and monitoring; (2) addressing wolf-related conflicts; (3) facilitating wolf-related benefits; and (4) developing and implementing wolf-related education and public information.

The Fond du Lac Band (Minnesota) of Lake Superior Chippewa believes that the "well-being of the wolf is intimately connected to the well-being of the Chippewa People" (Schrage in litt. 2003). In 1998, the Band passed a resolution opposing Federal delisting and any other measure that would permit trapping, hunting, or poisoning of the wolf (Schrage in litt. 1998b; in litt. 2003; 2009, pers. comm.). If the prohibition of trapping, hunting, or poisoning is rescinded, the Band's Resource Management Division would coordinate with State and Federal agencies to ensure that any wolf hunting or trapping would be "conducted in a biologically sustainable manner" (Schrage in litt. 2003). The band finalized a wolf management plan for the Fond du Lac Reservation in 2012. A primary goal of the management plan is to maintain gray wolf numbers at levels that will contribute to the long-term survival of the species. The plan expresses the Tribe's belief that humans and wolves need to coexist, in accordance with the Band's traditions

and customs and, thus, also recognizes that a system must be developed to deal with concerns for human safety and instances of depredation by wolves on livestock and pets.

The Tribal Council of the Leech Lake Band of Minnesota Ojibwe (Council) approved a resolution that describes the sport and recreational harvest of wolves as an inappropriate use of the animal. That resolution supports limited harvest of wolves to be used for traditional or spiritual uses by enrolled tribal members if the harvest is done in a respectful manner and would not negatively affect the wolf population. The Leech Lake Reservation was home to an estimated 60 wolves (http://www.llojibwe.org/drm/fpw/wolf.html, accessed 12/17/2019), although more recent survey data are not available.

The Menominee Indian Tribe of Wisconsin is committed to establishing a self-sustaining wolf population, continuing restoration efforts, ensuring the long-term survival of the wolf in Menominee, placing emphasis on the cultural significance of the wolf as a clan member, and resolving conflicts between wolves and humans. The Tribe has shown a great deal of interest in wolf recovery and protection. In 2002, the Tribe offered their Reservation lands as a site for translocating seven depredating wolves that had been trapped by WI DNR and Wildlife Services. Tribal natural resources staff participated in the soft release of the wolves on the Reservation and helped with the subsequent radio-tracking of the wolves. Although by early 2005 the last of these wolves died on the reservation, the tribal conservation department continued to monitor another pair that had moved onto the Reservation, as well as other wolves near the reservation (Wydeven in litt. 2006). When the female of that pair was killed in 2006, Reservation biologists and staff worked diligently to raise the orphaned pups in captivity with the WI DNR and the Wildlife Science Center (Forest Lake, Minnesota) in the hope that they could later be released to the care of the adult male. However, the adult male died prior to pup release, and they were moved back

to the Wildlife Science Center (Pioneer Press 2006). In 2010–2018 the reservation generally supported 7 to 16 wolves in 3 or 4 packs (Menominee Tribal Conservation Department). The Menominee Tribe continues to support wolf conservation and monitoring activities in Wisconsin.

The Keweenaw Bay Indian Community (Michigan) will continue to list the wolf as a protected animal under the Tribal Code following any Federal delisting, with hunting and trapping prohibited (Keweenaw Bay Indian Community 2019, in litt.). Furthermore, the Keweenaw Bay Community developed a management plan in 2013 that "provides a course of action that will ensure the long-term survival of a self-sustaining, wild gray wolf (*Canis lupus*) population in the 1842 ceded territory in the western Upper Peninsula of Michigan" (Keweenaw Bay Indian Community Tribal Council 2013, p. 1). The plan is written to encourage cooperation among agencies, communities, private and corporate landowners, special interest groups, and Michigan residents (Keweenaw Bay Indian Community 2019, in litt.). Several Midwestern Tribes have expressed concern that Federal delisting would result in increased mortality of wolves on reservation lands, in the areas immediately surrounding the reservations, and in lands ceded by treaty to the Federal Government by the Tribes. In 2006, a cooperative effort among Tribal natural resource departments of several Tribes in Wisconsin, WI DNR, the Service, and Wildlife Services led to a wolf-management agreement for lands adjacent to several reservations in Wisconsin. The goal is to reduce the threats to reservation wolf packs when they are temporarily off the reservation. Other Tribes have expressed interest in such an agreement. This agreement, and additional agreements if they are implemented, provides supplementary protection to certain wolf packs in the Great Lakes area.

The Great Lakes Indian Fish and Wildlife Commission has stated its intent to work closely with the States to cooperatively manage wolves in the ceded territories in the core areas,

and will not develop a separate wolf-management plan (Schlender in litt. 1998). Furthermore, the Voigt Intertribal Task Force of the Great Lakes Indian Fish and Wildlife Commission has expressed its support for strong protections for the wolf, stating "[delisting] hinges on whether wolves are sufficiently restored and will be sufficiently protected to ensure a healthy and abundant future for our brother and ourselves" (Schlender in litt. 2004).

According to the 1854 Authority, "attitudes toward wolf management in the 1854 Ceded Territory run the gamut from a desire to see total protection to unlimited harvest opportunity." However, the 1854 Authority would not "implement a harvest system that would have any long-term negative impacts to wolf populations" (Edwards in litt. 2003). In comments submitted for our 2004 delisting proposal for a larger Eastern DPS of the gray wolf, the 1854 Authority stated that the Authority is "confident that under the control of state and tribal management, wolves will continue to exist at a self-sustaining level in the 1854 Ceded Territory. Sustainable populations of wolves, their prey and other resources within the 1854 Ceded Territory are goals to which the 1854 Authority remains committed. As such, we intend to work with the state of Minnesota and other tribes to ensure successful state and tribal management of healthy wolf populations in the 1854 Ceded Territory" (Myers in litt. 2004).

While there are few written tribal protections currently in place for wolves in the Great Lakes area, the highly protective and reverential attitudes held by tribal authorities and members have assured us that any post-delisting harvest of reservation wolves will be very limited and will not adversely affect the delisted wolf populations. Furthermore, any off-reservation harvest of wolves by Tribal members in the ceded territories will be limited to a portion of the harvestable surplus at some future time. Such a harvestable surplus will be determined and monitored jointly by State and Tribal biologists, and will be conducted in coordination with the

Service and the Bureau of Indian Affairs, as is being successfully done for the ceded territory harvest of inland and Great Lakes fish, deer, bear, moose, and furbearers in Minnesota, Wisconsin, and Michigan. Therefore, we conclude that any future Native American take of delisted wolves will not significantly affect the viability of the wolf population, either locally or across the Great Lakes area.

In the Western United States, Native American Tribes have played a key role in the recovery of gray wolves. We specifically acknowledge the profound contributions of the Nez Perce Tribe in the recovery of the gray wolf in the northern Rocky Mountains. The Nez Perce Tribe devoted substantial biological expertise and resources to support gray wolf reintroduction and monitoring that assisted in the recovery of this species. We also acknowledge other Tribes in the Western United States that have developed, and are implementing, wolf management plans, including the Eastern Shoshone and Northern Arapaho Tribes in Wyoming, the Blackfeet Tribe and the Confederated Salish and Kootenai Tribes in Montana, the Confederated Tribes of the Colville Reservation and the Spokane Tribe in Washington, and the Confederated Tribes of the Umatilla Indian Reservation in Oregon. We are not aware of any Tribal wolf management plans, beyond those already being implemented in the Western United States (see Management in the NRM section). However, Tribal biologists from the Confederated Tribes of Warm Springs are actively participating in radio-collaring and monitoring wolves on the Warm Springs Reservation in western Oregon.

The Service and the Department of the Interior recognize the unique status of the federally recognized Tribes, their right to self-governance, and their inherent sovereign powers over their members and territory. Therefore, the Department of the Interior, the Service, the Bureau of Indian Affairs, and other Federal agencies, as appropriate, will take the needed steps to

ensure that Tribal authority and sovereignty within reservation boundaries are respected as the States implement their wolf-management plans and revise those plans in the future. Furthermore, there may be Tribal activities or interests associated with wolves encompassed within the Tribes' retained rights to hunt, fish, and gather in treaty-ceded territories. The Department of the Interior is available to assist in the exercise of any such rights. If biological assistance is needed, the Service will provide it via our field offices. Upon delisting, the Service will remain involved in the post-delisting monitoring of wolves in the Great Lakes area, but all Service management and protection authority under the Act will end.

Consistent with our responsibilities to Tribes and our goal to have the most comprehensive data available for our post-delisting monitoring, we will annually contact Tribes and their designated intertribal natural resource agencies during the 5-year post-delisting monitoring period to obtain any information they wish to share regarding wolf populations, the health of those populations, or changes in their management and protection. Reservations that may have significant wolf data to provide during the post-delisting period include Bois Forte, Bad River, Fond du Lac, Grand Portage, Keweenaw Bay Indian Community, Lac Courte Oreilles, Lac du Flambeau, Leech Lake, Menominee, Oneida, Red Lake, Stockbridge-Munsee Community, and White Earth. Throughout the 5-year post-delisting monitoring period, the Service will annually contact the natural resource agencies of each of these reservations and that of the 1854 Treaty Authority and Great Lakes Indian Fish and Wildlife Commission.

Management on Federal Lands

Great Lakes Area—The five national forests with resident wolves in Minnesota, Wisconsin, and Michigan (Superior, Chippewa, Chequamegon-Nicolet, Hiawatha, and Ottawa

National Forests) have operated in conformance with standards and guidelines in their management plans that follow the Revised Recovery Plan's recommendations for the eastern timber wolf (USDA Forest Service (FS) 2004a, chapter 2, p. 31; USDA FS 2004b, chapter 2, p. 28; USDA FS 2004c, chapter 2, p. 19; USDA FS 2006a, chapter 2, p. 17; USDA FS 2006b, chapter 2, pp. 28–29). The Regional Forester for U.S. Forest Service Region 9 may maintain the classification of the wolf as a Sensitive Species, however, the Regional Foresters have the authority to recommend classification or declassification of species as Sensitive Species. Under these standards and guidelines, a relatively high prey base would be maintained, and road densities would either be limited to current levels or decreased. For example, on the Chequamegon-Nicolet National Forest in Wisconsin, the standards and guidelines specifically include the protection of den sites and key rendezvous sites, and management of road densities in existing and potential wolf habitat (USDA 2004c, chap. 2, p. 19).

The trapping of depredating wolves may be allowed on national forest lands under the guidelines and conditions specified in the respective State wolf-management plans. However, there are relatively few livestock raised within the boundaries of national forests in the upper Midwest, so wolf depredation and lethal control of wolves is not likely to be a frequent occurrence, or to constitute a significant mortality factor, for the wolves in the Great Lakes area. Similarly, in keeping with the practice for other State-managed game species, any public hunting or trapping season for wolves that might be opened in the future by the States may include hunting and trapping within the national forests .

Wolves regularly use four units of the National Park System in the Great Lakes area and may occasionally use an additional three or four units. Although the National Park Service (NPS) has participated in the development of some of the State wolf-management plans in this area,

NPS is not bound by States' plans. Instead, the NPS Organic Act and the NPS Management Policy on Wildlife generally require the agency to conserve natural and cultural resources and the wildlife present within the parks. NPS management policies require that native species be protected against harvest, removal, destruction, harassment, or harm through human action, although certain parks may allow some harvest in accordance with State management plans. Management emphasis in National Parks after delisting will continue to minimize the human impacts on wolf populations. Thus, because of their responsibility to preserve all native wildlife, units of the National Park System are often the most protective of wildlife. In the case of the wolf, the NPS Organic Act and NPS policies will continue to provide protection following Federal delisting.

Management and protection of wolves in Voyageurs National Park, along Minnesota's northern border, is not likely to change after delisting. The park's management policies require that "native animals will be protected against harvest, removal, destruction, harassment, or harm through human action." No population targets for wolves will be established for the National Park (Holbeck in litt. 2005). To reduce human disturbance, temporary closures around wolf denning and rendezvous sites will be enacted whenever they are discovered in the park. Hunting is already prohibited on park lands, regardless of what may be allowed beyond park boundaries (West in litt. 2004). A radio-telemetry study conducted between 1987 and 1991 of wolves living in and adjacent to the park found that all mortality inside the park was due to natural causes (for example, killing by other wolves or starvation), whereas the majority (60–80 percent) of mortality outside the park was human-induced (for example, shooting and trapping) (Gogan et al. 2004, p. 22). If there is a need to control depredating wolves outside the park, staff will work with the State to conduct control activities where necessary (West in litt. 2004). However, such

control is unlikely to be needed because presently there are no agricultural activities occurring adjacent to the park.

The wolf population of Isle Royale National Park, Michigan, is small, isolated, and lacks unique genetic diversity (Wayne et al. 1991). For these reasons, and due to constraints on expansion because of the island's small size, this wolf population does not contribute significantly towards meeting numerical recovery criteria. However, long-term research on this wolf population has added a great deal to our knowledge of the species. The wolf population on Isle Royale has typically varied from 18 to 27 wolves in 3 packs, but was down to just 2 wolves (a father-daughter pair) from the winter of 2015–2016 until 2018 (Peterson et al. 2018). In 2018, the NPS announced plans to move additional wolves to Isle Royale in an effort to restore a viable wolf population (83 FR 11787, March 16, 2018). Four wolves from Minnesota were released on the island in the fall of 2018, and 11 were relocated from Ontario in March 2019. One of the Minnesota wolves died later that fall; one of the Ontario wolves died in the winter; and one returned to the mainland during the winter. As of late May 2019, 14 wolves occurred on Isle Royale National Park: 12 successfully translocated from Minnesota and Canada plus the 2 wolves that remained on Isle Royale before the initiation of wolf reintroduction efforts (https://https://www.nps.gov/isro/learn/news/presskit.htm).

Two other units of the National Park System, Pictured Rocks National Lakeshore and St. Croix National Scenic Riverway, are regularly used by wolves. Pictured Rocks National Lakeshore is a narrow strip of land along Michigan's Lake Superior shoreline. Lone wolves periodically use, but do not appear to be year-round residents of, the Lakeshore. If denning occurs after delisting, the Lakeshore will protect denning and rendezvous sites at least as strictly as the Michigan Plan recommends (Gustin in litt. 2003). Harvesting wolves on the Lakeshore

may be allowed (if the Michigan DNR allows for harvest in the State), but trapping is not allowed. The St. Croix National Scenic Riverway, in Wisconsin and Minnesota, is also a mostly linear ownership. The Riverway is likely to limit public access to denning and rendezvous sites and to follow other management and protective practices outlined in the respective State wolf-management plans, although trapping is not allowed on NPS lands except possibly by Native Americans (Maercklein in litt. 2003).

At least one pack of 4–5 wolves used the shoreline areas of the Apostle Islands National Lakeshore, with a major deer yard area (a place where deer congregate in the winter) occurring on portions of the Park Service land. Wolf tracks have been detected on Sand Island, and a wolf was photographed by a trail camera on the island in September 2009. A gray wolf was also detected on Stockton Island (Allen et al. 2018, p. 277). It is not known if wolves periodically swim to these and other islands, or if they travel to islands only on ice in winter.

Wolves occurring on National Wildlife Refuges in the Great Lakes area will be monitored for a minimum of 5 years after delisting (USFWS 2008, p. 9). Trapping or hunting by government trappers for depredation control will not be authorized on National Wildlife Refuges. Because of the relatively small size of these Refuges, however, most or all wolf packs or individual wolves in these Refuges also spend significant amounts of time off these Refuges.

Wolves also occupy the Fort McCoy military installation in Wisconsin. Management and protection of wolves on the installation will not change significantly after Federal or State delisting. Den and rendezvous sites will continue to be protected, hunting seasons for other species (coyote) will be closed during the gun deer season, and current surveys will continue, if resources are available. Fort McCoy has no plans to allow a public harvest of wolves on the installation (Nobles in litt. 2004; Wydeven et al. 2005, p. 25; 2006a, p. 25).

Minnesota National Guard's Camp Ripley contains parts of 2 pack territories, which typically include 10 to 20 wolves. Minnesota National Guard wildlife managers try to have at least one wolf in each pack radio-collared and to fit an additional one or two wolves in each pack with satellite transmitters that record long-distance movements. There have been no significant conflicts with military training or with the permit-only public deer-hunting program at the camp, and no new conflicts are expected following delisting. Long-term and intensive monitoring has detected only two wolf mortalities within the camp boundaries—both were of natural causes (Dirks 2009, pers. comm.).

The protection afforded to resident and transient wolves, their den and rendezvous sites, and their prey by five national forests, four National Parks, two military facilities, and numerous National Wildlife Refuges in Minnesota, Wisconsin, and Michigan will further ensure the conservation of wolves in the three States after delisting. In addition, wolves that disperse to other units of the National Wildlife Refuge System or the National Park System within the Great Lakes area will also receive the protection afforded by these Federal agencies.

West Coast States—The West Coast States generally contain a greater proportion of public land than the Great Lakes area. Public lands here include many National Parks, National Forests, National Monuments, National Wildlife Refuges, and lands managed by the Bureau of Land Management. These areas are largely unavailable and/or unsuitable for intensive development and contain abundant ungulate populations. Public lands in the West contain relatively expansive blocks of potentially suitable habitat for wolves. On some of these public lands the presence of livestock grazing allotments increases the likelihood of wolf–livestock conflict, which increases the chances of wolf mortality from lethal removal of chronically depredating wolf packs. In areas occupied by wolves in the northern Rocky Mountains, the

overall wolf population has been remarkably resilient—in terms of population numbers and distribution—despite lethal control of depredating wolves.

In the listed portions of California, Oregon, and Washington, wolves are resident on portions of the Lassen, Plumas, Fremont-Winema, Rogue-Siskiyou, Mount Hood, Okanogan-Wenatchee, and Mt. Baker-Snoqualmie National Forests (Forests) and portions of Bureau of Land Management Districts in those States. Forest Service Land and Resource Management Plans (LRMPs) and Bureau of Land Management Resource Management Plans (RMPs) for these areas pre-date the reestablishment of wolf packs and, therefore, do not contain standards and guidelines specific to wolf management. The LRMPs and RMPs do, however, recognize that these agencies have obligations under sections 7(a)(1) and 7(a)(2) of the Act to proactively conserve and avoid adverse effects to federally listed species. When federally delisted, the Regional Foresters for U.S. Forest Service Region 6 will include the gray wolf as a Sensitive Species in their region (BLM 2019, p. 4). U.S. Forest Service Region 5 may do the same. As a Sensitive Species, conservation objectives for the gray wolf and its habitat would continue to be addressed during planning and implementation of projects. BLM requires the designation of federally delisted species as sensitive species for 5 years following delisting (BLM 2008, p. 36). BLM sensitive species are managed consistent with species and habitat management objectives in land use and implementation plans to promote their conservation and minimize the likelihood and need for listing under the Act (BLM 2008, p. 8).

Gray wolves disperse through, but are not necessarily residents of, National Monuments, and National Wildlife Refuges in the listed portions of all three West Coast States. Wolves are also known to disperse through National Parks, and one territory in Washington overlaps a small portion of the North Cascades National Park. Similar to these types of lands in the Great Lakes

areas, management plans provide for the conservation of natural and cultural resources and wildlife. The gray wolf and its habitat are expected to persist on these lands once federally delisted.

Central Rocky Mountains—Similar to other western States, a large proportion of Colorado and Utah is composed of publicly owned Federal lands (approximately 36 percent in Colorado and approximately 63 percent in Utah) (Congressional Research Service 2020). Public lands include National Forests, National Parks, National Monuments, and National Wildlife Refuges, which comprise approximately 63 percent of the public lands in Colorado and 30 percent in Utah. In addition, the Bureau of Land Management manages approximately 35 percent of public land in Colorado, much of which is located in the western portion of the State, and approximately 67 percent of Utah public lands. Although much of this public land is largely unavailable and/or unsuitable for intensive development and contains an abundance of ungulates, livestock grazing does occur on some public lands in both Colorado and Utah, which may increase the potential for wolf mortality from lethal control of chronically depredating packs. However, in both Minnesota and the northern Rocky Mountains, lethal control of depredating wolves has had little effect on wolf distribution and abundance (see **Human-Caused Mortality** section above).

At present, the group of at least six wolves that were confirmed in January 2020 in northwest Colorado have been documented primarily on lands owned by the Bureau of Land Management and the U.S. Fish and Wildlife Service, but likely use some State and private land in the area as well. Although very close to the Utah border, this group of wolves has not been confirmed in Utah. The lone disperser that continues to reside in the North Park area of north-

central Colorado has been documented on the Medicine-Bow/Routt National Forest and likely uses adjacent State and private lands.

Summary of Post-delisting Management

In summary, upon delisting, there will be varying State and Tribal classifications and protections provided to wolves. The State wolf-management plans currently in place for Minnesota, Wisconsin, and Michigan will maintain viable wolf populations in each State. Each of those plans contains management goals that will maintain healthy populations of wolves in the State by establishing a minimum population threshold of 1,600 in Minnesota, 250 in Wisconsin, and 200 in Michigan, and each State intends to manage for numbers above these levels. Furthermore, both the Wisconsin and Michigan Wolf Management Plans are designed to manage and ensure the existence of wolf populations in the States as if they are isolated populations and are not dependent upon immigration of wolves from an adjacent State or Canada, while still maintaining connections to those other populations. This approach provides strong assurances that wolves in Wisconsin and Michigan will remain a viable component of the wolf population in the Great Lakes area and the lower 48 United States. Each of the three Great Lakes States has a longstanding history of leadership in wolf conservation. All of the State management plans provide a high level of assurance of the persistence of healthy wolf populations and demonstrate the States' commitment to wolf conservation.

Furthermore, when federally delisted, wolves in Minnesota, Wisconsin, and Michigan will continue to receive protection from human-caused mortality by State laws and regulations. Wolves are protected as game species in each of those States, and lethal take is prohibited without a permit, license, or authorization, except under a few limited situations (as described under the management plans above). Each of the three States will consider population-

management measures, including public hunting and trapping, after Federal delisting. However, regardless of the methods used to manage wolves, each State has committed to maintaining wolf populations at levels that ensure healthy wolf populations will remain.

Similarly, State management plans developed for Washington, Oregon, and California contain objectives to conserve and recover gray wolves. To maintain healthy populations, each State will monitor population abundance and trends, habitat and prey availability, and impacts of disease and take actions as needed to maintain populations. They are also committed to continuing necessary biological and social research, as well as outreach and education, to maintain healthy wolf populations. Wolves in Washington, Oregon, and California will also be protected by State laws and regulations when federally delisted. Currently, wolves in Washington and California are protected under State statutes as endangered species, and under their respective State management plans. Wolves in Oregon are State-delisted but still receive protection under its State management plan. Each plan contains various phases outlining objectives for conservation and recovery. As recolonization of the West Coast States continues, different phases of management will be enacted. All phases within the various State management plans are designed to achieve and maintain healthy wolf populations.

In the central Rocky Mountains, wolves will remain listed as an endangered species at the State level in Colorado and will continue to receive protection under the Colorado Revised Statutes. In Utah, the State management plan will guide management of wolves until 2030; until at least two breeding pairs are documented in the State for two consecutive years; or until the political, social, biological, or legal assumptions of the plan change, whichever occurs first.

Finally, based on our review of the completed Tribal management plans and communications with Tribes and Tribal organizations, we anticipate that federally delisted

wolves will be adequately protected on Tribal lands. Furthermore, the minimum population levels defined in the Minnesota, Wisconsin, and Michigan State management plans can be maintained (based on the population and range of off-reservation wolves) even without Tribal protection of wolves on reservation lands. In addition, on the basis of information received from other Federal land-management agencies, we expect that National Forests, National Parks, military bases, and National Wildlife Refuges will provide protections to wolves in the areas they manage that will match, and in some cases exceed, the protections provided by State wolf-management plans and State regulations.

Summary of Changes From the Proposed Rule

Based on our review of all public and peer reviewer comments we received on our March 15, 2019, proposed rule (84 FR 9648, March 15, 2019), and new information they provided or that otherwise became available since the publication of the proposed rule, we reevaluated the information in the proposed rule and made changes as appropriate. As indicated in this rule (see **Determination of Species Status**), our analyses are based on the best scientific and commercial data available. Thus, we include in this final rule new information received in response to the March 19, 2019, proposed rule that meets this standard.

We received many comments related to our approach to the proposed rule. While commenters presented a broad range of positions regarding our approach, many of them focused on several common issues. Some commenters questioned our decision to combine the two listed gray wolf entities for analysis rather than analyze each of the listed entities separately. Others pointed out that we did not include the analyses to support our conclusion that, even if we had analyzed the listed entities separately, neither would meet the Act's definitions of a threatened

species or an endangered species (84 FR 9686, March 15, 2019). Still others expressed disagreement with our treatment of gray wolves in the West Coast States, opining that we could not adequately consider the status of gray wolves in the West Coast States without also assessing threats to the recovered and delisted gray wolf population in the NRM DPS. Finally, a few commenters reasoned that the Act allows us to analyze the status of only valid listable entities, and, because we acknowledge the two gray wolf listed entities do not qualify as valid species, subspecies, or DPSs under the Act, the entities should be delisted on that basis alone.

In light of the peer review and numerous comments received during the public comment period, we have reexamined the approach we took in the proposed rule. Our proposal clearly articulated the reasoning behind combining the listed entities for analysis and, as this final rule illustrates, we continue to find it a reasonable approach. However, we agree with commenters who suggested that we should include a separate determination for each of the currently listed gray wolf entities. Thus, we added the analysis to this final rule to support our statement in the proposed rule that, when analyzed separately, the entities do not meet the definition of a threatened or an endangered species.

We have also reconsidered our approach to the NRM wolves in light of public comments. The biological report we prepared to support our proposal included detailed information related to gray wolf abundance and distribution throughout the lower 48 United States, including the NRM DPS. However, we did not include the delisted NRM DPS in the threats analysis of our proposed rule because wolves in that DPS are not currently listed under the Act. Nonetheless, because we considered wolves in the West Coast States to be an extension of the population of wolves in the delisted NRM DPS, we included information about the NRM DPS in our proposal to provide context for our discussion of wolves comprising the combined listed entity.

Commenters remarked that this approach was inconsistent, and one commenter opined that we could not delist wolves in the West Coast States without also including the NRM DPS in our analysis. In this final rule, we include NRM wolves in the analysis because we conclude that it makes sense, biologically, to consider those wolves because of their connection to the west coast wolves that are part of the listed 44-State entity. As we concluded in our proposed rule, west coast wolves are not discrete from the NRM DPS (84 FR 9654, March 15, 2019; see also **The Currently Listed *C. lupus* Entities Do Not Meet the Statutory Definition of a "Species"**). Because most west coast wolves are dispersers from the NRM, or are descended from dispersers, wolves in the NRM are relevant to our analysis of whether the west coast wolves are "significant" to the entities that we evaluate in this rule. Thus, in this final rule we include an evaluation of the status of the two currently listed gray wolf entities combined with the recovered NRM DPS. However, although we consider the NRM wolves due to their connection to currently listed wolves, we reiterate that wolves in the NRM DPS are recovered, and we are not reconsidering or reexamining our 2009 and 2012 delisting rules (74 FR 15123, April 2, 2009; 77 FR 55530, September 10, 2012).

Finally, while our proposed rule already articulated that neither of the two gray wolf listed entities constitute valid listable entities under the Act and should, therefore, be removed from the List (84 FR 9686, March 15, 2019), we added a more complete discussion in this final rule to support our conclusion (see **The Currently Listed *C. lupus* Entities Do Not Meet the Statutory Definition of a "Species"**). We also clarify that, while the currently listed entities could be removed from the List on that basis, we elected not to act solely on that basis in this final rule. Instead, we elected to consider whether the gray wolves within the currently listed

entities meet the definition of a threatened or an endangered species, in this case whether they are recovered.

In addition to the items discussed above, we made the following changes in this final rule:

(1) We updated distribution information for the gray wolf;

(2) we added a ***Definition and Treatment of Range*** section to **Approach for this Rule** (see **Our Response** to **Comments 5, 7, 8, 10, 63**);

(3) we added a *Genetic Diversity and Inbreeding* section to **Summary of Factors Affecting the Species** (see **Our Response** to **Comments 2, 41, 57, 116, 117**);

(4) we incorporated information regarding gray wolves in the central Rocky Mountains into the **Summary of Factors Affecting the Species** section as well as incorporated a consideration of these wolves into our **Determination of Species Status** section;

(5) we incorporated new information as appropriate; and

(6) we made efforts to improve clarity and correct typographical or other minor errors.

Summary of Comments and Recommendations

In the proposed rule published on March 15, 2019 (84 FR 9648), we requested that all interested parties submit written comments on the proposal by May 14, 2019. We also contacted appropriate Federal and State agencies, Tribes, scientific experts and organizations, and other interested parties and invited them to comment on the proposal. A newspaper notice inviting general public comment was published in *USA TODAY* on March 22, 2019. Subsequently, on May 14, 2019, we extended the public comment period until July 15, 2019 (84 FR 21312). We

received several requests for public hearings. A public information open house and public hearing was held in Brainerd, Minnesota, on June 25, 2019 (84 FR 26393).

In addition, in accordance with our joint policy on peer review published in the *Federal Register* on July 1, 1994 (59 FR 34270), and updated guidance issued on August 22, 2016 (USFWS 2016, entire), we solicited expert opinion from five knowledgeable individuals with scientific expertise that included experience with large carnivore management, especially wolves, expert knowledge of conservation biology, wildlife management, demographic management of mammals, genetics, population modeling, mammalian taxonomy, or systematics. We received responses from all five peer reviewers. The peer review process, including the selection of peer reviewers, was conducted and managed by an independent third party (USFWS 2018, entire; Atkins 2019, pp. 1–6).

We reviewed all comments received from the peer reviewers and the public for substantive issues and new information regarding the delisting of the gray wolf, inclusive of comments on the proposed rule and the supporting biological report. Multiple respondents provided technical edits and editorial comments and corrections on the proposed rule and biological report, or recommended additional citations to consider. We made recommended edits and corrections to the rule and biological report, where appropriate. We also reviewed and considered all additional citations provided by peer reviewers and others, and incorporated information from them, as appropriate, into this final rule and the biological report.

Peer Reviewer Comments

Overall, three of the reviewers found the biological report represented an accurate overview of the changes in the biological status (range, distribution, abundance) of the gray wolf

in the lower 48 United States over the last several decades, and provided recommended revisions and updates. Although one of those reviewers found our taxonomic treatment of wolves to be somewhat arbitrary, a fourth reviewer found the taxonomy section adequate and recommended additional information on biology, ecology, and biological status of the gray wolf for inclusion in the report. A fifth reviewer found the biological report inadequate because the reviewer believed that there were other sources of information that should be included, which the reviewer provided and we considered.

With respect to our proposed rule, 2 peer reviewers found our analysis of the factors relating to the persistence of gray wolves in the lower 48 United States to be adequate; 1 peer review provided corrections and updates. Three reviewers found our analysis of these factors inadequate, mainly because they found our treatment of genetic threats, human-caused mortality, or habitat suitability insufficient, or because they disagreed with Service policy.

Three reviewers found it reasonable to conclude that the approach of Michigan, Wisconsin, and Minnesota to wolf management is likely to maintain a viable wolf population in the Great Lakes area into the future, while two did not. One of these two found that the proposed rule did not provide adequate support for either the conclusion that the metapopulation in the Great Lakes area contained sufficient resiliency, redundancy, and representation to sustain populations within the combined listed entity into the future or that wolves outside this metapopulation are not necessary to maintain its recovered status. All provided additional information and literature for inclusion in the rule, which we reviewed. Comments received are addressed in the following summary, and our responses are incorporated into this final rule as appropriate.

Finally, although we did not request peer review on matters related to policy application, we received a number of policy-related comments from four of the five reviewers. Issues raised included: how we applied certain terms defined in Service policies (e.g., species "range"); our application of the SPR policy; and our approach to the rule. Although these comments are outside of the scope of the requested scientific peer review (USFWS 2018, entire; Atkins 2019, pp. 1–6), we address them in the summary below.

Biology, Ecology, Range, Distribution, or Population Trends

Comment 1: Several reviewers stated that the biological report and proposed rule oversimplified the genetic structure of gray wolves and requested additional information about population or metapopulation structure in wolves.

Our Response: We modified both the biological report and the rule to better reflect the various factors that have been shown to impact the population genetic structure of wolves in North America, including consideration and addition of citations recommended by the reviewer.

Comment 2: Several reviewers noted that there should be a more detailed discussion of potential genetic impacts of delisting and provided additional citations for our consideration. These comments included requests for further consideration of the impacts of delisting on connectivity between populations, particularly in western States.

Our Response: We revised the biological report to provide greater detail on existing genetic structure in wolves as a background for potential genetic issues that may result from the rule. In addition, we added a section to this rule (*Genetic Diversity and Inbreeding*) that provides a more in-depth analysis of the potential genetic impacts of delisting, including consideration of inbreeding and effects to metapopulation structure and connectivity.

Comment 3: Peer reviewers raised concerns about our description of the historical range of gray wolves, pointing out that the scientific evidence indicates that either eastern or red wolves were present in the Northeastern United States historically, not the gray wolf.

Our Response: As we discuss in the rule and the biological report, the taxonomy of wolves, particularly in the Eastern United States, is not settled. Along with the morphological data presented by authors such as Nowak (1995, entire; 2002, entire; 2003, entire; 2009, entire), there is now significant genetic and genomic research that has contributed to the ongoing debate over the correct taxonomic relationship between eastern wolves, red wolves, and western gray wolves. This debate includes considerable uncertainty about the potential historical ranges of those groups, including questions about the degree to which they did or did not overlap, which can be difficult to ascertain based on limited available samples. In presenting information on historical range, we sought to acknowledge this uncertainty while considering the taxa that were covered by the original listing rule we are addressing. As a result, we explicitly include eastern wolves, but not red wolves, in the gray wolf entities evaluated for this rule, meaning that the historical range of the gray wolf in the lower 48 United States does not attempt to distinguish between the ranges of western gray wolf and eastern wolf and instead considers them as a single range. The area of "uncertainty" in our map of the historical range in the biological report, therefore, reflects the fact that there is evidence that the Northeastern United States may have been inhabited by wolves included in our analysis. We revised the text of the biological report to clarify the information pertaining to historical range and to address the reviewers' concerns.

Comment 4: One peer reviewer sought clarification of information presented in the figures depicting historical range and current distribution of the gray wolf (*Canis lupus*) in the lower 48 United States (figure 2 of the proposed rule and figure 1 of the biological report).

Specifically, the reviewer asked us to explain the basis for the current distribution and provide citations for data used to develop the current distribution so that he could determine whether we included data for all wolves or some subset of wolves, how the polygons were delineated, and if there is a time period associated with the data used.

Our Response: The current distribution (i.e., range) shown in figure 2 of the proposed rule and figure 1 of the biological report includes State data for packs and groups of wolves. The distribution is current as of winter 2019–2020. We revised these figures and associated text to address the concerns raised by the peer reviewer. Also see **Our Response** to **Comment 6**.

Comment 5: One peer reviewer requested additional detail regarding figure 1 in the biological report (same as figure 2 in proposed rule). Specifically, the reviewer questioned whether current distribution is also current range and noted that the figure does not provide a spatial reference describing the area included in the threats analysis, nor is it described in associated paragraphs.

Our Response: The figure depicts the current distribution of known wolves in the lower 48 United States. The figure was not meant to indicate a specific spatial extent for our threats analysis, rather it was to provide a representation of the approximate locations of wolves within the listed wolf entities relative to wolves in the remainder of the lower 48 United States. The threats analyses have been completed for the two listed entities assessed separately, in combination (combined listed entity), and in combination with the NRM DPS (lower 48 United States entity), all of which are encompassed by the current distribution indicated in figure 1 of the biological report. We endeavored to match our threats analysis to the spatial scale of the gray wolf's distribution. However, some data on threats and conservation measures and management of wolves were provided at regional or State-wide scales, and we did not want to constrain our

analysis to the dynamic smaller polygons in the West Coast States and Central Rockies where wolves continue to recolonize. Therefore, our threats analysis encompasses relevant threats to wolves, as well as conservation and management, in the following geographic areas: West Coast States (western Washington, western Oregon, and California), Northern Rocky Mountains (represented in the figure), Central Rocky Mountains (Colorado and Utah [outside of the NRM DPS]), and the Great Lakes Area (Minnesota, Wisconsin, and Michigan). See **Our Response** to **Comment 37** and *Definition and Treatment of Range* in this final rule.

Comment 6: One peer reviewer recommended that including marks on States in which dispersing gray wolves have appeared in figure 1 in the biological report (figure 2 in the proposed rule) may further demonstrate the level of recovery gray wolves have attained.

Our Response: As indicated in our response to **Comment 5**, the purpose of this figure is to show the current distribution of gray wolves to provide information about where wolves are currently known to occur (see *Definition and Treatment of Range*). We acknowledge that dispersing wolves have been documented outside of the known, current distribution and present this information in the text of this final rule and the biological report.

Comment 7: One peer reviewer assumed our analysis of threats for wolves in the Great Lakes area was in the area of current distribution and indicated that this made sense, as it is a single large area supporting thousands of wolves. Similarly, the peer reviewer questioned whether our threats analysis for wolves in Washington, Oregon, and California included only the small, isolated patches of occupied wolf habitat or also included the intervening areas.

Our Response: The peer reviewer is correct regarding the scope of the threats analysis for the Great Lakes area wolves. In areas where the saturation of wolves is denser, polygons delineated around occupied habitats are larger and also incorporate corridors connecting

occupied habitats to one another. The opposite is true in the West, where wolves are less saturated due to more recent recolonization from resident packs, the NRM, and Canada. Connecting these smaller occupied patches to the larger metapopulation would be speculative at best given the level of information currently available about corridors that may connect occupied habitats. We describe the current condition of wolves in Washington, Oregon, California, and Colorado (not limited to small polygons) and how these wolves would be managed post-delisting (also see **Our Responses** to **Comments 8 and 37** and *Definition and Treatment of Range* in this final rule).

Comment 8: One peer reviewer noted that the apparent current range of the gray wolf in the lower 48 United States, under a metapopulation structure, should include portions of the historical range because the historical range provides connectivity between known occurrences. Additionally, the peer reviewer advised that sink areas of metapopulations (e.g., dispersal end points in various western and midwestern States) should be considered current range as they provide viability and connectivity to metapopulations (citing Howe et al. 1991 and Heinrichs et al. 2015).

Our Response: As described in the *Definition and Treatment of Range* section of this final rule, we define current range to be the area occupied by the species at the time we make a status determination. The current range of the gray wolf in the lower 48 United States is based on data provided by the States on the locations of groups or packs of wolves. Individual dispersing wolves do not have a defined territory or consistently use any one area and, therefore, are not included in the current range of the gray wolf. Also see **Our Response** to **Comment 37** and *Definition and Treatment of Range* in this final rule.

Comment 9: One peer reviewer questioned why we include listed and delisted wolves in figure 2 of the biological report, when we state that we are not including the delisted NRM DPS wolves as part of the listed entity under analysis.

Our Response: As explained above, we are including wolves in the delisted NRM DPS in our analysis of the status of the lower 48 United States entity for this final rule. We provided information from the NRM DPS in our biological report and the proposed rule because the NRM wolves are biologically connected to wolves in the West Coast States, and to illustrate how wolf populations have responded post-delisting when they are managed under State authority. We also included NRM wolves in figure 2 of the biological report, which provides information on changes in distribution and abundance since the original listing in 1978 (see USFWS 2020, p. 14).

Comment 10: One peer reviewer sought clarification on whether our description of the public lands available for expansion of west coast wolves includes areas outside of the current range or current distribution.

Our Response: We have clarified, in this final rule, that our findings are based on the current range of the gray wolf and do not rely on further range expansion of west coast wolves. Also see *Definition and Treatment of Range* in this final rule.

Comment 11: One peer reviewer requested inclusion of 2018 minimum wolf counts for Washington, Oregon, and California, as well as for the Mexican gray wolf. Similarly, another peer reviewer noted an inconsistency in our discussion of whether the Mexican gray wolf population was growing or stable.

Our Response: The requested data were not available at the time the biological report and proposed rule were completed. The 2018 data, as well as data from winter 2019–2020, are now included in this final rule and revised biological report. We also clarified that the Mexican gray wolf population continues to grow.

Comment 12: One peer reviewer noted that Appendix 1 of the biological report contained minimum annual counts of wolves only for Michigan, Minnesota, and Wisconsin. Similar information was requested for Washington, Oregon, and California.

Our Response: We have added another table, Appendix 2, to the biological report that provides minimum end of year counts for wolves in Idaho, Montana, Wyoming, Washington, Oregon, and California.

Comment 13: One reviewer recommended that we clarify in the biological report differences between minimum wolf counts versus patch occupancy modeling when discussing wolf population estimates in Montana and proposed specific language.

Our Response: The paragraph in question has been revised and updated using similar concepts, rather than the exact terminology provided by the reviewer. Updated information is also included in the *Human-caused Mortality* section of this final rule.

Human-caused Mortality

Comment 14: One peer reviewer expressed their view that illegal take is underestimated by State monitoring programs and would be much higher than it is today if wolves were to be delisted. This reviewer expressed concerns about a "catastrophic decline" in the Minnesota wolf

population post-delisting as well as "unwarranted assurances about the safety of wolves in the Western Great Lakes" post-delisting in both the proposed rule and biological report. One peer reviewer recommended that we add State-by-State estimates of mortality rates and include additional mortality factors to table 4 in the rule (to include all forms of mortality aside from lethal control and legal public harvest). The reviewer created a new table and provided new information about the percent of the population removed annually through agency control efforts. Other commenters also expressed concern that State monitoring programs underestimate mortality rates, including the effects of legal depredation control and other sources of mortality.

Our Response: In most instances, State and Tribal wildlife agencies have been the primary agencies responsible for monitoring wolf populations while they were federally listed. As a result, the Service has relied upon data provided by partner wildlife agencies to evaluate population metrics related to recovery. We do not expect that wolf monitoring will significantly change or become less precise post-delisting. To evaluate the population status of wolves, biologists used a variety of monitoring techniques to evaluate pack size and reproductive success, identify pack territories, monitor movements and dispersal events, and identify new areas of possible wolf activity. In addition to direct counts that provide a minimum known number each year, managers attempt to use similar survey techniques annually so that accurate assessments of historical trends may be used to further evaluate wolf population status and changes over time. However, traditional techniques used to monitor wolves (e.g., capture and radio-collar animals, monitor from the ground or air) can be dangerous to the animal and wildlife personnel, are costly and time-consuming, and become less precise as wolf abundance and distribution increase; thus, these techniques underestimate the true population size (Gude *et al*. 2012, p. 116).

As a result, State management agencies have been at the forefront in developing more accurate, cost-efficient monitoring techniques to assess wolf population status in their respective States. For example, Montana incorporates hunter surveys, along with other variables, into a patch occupancy modeling framework to estimate wolf abundance and distribution across the State. Idaho experimented with multiple noninvasive monitoring techniques to assess reproductive success and the number of packs in the State and most recently used camera surveys and a modeling framework to provide a population estimate for 2019. Michigan inventories wolves using a geographically based, stratified, random sample that produces an unbiased, regional estimate of wolf abundance. Minnesota radio-collars a relative few individuals in a number of packs Statewide and uses metrics obtained from those packs to evaluate occupied range and abundance. In addition to using similar techniques as Minnesota, Wisconsin also uses citizen science volunteers who are trained and qualified through a tracking program to assist agency personnel in documenting wolf presence and number across survey blocks in winter. California, Oregon, Washington, and Wyoming continue to use traditional monitoring approaches that provide minimum counts.

Most State management agencies within occupied wolf range in the lower 48 United States publish a report that summarizes the results of wolf monitoring and management activities each year they are conducted. The Service reviewed these reports to complete the biological report and the proposed and final rules. These reports also provide information about the number and type of known causes of mortality that occurred in each State. Wolves may go missing for a variety of reasons, and removing these animals from survival analyses has the potential to bias survival estimates high (Liberg *et al*. 2012, p. 914; Stenglein *et al*. 2015c, p. 374; O'Neil 2017, p. 202; Treves *et al.* 2017b, pp. 7–8). However, it is not reasonable to assume that all, or even

most, wolves with unknown fates have died, particularly through illegal means. For example, a wolf captured in northeast Oregon in 2011 went missing later that same year until it was rediscovered again in 2015 in southwestern Oregon (ODFW 2016, p. 8), where it became the breeder in a newly formed pack (ODFW 2017, p. 5). An integrated population model for Wisconsin's wolf population indicated that up to an additional 4 percent of missing wolves may have actually died between 2003 and 2011 (Stenglein *et al*. 2015c, pp. 372–374).

Managers use empirical data from monitoring efforts and reports from the public to provide accurate information about the number and causes of known wolf mortalities, but are cautious about drawing conclusions from those data regarding the fates of missing animals. Most managers acknowledge that information related to the number and cause of wolf mortalities are likely biased because not every wolf is fitted with a radio collar and not every wolf that dies is recovered so their fates are unknown. In the NRM, it was estimated that 10 percent of the population was illegally killed annually. Although some research has indicated that rates of illegal take may be biased low (Liberg et al. 2012, p. 914; Treves et al. 2017b, pp. 7–8), other studies have supported the estimate that between 6 and 10 percent of the known population may be illegally killed each year in both the NRM and the Great Lakes area wolf populations (Smith *et al.* 2010, p. 625; Ausband *et al.* 2017a, p. 7; O'Neil 2017, p. 214, Stenglein *et al.* 2018, p. 104). Wolves die for a variety of reasons and the mechanisms they have to compensate for these mortalities have made wolf populations very adaptable and resilient to perturbations. Table 4 in the rule provides information about the average annual number and percent of the total estimated population removed in 5-year increments (with the exception of the period between 2015 and 2017) via agency-directed lethal control of depredating wolves in Minnesota. This table relates only to depredation control in Minnesota; other forms of mortality are addressed elsewhere in the

rule. While the Service appreciates the reviewer's efforts to create a new table, we find the table that was originally published in the proposed rule is an appropriate way to provide information about the average number and percentage of the population removed through lethal control actions in Minnesota.

Refer to the *Human-caused Mortality* section of the rule and **Our Response** to **Comment 16** for further information related to discussions about illegal take.

Comment 15: One reviewer noted that we did not analyze human-caused mortality for western wolves—specifically, how human-caused mortality in the core of the western United States metapopulation could affect the viability of outlying western listed wolves. The same reviewer also noted a lack of discussion regarding the potential for high levels of human-caused mortality in one western listed area to affect the viability of other western listed areas.

Our Response: Aside from large protected areas such as Yellowstone and Isle Royale National Parks, human-caused mortality has been, and continues to be, the primary source of known wolf mortality in the lower 48 United States, including wolves in the West Coast States. Wolves in the core of the western United States metapopulation (e.g., NRM DPS) are managed under State authority and following an initial population decline post-delisting, wolf populations appear to have stabilized in Idaho and Montana, whereas they continue to increase in Oregon and Washington (see table 3). Wolf populations in Wyoming were delisted in 2017 and may be following a similar pattern to that observed in Idaho and Montana (see table 3).

While it is possible that increased levels of human-caused mortality due to public harvest could affect peripheral populations of wolves by creating isolated pockets that may result in reduced genetic diversity and increased potential for inbreeding in outlying areas, there is no

empirical evidence to indicate that this has occurred or is likely to occur in the future. Genetic diversity was limited for wolves on Isle Royale National Park, but the cause was their location on an isolated island rather than the effects of human-caused mortality. Dispersal is innate to the biology of the wolf and moderate increases in human-caused mortality in core areas may reduce the overall number of dispersers due to slight reductions in the total number of wolves on the landscape. Increased human-caused mortality also has the potential to create additional vacant habitats and social openings within packs, which may result in an overall reduction in dispersal distance for wolves in the core of the western United States metapopulation. Nonetheless, short- and long-distance dispersal events, as well as effective dispersal in which the disperser became a breeder, continue to be documented in hunted populations, as well as high- and low-density wolf populations, which contributes to the maintenance of high levels of genetic diversity. Furthermore, resident packs in California, Oregon, and Washington contribute annually to the number of dispersing wolves that are available to fill social openings or to recolonize vacant suitable habitat both within and outside of each State. This supports the continued viability of wolves and enhances the resiliency, redundancy, and representation of wolves in the gray wolf entities evaluated in this rule. For further information, refer to the *Human-caused Mortality* and *Genetic Diversity and Inbreeding* sections of this final rule.

Comment 16: One reviewer and one commenter stated that the biological report and the proposed rule did not review the scientific debate concerning the effects of current levels of illegal take and the potential increase in legal take (i.e., "tolerance hunting") on wolf populations.

Our Response: We reviewed the citations provided by the reviewer and have updated the rule accordingly. We acknowledge in the *Human-caused Mortality* section of the rule that

human-caused mortality is likely to increase post-delisting as some States (primarily the Great Lakes States) begin to manage wolves under the guidance of their respective State management plans. This may include increased use of lethal control to mitigate depredations on livestock and the implementation of public harvest to stabilize or reduce wolf population growth rates. Post-delisting, gray wolves in Washington and California will continue to be classified as endangered at the State level until they are State-downlisted or State-delisted based on population performance and recovery metrics specific to each State. Wolves in Oregon were State-delisted in 2016; however, they continue to receive protection under a State statute and the Oregon Wolf Conservation and Management Plan, which mandates a public rulemaking process prior to authorizing legal hunting of wolves. In Colorado, wolves will continue to be classified as endangered at the State level after delisting, and management will be guided by the wolf management recommendations developed by the Colorado Wolf Management Working Group. Based on past delisting efforts in the Great Lakes area, and as demonstrated by current State management of wolves in Idaho, Montana, and Wyoming, we conclude it is unlikely that moderate increases in human-caused mortality will cause dramatic declines in wolf populations across the lower 48 United States.

We do not agree that increased take through lethal depredation control and legal harvest will cause a corresponding increase in illegal take. Although some have indicated that estimates of illegal take are underestimated (Liberg et al. 2012, p. 914; Treves et al. 2017b, pp. 7–8), multiple, independent studies from different areas of the lower 48 United States indicate that illegal take removes approximately 10 percent of populations annually (Smith et al. 2010, p. 625; Ausband et al. 2017a, p. 7; O'Neil 2017, p. 214, Stenglein et al. 2018, p. 104). There are also indications that documented illegal take of wolves was higher during periods of Federal

management compared to State management (Olson et al. 2014, entire). Based on empirical information compiled by wildlife management agencies, illegal mortality did not increase following previous delisting efforts in the Great Lakes area or the NRM States. See the *Human-caused Mortality* section of the rule for further information related to illegal take and wolf survival as well as the **Post-delisting Management** section of the rule for information related to how States intend to adaptively manage wolf populations to ensure the continued existence of a recovered, viable population.

Comment 17: One peer reviewer objected to the use of lethal control by States to mitigate wolf conflicts with livestock and humans post-delisting. The peer reviewer also asserted that the proposed rule made assumptions that lethal control was self-limiting and inferred that agency control only leads to more wolf killing.

Our Response: We recognize and respect that some people may find some or all forms of human-caused wolf mortality morally or ethically objectionable, particularly the use of lethal removal of wolves to mitigate conflicts with livestock. However, the Act requires that we make our determination based on whether the entity under analysis meets the Act's definition of a threatened species or an endangered species (in this case, is it recovered and will State management retain that recovered status if the Act's protections are removed). We may not consider the reasons why individual wolves may be killed after the species is delisted unless it would affect our analysis of the statutory threat factors.

Conflicts occur wherever wolves and livestock coexist, often regardless of what methods are used to prevent or mitigate those conflicts. Both nonlethal and lethal methods are often temporary solutions to resolve conflicts and seldom provide long-term effectiveness. Under

certain circumstances, preventative and nonlethal techniques have been shown to be effective. These include the effectiveness of proactive methods to curb learned behaviors associated with food rewards in wolves (Much et al. 2018, p. 76), the inferred effectiveness of human presence at reducing recurrent depredations in Minnesota (Harper et al. 2008, pp. 782–783), and the adaptive use of multiple preventative and nonlethal methods to minimize sheep depredations in Idaho (Stone et al. 2017, entire). Conversely, lethal control has been demonstrated to be effective at minimizing recurrent depredations through an overall reduction in pack size if conducted shortly after a depredation occurred; however, complete pack removal was most effective (Bradley et al. 2015, pp. 6–9). In addition to the targeted removal of wolves to minimize the potential of recurrent depredations on sheep (Harper et al. 2008, p. 783), the targeted removal of a relatively high number of individuals relative to pack size significantly reduced the probability of recurrent cattle depredations the following year (DeCesare et al. 2018, pp. 8, 10–11). In a review of both nonlethal and lethal methods to mitigate carnivore conflicts, the effectiveness of nonlethal methods to reduce livestock losses ranged between 0 and 100 percent, whereas the effectiveness of targeted, lethal control ranged between 67 and 83 percent (Miller et al. 2016, pp. 3–8). In contrast, another review indicated that lethal control was just as, if not more, effective than most nonlethal methods at mitigating conflict, but that success was more variable when compared to nonlethal methods (van Eeden et al. 2017, p. 29). This indicates that no single method or technique is consistently effective under all conditions to minimize conflict risk. Although continued research is needed (Treves et al. 2016, entire; Eklund et al. 2017, entire; van Eeden et al. 2018, entire), we acknowledge that a depredation management plan that is adaptive and includes a combination of multiple nonlethal and lethal methods may improve its overall effectiveness at minimizing depredation risk (Bangs et al. 2006, entire; Treves and Naughton-

Treves 2005, p. 106; Wielgus and Peebles 2014, pp. 1, 14; Miller et al. 2016, p. 7; Stone et al. 2017, entire; DeCesare et al. 2018, p. 11).

Lethal control of depredating wolves is used reactively rather than proactively, often after other techniques to prevent depredations were unsuccessful, to stop current depredations and minimize the potential for recurrence at the local scale while continuing to promote wolf population growth, recovery, sustainability, and/or viability at the landscape scale. As wolf populations have continued to increase in number and expand their range into more agriculturally oriented and human-dominated landscapes, more wolf territories overlap with livestock and humans. This outcome increases both interaction rates and the potential for conflict, which in turn reduces the probability that wolves will persist in these areas long term (Mech et al. 2019, entire). Even so, overall, few wolf packs are implicated in livestock or pet depredations on an annual basis (for example, approximately 20 percent of known packs in the NRM; also see Olson et al. 2015, entire). Thus, how depredating wolves are managed will influence where non-depredating wolves may persist because the removal of the small number that cause conflict may increase tolerance for the remaining wolves that do not (Musiani et al. 2005, p. 884).

The use of lethal control to mitigate wolf conflicts with livestock has been criticized for lacking long-term effectiveness and being too costly (Wielgus and Peebles 2014, entire; McManus et al. 2015, entire; Lennox et al. 2018, entire; Santiago-Avila et al. 2018, entire). However, lethal control of depredating wolves is not intended to resolve long-term depredation management issues across a large spatial scale (Musiani et al. 2005, p. 885). Rather, it has consistently been used by managers as a short-term response to mitigate recurrent depredations of livestock on a relatively small scale that could not be resolved using other methods. Wielgus

and Peebles (2014, pp. 7–14) argued that lethal removal of wolves in one year exacerbated the conflict cycle, which resulted in an increased number of livestock killed by wolves the following year. Subsequent studies have refuted this assertion and found that, when the same data were reanalyzed, the use of lethal control was effective at reducing livestock depredations the following year (Poudyal et al. 2016, entire), and an increasing wolf population was the primary cause of the observed increases in the number of livestock depredations (Kompaniyets and Evans 2017, entire). Others have documented the effectiveness, or lack thereof, of certain lethal control prescriptions used to minimize depredation risk within the same year the control actions were conducted or the year following the control actions (Bradley et al. 2015, entire; DeCesare et al. 2018, pp. 8, 10). As long as wolves and domestic livestock share the landscape, conflict will occur, and depredation management programs that use a combination of proactive and reactive tools are often most effective at minimizing depredation risk.

Although DeCesare et al. (2018, pp. 9–11) concluded that public harvest alone had little effect on the annual recurrence of livestock depredations in Montana, there is some evidence to indicate that the combination of lethal control and public harvest has the potential to reduce the number of confirmed livestock depredations caused by wolves without having a significant impact on wolf populations. For example, the Wisconsin wolf population declined slightly from 815 to 746 animals (an 8 percent decrease) between 2012 and 2015 (wolves were federally delisted between 2012 and 2014). However, during that same time period, verified wolf kills on cattle and the number of farms with verified depredations declined significantly (Wiedenhoeft et al. 2015, pp. 4–5, 12). A similar trend was observed in the NRM when it was delisted in 2011, with the exception of Wyoming. Between 2006 and 2011, an average of approximately 190 cattle depredations was confirmed per year, while between the years of 2012 to 2015, the number of

confirmed cattle depredations decreased to an average of about 151 per year (see USFWS et al. 2016, table 7b). Although the number of confirmed cattle depredations in Montana trended slightly upward in 2017 and 2018, the number of reported depredations declined significantly in Montana from a high of 233 in 2009, to approximately 100 or fewer between 2014 and 2018 (Inman et al. 2019, p. 11). Similarly, the number of livestock killed by wolves in Wyoming has declined since wolves were federally delisted in 2017 (WGFD et al. 2020, p. 19).

As a result of the overall reduction in livestock depredations, the number of wolves lethally removed to mitigate conflicts has also generally declined in the NRM States. The Service does not expect confirmed livestock depredations to cease altogether post-delisting, even though States will have the ability to use targeted lethal control and public harvest to manage wolf conflicts and populations, respectively. Rather, we expect there may be a slight decrease in the number of livestock depredations post-delisting, followed by fluctuations around a lower long-term average in subsequent years as managers learn how best to manage wolf populations and conflicts to ensure the long-term survival of the species. Furthermore, if wolves are causing less conflict, it could lead to improved tolerance for wolves and, although annual fluctuations are likely, an overall reduction in the number of wolves lethally removed annually as a result.

For information on the percent of the wolf population removed through agency-directed lethal control as well as wolves taken in defense of property by private individuals and its effect on wolf populations in the Great Lakes area, refer to the **Post-delisting Management** section of this rule. Also refer to the *Human-caused Mortality* section of this rule for information related to the effects of human-caused mortality, including lethal control, on wolf populations in the NRM post delisting.

Comment 18: One peer reviewer asserted the biological report lacked information on human-caused mortality, human attitudes, and behavior as they relate to human-caused mortality, as well as cumulative effects of mortality and reproductive failure in wolves. As a result, the reviewer believed the threats assessment in the proposal was uninformed by a scientific analysis of the peer-reviewed literature on human-caused mortality. The reviewer recommended the biological report be revised to include scientific information on the patterns and processes of human-caused mortality in wolves.

Our Response: The purpose of the biological report is to provide a concise overview of the changes in the biological status (range, distribution, abundance) of the gray wolf (*Canis lupus*) in the lower 48 United States over the last several decades. A full discussion of human-caused wolf mortality (including human attitudes and behaviors and the effects of take on wolf social structure) and a complete analysis of potential threats facing wolves was included in the proposed rule and has been updated and revised as appropriate in this final rule. Refer to **Comments 36** and **19** and revisions made in response to those comments for additional information.

Comment 19: Two reviewers critiqued the discussion related to human behaviors and the inclination to poach wolves post-delisting. Both reviewers provided references for an updated discussion regarding this topic in the proposed rule. One reviewer stated the rule misinterpreted the review by Treves and Bruskotter (2014) regarding tolerance for predators.

Our Response: The **Role of Public Attitudes** section of this final rule has been updated and revised to include references recommended by both peer reviewers as well as other references that inform the discussion of human behaviors related to wolves and wolf

management. As the reviewers recommended, we expanded the discussion in the rule related to human behaviors, how those behaviors are correlated with management, and the inclination to illegally take a wolf based on the listing status of wolves. We also added a section related to overall tolerance for wolves and, we conclude, appropriately reinterpreted the review by Treves and Bruskotter (2014).

We conclude that public tolerance of wolves is likely to improve as wolves are delisted and local residents feel they have input in management of wolf populations. This process has already begun in the NRM States; however, it will likely take time for this increased control over wolf management, and the related sense of ownership, to translate into tangible benefits in improved public opinion. Public acceptance is highest where wolves were not extirpated and where residents have had longer periods of exposure to wolves (Houston et al. 2010, pp. 399–401). However, it is unclear whether this is due to increased knowledge and experience dealing with wolves or to less stringent local management policies (including public harvest and defense of property regulations).

Comment 20: One peer reviewer and several other commenters recommended that we conduct a population viability analysis (PVA) or other additional modeling exercises or analysis before delisting. The peer reviewer and some of the other commenters further stated that we should provide more support, via a PVA, that a population of 1,251 to 1,440 wolves in Minnesota would be viable.

Our Response: The Act requires that we use the best scientific data available when we make decisions to list, reclassify, or delist a species. However, it does not require that we produce new science to fill knowledge gaps. PVAs can be a valuable tool to help us understand

the population dynamics of rare species (White 2000, entire). They can also be useful in identifying gaps in our knowledge of the demographic parameters that are most important to a species' survival. However, the difficulty of applying PVA techniques to wolves has been discussed by Fritts and Carbyn (1995, pp. 28–29) and Boitani (2003, pp. 332–333). Problems include our inability to: (1) Provide accurate input information for the probability of occurrence of, and impact from, catastrophic events (such as a major disease outbreak or prey base collapse); (2) incorporate all the complexities and feedback loops inherent in wild systems and agency adaptive management strategies; (3) provide realistic inputs for the influences of environmental variation (such as annual fluctuations in winter severity and the resulting impacts on prey abundance and vulnerability); (4) account for temporal variation, selective outbreeding, and individual heterogeneity; and (5) address the spatial aspects of extreme territoriality and the long-distance dispersals shown by wolves. Relatively minor changes in any of these input values into a theoretical model can result in vastly different outcomes.

The revised recovery plan for the Eastern Timber Wolf indicated recovery would be achieved when: (1) the survival of the wolf in Minnesota is assured, and (2) at least one viable population (as defined below) of eastern timber wolves outside Minnesota and Isle Royale in the lower 48 United States is reestablished. The recovery plan did not establish a specific numerical criterion for the Minnesota wolf population. While the plan did identify a goal "for planning purposes only" of 1,251 to 1,400 wolves for the Minnesota population (USFWS 1992, p. 28), the plan explicitly states that the region's total goals, "exceed what is required for recovery and delisting of the eastern timber wolf" (USFWS 1992, p. 27). This planning goal was driven not by minimum estimates of viability, but instead by: existing populations of 1,550 to 1,750 wolves in Minnesota (USFWS 1992, p. 4), the plan's objective to maintain existing populations (USFWS

1992, p. 24), and existing planning goals by other land managers within Minnesota (USFWS 1992, p. 27). Population viability and sustainability are explicitly discussed in the plan. The plan states a "viable population" includes either: (1) an isolated, self-sustaining population of 200 wolves for 5 successive years; or (2) a self-sustaining population of 100 wolves within 100 miles of the Minnesota population (USFWS 1992, pp. 4, 25–26). Furthermore, the plan stated that "a healthy, self-sustaining wolf population should include at least 100 interbreeding wolves [that would] maintain an acceptable level of genetic diversity" (USFWS 1992, p. 26). After evaluating all available information, we determine that the best scientific and commercial information available continues to support our conclusion that these recovery goals will ensure that the population does not again become in danger of extinction.

Habitat and Prey Availability

Comment 21: One peer reviewer provided information from Smith et al. (2016) regarding habitat suitability for the gray wolf in the central United States. In particular, the peer reviewer pointed out that while there appears to be suitable habitat in South Dakota and wolves dispersing to that area, breeding has not been documented. They also pointed out that the model used in Smith et al. (2016) did not account for forest cover as an attribute of wolf habitat, which was an important attribute in the Great Lakes area (Mladenoff et al. 2009) and the Rocky Mountains (Oakleaf et al. 2006).

Our Response: We acknowledge that not all wolf habitat models incorporate the same predictor variables. We have updated this final rule to explain that, despite model results of Smith et al. (2016), relatively high densities of livestock and limited hiding cover for wolves (forests) in large portions of the Midwest are likely reasons that wolves have failed to recolonize

this area (Smith et al. 2016, pp. 560–561). As indicated in the *Habitat and Prey Availability* section, predictions of suitable habitat generally depict areas with sufficient prey where human-caused mortality is likely to be relatively low due to limited human access, high amounts of escape cover, or relatively low numbers of wolf–livestock conflicts. Models that fail to account for the potential for wolf–livestock conflicts or other conflicts with humans are likely to overestimate the availability of suitable habitat.

Comment 22: One peer reviewer asserted that defining a human behavior (wolf-killing) as a habitat feature is contrary to longstanding ecological practice and not all humans kill gray wolves or even want to kill gray wolves (e.g., Treves et al. 2013). The reviewer stated that human density is a weak correlate of threat to wolves and that the proposed rule should not define a habitat as unsuitable because people live there; rather, an area should be classified as unsuitable only when mortality or failed reproduction are recurrent phenomena.

Our Response: We have clarified that our definition of suitable habitat generally refers to areas with sufficient prey where human-caused mortality is likely to be relatively low due to limited human access, high amounts of escape-cover, or a low probability of conflict with humans and livestock. The standard practice in the development of wolf habitat models is to include the potential for wolf–human conflict (e.g., areas with high human and livestock densities) and areas of higher human-caused wolf mortality (e.g., areas closer to roads and areas without forest cover). Because wolves can occur nearly anywhere with high enough prey densities (including semideveloped landscapes) and low enough human-caused mortality, the inclusion of information on wolf–human conflict is essential to identifying where wolves are likely to persist over time (see Mech 2017).

Comment 23: One reviewer commented that habitat suitability should be measured only at the individual level rather than the population level and further commented that habitat suitability should be defined by observing where reproduction and survival occur. The reviewer pointed to language in the proposed rule that indicated an area of Minnesota was not suitable habitat even though 450 wolves live there, and the reviewer questioned how this area could be unsuitable given the presence of such a large number of wolves.

Our Response: We have clarified our definition of suitable habitat in this final rule. We define suitability to include areas where wolf–human conflict is low enough to allow wolf populations to persist. Wolves are habitat generalists and can reproduce and survive nearly anywhere given sufficient food resources and low enough human-caused mortality. Therefore, we find that development of a definition that factors in wolf–human conflict is necessary to identify areas where wolf persistence is likely. The reference in our proposed rule to an area in Minnesota containing 450 wolves as being "not suitable for wolves" originated from our Revised Recovery Plan. The statement, as written, was not intended to convey that wolves were not capable of surviving there but instead that it was not desirable for wolves to occur there due to greater human density, including a high proportion of intensively farmed areas (USFWS 1992, p. 15). We have edited this final rule for clarity.

Disease and Parasites

Comment 24: One peer reviewer recommended we consider the impacts of chronic wasting disease (CWD) in deer and elk, as they are primary prey species for wolves. They noted that CWD is not currently found in areas with wolf packs, and included a reference to evaluate.

Our Response: We added a discussion of CWD and what we know about its impacts to wolf prey (see the *Habitat and Prey Availability* section).

Post-delisting Management

Comment 25: One peer reviewer stated that the Service should openly discuss the changes in wolf monitoring methods used by the State of Wisconsin over time (e.g., use of volunteer trackers) and how those changing methods may affect the State's population and growth rate estimates (including differences in standard deviation).

Our Response: Survey methods in Wisconsin have not changed significantly since the Wisconsin Department of Natural Resources began producing annual counts of the State's gray wolf population in winter 1979–1980 (Wydeven 2019b, in litt.).

Comment 26: One peer reviewer proposed changes to the Wisconsin Wolf Management Plan, such as alternative hypotheses about population growth and further analysis and rationale for the population goal.

Our Response: Wisconsin's plan provides for maintaining a population of wolves, which in combination with wolves in Michigan, will comprise a viable population that is not in danger of extinction in the foreseeable future. We conclude that Wisconsin's management plan, as currently written, will accomplish that goal. We recommend that recommendations for ways to improve the States' management following delisting should be discussed with the State management agency.

General

Comment 27: One peer reviewer stated that we did not consider many relevant published articles and did not adequately assess the quality of the evidence we used in reaching our conclusions. The reviewer maintained that we did not adequately consider disagreements within the scientific literature, and that some of the evidence does not meet long-established standards of evidence.

Our Response: In accordance with section 4 of the Act, we are required to make our determinations on a species' status based on the best scientific and commercial data available at the time of the determination. We prepare status assessments and associated reports summarizing the best available information that is relevant to our consideration of whether a species meets the Act's definition of a threatened species or an endangered species. The evidentiary standards we apply are found in our Policy on Information Standards under the Act (published in the *Federal Register* on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106-554; H.R. 5658)), and our associated Information Quality Guidelines (http://www.fws.gov/informationquality/). These provide criteria and guidance and establish procedures to ensure that our decisions are based on the best scientific and commercial data available. They require us, to the extent consistent with the Act and with the use of the best scientific and commercial data available, to use primary and original sources of information as the basis for our status determinations. Primary or original information sources are those that are closest to the subject being studied, as opposed to those that cite, comment on, or build upon primary sources.

The Act and our regulations do not require us to use only peer-reviewed literature. Rather, we may exercise our expert judgment in determining what information constitutes the "best scientific and commercial data available." We use information from many sources, including but not limited to: articles in peer-reviewed journals, scientific status surveys and studies completed by qualified individuals, Master's thesis research that has been reviewed but not published in a journal, other unpublished governmental and nongovernmental reports, reports prepared by industry, personal communication about management or other relevant topics, conservation plans developed by States and counties, and biological assessments.

Our proposed rule and draft biological report were based on sources that we concluded are: (1) the best scientific and commercial data available at the time of the determination and (2) relevant to a determination of the status of the gray wolf entity under analysis. We evaluated all additional information provided during the public comment period by peer reviewers, governmental agencies, Native American Tribes, the scientific community, industry, and any other interested parties, and we considered the information in developing this final rule and the final biological report, as appropriate.

Biological Report

Comment 28: One peer reviewer recommended the biological report include data on wolf immigration from Canada to support the claim that wolves from Canada will repopulate the Great Lakes area or West Coast States.

Our Response: The biological report references wolves from Canada recolonizing portions of northern Montana beginning in the early 1980s. Long-distance dispersal has also been critical to wolf recolonization in the Great Lakes area (Treves et al. 2009, entire).

Furthermore, wolves from British Columbia, along with wolves from the Northern Rocky Mountains are in the process of recolonizing suitable habitats in the West Coast States (Hendricks et al. 2019, entire). We have updated the biological report to cite multiple studies showing that, if human-caused mortality is regulated, wolves have a remarkable ability to recolonize areas with a sufficient prey-base (e.g., Mech 1995, Boyd and Pletcher 1999, Treves et al. 2009, Mech 2017, Hendricks et al. 2019). The discussion of connectivity and immigration from Canada in the biological report is provided to illustrate that wolves in the Great Lakes area and the West Coast States do not function as isolated populations, and that their connectivity with even larger populations in Canada increases their resiliency. We do not anticipate that wolves in the Great Lakes area or West Coast States will be eliminated or reduced such that repopulation will be necessary.

Comment 29: One peer reviewer provided additional information on pack territory sizes, recommending we include more detailed information on territories in the Great Lakes region.

Our Response: In the biological report, we provided the known range of pack territory sizes (12.7 to 1,003.9 mi^2 (33 to 2,600 km^2)) to show their variability. We do not view the detailed information on pack sizes from individual studies cited by the reviewer to be necessary to our analysis, which relies only on the proposition that territory sizes are variable.

Comment 30: One peer reviewer stated that our biological report misreported human-caused wolf mortality rates from Fuller et al. (2003). The reviewer also recommended citing Stenglein et al. (2015b), stating that their model of the Wisconsin wolf population demonstrates that a 30 percent annual harvest would, on average, reduce the wolf population by 65 percent over 20 years.

Our Response: The percentages provided in the biological report refer to the data analyzed by Fuller et al. (2003). While Fuller et al. (2003) also provides a review of other studies that have investigated sustainable human-caused wolf mortality rates, these rates are within the overall range of sustainable mortality rates provided in the biological report (17 to 48 percent). We added the information from Stenglein et al. (2015b) regarding harvest rates and wolf population reduction.

Comment 31: One peer reviewer advised that we include additional information on source-sink dynamics and provided citations to consider. The reviewer noted that source-sink dynamics have been notable in the Northern Rocky Mountains, especially in northwest Montana and the Greater Yellowstone region, where much ungulate winter range lies outside of protected areas (Fritts and Carbyn 1995). The reviewer also provided several citations on source-sink dynamics in mountain lion populations that they indicated were relevant to wolves. The reviewer also recommended indicating that broad-scale source-sink dynamics over areas larger than many demographic study areas can cause high local mortality rates to appear sustainable because the population is being sustained by immigration from source habitat.

Our Response: We reviewed the citations provided by the reviewer and updated the biological report to include a brief discussion of the role of dispersal and source-sink dynamics in wolf population regulation. Regarding broad-scale source-sink dynamics, we have updated the biological report accordingly.

Comment 32: One peer reviewer stated that the biological report omitted a thorough discussion of suitable habitat in some unoccupied but suitable habitats in parts of the lower 48 United States (e.g., parts of the Pacific Northwest, Colorado, Utah, and the Northeast). They

found this omission to be at odds with previous iterations of listing and delisting rules for the gray wolf. The reviewer recommended a more complete analysis of potentially suitable habitat in the lower 48 United States, including a map compiling existing information regarding potentially suitable habitat.

Our Response: We updated the biological report to reflect that suitable, but unoccupied, habitat occurs in parts of the West Coast States, the central Rocky Mountains (inclusive of Colorado and Utah), and the Northeast. However, unoccupied areas were not a focus for our analysis, and this final rule does not rely on recolonization of these areas to support the determination that gray wolves are recovered. Because we are not relying on suitable habitat that is unoccupied for our delisting determination, we find it unnecessary to compile a map of suitable habitat outside the current range. The publications cited in the biological report provide additional information regarding habitat models in specific areas.

Comment 33: One peer reviewer indicated that notable dispersal events should be mentioned in the biological report, as they are relevant to a discussion on metapopulation structure and the recolonization of potential wolf habitat (e.g., northern Rockies to Arizona, dispersal of wolves from Quebec to the Northeastern United States).

Our Response: The biological report references dispersal events of several hundred kilometers. We have added language to the **Biology and Ecology** section of the report to describe how long-distance dispersal distances relate to recolonization of suitable habitat. We also clarified our discussion of dispersal of wolves from Quebec to the Northeastern United States. While dispersal plays an important role in recolonization of suitable habitat, individual

dispersers that do not settle in an area, survive, and reproduce do not substantively contribute to the wolf's metapopulation structure or dynamics.

Comment 34: One peer reviewer sought clarification on the *Washington and Oregon* section of the biological report. The reviewer asked us to more clearly distinguish population information on listed and delisted wolves and how population management in delisted areas affects population growth rates in listed areas.

Our Response: We updated the biological report with additional information on the distribution of wolves with respect to the listed/delisted boundary in Washington and Oregon. We are not aware of any specific studies that have looked at the effect of wolf management in delisted areas on the population growth rates of federally listed wolves adjacent to those delisted areas. However, we have updated the biological report to acknowledge the role source-sink dynamics can play in peripheral, recolonizing wolf populations. We also address potential impacts to dispersal rates in harvested populations. Finally, we cite the latest annual reports from each State as the authority on population growth and distribution of wolves in those States.

Comment 35: One peer reviewer objected to our characterization, in the biological report, of wolf colonization of nearby areas as happening "quickly." They found the term to be ambiguous and recommended replacing it with something more quantitative (e.g., within decades). They also recommended the report acknowledge that the rapidity of population establishment in new areas varies with the extent of intervening unsuitable habitat between the source population and newly colonized area, as evidenced by the delay between initial dispersals and pack establishment in the Cascade Range of the West Coast States.

Our Response: While some recolonization happens within decades, other recolonization events happen even more rapidly depending on the specific circumstances. Therefore, we conclude that it is not appropriate to add a more specific time period. We have added a sentence to the **Biology and Ecology** section of the biological report to address the comment regarding the rate of recolonization being affected by the extent of intervening unsuitable habitat.

Comment 36: One peer reviewer commented that, in order to allow for a scientific evaluation of the likelihood of a decline in gray wolf populations after delisting, the biological report should include: (1) a comprehensive analysis of all mortality causes within each subpopulation deemed essential to the combined listed entity and (2) a "thorough examination of cumulative effects across all subpopulations." The reviewer further contended that those assessments should be based on peer-reviewed evidence about current and anticipated future (following delisting) causes of mortality.

Our Response: We conducted a thorough analysis, based on the best available scientific data, of the threat factors currently facing the gray wolf in the lower 48 United States and those that are reasonably likely to have a negative effect on the viability of wolf populations without the protections of the Act. See **Summary of Factors Affecting the Species**, above. We considered the effects of these factors individually and cumulatively. For clarification purposes, we have added a reference to the discussion in the rule to the biological report.

Policy

Comment 37: Three peer reviewers questioned our definition or use of the term "range," either on its own or in the context of the SPR phrase (or both). One considered our description of the gray wolf's range in the lower 48 United States to be illogical and unclear with respect to

distinguishing current range from unoccupied historical range. This reviewer argued that the distinction is necessary to understand what areas are included in the threats analysis and why. Another argued that our definition of "range" is problematic because it does not account for the temporal dynamics (changes over time) of a species' range or the difficulties of scale inherent to the ecological concept of "range." In addition, one peer reviewer stated that a "significant portion" of range must mean more than half and that, therefore, the gray wolf has not recolonized enough of its range in the lower 48 United States to meet that standard. Another, citing *Desert Survivors* v. *Dep't of the Interior*, F. Supp. 3d 1131 (N.D. Cal. 2018), stated that the central Rocky Mountains (i.e., Colorado and Utah) and the Northeastern United States merit evaluation as significant portions of the range.

Our Response: The ecological concept of "range" is complex. Because of these complexities, the Service and the National Marine Fisheries Service (NMFS) published a legally binding interpretation of the term "range," as used in the Act's definitions of "threatened species" and "endangered species," in our SPR policy (79 FR 37578, July 1, 2014). Several courts have upheld this interpretation (*Humane Society* v. *Zinke*, 865 F.3d 585 (D.C. Cir. 2017); *Ctr. for Biological Diversity* v. *Zinke*, 900 F.3d 1053, 1066–67 (9th Cir. 2018); *Desert Survivors* F. Supp. 3d 1131). The Services interpret the term "range" in these statutory definitions as the general geographical area occupied by the species at the time USFWS or NMFS makes a status determination under section 4 of the Act (79 FR 37583, July 1, 2014). In other words, we interpret "range" in these definitions to be current range, i.e., range at the time of our analysis (see *Definition and Treatment of Range*). We have revised this final rule to clarify how we interpret range and what we consider to be the current range of the gray wolf in the lower 48 United States.

The opinion that the gray wolf has not recolonized enough of its range in the lower 48 United States to reach the standard of a significant portion is inconsistent with Service policy because it equates the term "range" in the Act's definitions of "threatened species" and "endangered species" with historical range. In our status assessments, we assess threats to the species where the species exists. In other words, we assess threats to the species in its current range, including the effects of lost historical range on the species (see **Historical Context of Our Analysis** and **Summary of Factors Affecting the Species**). We also consider whether the threats that caused the loss of historical range are still affecting the species within its current range.

Under our SPR policy, the Northeastern United States does not merit evaluation as a significant portion of the species' range because the best available science indicates that this area is unoccupied. However, given the recent report of a group of six wolves in the central Rocky Mountains, we agree with the reviewer that this area merits consideration as a significant portion of the range of the entities evaluated in this rule. We have revised this rule accordingly.

Comment 38: One reviewer considered our treatment of "range" and "significance" to be inconsistent with *Desert Survivors* v. *Dep't of the Interior* and our treatment of recovery in other species, such as bald eagle and grizzly bear, where we considered geographic distribution in multiple regions. The reviewer indicated that we should present information evaluating the significance of historical range loss on the genetic and demographic structure of the wolf metapopulation as a whole and within specific ecotypes and subspecies. The reviewer also indicated that we should assess the significance of range loss to the broader suite of values ("esthetic, educational, historical, recreational, and scientific") discussed in the Act's preamble.

Our Response: Our approach in this rule is consistent with *Desert Survivors* and our approach to recovery for other species. The Act requires that we recover listed species such that they no longer meet the definitions of "endangered species" or "threatened species," i.e., are no longer in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of their range. As explained in our proposed rule and this final rule, there is no uniform definition for recovery or standard methodology regarding how recovery must be achieved (see **Gray Wolf Recovery Plans and Recovery Implementation**). Gray wolves are a prolific, highly adaptable species capable of dispersing long distances and recolonizing most habitat types, provided those habitats contain sufficient prey and human-caused mortality is managed. Consequently, our recovery strategy for gray wolves in the lower 48 United States consists of recovery of the species in three broad regions (NRM, Southwestern United States, and Eastern United States) that capture different subspecies and habitats. For decades, we have demonstrated a consistent commitment to this strategy.

Additionally, when we evaluate the status of a species, we evaluate the impacts of any loss of historical range on the viability of the species in its current range (see **Historical Context of Our Analysis** and **Determination of Species Status)**. In other words, we thoroughly assessed the effects of historical range loss on the current and, to the extent it is foreseeable, future viability of the gray wolf entities addressed in this rule based on the best available scientific and commercial data available, consistent with both the Act and case law.

Finally, the Act instructs us to determine whether any species is an endangered species or a threatened species because of any of the five factors identified in the Act. Thus, we may not determine the status of a species based on an assessment of the esthetic, educational, historical, recreational, and scientific value of that particular species to society. Also, lost historical range

cannot be a significant portion of the range of any of the gray wolf entities addressed in this rule because, under our SPR policy, “range” is interpreted as current range (for additional information, see 79 FR 37578, July 1, 2014).

Comment 39: One reviewer claimed that our consideration of “significance” as used in the phrase “significant portion of its range” is duplicative of our assessment of whether the combined listed entity is at risk throughout its range, contrary to recent court opinions. The reviewer recommended a definition for "significance" that is based on the criteria used to determine significance under the DPS policy. They stated that such a definition would meet the requirements of *Desert Survivors* v. *Dep't of the Interior* and provided an example of a DPS analysis done for the red wolf (Waples et al. 2018).

Our Response: Our approach to analyzing significance in this rule is consistent with the Act and case law. For the gray wolf entities addressed in this rule, we assessed “significance” based on whether portions of the range contribute meaningfully to the resiliency, redundancy, or representation of the gray wolf entity being evaluated without prescribing a specific “threshold.” This approach is substantively different from the way we defined “significance” in our SPR policy and, therefore, different from the approach evaluated and overturned by the courts.

Further, in developing that SPR policy, we considered using the definition of significance in the DPS policy as a threshold for significant in the SPR phrase. However, we rejected this option because “it would result in all DPSs being SPRs, rendering the DPS language in the Act meaningless” (79 FR 37581, July 1, 2014). Thus, we concluded that the threshold for significance must be higher for evaluating SPR than for purposes of the DPS policy (for more information on this topic, see 79 FR 76997–76998, July 1, 2014).

There are several important differences between DPSs and SPRs. First, Congress intended for the DPS authority to be used sparingly (Senate Report 151, 96th Congress, 1st Session). If we find that a species is endangered or threatened in a DPS, we list only the DPS. By contrast, if we find that the species is endangered or threatened in an SPR, we list the entire species (79 FR 37609, July 1, 2014). Second, the significance of a DPS is assessed relative to the taxon to which it belongs (i.e., the DPS must be significant to the taxon as a whole) (61 FR 4725, February 7, 1996), whereas, under our SPR policy, the significance of a portion is assessed in relation to the "species" (species, subspecies, or DPS) under analysis. Third, SPRs need not discrete. In other words, SPRs can be biologically connected to and influenced by other populations that, collectively with the portion being evaluated, are not endangered species or threatened species. Consequently, we do not consider the DPS criteria for significance to be a reasonable definition of "significant" in the SPR analysis.

Comment 40: One reviewer maintained that we misinterpreted Shaffer and Stein (2000). The reviewer argued that representation applies to a population itself rather than to a population's contribution to the entire species. In other words, that the appropriate question to ask in our SPR analysis is whether a population's absence in a portion of its range would have significant ecological consequences or whether a portion of the species' range includes ecosystems not found elsewhere in the species' range.

Our Response: We view representation as the ability of a species to adapt to changing environmental conditions over time (i.e., the species' adaptive capacity) (Smith et al. 2018, p. 304). While Shaffer and Stein (2000) introduced the concept of representation in the broad context of conserving biodiversity across ecosystems, we apply their concept at the species level, consistent with Smith et al. (2018). We use Smith et al.'s (2018) definition of representation in

relation to the Act's definitions of endangered species and threatened species by asking whether the species has sufficient adaptive diversity such that it is not in danger of extinction or likely to become so in the foreseeable future. Adequate representation does not require preservation of all adaptive diversity to meet this standard under the Act. As indicated in **Our Response** to **Comment 39,** we assessed the significance of portions of the gray wolf entities addressed in this rule based on whether the portions contribute meaningfully to the resiliency, redundancy, or representation of the gray wolf entity being evaluated, and we consider this approach to be consistent with the Act and case law. We revised this final rule to clarify that we use the concepts introduced by Shaffer and Stein (2000), as refined by Smith et al. (2018) and considered in the context of the Act.

Comment 41: One reviewer questioned our conclusions that the Great Lakes metapopulation contains sufficient resiliency, redundancy, and representation to sustain populations within the combined listed entity over time, and that the relatively few wolves that occur outside the Great Lakes area are not necessary for the recovered status of the combined listed entity. The reviewer argued that these conclusions are contingent on factual omissions and misinterpretations of wolf ecology and genetics. While the reviewer refers to the combined listed entity, their comment could apply to the analysis of other entities now included in this final rule.

Our Response: Our conclusions are based on the best available scientific and commercial data, including information and interpretations provided by this and other peer reviewers. We have revised the discussions in the final biological report and this final rule regarding gray wolf ecology and genetics in order to clarify the basis for our conclusions. Specifically, we have added additional information on these topics, and added a section to the rule (*Genetic Diversity and Inbreeding*) that provides a more in-depth analysis of the potential

impacts of delisting on gray wolf genetic diversity. Based on this information, we conclude that the gray wolf entities evaluated in this rule do not meet the definition of an endangered species or threatened species, nor are they likely to meet either definition absent the protections of the Act.

Comment 42: Most peer reviewers questioned the entity we evaluated. One asserted that we could add or remove only species, subspecies, or DPSs from the List and noted that we did not include a DPS analysis of the combined listed entity to determine whether it was a valid entity. Some argued that our treatment of DPSs or "discreteness" (or both) was inconsistent, illogical, or unclear, or recommended we conduct DPS analyses on specific populations or areas within the listed entities. One maintained that our DPS analysis of Pacific Northwest wolves was flawed. This same reviewer argued that our approach is inconsistent with previous wolf rulemakings and recovery planning with respect to treatment of the central Rocky Mountains and the Northeastern United States because we did not consider or treat these areas as DPSs or include a substantive discussion of either area as potential habitat. Another peer reviewer stated that regions considered in-depth in previous rulemakings and other documents (e.g., the central Rocky Mountains and Northeast) were only mentioned in passing in the proposed rule.

Our Response: In our March 15, 2019, proposed rule, we explained that neither of the currently listed entities qualifies as a DPS. In this final rule we expand on that discussion and also explain why we are considering the status of gray wolves in several different configurations. (see **The Currently Listed *C. lupus Entities* Do Not Meet the Statutory Definition of a "Species"** and *Why and How We Address Each Configuration of Gray Wolf Entities*). We did not conduct a DPS analysis of Pacific Northwest wolves (or wolves in any other subset of the entities we assessed) in our proposed rule or this final rule. Rather, we discuss the Pacific Northwest

DPS analysis we conducted in 2013, in the context of summarizing background information about actions we have undertaken relevant to our national wolf strategy (see *National Wolf Strategy*). We also reference this 2013 DPS analysis when we discuss the lack of discreteness of these wolves and NRM wolves (see **The Currently Listed *C. lupus* Entities Do Not Meet the Statutory Definition of a "Species"**).

Our approach is consistent with previous wolf recovery planning efforts, which have consistently focused on three areas—the NRM, Eastern United States, and Southwestern United States—as reflected in our past actions. As shown in table 1, since 1978 our wolf recovery plans, reintroduction efforts, and reclassification or delisting rules have focused on these three areas. We have revised the language in this final rule and, where appropriate, provided more detailed information in our biological report to help clarify our approach in this rule. With respect to potential habitat in the Northeastern United States, we also clarify that our approach is to focus our assessment of suitable habitat and prey availability on areas currently occupied by wolves. New information on wolves in the central Rocky Mountains since publication of our proposed rule indicates the presence of a group of six or more wolves and the long-term presence of an individual radio-collared wolf. Thus, new information indicates that gray wolves currently occupy Colorado. Therefore, we have added an analysis of habitat in the central Rocky Mountains to this final rule. We acknowledge the existence of suitable habitat in areas outside of gray wolf current range, but we do not consider them in-depth because we are not relying on those areas for our status determinations.

Comment 43: One peer reviewer contended that, in not evaluating the status of subspecies, we are sidestepping the commitment made in our 1978 reclassification rule to "continue to recognize valid biological subspecies for purposes of…research and conservation

programs," and that we are delisting the gray wolf in the lower 48 United States based on the recovery of one subspecies, *C. l. nubilis*. Citing Hendricks et al. 2018, they argued that, for example, our approach does not consider threats to the coastal rainforest ecotype that has colonized the U.S. Pacific Northwest and overlaps with the distribution of *C. l. fuscus*.

Our Response: Delisting the currently listed gray wolf entities based on the status of gray wolves in any of the three configurations we analyzed is consistent with our 1978 commitment to conserve subspecies. The 1978 reclassification was undertaken because of uncertainty about the taxonomic validity of some of the previously listed subspecies, and because we recognized that wolf populations were historically connected and that subspecies boundaries were thus malleable and populations admixed. The rule predated the November 1978 amendments to the Act (which replaced the ability to list "populations" with the ability to list "distinct population segments") and, therefore, at the time of the 1978 rule, listable entities included "populations." The 1978 rule stated that "biological subspecies would continue to be maintained and dealt with as separate entities" (43 FR 9609, March 9, 1978), i.e., subspecies or populations. Subsequent recovery plans and all gray wolf rulemakings since then have focused on units that are consistent with the stated intent of the 1978 rule to manage and recover the different gray wolf groups covered by the 1978 listings as "separate entities" (43 FR 9609, March 9, 1978). Within 4 years of the 1978 rule, we developed recovery plans for wolf populations in the following regions of the United States: the northern Rocky Mountains, the East, and the Southwest (table 1). Since then, the NRM wolf population (now metapopulation) has recovered (74 FR 15123, April 2, 2009, entire; 77 FR 55530, September 10, 2012, entire), the southwest wolf population is protected under a separate subspecies listing as endangered (80 FR 2488, January 16, 2015, entire), and the Great Lakes wolf population (now metapopulation)

is recovered. It was never our intent to recover wolves throughout the entire geographic area encompassed by the 1978 listings. Instead, we have focused on recovering the different gray wolf groups covered by the 1978 listings as "separate entities."

With respect to Pacific coastal rainforest wolves, wolves that recolonized Washington and Oregon originate primarily from the interior forest ecotype, which is more indicative of wolves from southeastern British Columbia, southwestern Alberta, or the NRM (Hendricks et al. 2019, p. 138, Supplemental table S2). Of the 54 wolves from Washington and Oregon that Hendricks et al. (2018) sampled, 2 possessed mitochondrial DNA haplotypes only known from wolf populations in coastal British Columbia. Only one of the two wolves with the coastal haplotype resided in the west coast portion of the entity currently listed as endangered (44-State entity) and, consequently, the combined listed entity, in an area considered highly suitable for coastal wolves. The other resided within the boundary of the NRM DPS in the interior of northeast Washington. Furthermore, based on an assessment of single nucleotide polymorphisms (SNPs), three of the five wolves from Washington were intermediate between NRM wolves and coastal wolves, indicating that Washington was an admixture zone for coastal and inland wolf ecotypes (Hendricks et al. 2018, p. 8). Thus, rather than dispersal and recolonization of wolves from a specific ecotype to that same ecotype, these results demonstrate the ability of wolves to disperse to, inhabit, and survive in a variety of habitats that may be very different from where they or their parents originated. It also indicates that wolves from coastal and inland ecotypes interbreed in admixture zones (Hendricks et al 2018, entire). We analyzed threats to the gray wolves inhabiting Pacific coastal rainforest ecosystems in our 2016 assessment of the status of the Alexander Archipelago wolf and found that these wolves are not in danger of extinction or likely to become so in the foreseeable future (81 FR 435, January 6, 2016, entire).

Comment 44: Referring to the combined listed entity, one reviewer stated that, while the Act does not require species to be restored everywhere, recovery in one region (the Great Lakes area) is not sufficient to delist a species formerly distributed across the continent. The reviewer asserted the rule is an effort to advance broader shifts in interpretation of the Act for widely distributed species.

Our Response: As discussed in this final rule and the final biological report, gray wolves are recovered in each of the two currently listed entities, in the two currently listed entities combined into a single entity, and in the lower 48 United States entity. They currently exist in two large, growing or stable metapopulations—one in the Great Lakes area and one in the Western United States—that are interconnected with even larger populations of wolves in Canada. The core of the former occurs in the Great Lakes States of Minnesota, Wisconsin, and Michigan, and the core of the latter occurs in the western States of Idaho, Montana, and Wyoming. The western United States metapopulation is currently recolonizing western Washington and western Oregon, has begun to recolonize California, and is in the early stages of recolonizing Colorado. Moreover, dispersing wolves have been detected in all the States in historical gray wolf range west of the Mississippi River except Oklahoma and Texas. Continued wolf dispersal across western States demonstrates that gray wolves could eventually find most large patches of suitable habitat in the west as long as healthy core wolf populations are maintained on the landscape.

In addition to the metapopulations of gray wolves in the Great Lakes area and the Western United States, the Mexican wolf (*C. lupus baileyi*) inhabits the Southwestern United States (Arizona and New Mexico) and Mexico. The population in Arizona and New Mexico is small but growing, and there is an establishing population in Mexico. These wolves are listed

separately as an endangered species and are unaffected by this rule; they will remain on the List until the subspecies has recovered.

The standard for listing or delisting a species under the Act is whether it meets the Act's definition of an endangered species or a threatened species. The Act defines an endangered species as "any species which is in danger of extinction throughout all or a significant portion of its range" and a threatened species as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." Neither the Act nor our regulations require that a listed species be restored to any threshold amount of its historic range before it may be delisted. Based on our analysis of the best available scientific and commercial data, we have determined that each of the gray wolf entities evaluated in this rule is not in danger of extinction, or likely to become so in the foreseeable future, throughout all or a significant portion of its range (see **Determination of Species Status**).

Comment 45: One peer reviewer considered our treatment of connectivity between wolves in the West Coast States portion of the combined listed entity (referred to by the reviewer as the Pacific Northwest) and the NRM to be inconsistent and problematic. According to the reviewer, we state in our proposed rule that we do not discuss management in the NRM because the NRM is legally a distinct entity but also find that West Coast States wolves are superfluous to the gray wolf entity because the NRM population provides demographic support to them.

Our Response: We considered the comments of this peer reviewer, and other commenters, and we have modified our approach in this final rule (see **Summary of Changes from the Proposed Rule**). We evaluate the status of gray wolves in three different configurations, including a lower 48 United States entity (see *Why and How We Address Each Configuration of Gray Wolf Entities*).

Comment 46: One peer reviewer considered our use of the term "eastern wolf"—to denote wolves in the Great Lakes area or the Northeast—to be inappropriate. According to the reviewer, the term "eastern wolf" should refer only to the genetically distinct wolves living in and around Algonquin Provincial Park in Canada. The same reviewer also indicated that our decision to consider eastern wolves to be members of the species *C. lupus* was arbitrary and disregards the precautionary principle. They stated that there is considerable evidence that a distinct eastern wolf originally existed in the Eastern United States and no solid evidence that gray wolves historically lived in the Eastern United States outside the Great Lakes region, though they noted that the historical occurrence of gray wolves in the eastern States is uncertain. The reviewer further stated that there is general scientific agreement that eastern wolves and red wolves deserve separate conservation consideration as unique ecotypes, ecological surrogates, DPSs, or species, and that Federal protection may be needed in the Eastern United States to protect and recover the endangered red wolf and the eastern wolves found in and around Algonquin National Park that are listed in Canada as threatened.

Our Response: Many scientists have long considered eastern wolves to be distinct from coyotes and gray wolves in the Western United States. However, the correct taxonomic assignment and evolutionary origin of the eastern wolf is uncertain. Scientists have variously described the eastern wolf as a species, a subspecies of gray wolf, an ecotype of gray wolf, the product of hybridization between gray wolves and coyotes, the same species as the red wolf, or a hybrid between red wolves and gray wolves (see *Taxonomy of Gray Wolves in North America*). We originally listed the gray wolf subspecies *C. l. lycaon,* the eastern timber wolf, in 1967. We continued to recognize this subspecies—and the Northeastern United States as part of its historical range—for years, as evidenced by both our original (1978) and revised (1992)

Recovery Plan for the Eastern Timber Wolf. In 2013, we proposed recognizing the species *C. lycaon,* occurring in southeastern Canada and, historically, the Northeastern United States, in our proposed rule to delist *C. lupus* and list *C. l. baileyi* as endangered (table 1). However, peer reviewers of that proposed rule considered the scientific basis for recognizing *C. lycaon* as a species to be insufficient. They noted that this is an area of active scientific research with frequent studies published yearly, and stated that the proposed recognition of these wolves as a species was premature (National Center for Ecological Analysis and Synthesis 2014, unpaginated). Debate on the subject in the scientific community and, consequently, the taxonomy and evolutionary history of eastern wolves remains unresolved (USFWS 2020, pp. 1–3). Therefore, in this rule we continue to recognize wolves in the Northeastern United States as members of the species *C. lupus*. We conclude that this is appropriate based on our review of the best available scientific and commercial information. Our decision results in a much larger historical range to the gray wolf entities evaluated than if we considered eastern wolves to be a distinct entity or members of the red wolf species.

The reviewer also argues that Federal protection may be needed for wolves in the Eastern United States, to protect dispersers or allow for reintroductions of the endangered red wolf and the eastern wolves found in and around Algonquin National Park that are listed in Canada as threatened. In 1967, we listed the red wolf as endangered wherever found, except where listed as an experimental population (32 FR 4001, March 11, 1967). The species remains on the List and, consequently, already receives the protections of the Act. The rest of the combined listed entity (and 44-State entity and lower 48 United States entity), which includes the Northeastern United States, does not warrant the protections of the Act because, as indicated in this rule, we have

determined that it does not meet the Act's definition of a threatened species or endangered species (see **Determination of Species Status**).

State and Federal Agency Comments

Recovery and Delisting

Comment 47: The Governor of Oregon indicated her belief that wolf recovery in Oregon is a success and that wolves are on the path to recovery. She also noted that the State of Oregon and other States can help lead to recovery of the species across a significant portion of its historical range. She expressed that wolves are wide-ranging, and as Oregon's wolves venture into California and return, they warrant the protection of the Federal Endangered Species Act during their travels.

Our Response: Gray wolves (excluding Mexican wolves) are currently distributed in two large and expanding metapopulations in the lower 48 United States. Based on our thorough review of the species' status, threats, and existing regulatory mechanisms, we have determined that none of the gray wolf entities we evaluate in this rule (including either of the currently listed gray wolf entities) meet the definition of a threatened species or endangered species under the Act (see **Determination of Species Status**). Regarding wolves that move between California and Oregon after delisting, these individuals will still be afforded protections under the California Endangered Species Act and the Oregon Wolf Conservation and Management Plan.

Comment 48: The California Department of Fish and Wildlife indicated that wolves in California are in the initial stages of reestablishment and that recovery in the State relies on conservation and management measures provided by Federal listing.

Our Response: Consistent with the Act, we are removing the currently listed gray wolf entities from the List because we have determined that gray wolves in these entities do not meet the definition of threatened or endangered (see **Determination of Species Status**). However, we expect wolves will continue to recolonize suitable habitat in California under State management. See the **Post-delisting Management** section of this rule for additional information.

Biology, Ecology, Range, Distribution, or Population Trends

Comment 49: The Arizona Game and Fish Department recommended that we add Arizona and New Mexico to the list of States with confirmed records of dispersing gray wolves, referencing information provided in Odell et al. 2018.

Our Response: We did not recognize Arizona as a State having a confirmed record of a dispersing gray wolf because the wolf documented in Arizona subsequently died in Utah and was included in Utah's totals. We have updated our final rule and biological report to include Arizona as an additional State with a confirmed record of a dispersing gray wolf, noting that the wolf later died in Utah and was also included in their total. With respect to the report relating to New Mexico (Odell et al. 2018, p. 294), we agree it seems plausible that the animal observed was not a Mexican wolf based on its black pelage, which has not been reported in Mexican wolves. However, because this has not been confirmed as a gray wolf, we decline to add New Mexico to the list of States with "confirmed" gray wolf dispersal.

Taxonomy

Comment 50: The Michigan Department of Natural Resources stated that we put too much emphasis on Mech and Paul (2008) in our discussion of taxonomy, and should instead rely on Heppenheimer et al. (2018).

Our Response: As noted in the rule, canid taxonomy remains unsettled, despite being relatively well-studied, even using advanced molecular techniques. We reviewed and cited Heppenheimer et al. (2018), along with a number of other genetic studies, in conducting our assessment of wolf taxonomy.

Human-caused Mortality

Comment 51: The Arizona Game and Fish Department, the Michigan Department of Natural Resources, and one public commenter indicated that the discussion about additive and compensatory mortality relied too much on information provided by Creel and Rotella (2010) and failed to discuss a rebuttal by Gude et al. (2012) or use the best available information when discussing the effects of mortality on wolf populations. Additional references were provided for the discussion. Another public commenter supported the notion that human-caused mortality was super-additive and noted its effects on wolf population dynamics.

Our Response: Based on the comments and information we received, we revised and updated the *Human-caused Mortality* section. In short, Creel and Rotella (2010) indicated that wolf populations can be harvested within limits, but that human-caused mortality was strongly additive to total mortality, and, based on their model predictions, population growth would decline as human-caused mortality increased. In contrast, using the same dataset, Gude et al.

(2012) demonstrated that wolf population growth remained positive in Montana, which was also supported by field observations, and that variations in growth were strongly influenced by annual recruitment. Gude et al. (2012) also discussed the limitations of traditional monitoring techniques in addition to the need to create more efficient and accurate monitoring methods to improve population estimation techniques as wolf populations continue to increase and expand. For further information, see the *Human-caused Mortality* section of the rule.

Comment 52: The California Department of Fish and Wildlife expressed views concerning the added value of the Act's protections in deterring illegal take of wolves under California law. In addition, the California Fish and Game Commission questioned the completeness of our discussion of the role of public attitudes as it relates to human-caused mortality and recommended additional information for consideration.

Our Response: While the Service respects the belief that continued Federal protections would provide an additional deterrence to illegal take under existing California law, the Act requires the Service to make status determinations based on whether the species meets the definition of an endangered species or a threatened species because of the five statutory factors. Gray wolves have been illegally killed both with and without the protection of the Act (i.e., illegal under other State or Federal rules or regulations), and, although some researchers (Treves et al. 2017b) and most wildlife managers would agree that known illegal take is likely biased low, several studies have estimated that around 10 percent of the known population is illegally taken annually in the NRM (Smith et al. 2010, p. 625; Ausband et al. 2017a, p. 7), Michigan (O'Neil 2017, p. 214), and Wisconsin (Stenglein et al. 2018, p. 104). However, wolf populations remain robust and recovered in these locations, and wolves continue to recolonize new areas of

suitable habitat in the West Coast States and have begun to recolonize the central Rockies. Furthermore, it has been demonstrated that illegal take was greater during periods of Federal protections in Wisconsin compared to periods when the wolf was delisted (see Olson et al. 2014). Surveys also indicate that members of the public are more trusting of their State fish and wildlife agencies than their State or Federal Government (Manfredo et al. 2018, pp. 8, 58–68). Thus, they may be less inclined to illegally take a wolf, and be more accepting of wolves on the landscape, if they perceive that State management provides more options to mitigate conflicts. For further information, see **Our Responses** to **Comment 14,** as well as **Comment 19**. Also see "The Role of Public Attitudes" in the *Human-caused Mortality* section of this final rule.

Comment 53: The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (Wildlife Services) commented that the ability to mitigate losses associated with wolves has contributed to wolf recovery in both the northern Rocky Mountains recovery area and Great Lakes region. Wildlife Services stated that in the Northern Rocky Mountains recovery area (Wyoming, Idaho, Montana), where wolves have been delisted and State wildlife agencies have assumed management authority, populations continue to exceed recovery goals and wolf–livestock conflicts and associated management costs have declined in those States. They contended that these trends provide strong evidence that wolves and related conflicts can be managed under State authority without the Act's protections. They further stated that effective response to wolf conflicts is a key component to building and maintaining public value of wolves and that the Act's restrictions on methods for conflict management have led to frustration in communities where conflicts occur, especially in Michigan and Wisconsin, where limits on methods are most restrictive. They concluded that the increased management options

associated with delisting will facilitate prompt, effective response to conflicts and enhance public acceptance of wolf populations.

Our Response: The Service agrees that State wildlife agencies are fully capable of managing for sustainable wolf populations while concurrently working with Wildlife Services to minimize conflicts caused by wolves using the full suite of mitigation response techniques available post-delisting. For further information, see **Our Responses** to **Comment 17** and **Comment 52.**

Comment 54: Wildlife Services noted that the Great Lakes population of gray wolves in Minnesota, Wisconsin, and Michigan is nearly four times that of the Northern Rockies population, and conflicts can be more effectively managed without the restrictions imposed by protection under the Act. Great Lakes wolf populations have exceeded recovery goals and continue to thrive. However, the region has also experienced an increase in the number, diversity, and distribution of wolf conflicts. Minnesota wolf populations have exceeded 2,600, nearly double Federal recovery goals and 1,000 more than State management goals. Wolf conflicts in Minnesota have increased 42 percent since wolves in Minnesota were returned to threatened status following a 2-year period of State management from 2012 to 2014. In Michigan, wolf population growth has slowed and stabilized around 650 for the past few years following several hard winters that have depressed deer herds. However, the Michigan wolf population exceeds recovery goals by 343 percent, and suitable habitat is saturated. Wolf populations also continue to grow in Wisconsin where the 2018–2019 overwinter minimum wolf count was 914 to 978 wolves in 243 packs, a 1 percent increase over the 2017–2018 winter count. In Wisconsin, issues associated with wolves have continued to increase since 2014,

including: 12 percent increase in total verified wolf complaints, over 36 percent increase in attacks on domestic dogs, and a 24 percent increase in farms with verified livestock losses. Wisconsin noted more than a 24 percent increase in depredation payments from 2017 to 2018 that totaled over $134,000 in compensation. Suitable habitat in Wisconsin is occupied by wolves, and continued population growth will likely occur in areas where human–livestock–wolf conflicts will increase. Continued Federal listing of Great Lakes wolves will hamper effective management of wolf conflicts in that region.

Our Response: The Service appreciates the role that Wildlife Services has played in the recovery of gray wolves in the Great Lakes area and elsewhere, as well as the expertise and assistance personnel from the agency provide to mitigate wolf-related conflicts using both nonlethal and lethal means. We concur with the points raised related to wolf populations and wolf-related conflicts in the Great Lakes area. For further information, see **Our Responses** to C**omment 17** and **Comment 52.**

Comment 55: The Wisconsin Department of Natural Resources pointed out that they have committed significant resources to ensure that decisions are based on sound science across the spectrum of ecological and social issues involved. The Wisconsin Department of Natural Resources contended that Holsman (2014) clearly summarized public attitudes regarding wolves in Wisconsin and importantly noted that, while the majority of residents have positive attitudes toward wolves, there is reduced tolerance for wolves living outside of heavily forested areas of the State and wide support for lethal wolf control as a response to livestock depredations and human safety concerns.

Our Response: We greatly appreciate the commitment and longstanding contributions by Wisconsin to wolf conservation, recovery, and management in the State. We also understand the diversity of opinions that surround wolves and wolf management (also see **Our Response** to **Comment 19** and the section titled "The Role of Public Attitudes" in the *Human-caused Mortality* section of this final rule) and conclude that Wisconsin is well-equipped to manage a recovered wolf population with a full understanding of these diverse opinions.

Effects of Climate Change

Comment 56: The Arizona Game and Fish Department noted that while Hendricks et al. (2018) reports potential effects on wolf prey from increased risk of fire arising from climate change, fire can actually improve conditions such that areas are able to support higher densities of ungulate prey after fire. Additionally, the Arizona Game and Fish Department indicated that milder winter conditions in northern latitudes under climate change scenarios (citing Rivrud et al. 2019) will increase ungulate ranges and biomass available for wolves.

Our Response: The referenced paper (Rivrud et al. 2019, entire) is based on a study of red deer (*Cervus elaphus*) use of winter and summer habitats in Norway. The authors found that reduced snow cover as a result of global warming would increase habitat suitability and ranges of ungulate prey at their northern distribution limits (Rivrud et al. 2019, p. 1). While this study may not be directly applicable to the gray wolf entities addressed in this rule based on geographic locale, we understand the Arizona Game and Fish Department's view to be that there may be beneficial effects from fire on wolves due to changes in habitat suitability and localized expansion for ungulate prey and that there is potential for new areas to become accessible to ungulate prey via reduced snow cover. The degree and the future timeframe in which such

effects might take place, however, are unknown. In addition, regulation of population dynamics in ungulates is complex and unlikely to be driven by climate factors alone. See **Our Response** to **Comment 102** for more discussion of ungulate populations. Moreover, wolves are highly adaptable and are expected to readily respond to climate-related changes in prey populations or other factors.

Genetics

Comment 57: The California Department of Fish and Wildlife expressed concern about the potential risks inherent in small wolf populations within the State, including the risk of low or decreasing genetic diversity.

Our Response: Expanding populations, including the wolves in California, may be exposed to different pressures than core populations, including the potential for reduced genetic diversity, Allee effects, or founder effects. To more thoroughly examine issues of genetic diversity and how they may impact wolf viability across the range, we added the section *Genetic Diversity and Inbreeding* to this rule. As we note in that section, despite the potential for such genetic effects in California, the overall viability of the gray wolf entities addressed in this rule are unlikely to be significantly impacted. Also see the final biological report (USFWS 2020, pp. 18–19) for a discussion of the various locations from which California's wolves have descended.

Post-delisting Management

Comment 58: The California Department of Fish and Wildlife expressed concern that hunting seasons would be initiated by a number of States if the proposed rule is finalized. They stated that lethal management has been used in response to suspected depredations in other States

and that the ability of gray wolves to occupy their full historical range will be hindered by hunting and lethal management. They further stated that Federal protection of wolves from source populations outside of California is important for wolf recovery in the State. They stated they would like to see continued Federal protection of gray wolves to allow for continued expansion into California and other States.

Our Response: As demonstrated by current State management of wolves in Idaho, Montana, and Wyoming, it is unlikely that moderate increases in human-caused mortality will cause dramatic declines in wolf populations across the ranges of the gray wolf entities addressed in this rule. Even if human-caused mortality increases after delisting, we expect dispersing wolves to continue to move into and out of the West Coast States and recolonize vacant suitable habitat. The effects of increased human-caused mortality on wolf dispersal is discussed in the *Human-caused Mortality* section of the rule. Also, see **Our Responses** to **Comments 45, 16,** and **15**.

Comment 59: The Minnesota Department of Natural Resources commented that, since the 1980s, their agency has employed specific staff dedicated to wolf research and management, including implementation of the State's wolf management plan. Staff continues to contribute to the conservation of wolves in Minnesota through coordinating management, enforcing the prohibition against illegal take, investigating livestock depredation claims, and conducting population monitoring and research. The Minnesota Department of Natural Resources' conservation officers continue to enforce the requirements of the Wolf Management Act. Additionally, the Minnesota Department of Agriculture administers a compensation fund that provides payments in instances where wolves cause confirmed damage to livestock. Currently

Minnesota spends approximately $250,000 per year on wolf depredation management, excluding staff time.

Our Response: We thank the Minnesota Department of Natural Resources for this information supporting the fact that they have invested a significant amount of time and resources into managing the State's wolf population while wolves were federally listed and we fully support the State's ability and commitment to sustainable wolf management following delisting.

Comment 60: The Minnesota Department of Natural Resources reconfirmed their commitment to the long-term conservation of wolves and affirmed that, should the gray wolf be delisted in Minnesota, they will manage the species for its long-term sustainability and for the benefit of both present and future generations of Minnesotans. Moreover, the Minnesota Department of Natural Resources indicated they are further committed to managing gray wolves in Minnesota to contribute to the success of wolf recovery beyond the State.

Our Response: We greatly appreciate the longstanding contributions of the State of Minnesota in wolf conservation and its commitment to continued sustainable wolf management following delisting.

Comment 61: The North Dakota Game and Fish Department commented that wolves are listed as a "fur-bearer" with a closed season per State regulations. The status of wolves in North Dakota will remain such even after they are delisted, unless a significant change in the species distribution or population status is documented in the future. However, the removal of Federal protections for gray wolves would allow the North Dakota Game and Fish Department the ability

to timely and responsibly manage transient wolves should they depredate livestock in the future. Additionally, it would alleviate public interpretation difficulties associated with having wolves federally protected in North Dakota even though their jurisdiction is not part of one of the recognized populations, nor is it a target for future recovery actions.

Our Response: We appreciate the North Dakota Game and Fish Department's ability and commitment to manage wolves that enter the State via dispersal as a fur-bearer with a closed season and support their decisionmaking and ability to manage conflicts with wolves should they occur post-delisting.

Comment 62: The Utah Division of Wildlife Resources and one commenter indicated that the proposed rule failed to acknowledge or analyze wolf management plans for those States outside of the currently occupied range. They believed this analysis should be included to address concerns that States will not manage for wolves, once delisted. The Utah Division of Wildlife Resources also described Utah's wolf management plan goals and objectives, and when certain phases of the plan will be implemented to manage wolves that naturally recolonize the State. They also described staff preparedness and monitoring efforts that would occur if wolves were to recolonize the State. Furthermore, the Utah Division of Wildlife Resources stated that they have baseline information on big game populations that could be used to understand wolf–prey relationships in Utah, as well as programs to provide assistance to livestock producers.

Our Response: The Service recognizes the preparation and willingness of the Utah Division of Wildlife Resources to responsibly manage and monitor wolves that naturally recolonize the State post-delisting. We also appreciate their commitment to provide assistance to

livestock producers to minimize conflict risk and to provide compensation for wolf-caused livestock losses, as well as their ability to evaluate the impact wolves may have on ungulate populations while continuing to adaptively manage for sustainable big game populations. An analysis of wolf management plans was conducted for States within the current range of the gray wolf and can be found in the **Post-delisting Management** section of this rule. Due to recent information confirming the presence of a group of six wolves in extreme northwest Colorado, and their proximity to and potential use of habitats within Utah, we conducted an analysis of the Colorado Wolf Management Recommendations and the Utah Wolf Management Plan (see **Post-delisting Management**). We did not consider management in States outside of the current range, other than Utah, because wolves are not expected to persist long term in most of those States.

Policy

Comment 63: The California Fish and Game Commission asserted that the proposed rule does not address the absence of gray wolf populations in most of the species' historical range. They expressed concern that we interpret "range," within the Act's definitions of "endangered species" and "threatened species," as current range. They stated that this creates a shifting baseline, discounts historical habitats in California and elsewhere, and ignores science and the law. Also, the Michigan Attorney General indicated that, as a result of the court opinion issued in *Desert Survivors* v. *U.S. Dep't of the Interior*, 336 F. Supp. 3d 1131, 1137 (N.D. Cal. 2018), the SPR phrase in the Act's definition of "endangered species" carries its ordinary meaning. Citing *Defenders of Wildlife* v. *Norton*, 239 F. Supp. 2d 9, 21 (D.D.C. 2002), the Michigan Attorney General asserted that the Service must explain its conclusion that an area in which a species can no longer live is not a significant portion of its range.

Our Response: We describe our interpretation of range and our rationale for this interpretation in detail in our SPR policy, which is legally binding (79 FR 37578; July 1, 2014). Per that policy, we interpret the term "range" in the Act's definitions of "endangered species" and "threatened species" to be the general geographical area occupied by the species at the time the U.S. Fish and Wildlife Service or National Marine Fisheries Service makes a status determination under section 4 of the Act (79 FR 37583, July 1, 2014). In other words, we interpret "range" in these definitions to be the current range. Three recent court rulings have upheld our interpretation (see **Our Response** to **Comment 37**).

We assume the Michigan Attorney General's statement that "the Service must explain its conclusion that an area in which a species can no longer live is not a significant portion of its range" refers to our conclusion that a species' unoccupied historical range cannot be a significant portion of its range. The cited case, *Defenders of Wildlife* v. *Norton*, pre-dates our SPR policy, which interprets the term "range" in the Act's definitions of "endangered species" and "threatened species" as current range. Based on that interpretation, if a portion of historical range is not occupied, then it is not part of the species "range" (i.e., current range) and thus cannot be a portion (significant or not) of that range. In response to several comments related to our interpretation of "range," we have clarified our definition and treatment of range in this final rule (see *Definition and Treatment of Range*).

Comment 64: The California Fish and Game Commission indicated that establishing and maintaining robust gray wolf populations in suitable habitat across the species' historical range can help ensure long-term survival of the species and recovery success. They expressed concern that, if the species is delisted, populations could potentially stop growing or even decline due to hunting and lethal management.

Our Response: We agree that broadly distributed, robust populations help ensure the long-term survival of a species. Gray wolves have recovered in two broad regions of their historical range in the lower 48 United States (the Great Lakes States and the NRM region), and the Mexican wolf will remain listed in a third broad region. In the Great Lakes and the NRM, wolves occur as large metapopulations distributed in suitable habitat across several States. Based on an analysis of the best available data, we have determined that none of the gray wolf entities evaluated in this rule are in danger of extinction, or likely to become so in the foreseeable future, throughout all or a significant portion of its range (see **Determination of Species Status**). Although we acknowledge that human-caused mortality is likely to increase post-delisting as some States with viable gray wolf populations begin to manage wolves under the guidance of their State management plans, it is unlikely that moderate increases in human-caused mortality will cause dramatic declines in wolf populations across the gray wolf entities evaluated in this rule (see **Our Response** to **Comment 16**).

Comment 65: The California Fish and Game Commission asserted that Federal policy should reflect a greater commitment to active gray wolf recovery efforts, identifying and protecting critical habitat and movement corridors, maintaining a population level consistent with ecosystem functionality, and implementing innovative policy and guidance to reduce lethal control as a management strategy.

Our Response: We have been strongly committed to gray wolf recovery since the 1970s. As a result of our commitment and the commitment and recovery efforts of our State, Federal, and Tribal partners, the gray wolf entities evaluated in this rule do not meet the Act's definition

of an endangered species or of a threatened species. Therefore, we are removing the currently listed *C. lupus* entities from the List. (See **Our Responses** to **Comments 44** and **42**).

Comment 66: Referring only to the gray wolf entity currently on the List as endangered (the 44-State entity), the Michigan Attorney General contended that the proposed delisting rule does not meet the Act's requirements because it does not include a complete five-factor analysis for the current range of the gray wolf in that entity. The Michigan Attorney General noted that we explain why gray wolves are no longer in danger of extinction in portions of Michigan and Wisconsin, but fail to analyze whether gray wolves currently living in other States are in danger of extinction throughout all or a significant portion of the entity's range. For example, the Michigan Attorney General stated that we did not investigate the effects of human-caused mortality on gray wolves in North Dakota, South Dakota, Utah, Colorado, Nevada, Missouri, Indiana, Illinois, Nebraska, or Kansas, and asserted that we withdraw the proposed rule and allow the Michigan Department of Natural Resources to lead other States, by example, in managing the gray wolves within their borders into recovery, instead of into extinction.

Our Response: We appreciate the State of Michigan's significant contribution to gray wolf recovery. However, we do not make status determinations on a State-by-State basis. Rather, we determine whether a species (in this case, each of the gray wolf entities evaluated in this rule) meets the Act's definition of an endangered species or of a threatened species because of the five factors throughout all or a significant portion of its range. We interpret the term "range" as used in the Act's definitions of "threatened species" and "endangered species" to refer to the area occupied by the species at the time we make a status determination (79 FR 37583, July 1, 2014). As a result, our analysis of the effects of threats under the five factors to the viability of each of

the gray wolf entities evaluated in this rule focuses on its occupied range. Thus, we did not assess the effects of threats to gray wolves in States that are not currently occupied by gray wolves (see **Our Response** to **Comment 37**). However, we considered impacts arising from loss of each gray wolf entity's historical range on that entity's viability (see **Historical Context of Our Analysis** and **Determination of Species Status**). In other words, we thoroughly assessed the effects of threats and historical range loss on the viability of the gray wolf entities evaluated in this rule based on the best available scientific and commercial data available. In so doing, we have determined that each of the gray wolf entities evaluated is not in danger of extinction, or likely to become so in the foreseeable future, throughout all or a significant portion of its range (see **Determination of Species Status**). Consequently, we are removing the currently listed *C. lupus* entities from the List. (See **Our Response** to **Comment 42**).

Comment 67: Referring only to the gray wolf entity currently on the List as endangered (the 44-State entity), the Michigan Attorney General indicated that the approach taken in our proposed rule is not in accordance with the Act because it is the same approach taken in our December 28, 2011, rule designating and delisting the western Great Lakes DPS (76 FR 81666), which was vacated by the U.S. Court of Appeals for the D.C. Circuit (*Humane Society*, 865 F.3d at 603). The Michigan Attorney General stated that the approach in the proposed rule splits the 44-State entity into a recovered subgroup (wolves in Wisconsin and Michigan) and an unrecovered subgroup (wolves in several other States in that listed entity) that will become extinct. Quoting the D.C. Circuit opinion, they indicate that the unrecovered subgroup is an "orphan to the law" and that our "failure to address the status of the remnant is fatal."

Our Response: In this rule, we evaluate the status of the entire 44-State entity (as well as two larger entities that include the entire 44-State entity). The western Great Lakes DPS that was designated and delisted in 2011 (see 76 FR 81666, December 28, 2011) constitutes only a subset of the 44-State entity. Further, our approach in this rule is consistent with the *Humane Society* opinion because we assess the status of the entire 44-State entity, thus there are no subgroups of wolves that could be considered "orphans to the law."

Comment 68: The Minnesota Department of Natural Resources stated that a blanket delisting of gray wolves across the United States may not be warranted. They also expressed concern that we may not be identifying and applying delisting criteria appropriately.

Our Response: We appreciate the Department's perspective and the State of Minnesota's significant contribution to gray wolf recovery. While our past status reviews focused on DPSs and taxonomic units that align with our national wolf strategy, we have revised our approach in this rule in recognition of the unique listing history of the gray wolf and court opinions addressing rules in which we designated gray wolf DPSs (see table 1). Therefore, in this rule we do not designate and assess gray wolf DPSs. Rather, we assess the status of the two currently listed gray wolf entities themselves (separately, and combined into a single entity) and the lower 48 United States entity. Further, by "delisting criteria" we assume the Department is referring to recovery criteria. We do not base our status determinations on recovery criteria alone (see **Our Response** to **Comment 69**). We make our determinations based on a species' (in this case, each of the gray wolf entities assessed in this rule) status throughout all or a significant portion of its range. (See **Our Response** to **Comment 66**). Because we have determined that each of the gray wolf entities assessed in this rule is not in danger of extinction, or likely to

become so in the foreseeable future, throughout all or a significant portion of its range (see **Determination of Species Status**), we are removing the currently listed gray wolf entities from the List (see **Our Response** to **Comment 42**).

Comment 69: The California Fish and Game Commission and several other commenters opined that much of the recovery analysis in the proposed rule is based on an outdated recovery plan using outdated science. They stated that the recovery criteria on which the rule is based do not factor in the best available science and, therefore, neither does any analysis in the rule that is based on the recovery criteria.

Our Response: Our determination is based on analysis of the best available information regarding the threats to, and viability of, the gray wolf entities evaluated in this rule. Recovery plans and recovery criteria are intended to provide guidance to the Service, States, and other partners on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved. They are not regulatory documents and cannot substitute for the determinations and promulgation of regulations required under section 4(a)(1) of the Act. We use recovery criteria in concert with the best scientific and commercial data available at the time of the delisting determination, to determine whether threats have been minimized sufficiently and populations have achieved long-term viability to determine whether a species meets the Act's definition of an endangered species or of a threatened species and, therefore, can be reclassified from endangered to threatened or delisted.

Tribal and Tribal Organization Comments

Comment 70: The Nez Perce Tribe expressed their interest in sustainable wolf populations outside of the NRM. Specifically, they commented that the expansion of wolves into areas of former occupation in the Pacific Northwest outside of the NRM would contribute to the persistence of wolves in their homeland as part of a broader metapopulation. The Tribe encouraged us to take no action that threatens, reduces, or hinders the reestablishment and persistence of wolves in all suitable habitat outside the NRM DPS. The Tribe further recommended that the Service support active, precise, and accurate monitoring of wolf pack locations, movements, and demographics to validate that goal.

Our Response: We share the Tribe's interest in sustainable wolf populations, and we expect the wolf metapopulation in the Western United States to continue to expand into unoccupied suitable habitats in the West Coast States and central Rocky Mountains, as envisioned in State wolf conservation and management plans. We support State and Tribal-led efforts to use the best available scientific methods for tracking population trends and distribution, recognizing that in some cases tracking every wolf pack will not be feasible or necessary.

Comment 71: The Makah Tribal Council indicated that the current legal framework in Washington, with Federal protection of wolves in the western two-thirds of Washington State and Tribal/State management responsibility in the eastern one-third of the State, makes overall management of wolves within the State extremely challenging.

Our Response: We thank the Tribal Council for their comment and understand the challenges that have arisen from delimiting the NRM population, which has continued to expand

beyond its legally designated boundaries. Although our final rule is based solely on the best available scientific and commercial information with respect to the status of each of the gray wolf entities we evaluated, one consequence of the delisting is that it will resolve the challenge raised by the Tribe.

Comment 72: The Nez Perce Tribe expressed that the sustainability of habitat conditions for wolves, including their prey base, should be of high priority to the Service as it considers delisting. To avoid conflict, the Tribe recommends that the Service work closely with Tribes and States to monitor wild ungulate populations and adjust population objectives for those species as necessary to ensure the robust availability of prey for both wolves and humans.

Our Response: Wolves can exist in nearly any habitat with sufficient food resources and limited human-caused mortality. We agree that a sustainable prey base is necessary for maintaining robust and resilient wolf populations, and we assessed the adequacy of the prey base following delisting in making our delisting determination (see *Habitat and Prey Availability*). We will work closely with the States and Tribes throughout the post-delisting monitoring period to gather and assess data on wolf status, including information on changes to protections for wolves, wolf prey, or wolf habitat.

Comment 73: Several Tribes and multi-Tribal organizations commented that providing Tribes with an opportunity to participate in regular and meaningful consultation is an essential component of a productive Federal–Tribal relationship.

Our Response: In accordance with the President's memorandum of April 29, 1994, Government-to-Government Relations with Native American Tribal Governments (59 FR

22951), E.O. 13175, and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we recognize our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes.

We take seriously our government-to-government relationship with Tribes and respect Tribal sovereignty, and we coordinated with the affected Tribes when preparing the March 15, 2019, proposed rule (84 FR 9648). Furthermore, throughout several years of development of earlier related rules and the March 15, 2019, proposed rule, we have endeavored to consult with Native American Tribes and Native American organizations in order to both (1) provide them with a complete understanding of the changes, and (2) understand their concerns with those changes. As we were preparing this rule, we met with the Chippewa Ottawa Resources Authority Board and the Great Lakes Indian Fish and Wildlife Commission's Voigt Inter-Tribal Task Force to discuss the proposal. We also offered to meet individually and discuss the proposal with any Tribe that wanted to do so, and we met with the Fond du Lac Band of Chippewa Indians and the Nez Perce. Additionally, we have fully considered all of the comments on the proposed rule submitted by Tribes and Tribal organizations, and we have attempted to address their concerns and considered any information they provided, incorporating it into the rule where appropriate. We invite Native American Tribes and multi-Tribal organizations to reach out to us after

publication of this final rule so that we may engage in discussions aimed at facilitating the transition to State and Tribal management of wolves.

Comment 74: Several commenters stated that the Service must ensure that State wolf management strategies accommodate Tribal interests within reservation boundaries as well as honor the Tribal role and authority in wolf management in the ceded territories. Furthermore, they also indicate that the Federal trust responsibility, as it pertains to wolf management, must be continued after delisting.

Our Response: The Service and the Department of the Interior recognize the unique status of the federally recognized Tribes, their right to self-governance, and their inherent sovereign powers over their members and territory. Therefore, the Department, including the Service and the Bureau of Indian Affairs, will take all appropriate steps to ensure that Tribal authority and sovereignty within reservation boundaries are respected as the States implement their wolf management plans and revise those plans in the future. Furthermore, there may be Tribal activities or interests associated with wolves encompassed within the Tribes' retained rights to hunt, fish, and gather in treaty-ceded territories. The Department of the Interior is available to assist in the exercise of any such rights. If biological assistance is needed, the Service will provide it via our field offices. Upon delisting, all Service management, and protection authority under the Act, of the gray wolf entities will end, although the Service will remain involved in the post-delisting monitoring of gray wolves. Legal assistance will be provided to the Tribes by the Department of the Interior, with the involvement of the Bureau of Indian Affairs as needed. We strongly encourage the States and Tribes to work cooperatively toward post-delisting wolf management.

Comment 75: Two Tribal organizations and several commenters indicated that we did not adequately analyze the effects of increased human-caused mortality on wolf pack social structure, pack dynamics, and livestock depredations. Two commenters noted that wolf populations are self-regulating and are limited by prey availability. Some commenters felt that we needed to reassess regulatory mechanisms in State management plans that allow for "substantial sport-hunting," which could affect wolf persistence and ecosystem health.

Our Response: We acknowledge the importance group living has for a social animal such as the wolf. We are also aware that wolf populations may, under certain conditions, be regulated by density-dependent, intrinsic mechanisms. However, most wolves in the lower 48 United States live in human-dominated landscapes that are not free of human influences. As such, wolf populations are subject to varied levels of anthropogenic influences that can affect certain life-history characteristics.

In general, the loss of a wolf or wolves from a pack, regardless of the cause, alters the social dynamics of the pack. This may, in turn, affect pack cohesion and persistence. However, the effects will vary depending upon the circumstances, including: the individual wolf that was lost, the time of year the loss occurred, the size of the pack, and the size of the wolf population in which the loss occurred. Wolves are resilient and adaptable and have evolved mechanisms to compensate for human-caused, or any other form of, mortality.

The social structure of some packs are affected by increased human-caused mortality, especially on the peripheries of occupied ranges where wolf survival is generally lower than in core areas. However, we conclude that regulatory mechanisms within occupied wolf range are adequate to maintain sufficient wolf population sizes after delisting such that increases in human-caused mortality will have a minimal effect on wolf populations. Refer to the *Human-*

caused Mortality—Effects on Wolf Social Structure and Pack Dynamics section of this rule for further information regarding the effects of increased human-caused mortality on pack dynamics. Also, refer to the *Human-caused Mortality* and **Post-delisting Monitoring** sections of the rule and **Our Response** to **Comment 120** for information related to regulatory mechanisms that will be in place post-delisting and the effects of harvest on wolf populations. See **Our Response** to **Comment 17** for further information about lethal control.

Comment 76: A few commenters stated that Tribal plans that address the management, protection, and/or stewardship of gray wolves should be considered to the same degree as State management plans.

Our Response: We recognize the measures by Tribes to conserve wolves on their lands. We included additional available information on Tribal management in the delisted NRM (**Management in the NRM DPS**) and on Tribal management post-delisting for other areas (*Tribal Management and Conservation of Wolves*) in this final rule. However, because State wildlife management agencies will assume most management responsibilities when wolves are delisted, we assessed the State management plans in greater detail. We recognize that the conservation of wolves by Tribes on Tribal lands after delisting may provide additional benefits to the species.

Comment 77: Many Tribes, multi-Tribal organizations, and Tribal members expressed the significant cultural and spiritual relationship between Native Americans and the gray wolf.

Our Response: We appreciate the cultural and spiritual significance of the wolf to many Native Americans. Although we acknowledge the importance of the cultural and spiritual

significance of wolves to native people, we cannot consider it as a factor in our determination. Rather, we must evaluate the five statutory factors, consistent with the purpose of the Act to provide for the conservation of endangered species and threatened species, and the ecosystems upon which they depend. The Act defines conservation as the use of all methods and procedures which are necessary to bring any endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Under our implementing regulations (50 CFR 424.11), a species should be delisted when the best scientific and commercial data available indicate that it no longer meets the definition of an endangered species or a threatened species under the Act. None of the gray wolf entities we evaluated meets the definition of an endangered species or a threatened species; therefore, we are removing the currently listed entities from the List.

Comment 78: Two commenters stated that the Service should use Tribes' traditional ecological knowledge (TEK) in the delisting decision and future gray wolf management plans. One commenter noted that Service publications describe TEK as "Native Science" gained "over hundreds or thousands of years through direct contact with the environment." The commenter also stated that Service publications acknowledge how TEK "encompasses the world view of indigenous people which includes ecology, spirituality, human and animal relationships, and more." The commenter asserts that TEK is the very definition of the best available science.

Our Response: We agree that TEK may constitute the best available science, and it should be used in our decisions as appropriate, which is determined on a case-by-case basis. We sought information from Tribes in preparation of the proposed rule and incorporated any scientific information we received from them.

Public Comments

In this section we do not repeat issues that we've already addressed above. We only address new issues raised that were not raised by peer reviewers, State or Federal agencies, or Tribes.

Recovery and Delisting

Comment 79: Multiple commenters and two Tribal organizations expressed concern that while wolves have rebounded from near-extinction in parts of the northern Rocky Mountains region and Great Lakes area, most of the suitable habitat remains unoccupied and current population levels are lower than historical population levels. They asserted that recovery of wolves where they currently exist is due to Federal protections; thus, it is premature to remove Federal protections because wolves occupy only a small portion of their historical suitable habitat and/or range in the lower 48 United States. Some of these commenters stated that the Act provides for restoration throughout the historical range of wolves, and without protection by the Act, dispersing wolves could be shot or trapped before they are able to establish viable populations in unoccupied habitat. Commenters were also concerned that there is a lack of protection for wolves and promotion for wolf recovery in States not currently occupied by wolves. Similarly, some argued that the Act goes beyond just protecting the minimum number of individuals to prevent extinction.

In contrast, some commenters noted that occupancy of wolves across the entire historical range is not possible, practical, or necessary to support viable wolf populations, and that wolves will return to unoccupied areas if suitable habitat exists.

Our Response: We acknowledge that wolves do not occupy all of the potentially suitable habitat in the lower 48 United States. However, the Act does not describe recovery in terms of the proportion of historical range or potential habitat that must be occupied by a species, nor does it include restoration throughout the entire historical range as a conservation purpose. Thus, the Act does not require us to restore the gray wolf (or any other species) to all of its historical range or any specific percentage of currently suitable habitat. We find that the current level of occupied habitat is sufficient because it has supported recovery of the species. We also expect that wolf populations will continue to grow and expand post-delisting in the West Coast States and central Rocky Mountains under State management (see **Post-delisting Management** section of this rule and **Our Response** to **Comment 58.** We are not, however, relying on such expansion for our determination that wolves in each of the gray wolf entities evaluated in this rule do not meet the definition of a threatened species or an endangered species under the Act.

Comment 80: One commenter indicated that the Service has abandoned its responsibility to recover wolves in the lower 48 United States, which the commenter believed is contrary to its duty to conserve species under section 7(a)(1) of the Act.

Our Response: In this final rule we analyze gray wolves in the lower 48 United States entity, and we conclude that they do not meet the definition of an endangered species or threatened species. The commenter's reliance on section 7(a)(1) of the Act is misplaced. Section 7(a)(1) directs Federal agencies to use their authorities in furtherance of the purpose of the Act by carrying out programs for the conservation of species that are currently listed under the Act. Section 7(a)(1) does not impose a separate requirement to conserve species that no longer warrant listing due to recovery. When a species no longer meets the definition of a threatened

species or an endangered species under the Act and is delisted, section 7(a)(1) does not apply to that species. As described in **Our Response** to **Comment 79**, the Act does not require us to restore the gray wolf (or any other species) to all of its historical range or any specific percentage of currently suitable habitat before we may conclude that the species is recovered. Rather, that analysis is based on the five statutory factors. Based on the analyses in this final rule, we have concluded that the gray wolf entities currently listed are recovered—that is, they no longer meet the statutory definition of a threatened species or an endangered species. Thus, upon the effective date of this final rule (see **DATES**, above), section 7(a)(1) of the Act will not apply because the two currently listed gray wolf entities will no longer be listed.

Comment 81: One commenter was concerned that shifting management of wolves to States post-delisting is not an adequate policy alternative to the Service's mandate to develop a substantive plan for gray wolf recovery per its responsibility under the Act. The commenter further stated that rather than focusing on the active recovery of the wolf, the Service issued multiple rulemakings to delist wolves.

Our Response: There is no uniform definition for what constitutes recovery and how recovery must be achieved (see **Gray Wolf Recovery Plans and Recovery Implementation**). Our recovery strategy for gray wolves in the lower 48 United States consists of recovery of the species in three broad regions (NRM, Southwestern United States, and the East) that capture different subspecies and habitats, and we have, for decades, demonstrated a consistent commitment to this strategy. Recovery plans and recovery criteria are intended to provide guidance to the Service, States, and other partners on methods for eliminating, ameliorating, and minimizing threats to listed species and on criteria that may be used to determine when recovery

is achieved. We use recovery criteria, along with an analysis of the five factors to determine whether threats have been abated sufficiently and populations have achieved long-term viability, such that a species no longer meets the definition of endangered or threatened. The multiple rulemakings to delist wolves are a result of the Service's commitment to this recovery strategy. Returning management of gray wolves to the States is appropriate because each of the currently listed gray wolf entities has recovered and does not warrant Federal protections. We have explained elsewhere in this rule why State management is sufficient to ensure the conservation of the gray wolf after delisting. Also see **Our Response** to **Comment 84**.

Comment 82: Several commenters stated that we inappropriately relied on wolf populations in Canada to determine that the combined listed entity is not in danger of extinction or likely to become so in the foreseeable future. While the reviewer refers to the combined listed entity, their comment could apply to the analysis of other entities now included in this final rule.

Our Response: We have concluded that each of the entities assessed in this rule—Minnesota, 44-State entity, combined listed entity, and lower 48 United States entity—contains sufficient resiliency, redundancy, and representation to sustain gray wolf populations over time. We provided general information on populations in Canada to acknowledge that they provide additional resiliency, redundancy, and representation to these entities beyond that necessary to sustain populations within the gray wolf entities we evaluated. We have clarified this point in this final rule.

Comment 83: One commenter expressed concern that we were relying too heavily on genetic rescue from Canada to ensure wolf recovery in the United States. The commenter was also concerned that State management might result in significant genetic bottleneck with

implications for disease resistance and reproductive output. The commenter noted that disease outbreaks have caused "sudden and severe" mortality in Yellowstone wolves three times in the past decade.

Our Response: There is no evidence that gray wolves in the lower 48 United States suffer from low genetic diversity, except where they occur in isolated areas at extremely low population numbers (e.g., Isle Royale). High dispersal rates and long dispersal distances facilitate population connectivity between wolves in the United States and Canada (Fain et al. 2010, p. 1758; Forbes and Boyd 1996, pp. 1088–1089; Treves et al. 2009, p. 200; Jimenez et al. 2017, pp. 7–10), which is not expected to change following delisting. While human-caused mortality is likely to increase in some States following delisting, we have determined that post-delisting management is sufficient to maintain viable metapopulations of the gray wolf (see **Determination of Species Status** section). The viability of these metapopulations is enhanced, but not dependent upon, their connectivity with Canada, since we expect population numbers to be sufficiently high to maintain genetic diversity without the need for genetic rescue. The fact that wolves have sustained bouts of heightened mortality due to disease in some years is not evidence of a genetic deficiency. While infectious disease is one of the key factors, along with prey abundance and social competition, affecting wolf population dynamics, the ability of wolves in the Greater Yellowstone Ecosystem to rebound from disease outbreaks, in most instances the following year, demonstrates the resilience of individual wolves and packs as well as the limited effects disease has on the dynamics of wolf populations.

Comment 84: Several commenters stated that we should have modified our recovery planning and implementation efforts after revising the listing to a single lower 48 United States

listing in 1978. Some expressed that delisting is premature or in violation of the Act because recovery goals have not been identified or met for some or all unoccupied areas of the lower 48 United States, or because the 1992 Eastern Timber Wolf Recovery Plan is inadequate for guiding recovery in the combined listed entity because it is outdated and not the best available science and/or is geographically restricted. Commenters requested we develop, or believe the Act and/or our implementing regulations require us to develop, a single recovery plan for the lower 48 United States, or nationwide, before proceeding with any delisting action. Some commenters provided suggestions regarding the development of such a plan, including specific areas in which wolves could be recovered. Other commenters stated that the Service should base recovery on subspecies or identify distinct population segments across the gray wolf's historical range, and that these should replace or supplement the current recovery zones. The Pacific Northwest, California, central Rockies, and Northeastern United States were mentioned most frequently for additional recovery programs. Still other commenters expressed their opinion that additional recovery efforts across the entire lower 48 United States were unwise and unnecessary.

Our Response: Recovery plans are non-binding documents that are intended to provide guidance to the Service, States, and other partners on methods of minimizing threats to listed species and criteria that may be used to determine when recovery is achieved. However, our determination of the status of each of the gray wolf entities assessed in this rule is based on the status of each entity relative to the Act's definition of an "endangered species" or "threatened species," not based on the achievement of specific recovery criteria. Possible future wolf recovery efforts are beyond the scope of this rulemaking because such actions are not necessary as a result of our determination that the gray wolf entities assessed in this rule do not meet the Act's definition of an endangered species or threatened species.

As noted in the March 9, 1978, reclassification rule (43 FR 9607), we replaced the previous subspecies listings with a listing for gray wolves in Minnesota as threatened and gray wolves elsewhere in the lower 48 United States and Mexico as endangered in order to most conveniently handle the gray wolf listing. Our 1978 reclassification rule provided assurances that we would continue to recognize valid biological subspecies for purposes of our research and conservation programs (see 39 FR 1171, January 4, 1974), and we developed gray wolf recovery plans accordingly.

We have satisfied our statutory responsibilities for recovery planning. Section 4(f)(1) of the Act instructs us to develop plans for the conservation and survival of endangered and threatened species. The Act further states that priority should be given to species that are most likely to benefit from such plans. To this end, we prioritized gray wolf recovery planning efforts to focus on the NRM, the Eastern United States, and the Southwestern United States. We completed a recovery plan for the NRM in 1980, and revised it in 1987. In the East, we completed a recovery plan in 1978, and revised it in 1992. In the Southwest, a recovery plan was completed in 1982, and revised in 2017. We disagree with commenters who suggested that we should have developed a single recovery plan for the lower 48 United States. We are not required to revise our recovery plans and, even if we were, we continue to believe that it is appropriate to focus recovery efforts on these three regions. With the delisting of the currently listed gray wolf entities, we will focus our wolf recovery efforts on recovering gray wolves in the Southwest (the subspecies *C. l. baileyi*) and red wolves (*Canis rufus*) in the Southeast. Also see **Our Response** to **Comment 69**.

Comment 85: Commenters offered many reasons why they thought delisting was premature or not warranted. Some commenters indicated that wolf recovery requires, should

require, or could be improved by: (1) Establishment of large populations in more, or all, suitable or potentially suitable habitat within the species' historical range; (2) natural connectivity or linkage between populations; (3) protective regulatory mechanisms throughout the species' historical range, or in all or portions of its unoccupied historical range; and/or (4) protection and enhancement of existing population levels. Some claimed that we ignored historical range or historical population numbers when assessing recovery, while others expressed concern about impacts to other species, ecosystems, or the economy if wolves are delisted. Other commenters provided additional reasons why delisting now is appropriate, citing damages from wolves in the form of livestock and dog injuries and fatalities and other indirect damages in reduced farm productivity after interactions with wolves.

Our Response: Under our implementing regulations (50 CFR 424.11), a species should be delisted when the best scientific and commercial data available indicate that it no longer meets the definition of an endangered species or a threatened species under the Act. This final delisting determination is based upon our evaluation of the status of each of the gray wolf entities assessed in this rule in light of the Act's definition of an "endangered species" or "threatened species." Thus, we consider potential threats to the species (in this case, the entities assessed in this rule) as outlined in section 4(a)(1) of the Act. When we evaluate the status of a species, we evaluate the impacts of the species' historical range loss on the viability of the species in its current range (see **Historical Context of Our Analysis** and **Determination of Species Status**). As described in detail in this rule, each of the gray wolf entities we assessed does not meet the Act's definition of "endangered species" or "threatened species." Therefore, delisting the currently listed gray wolf entities is warranted.

Some of the commenters' suggestions are inconsistent with the purposes of the Act. The purpose of the Act is to prevent extinctions and provide for the conservation of endangered and threatened species. The Act defines conservation as the use of all methods and procedures which are necessary to bring any endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary (i.e., recovery). Our conservation efforts have been successful for the gray wolf, and the Act's protections are no longer required for the currently listed gray wolf entities.

Comment 86: One commenter opined that the absence of wolves in areas of high human densities and areas where prey populations are not adequate to maintain viable wolf populations is a positive aspect of historical range loss that is missing from our analysis of the status of the combined listed entity. The commenter claimed that historical range reduction has provided support to the recovery of the combined listed entity by reducing the levels of human–wolf conflict and by concentrating wolf populations in areas where there is an adequate prey base, and that the final rule should recognize this positive factor.

Our Response: We are not aware of any information indicating a positive causal relationship between gray wolf historical range loss (extirpation from most of the species' historical range) and gray wolf recovery. An active eradication program is the sole reason that wolves were extirpated from their historical range in the United States, and the regulation of human-caused wolf mortality is the primary reason wolf numbers have significantly increased and their range has expanded since the 1970s (see *Human-caused Mortality*). The commenter may be referring to factors that potentially influence human attitudes and tolerance of wolves, and the effects of attitudes and tolerance on the illegal killing and overall mortality of wolves.

We have revised this final rule to provide additional information and clarity on this topic (see *Human-caused Mortality,* "The Role of Public Attitudes").

Comment 87: Some commenters were concerned that human-caused mortality after delisting may halt or reverse gray wolf "restoration."

Our Response: As we stated in the *Human-caused Mortality* section of the proposed rule, and this final rule, human-caused mortality is likely to increase post-delisting. This may include increased use of lethal control to mitigate depredations on livestock and the implementation of public harvest to stabilize or reduce wolf population growth rates. Nonetheless, based on past delisting efforts in the Great Lakes area, and as demonstrated by current State management of wolves in the northern Rocky Mountains, we conclude that moderate increases in human-caused mortality after delisting are unlikely to cause dramatic declines in wolf populations across any of the gray wolf entities evaluated. Wolves in California, Colorado, and Washington will continue to remain State-listed and receive protections through State laws and regulations. Although wolves are delisted at the State level in Oregon, they continue to receive protections through the State Plan, its associated regulation, and Oregon's wildlife policy.

Comment 88: A few commenters were concerned that with gray wolf delisting, a lack of Federal protection and funding will mean wolves will not be able to reestablish in Colorado or contribute to ecosystem benefits in Colorado. In addition, they were concerned that post-delisting, human-caused mortality of gray wolves in Wyoming will preclude wolf movements from Wyoming to Colorado, in turn failing to reestablish populations in Colorado. The commenters indicated that there are currently no wolf packs in Colorado, and that dispersal of

wolves from Canada to the northern Rocky Mountains region was not quick even following the end of "routine shooting of wolves." They indicated that the presence of wolf populations in Colorado would provide resiliency and redundancy if wolf populations collapse in other States due to habitat loss from human development, disease, prey population declines, or human-caused mortality.

Our Response: In January 2020, a group of six gray wolves was observed traveling together in the northwestern part of Colorado, indicating that gray wolves are in the beginning stages of recolonizing the State. In addition, since publication of the proposed rule, a dispersing individual from northwestern Wyoming was documented in Colorado in July 2019 and has remained in the State using a defined territory since that time. Additional populations of wolves in Colorado would add to the resiliency and redundancy of gray wolves in the lower 48 United States. However, as explained in this final rule, it is not necessary for wolves to occupy all, or most, of their historical range for us to conclude that delisting is appropriate.

Our delisting of the gray wolf does not preclude the continued recolonization in Colorado or the future reestablishment of wolves in any other State. We appreciate the concern that wolf dispersal may be affected by increases in human-caused mortality, which may delay recolonization of vacant, suitable habitats in Colorado. Although recolonization of vacant, suitable habitats can occur relatively quickly, it does still take time, whether or not human-caused mortality is highly regulated. However, the innate behavior of wolves to disperse and locate other dispersing individuals across vast landscapes to, in some cases, fill social openings in existing packs or form new packs in part explains why wolf populations are resilient to moderate increases in human-caused mortality and are highly capable of continuing to recolonize vacant suitable habitats where they exist.

Comment 89: Two commenters opined that wolf recovery cannot be achieved, and delisting is not appropriate, until wolves have returned to Utah. They indicated that much of Utah is historical and current gray wolf habitat, and pointed out that the exclusion of Utah from the recovery area for gray wolves is not explained. One commenter claimed that northern Utah was included in the NRM DPS as an intended "migratory corridor," and asked why it was included as a migratory corridor if it will never function as one.

Our Response: As is stated in this final rule, gray wolves need not occupy all, or most, of their historical range in order for us to conclude that delisting is appropriate. See **Our Response** to **Comment 79** for additional information. The NRM DPS boundary was delineated to encompass an area sufficient for recovery of gray wolves in the northern Rocky Mountains. The northeast portion of Utah was most recently delisted as part of the NRM DPS in 2011. Similar to many other areas in the NRM DPS, that area will continue to provide connectivity to areas outside the NRM DPS, and this rule will not affect the ability of wolves to use both suitable and unsuitable habitats as dispersal routes to recolonize new areas outside the NRM DPS. See 72 FR 6112–6113, for additional information.

Comment 90: One commenter believed that delisting wolves at this time is not appropriate because there are large areas of unoccupied habitat, which, if occupied, could help maintain genetic diversity and resilience, especially as climate change alters habitats and prey availability. The commenter cited Hendricks et al. (2019) as using newer genetic techniques to explain how wolves adapt to different environments. In light of this research, the commenter believed it was premature to declare that self-sustaining populations in the Great Lakes or Northern Rocky Mountains are adequate for long-term survival of the species.

Our Response: As is described in the March 15, 2019, proposed rule and this final rule, we evaluated the resiliency (in addition to other factors) of the Minnesota entity, 44-State entity, combined listed entity, and lower 48 United States entity, and determined that none of these entities meet the Act's definition of an endangered species or threatened species. As part of this evaluation, we assessed climate change, prey availability, and the Hendricks et al. (2019, entire) study. The northern Rocky Mountains wolves remain delisted and continue to expand beyond the NRM DPS boundary. We expect that wolves in the Great Lakes area will remain recovered post-delisting. Also see **Our Response** to **Comment 113**, which addresses concerns related to climate change effects on habitat and prey. **Our Response** to **Comment 79** is also relevant to concerns raised by this commenter.

Comment 91: Several commenters asked specifically for the inclusion of more details regarding suitable habitat in unoccupied Rocky Mountain States in our biological report and final rule. They cited Carroll et al. (2006) and other studies that found that Colorado and Utah could support a population of over 1,000 wolves.

Our Response: Due to recent information confirming the presence of a group of six wolves in extreme northwestern Colorado, and their proximity to and potential use of habitats within Utah, we conducted an evaluation of suitable habitat in Colorado and Utah in this rule (see *Habitat and Prey Availability*).

Comment 92: One commenter asked about the basis for our conclusions regarding continued wolf viability in the western Great Lakes and whether we had conducted population viability analyses. They requested that we state our assumptions and clarify definitions of terms. They also asked whether we considered, in our assessment of wolf viability, the likelihood of

habitat changes in a significant portion of the range of the combined listed entity. While the reviewer refers to the combined listed entity, their comment could apply to the analysis of other entities now included in this final rule.

Our Response: We did not develop a quantitative model of wolf population dynamics for wolves in the Great Lakes area. Once established, wolf populations are known to be remarkably resilient to human-caused mortality and are not particularly sensitive to changes in habitat as long as sufficient prey populations are maintained (see *Habitat and Prey Availability* section). The basis for our conclusions that wolves are no longer threatened or endangered in the entities evaluated in this rule are summarized in the *Determination of Status Throughout All of Its Range* and *Determination of Status Throughout a Significant Portion of Its Range* sections for each of the entities. In short, wolf populations have remained above recovery targets in the Great Lakes region for almost two decades, and the States have committed to maintaining wolf populations well above these targets for the foreseeable future. (See also **Our Response** to **Comment 20**.)

Comment 93: Several commenters were concerned that the removal of Federal protections would inhibit the recovery progress of gray wolves, setting populations on a path toward extinction that would upset ecological systems kept in balance by wolves. Several commented that loss of apex predators substantially diminishes the functions and resiliency of ecosystems. The commenters claimed that ignoring the gray wolf's role in ecosystem function similarly ignores the best available science on this matter. Similarly, they contended that the understanding of wolf ecology and recovery has changed since recovery plans were developed.

Additional commenters asserted that the Act protects ecosystems needed by endangered species and goes beyond just protecting the minimum number of individuals to prevent extinction. Commenters also indicated that the Service should consider ecosystem value when evaluating a significant portion of the range and the indirect effects of wolf population decline post-delisting on ecosystem health and function. Along these lines, commenters stated that wolves "need to be restored to ecologically functional population sizes sufficient to influence ecosystems" (citing Belant and Adams 2010, entire). Commenters pointed to numerous studies in the northern Rocky Mountains region and the Great Lakes area, where wolf populations were determined to influence ungulate and other predator populations in such a way that the dynamics of biological diversity and ecosystem functions produced trophic cascades. Finally, another commenter stated that sufficient research is not available on wolf-ecosystem effects, and that such research needs to be conducted while wolves are still federally protected so the information can be used to inform delisting decisions; when wolves are delisted it would be difficult to obtain funding to support this research.

Our Response: Wolves play a key role in ecosystems, including their potential to contribute to trophic cascades. While some believe wolves should remain listed until these cascading ecological effects are restored throughout ecosystems, this approach is not required by the Act and is not necessary for a determination that a species has recovered (no longer meets the Act's definition of an endangered species or threatened species). The Service is not required to achieve or maintain "ecological effectiveness" (i.e., occupancy with densities that maintain critical ecosystem interactions and help ensure against ecosystem degradation) (Soule et al. 2003, p. 1239). That said, the concern that delisting would result in declines or extinction is unfounded.

Service policy calls for an ecosystem approach to carrying out programs for fish and wildlife conservation (National Policy Issuances 95–03 and 96–10; 59 FR 34274, July 1, 1994). The goal of this approach is to contribute to the effective conservation of natural biological diversity through perpetuation of dynamic, healthy ecosystems when carrying out our various mandates and functions. Preserving and recovering endangered and threatened species is one of the more basic aspects of an ecosystem approach to conservation. Successful recovery of an endangered species or threatened species requires that the necessary components of its habitat and ecosystem be conserved, and that diverse partnerships be developed to ensure the long-term protection of those components. Thus the recovery success demonstrated for gray wolves, a keystone or "highly interactive species" (as defined by Soule et al. 2003, p. 1239), also is an example of the success of the ecosystem approach.

Many new studies of wolf ecology and its implications for recovery have been published since the species was originally listed. We incorporated the best available scientific and commercial data into the proposed rule and this final rule (see **Our Response** to **Comment 27**). We used this information to reach our determination that gray wolves do not meet the Act's definition of an endangered species or threatened species and no longer require Federal protections. Any influence this final rule may have on funding additional research is beyond the scope of this rulemaking process.

Comment 94: Multiple commenters favored the reintroduction of wolves to suitable historical ranges "for the sake of wolves" and to repair damages in ecosystems due to a lack of large predators.

Our Response: As discussed in this final rule, we have determined that each of the gray wolf entities evaluated does not meet the Act's definition of an endangered species or threatened species and does not warrant protection under the Act (see **Determination of Species Status**). Therefore, additional reintroduction efforts by the Service are not planned, as the currently listed gray wolf entities have recovered. Because we have determined that gray wolves should not be federally listed, any future wolf reintroduction into additional areas would be at the discretion of State and Tribal agencies. The interaction of wolves and ecosystems is addressed in **Our Response** to **Comment 93**.

Comment 95: One commenter asked that, rather than delist the gray wolf, we reclassify *C. lupus* to accurately reflect the species' historical range and the scope of the Service's obligations under the Act.

Our Response: We interpret this comment as a recommendation to revise the boundaries of the currently listed gray wolf entities. For reasons explained in this rule (see **Approach for this Rule**), we evaluated the status of each of the currently listed entities separately, combined into a single entity, and the two currently listed entities combined with the NRM DPS (lower 48 United States entity). Because we determined that none of the gray wolf entities evaluated meets the Act's definition of an endangered species or a threatened species, we are removing the currently listed gray wolf entities from the List.

Comment 96: A few commenters expressed concern that delisting gray wolves could harm Mexican wolves, either by increasing human-caused mortality of Mexican wolves dispersing outside the Mexican Wolf Experimental Population Area, or by potentially reducing the likelihood of "genetic rescue" via interbreeding with dispersing gray wolves.

Our Response: This final rule has no effect on the separate listing for the Mexican wolf. The Mexican wolf will remain listed as an endangered species and continue to receive the protections of the Act. The Act prohibits activities that "take" endangered and threatened species unless a Federal permit allows such "take" (16 U.S.C. 1538). Therefore, it will remain illegal under the Act for members of the public to shoot a Mexican wolf, regardless of State laws pertaining to gray wolves or the potential for mistaking a Mexican wolf for a gray wolf or coyote, and members of the public are obligated to ensure that their activities are lawful. We will continue to assess significant causes of mortality as the experimental population expands numerically and geographically within the Mexican Wolf Experimental Population Area. Furthermore, although no information exists that indicates Mexican wolves are currently dispersing into neighboring States, our 10(j) rule specifies that such dispersers will be captured and returned to the Mexican Wolf Experimental Population Area south of I–40 in Arizona and New Mexico, maintained in captivity, or transferred to Mexico (see 50 CFR 17.84(k)). Finally, if genetic rescue is determined to be a necessary tool for the Mexican wolf at some time in the future, appropriate techniques will be used at that time.

Biology, Ecology, Range, Distribution, or Population Trends

Comment 97: One commenter stated that we misrepresented the best available science pertaining to the population and metapopulation structure of wolves. They noted sections of the proposed rule in which we stated that wolves in the West Coast States and the Great Lakes are both part of larger metapopulations of wolves. They noted that dispersal between those two areas has not been documented and dispute their connectivity. Further, they stated that there is no evidence that wolves in the Great Lakes comprise western gray wolves and eastern wolves, due

to the aforementioned lack of connectivity between wolves in the northern Rocky Mountains and the Pacific Coast and the Great Lakes.

Our Response: In this final rule we clarify our statements about metapopulations. Our intention in the proposed rule was to convey that wolves in the northern Rocky Mountains and West Coast States were part of a metapopulation that included wolves in western Canada, and that wolves in the Great Lakes area were part of another metapopulation that included wolves in those States as well as in Ontario and Manitoba, Canada. The intent was not to imply that all of those wolves were meaningfully connected as part of a single metapopulation; we agree that there are no data to show effective dispersal between those two larger areas. We have reviewed and clarified the text where necessary to help ensure the correct interpretation. As for the commenter's statement about western wolves in the Great Lakes area, it is important to note that the term "western gray wolves" is used in the taxonomy section to distinguish between western and eastern wolves. There is general agreement that western wolves are *Canis lupus*, unlike the eastern wolves, about which there is significant debate, as explained in the rule. These "western gray wolves," therefore, are widely agreed to be the same taxonomic species as the wolves in the northern Rocky Mountains, but that does not imply, nor do we indicate in the rule, that there is current dispersal or connectivity between the "western gray wolves" in the Great Lakes area and wolves in the northern Rocky Mountains or other parts of the Western United States. We acknowledge that the terminology surrounding population structure and taxonomy can be confusing and have tried to clarify where possible.

Taxonomy

Comment 98: Some commenters indicated that the eastern wolf is a species (*C. lycaon*) recognized as threatened in Canada, and that dispersers into the Northeastern United States should be protected.

Our Response: We consider these wolves to be part of the gray wolf entities we assess. As explained in this rule, we have determined that none of the entities we assess meet the Act's definition of a threatened species or an endangered species (see **Determination of Species Status**) and, therefore, none warrant the protections of the Act. See **Our Response** to **Comment 46** and *How We Address Taxonomic Uncertainties in this Rule***.**

Comment 99: We received several comments that questioned how we handled the uncertainty surrounding the taxonomy of the gray wolf and the distribution of subspecies.

Our Response: We have clarified our view of the taxonomy and distribution of wolves to the extent possible given ongoing scientific uncertainty. The Act requires us to conduct our analysis based on the best available science. In the case of canid taxonomy, that science remains unresolved. In light of that uncertainty, we made certain assumptions and provided justification as appropriate. We understand that, absent complete scientific agreement on the subject, there will be disagreement about the correct interpretation of the conflicting data. However, we conclude that our approach satisfies the requirement to use the best available scientific data.

Human-caused Mortality

Comment 100: One commenter opined that there is a need for greater public involvement in wildlife conservation and management issues, particularly related to predator control.

Our Response: While we appreciate the commenter's perspective, the level of public involvement in wildlife conservation is not a relevant factor in our analysis for this final rule. However, we note that at least three State agencies (Washington Department of Fish and Wildlife, Minnesota Department of Natural Resources, and Wisconsin Department of Natural Resources) have convened citizen advisory groups to engage multiple stakeholders in discussing present and future wolf management in their respective States. Furthermore, State wildlife agencies generally have a citizen commission that sets policy and regulation for the agency through a public process that allows for input from all members of the public interested in a particular topic prior to the commission voting on policy decisions.

Comment 101: Two commenters noted that USDA 2015 found that wolves have minimal impact on the livestock industry compared to other causes. One commenter stated that lethal control is not effective.

Our Response: The report cited by the commenters surveys a random sample of producers nationwide then extrapolates information for each State based on survey results. Although this report demonstrates the minimal effect wolves have on the entire livestock industry at the national level, we conclude that it does not adequately address the local, and sometimes significant, effects that repeated depredations caused by wolves may have on individual livestock producers in occupied wolf range. Because the report lacks actual numbers

based on confirmed and probable depredations, the information presented is best used to identify general cattle and calf death loss trends over time at a very large spatial scale. We rely more heavily on the empirical information compiled by State, Federal, and Tribal wildlife management agencies that investigate and classify depredations caused by wolves. Much of this information is provided in annual reports that are available for public dissemination. See **Our Response** to **Comment 17** for information about lethal control.

Comment 102: Several commenters addressed the influence a delisted wolf population might have on acceptance and tolerance of wolves by sportsmen and -women. Most of these commenters indicated that hunters and State wildlife agencies share the burden of a recovered wolf population due to reduced game populations resulting in a reduction of tags allocated for the hunt and reduced revenue. One commenter indicated wolves have had little impact on big game populations. Commenters cited a reference highlighting the need for support from local communities to recover Mexican wolf populations and a reference noting that hunter and trapper tolerance would decline if wolves were to be relisted in Montana.

Our Response: We believe that local support was critical to, and continues to be critical to, the recovery and successful management of the gray wolf. Delisting may slowly improve tolerance for the species among certain stakeholders. However, we acknowledge that other stakeholder groups may experience frustration and reduced tolerance for wolf management as it changes from Federal to State authority. Accordingly, we have updated and revised the section *Human-Caused Mortality*—"The Role of Public Attitudes" in this rule. Specifically, we addressed the tolerance of wolves by hunters/trappers and overall acceptance of hunting and trapping as a tool used to manage wolf populations. The references provided by the commenters

have been incorporated into the discussion as appropriate. Although the commenter referenced a survey that noted tolerance of respondents for wolves would decrease if wolves were relisted in Montana, neither our proposed rule or this final rule considered relisting wolves in Montana.

We conclude that big game populations remain of sufficient size to support both a viable wolf population and recreational opportunities for both consumptive and nonconsumptive users of wildlife. However, we acknowledge that, in some localized areas, wolves may be a significant factor in observed big game population declines, which could result in reduced allocation of hunting licenses and reduced revenue for both local communities and State wildlife agencies. While models indicate that predators can limit prey populations (Eberhardt 1997, entire), the root cause of observed ungulate declines or lack of population growth is often more complex, and involves many more factors, than simply the presence of wolves. For example, habitat conditions on summer ranges and environmental factors (i.e., winter severity) across the Western United States can have a significant influence on the nutritional condition of adult female elk. This, in turn, affects pregnancy rates, the nutritional condition of calves, and ultimately calf survival and recruitment into the population (Cook et al. 2013, entire; Middleton et al. 2013, entire; Proffitt et al. 2016, entire; Horne et al. 2019b, entire). As a result, the effects of predation on elk may be more pronounced in populations suffering from poor nutrition (Proffitt et al. 2016, pp. 2167–2168).

Even if it is determined that predators have a significant role in the dynamics of ungulate populations, in many cases further research would be necessary to determine which predator is having the most significant effect. Although some studies have documented the ability of wolves to limit the abundance of ungulates (Boertje et al. 1996, entire; Hebblewhite et al. 2002, entire; Hayes et al. 2003, entire), recent studies of elk population dynamics across Idaho (Horne et al.

2019b, p. 1114) and in the Bitterroot Valley of Montana (Eacker et al. 2016, pp. 1354–1357) indicate that, aside from the nutritional condition of adult female elk, mountain lions play a larger role in the dynamics of elk populations than either black bears or wolves. In the Great Lakes area, environmental conditions have a greater influence than predation on white-tailed deer populations, the wolf's primary prey in much of this region. The effects of environmental conditions on white-tailed deer populations in turn play a large role in the dynamics of wolf populations in the region, particularly in regards to wolf abundance and population growth rates (see the "Great Lakes Area: Prey Availability" section of this rule). For further information about big game populations in the gray wolf entities evaluated in this rule, refer to the *Habitat and Prey Availability* section of the rule.

Comment 103: One commenter claimed that the livelihoods of people who live in rural areas with wolves are at stake; that wolves are killing their livestock, pets, and working animals; and that, if not provided relief, these residents will fight back against wolves and wolves will die. The commenter believed implementing the proposed rule was best for wolves and people because it returns control to the States.

Our Response: As noted in the *Human-Caused Mortality*—"The Role of Public Attitudes" section of the rule, research and empirical data indicate that illegal take occurs at a higher rate when gray wolves are federally protected by the Act as compared to periods when wolves are managed under State authority. Surveys also indicate that members of the public are more trusting of their State fish and wildlife agencies than their State or Federal Government (Manfredo et al. 2018, pp. 8, 58–68).

Comment 104: One commenter noted that attitudes towards wolves are largely positive. They stated that wildlife should not be managed based on the public's attitude regarding a species; rather, it should be based on sound science. The commenter also indicated that agencies should work to dispel misperceptions about wolves. Several commenters stated that humans continue to pose a major threat to wolf populations.

Our Response: Regardless of the current level of public tolerance for wolves, we conclude that public support may decrease if the species has recovered, yet remains on the List. The goal of the Act is to recover listed species and then delist them when they no longer require the Act's protections because they do not meet the definition of a threatened species or endangered species. After careful consideration of the best commercial and scientific information, the Service has determined that the gray wolf listed entities are no longer in need of the Act's protections and warrant removal from the List. See the *Human-Caused Mortality*—"The Role of Public Attitudes" section of the rule for more information about human dimensions and wolves.

The Service agrees that humans continue to pose the most significant threat to wolf populations in the lower 48 United States. We also conclude that adequate regulatory mechanisms that will be, or currently are, implemented by State, Federal, and Tribal wildlife management agencies provide sufficient protections to allow for the continued natural recolonization of wolves where vacant suitable habitat exists and will ensure wolf populations remain viable into the foreseeable future. For further information, see the *Human-caused Mortality* and **Post-delisting Management** sections of the rule. Also see **Our Response** to **Comment 120**.

Comment 105: One commenter was concerned with our analysis of human-caused mortality in the West Coast States. The commenter stated that the proposed rule did not discuss: (a) Lethal management by State and Federal land and wildlife managers; (b) the impact of recreational hunting in the NRM and its effects on wolf dispersal and recolonization of West Coast States; (c) recreational hunting seasons on Tribal lands, such as the unlimited, year-round wolf hunting season on Confederated Tribes of the Colville Reservation lands, which also allow certain hunting and trapping activities outside of Tribal lands; and (d) the loss of wolves at the behest of livestock producers. The commenter asserted that the threat to wolves from human-caused mortality is exacerbated by the lack of nonlethal coexistence practices in key wolf habitats in the West Coast States.

Our Response: With regards to lethal management (including hunting) in the NRM DPS and how that might impact West Coast States wolves, see **Our Response** to **Comment 15**. We address the impacts of lethal management of West Coast States, NRM DPS, and Great Lake States wolves in our *Human-caused Mortality* and **Post-delisting Management** sections. While nonlethal coexistence practices are not in place everywhere, State and Federal agencies and Tribal governments have made significant progress in deploying nonlethal deterrents to address wolf–livestock interactions in the West Coast States. We have contributed approximately $400,000 per year toward a national wolf–livestock grant program (inclusive of Mexican wolf) to incentivize livestock producers to implement nonlethal deterrents. Oregon and Washington have received a portion of these funds for the past several years, while livestock producers or the State have contributed an equal amount of their own funding or in-kind services toward nonlethal coexistence practices.

The commenter is correct that some Tribes immediately outside of the 44-State entity (and, consequently, the combined listed entity) allow wolf harvest. We have updated this final rule to include this information (see *Human-caused Mortality* and Management in the NRM DPS sections); although, we note that the area affected by these regulations is entirely within the NRM DPS, where wolves are already federally delisted.

Habitat and Prey Availability

Comment 106: We received multiple comments related to habitat in the West Coast States and the potential for continued occupancy and expansion of wolves into these States. Specifically, commenters noted that wolves are highly mobile and adaptable and are likely to find suitable habitats amongst the large blocks of State and Federal land in those States. Similarly, commenters noted that land use planning in some States ensures that private lands providing habitat will not be significantly altered. In addition, commenters noted that under State management, wolves are likely to continue to recolonize the West Coast States, at least partially via dispersal from the northern Rocky Mountains.

Our Response: We recognize the contributions of suitable wolf habitats in the areas described by the commenters. Wolves dispersing from the northern Rocky Mountains are important to the continued expansion of wolf populations in the West Coast States. While continued wolf dispersal from the northern Rocky Mountains into the West Coast States is not required for our findings in this final rule, we affirm that post-delisting management by States will continue to allow wolves to disperse and occupy West Coast States (see **Post-delisting Management** and **Post-delisting Monitoring**).

Comment 107: One commenter stated that the Pacific Northwest section 4 analysis in the proposed rule is flawed for the following reasons: (a) The rule's analysis of suitable habitat was based primarily on road density and human population density, and does not properly consider many other vital habitat components (such as forest cover and the availability of federally protected or State-protected lands) and fails to properly assess the threats facing wolf habitat on a broader scale; (b) the rule's failure to consider important connectivity corridors and habitats necessary to foster movement into and allow the recolonization of habitats across the West Coast States by dispersing wolves from the NRM DPS; (c) the rule's failure to consider the vast areas of suitable habitat currently unoccupied by wolves in the West Coast States; and (d) the rule's failure to consider the adequacy or certainty of State regulations and wolf management plans (the commenter specifically notes the lack of State-level listing protections in Oregon).

Our Response: Our biological report, as well as our proposed and final rules, considered vital habitat components, habitat corridors, and threats to habitat. As noted in our final biological report (see *Suitable Habitat* section) and this final rule (see *Habitat and Prey Availability* section), wolves are not habitat specialists and can persist, and travel through, nearly any habitat with sufficient prey, provided that sources of human-caused mortality are regulated. While road density and human population density are considered in some of the wolf habitat models we cite, other covariates include forest cover, livestock density or stocking rates, and land ownership (see *Suitable Habitat* section of the biological report). While there are large areas of unoccupied suitable gray wolf habitat in the lower 48 United States, we focused our analysis of habitat and prey availability on areas currently occupied by wolves. Because new information has emerged since publication of our proposed rule indicating that wolves now occupy a portion of northwest

Colorado, we have included an analysis of wolf habitat and prey availability in the central Rocky Mountains in this final rule (see *Habitat and Prey Availability* section).

We also fully considered the adequacy and certainty of State regulations and wolf management plans. Our analysis of post-delisting management considers the likelihood that wolves will persist in the Pacific Northwest following Federal delisting (see "State Management in the West Coast States"). After delisting, wolves will continue to be State-listed in Washington and California until those States determine that wolves are recovered. Although wolves will not be State-listed in Oregon following Federal delisting, the Oregon Department of Fish and Wildlife is required by State regulations to follow the Oregon Wolf Conservation and Management Plan. That plan includes program direction, objectives, and strategies to manage gray wolves in Oregon and defines the gray wolf's special status game mammal designation (Oregon Administrative Rule 635–110). Thus, there will continue to be substantial regulatory protections for gray wolves in the Pacific Northwest following Federal delisting.

Comment 108: One commenter asked that we provide the basis for several statements regarding changes to prey availability or habitat in the western Great Lakes. Specifically, they asked for the basis of our conclusions regarding the effects of ungulate harvest, management of ungulate habitat, or ungulate diseases on wolf prey availability.

On the topic of ungulate diseases, several commenters proposed that the spread of chronic wasting disease (CWD) can be controlled or otherwise inhibited by wolves. They indicated that the lack of large predators, including wolves, played a role in the current unnatural distribution and prevalence of CWD, and that wolves prey upon vulnerable animals, such as the weak, sick, young, or old; killing sick animals reduces the transmission of diseases, including

CWD. Commenters further opined that CWD may never have become established if wolves were present to reduce or eliminate its spread via selective predation on sick animals.

Our Response: We have updated our analysis in the *Habitat and Prey Availability* section of this rule to clarify the basis for our conclusions regarding the effects of ungulate harvest, management of ungulate habitat, and ungulate diseases on the viability of wolves. While predation can reduce the prevalence of infection in prey in some circumstances (see Hobbs 2006, p. 8; Wild et al. 2011, pp. 82–88; Tanner et al. 2019, pp. 5–7), in areas of high CWD disease prevalence this may not always be true (see Miller et al. 2008, entire). We decline to speculate whether or not CWD would have become established if wolves were present to reduce or eliminate its spread, as such speculation is immaterial to our decision.

Comment 109: One commenter stated that the U.S. Forest Service could help the gray wolf by fully implementing the forest management goals in existing National Forest Management Plans. They stated that creation of early seral habitats, which are generally favored by large ungulate species, would benefit wolves. They requested that we recognize that not only do the National Forests provide large blocks of contiguous habitat that are unlikely to be converted to other uses, but that they also provide management opportunities to increase prey availability through forest management.

Our Response: Some National Forests provide large blocks of contiguous habitat for the gray wolf (see *Management on Federal Lands* sections), although wolves are not limited to these areas. While it is true that some forest management practices can increase prey availability, wolves can also persist in areas without significant active forest management. Finally, we did

not find habitat or prey availability to be a limiting factor in our analysis of threat factors in this rule (see *Habitat and Prey Availability* section).

Comment 110: One commenter asked that we not specify road densities in delisting decisions, as they may limit management flexibility on National Forests. They pointed to research (e.g., Wydeven et. al. 2001) that appears to indicate wolves can persist in some areas with relatively high road densities. The commenter is concerned that lower road densities will limit access for forest management and the creation of early seral habitats for ungulates.

Our Response: In this final rule, we refer to road densities reported in the scientific literature because they have been found to be correlated with wolf mortality in some areas. We are not aware of any scientific basis for the concern that lower road densities would substantially reduce prey availability for wolves to the extent that it would impact population viability.

Comment 111: One commenter questioned why we believed wolves would continue to expand in California with the removal of Federal protections under the Act.

Our Response: Wolves in California are classified as endangered under the California Endangered Species Act, which prohibits take (defined as hunt, pursue, catch, capture, kill, or attempts to hunt, pursue, catch, capture, or kill) of listed wildlife species (California Fish and Game Codes sections 86 and 2080). This will not change with Federal delisting. As we discuss in the *Habitat and Prey Availability* section, the available scientific literature shows significant amounts of suitable unoccupied wolf habitat in California. Given their dispersal abilities (Jimenez et al. 2017, entire), and continued State regulatory protections in Oregon and California (see **Our Response** to **Comment 16**), we expect wolves to continue to disperse into California

from Oregon and to spread outward from the wolf pack currently located in California. Additionally, as the number of wolves and wolf packs increase in western Oregon, this increase will provide an additional supply of dispersers to recolonize California.

Disease and Parasites

Comment 112: One commenter stated that the Service addressed disease only as a threat to wolves in the Great Lakes area and did not address this issue for west coast wolves. The commenter also indicated that diseases are known factors for wolf population crashes in small and isolated populations, similar to those in the West Coast States. Another commenter sought clarification as to which States collect biological samples for disease monitoring, how disease monitoring will occur in the future, and if States are able to sufficiently monitor disease as wolf expansion continues.

Our Response: The analysis in the *Disease and Parasites* section of this final rule applies to the gray wolf throughout its range in the lower 48 United States and is not limited to wolves in the Great Lakes area. Further, wolves in the West Coast States are an extension of wolves from the NRM and western Canada and are actively recolonizing Washington, Oregon, California, and Colorado. Thus, they are not considered "small and isolated" as indicated by the first commenter. Similarly, our discussion of disease and parasite monitoring clearly indicates that all States that currently have wolves monitor for disease. Through the various State wolf management plans that are in place, and will be in place post-delisting, we conclude that States are capable of adequately monitoring disease and parasites into the future.

Effects of Climate Change

Comment 113: Three commenters disagreed with our assessment of climate change effects to wolves and wolf prey. One commenter was concerned about climate change-related declines in moose populations (citing Mech et al. 2018 and Nadeau et al. 2017), changes to ungulate susceptibility to chronic wasting disease (CWD), and loss of ungulate habitat to uncharacteristic fire in the West, which raised a question about the resilience of wolves in the future. The commenter felt a broader distribution of wolves is needed to address the potential for local population decreases or extirpations as a result of these concerns. Another commenter noted that, without snowpack, large hoofed animals will be able to out-run wolves and implied that ungulate prey may become less accessible to wolves. Similarly, this commenter was concerned about the loss of ice bridges in Isle Royale National Park, leading to isolation and population declines of wolves on the island. A third commenter stated that the role of climate change on wolf recovery is unknown and recommended that the impacts of climate change should be researched before delisting occurs.

Our Response: In this final rule, we find that each of the gray wolf listed entities evaluated is recovered and warrants delisting. Through this process, we evaluated factors potentially threatening the gray wolf in the lower 48 United States, including climate change (see *Effects of Climate Change*). We determined that climate change is not causing negative effects to the viability of the gray wolf populations in each of the entities evaluated and that it is not likely to do so in the foreseeable future. These comments do not alter the substance of our analysis, for the reasons explained below**.**

As discussed under *Effects of Climate Change*, wolves are highly adaptable, habitat and prey generalists. Similarly, prey species including ungulates also have reasonable adaptive capacity to shift habitats in response to changing conditions or potentially persist in place. Mech et al. (2018, pp. 45–46) and Nadeau et al. (2017, pp. 107–109) speculate that climate change and its combined potential habitat-related conditions, including potential for heat stress and rates of spread of disease and parasites, may be limiting factors for moose populations at the southern extents of their range in Minnesota and the Western United States. While climate change may be detrimental to moose populations in the Midwest, it may benefit white-tailed deer populations (Weiskopf et al. 2019, pp. 775–776), the wolf's primary prey in the region. Because historical evidence indicates gray wolves and their prey survived in hotter, drier environments, we expect wolves could easily adapt to the warmer and drier conditions that are predicted with climate change, including any northward expansion of diseases, parasites, or reduction in species currently at or near the southern extent of their range.

With regard to decreased snow cover in winter and the concern that prey would have an advantage, we note that such changes in snow cover could also improve over-winter survival of prey. Increases in overall ungulate populations would thereby provide more prey for wolves. Although climate change may negatively affect moose in parts of its range, in many areas, moose are secondary or tertiary prey items for wolves behind elk and deer in the West and white-tailed deer in much of the Great Lakes area. Therefore, the effects of declining moose populations on overall prey availability within the entities evaluated is expected to be minimal.

Because the wolves on Isle Royale do not meaningfully contribute to the viability of the gray wolf entities evaluated in this rule, the continued occurrence or loss of ice bridges does not warrant further analysis.

Comment 114: We received a number of comments that stated climate change and its effects should be analyzed more thoroughly as a threat to wolves, and that climate change poses serious challenges for many ecosystems and species. These commenters provided citations that document the current global extinction crisis, relate that crisis to climate change, report on the ecosystem effects of losing top predators or other megafauna, and discuss how wolves may help to buffer climate impacts.

Our Response: While we do not dispute the findings in the sources cited by the commenter, they are outside the scope of our analysis in this rule. Our analysis is limited to the specific threats affecting the gray wolf in the lower 48 United States. Literature addressing global conservation challenges can provide important context, but are not relevant to our analysis unless they relate to threats faced by the gray wolf in the lower 48 United States. Additionally, in assessing the impacts of climate change and other factors on wolves, we are not required to evaluate any effects the loss of wolves may have on other species, because those effects, even if significant, do not affect the status of the gray wolf entities addressed in this rule.

Comment 115: Several commenters requested a more thorough analysis of climate change effects on wolf habitat. They noted that patterns of drought and wildfire, changes in snowpack, and suitability for different vegetation types, including certain forest types, are likely to change. One commenter cited Gonzalez et al. (2018), which indicates climate change effects may be more pronounced in national parks, while another cited the U.S. Global Climate Change Research Program's Fourth National Assessment (2018), which includes projections of habitat effects in regions across the country.

Our Response: The cited papers and other research indicate there are likely to be habitat-level effects within the range of the gray wolf in the lower 48 United States due to climate change, including changes in precipitation, forest composition, and other factors. Depending on the region, there are also likely to be shifts in the specific composition, but not availability of, the ungulate prey base as climate change effects may be beneficial for some ungulate species and detrimental for others (Weiskopf et al. 2019). Wolves, however, are highly adaptable and able to exploit available resources, making it unlikely that such shifts will become limiting. As stated in our discussion of life history and biology, wolf population dynamics are strongly driven by the availability of prey and protection from persecution, not by specific habitat or vegetation types. While there are many habitat changes that may have local or short-term effects, including wildfires, or forest tree composition, the best available information about wolf biology indicates that these changes are not likely to significantly impact wolf population dynamics.

Genetics

Comment 116: Several commenters recommended we address effective population size, citing Frankham et al. (2014) and the "50/500" or "100/1000" rules as targets for minimum effective population sizes to ensure viability in both the short term and in perpetuity. They noted that effective population size has not been measured for the entire combined listed entity and that we provided no calculated ratio of census size to effective population size, and stated that management in Michigan and other States may allow effective population sizes to drop below sustainable levels.

Our Response: In response to these comments, we added a section to evaluate more thoroughly the available data addressing wolf population genetics (*Genetic Diversity and*

Inbreeding). This section includes relevant literature on available estimates of effective population size and why or how it relates to other genetic issues for wolves. Effective population size, as it relates to viability, is generally described as being important in the short term to avoid the effects of inbreeding, and in the long term to allow for evolutionary processes and adaptive capacity. As discussed in the *Genetic Diversity and Inbreeding* section, the available data do not indicate that inbreeding or associated effects are likely to pose a significant threat to the gray wolf in the lower 48 United States. In the long term, we expect that connectivity among States in the Great Lakes area and between those States and Canada will continue to support a large and genetically diverse population, as will connectivity among the NRM States and West Coast States and between those States and Canada. Moreover, we also recognize that a species' adaptive capacity is derived not only from genetic diversity, but also from phenotypic plasticity and dispersal ability (Nicotra et al. 2015, entire; Beever et al. 2016, entire). These factors are not included in general thresholds such as that provided by Frankham et al. (2014). Considering the life-history characteristics of the wolf, including high dispersal capability and adaptability, along with the factors discussed in the *Genetic Diversity and Inbreeding* section, it is unlikely that the wolf will be limited by adaptive capacity in the foreseeable future.

Comment 117: Several commenters recommended that we provide a more explicit assessment of wolf population genetics and a discussion of potential issues or concerns related to genetic diversity, including inbreeding or reductions in genetic diversity.

Our Response: In response to these comments, we added the section *Genetic Diversity and Inbreeding*, which evaluates potential genetic issues in wolves, both generally and within the gray wolf in the lower 48 United States specifically. We acknowledge the importance of

considering genetic issues more explicitly as they relate to the current status of wolves and to potential changes upon delisting. As stated in that section, studies of genetic diversity have generally found it to be relatively high within the lower 48 United States (with the exception of the wolves on Isle Royale). Given our understanding of population dynamics, dispersal, and connectivity within and outside of the gray wolf entities analyzed, we do not expect genetic issues to significantly impact the viability of those entities.

Additional Threats

Comment 118: One commenter recommended that we consider domestic and international trade as a potential threat, including, for example, export of wolf skins.

Our Response: Regardless of demand for wolf skins, specimens collected for domestic or international trade likely occur through intentional means such as trapping or hunting. Because we already addressed intentional means of mortality in our analysis of human-caused mortality, we find that this is not a separate or different threat that requires additional analysis.

Comment 119: One commenter stated that agricultural development is a source of historical "near extirpation" of wolves. The commenter indicated that this threat still exists today, as there is more agricultural land present than historically.

Our Response: In our March 15, 2019, proposed rule and this final rule, we acknowledge that large portions of the gray wolf's historical range are no longer suitable habitat to support wolves. However, we determined that sufficient suitable habitat exists to continue to support wolves into the future (see "Habitat and Prey Availability Summary" in this final rule).

Post-delisting Management

Comment 120: Several commenters stated that there is a mentality among some segments of the public to kill every wolf on the landscape, and without the protections of the Act, this mentality could result in the increased intentional killing of wolves (either through legal or illegal actions) that could once again threaten the continued existence of wolves. One commenter believed wildlife agencies were complicit in this mentality and assist the public by providing information to further reduce wolf populations. Many commenters were critical of the adequacy of regulatory mechanisms at the State level to maintain a recovered wolf population. One commenter indicated that management plans are not legally binding documents so there is no guarantee States will manage wolves above recovery levels, and others questioned the State management agencies' commitment or ability to do so. Several commenters took issue with the adequacy of State monitoring programs to accurately document wolf populations post-delisting. Five Tribal organizations and numerous commenters noted the declining trend in wolf numbers and the total number of wolves harvested post-delisting in the NRM DPS. These commenters argue that the same will occur elsewhere if wolves are delisted. One commenter was concerned about State funding for wolf programs and its effect on State monitoring programs to ensure a viable wolf population is maintained. Numerous commenters were concerned about the potential for increased mortality under State management and the effect it may have on recolonization of unoccupied, suitable habitat.

Several other commenters stated that wolves will continue to disperse after the protections of the Act have been removed, as has been observed in the NRM wolf population after delisting. Commenters noted that hunting has had little impact on wolf populations and that

wolf populations continue to grow in number and expand geographically. Commenters stated that State management plans and regulatory mechanisms have been more than adequate to maintain wolf populations well above recovery criteria and that the public should be commended for the work they have done to complete and implement management plans.

Our Response: While we acknowledge that some people have negative attitudes towards wolves and may illegally kill wolves as a result, we disagree with the assertion that State wildlife agencies assist members of the public in any way to carry out these actions. States and Tribes have rules and regulations governing the take of wolves and all wildlife, with professional staff available to monitor wildlife populations and enforce wildlife laws under their jurisdiction. We acknowledge that human-caused mortality will likely increase post-delisting. Based on knowledge and experience in areas that are already delisted, we expect wolf numbers to initially decline, followed by a period of stabilization with slight fluctuations around an equilibrium in subsequent years as State and Tribal managers begin to adaptively manage for sustainable wolf populations. We conclude that regulatory mechanisms that will guide wolf management post-delisting are adequate to ensure the long-term, recovered status of wolves into the foreseeable future and will provide opportunities for the continued recolonization of vacant suitable habitats in the West Coast States and the central Rocky Mountains (refer to the **Post-delisting Management** section of this rule for detailed information about State plans). For further information, see **Our Response** to **Comments 14**, **16, 19,** and **52** and the *Human-caused Mortality* section of the rule.

Human-caused mortality is the primary mortality factor for wolves outside of large, protected areas and, if left unregulated, can be a significant threat to wolf populations. However, we determined that regulatory mechanisms currently in place provide sufficient protections to

ensure sustainable and recovered wolf populations will persist into the foreseeable future. We conclude that it is reasonable to rely on State statutes, regulations, and wolf management plans to understand how wolves will be managed after delisting. Wolf management plans from the Great Lakes States of Michigan, Minnesota, and Wisconsin indicate that their primary goal is to ensure the long-term survival of wolves while concurrently minimizing wolf-related conflicts. State statutes and regulations are developed and adopted to assist each individual State in achieving this goal. Based on our review of available information, we expect that States will adaptively manage wolves to ensure the continued viability and recovered status of the species, which has already been demonstrated by wildlife managers in the Great Lake States during past delisting efforts (see **Our Response** to **Comment 130** and **Post-delisting Management**). In addition, we may use the Act's listing provisions, including emergency listing under sections 4(b)(7) and 4(g)(2) of the Act, if appropriate, to address any future threats to the viability and sustainability of the wolf population.

The West Coast States of Oregon, Washington, and California have adopted wolf-management plans intended to provide for the continued recolonization and conservation of wolves while also working to minimize wolf-related conflicts. Wolves inhabiting the eastern one-third of both Oregon and Washington were federally delisted in 2011 (see 76 FR 25590; May 5, 2011) and have been managed under State authority since that time. As a result, lethal control has been used on occasion to resolve repeated conflicts with livestock in the delisted portions of each State. Despite the delisting and subsequent use of lethal control, wolves have continued to increase in number and recolonize vacant, suitable habitats within each State. Wolves in California and Washington are classified as endangered at the State level and, regardless of Federal status, are likely to remain so until recovery objectives outlined in their

respective management plans are achieved and statutory and regulatory changes are made to reclassify wolves in each State. Washington recently initiated work to develop a post-recovery wolf management plan that would guide the long-term conservation and management of the species in the State. Wolves in Oregon are classified as a "special status game mammal" under Oregon Revised Statutes 496.004(9); however, regulated take is not anticipated to be a management option for some years (see **Our Response** to **Comment 107** for further information about Oregon). It is expected that wolf populations in these States will continue to increase as they recolonize vacant, suitable habitat within the region.

As stated previously in this rule, we fully expect human-caused mortality to increase post-delisting in Michigan, Minnesota, and Wisconsin, as these States attempt to stabilize or reduce wolf population growth, but we do not anticipate those declines will be significant enough to threaten the recovered status of wolves. The NRM States of Idaho and Montana provide an example of how wolf populations might respond to increased human-caused mortality post-delisting. In Idaho, the wolf population peaked in 2009 at 870 animals and under State management, including public harvest in all but one year since 2009, the population declined slightly and stabilized between 659 and 786 wolves during 2010–2015 (see table 3). Likewise, Montana wolves have been managed under State authority in all but one year since 2009. Population estimates acquired by patch occupancy modeling (Rich et al. 2013, entire) indicate wolf numbers reached a high of 1,088 wolves in 2013, but have since (from 2016–2018) stabilized between 800 and 850 animals (Inman et al. 2019, p. 7). Wolf populations in the Great Lakes States will likely follow a similar trend of an initial decline followed by long-term stabilization that will fluctuate slightly around an equilibrium as managers gain more experience in adaptively managing wolves. This equilibrium is expected to be well above minimum

recovery criteria. The Service will evaluate potential threats and wolf population responses to delisting and subsequent increases in human-caused mortality for 5 years post-delisting. It would not be in the best interest of the Great Lake States to severely reduce wolf populations or manage wolves down to minimum management levels, because doing so would severely limit State flexibility to address wolf conflict issues, limit wolf harvest opportunities, and increase the risk of relisting.

Another factor we considered regarding likely long-term wolf population levels is the practical challenge of reducing wolf populations down to levels that may threaten their viability and maintaining such reductions long term through legal, public harvest alone (e.g., hunting and trapping). These challenges include: wolves' reproductive capacity, which will require increased levels of mortality to maintain populations well below carrying capacity; wolf dispersal capability, which allows for rapid recolonization of vacant, suitable habitats and the ability to locate social openings in existing packs; the likelihood that wolves will become more challenging to harvest as their numbers are reduced and as they become more wary of humans; and the likelihood that hunter and trapper interest and dedication will diminish as the wolf population is reduced, impacts are less pronounced, and success rates decline. It was primarily due to the unregulated use of poisons that wolf populations were extirpated in the lower 48 United States outside of Minnesota. At present, poisons are either not used at all, or their use is highly regulated and has not posed a significant threat to wolf populations in the United States in recent decades.

For information related to State monitoring programs and the methodology used to accurately document wolf populations post-delisting see **Our Response** to **Comment 14**.

Wolf conservation and management programs can be costly, which, as discussed earlier, is a primary reason many States are at the forefront in developing alternative wolf monitoring methods and continue to gather information and explore techniques to minimize risk associated with wolf conflicts. Because cost effective wolf monitoring and management requires adequate funding, each State wolf management plan discusses current and future funding sources and needs. At present, States within occupied wolf range generally use a combination of State and Federal funds and/or grants to support wolf programs.

Although increased human-caused mortality may result in an overall decrease in the number of dispersers on an annual basis, as well as a reduction in dispersal distance as dispersers locate vacant territories or fill social openings nearer to their natal pack, dispersal is innate to the biology of the wolf and both short- and long-distance dispersal events will continue to occur. These movements will make it possible for wolves to recolonize areas of vacant, suitable habitat outside of currently occupied range, especially in the central Rocky Mountains and the West Coast States where resident packs in California, Oregon, and Washington contribute annually to the number of dispersing wolves on the landscape available to fill social openings in existing packs or to recolonize suitable habitat both within and outside of each State. By contrast, wolves have already recolonized most of the available suitable habitat in the Great Lake States, and any wolves that attempt to recolonize areas outside of the currently occupied range are not likely to persist long term due to the increased probability of conflict in more agriculturally oriented and human-dominated landscapes (see Mech et al. 2019, entire). For further information on this topic, see the *Human-caused Mortality* section of the rule and **Our Response** to **Comment 15**.

Comment 121: Two commenters expressed concerns about Federal compensation programs and the Federal Government's role in compensation programs post-delisting. One

spoke specifically about the Livestock Indemnity Program and how funds from this program may be unavailable to livestock producers who experience losses to wolves in States that do not currently have compensation programs already in place. This commenter believes that, without compensation programs, social tolerance for wolves will decrease, and wolves will be at greater risk of increased human-caused mortality. The other commenter stated that the Federal Government did not fulfill its responsibility to provide compensation for wolf-caused livestock losses and instead relied on States to develop compensation programs and distribute compensation funds. This commenter would like to see a Federal program that provides funds to States to assist with compensation to livestock producers who experience losses to wolves.

Our Response: We agree that compensation programs alleviate some of the financial burdens experienced by livestock producers resulting from wolf depredations on livestock or pets and may indirectly increase tolerance among members of this stakeholder group for having wolves on the landscape. However, the Act does not allow us to make listing determinations based on whether State, Federal, or private compensation programs are adequate or will continue to be available to producers post-delisting. At present, all States within occupied wolf range, except California and Colorado, currently have some form of State compensation to reimburse producers for livestock lost to wolves. Although the usefulness of the Livestock Indemnity Program may decline post-delisting, States and Tribes will continue to have the opportunity to apply for Federal grants (Wolf–Livestock Demonstration Funds) that can be used to help offset some of the costs associated with the implementation of nonlethal mitigation techniques and State compensation programs.

Comment 122: Several commenters expressed concern that State management would not be adequate to recover and maintain viability of wolves post delisting. Specifically, they contend that:

- California's plan is relatively new;
- Oregon's plan has become less protective;
- wolves are not State-listed in Oregon;
- Washington's plan is under legislative pressure and the State has allowed lethal control;
- the Great Lakes States previously allowed and will again allow recreational hunting and trapping;
- penalties for illegally killing wolves are inadequate;
- some States will manage wolves only to the point that they would not again require Federal listing;
- many States lack wolf management plans or protections or will manage to prevent establishment of wolves; and
- dispersal would be limited by hunting.

Our Response: We conclude otherwise, as reflected in the **Post-delisting Management** and **Management in the NRM DPS** sections of this rule. These State management plans contain objectives to conserve and/or recover gray wolves. To ensure healthy populations are maintained, States will monitor population abundance and trends, habitat and prey availability, and impacts of disease, and they will take actions as needed to maintain populations. Overall, State management plans demonstrate State commitment to wolf conservation, thus providing a high level of assurance that healthy wolf populations will persist. We do not have authority to

require specific State management measures. Rather, our role is to ensure that States implement management and protective measures that effectively conserve the wolves in their States, such that the species will not require Federal relisting.

Comment 123: One commenter questioned the basis and rationale for the conclusion in the proposed rule that wolf populations in Wisconsin and Michigan have exceeded 200 animals for about 20 years.

Our Response: The statement the commenter references is included in our discussion of *Recovery Progress* toward meeting the recovery criteria from the revised recovery plan (USFWS 1992, pp. 24–26). The second recovery criterion in the recovery plan states that at least one viable wolf population should be reestablished within the historical range of the eastern timber wolf outside of Minnesota and Isle Royale, Michigan (USFWS 1992, pp. 24–26). Per the recovery plan, if that population is isolated, it should consist of at least 200 wolves for at least 5 years to be considered viable. The populations in Wisconsin and Michigan (although not isolated) have been above 200 for about 20 years (since 1998–1999 in Wisconsin, and since 1999–2000 in Michigan); therefore, they have met the recovery criteria for an isolated population.

Comment 124: One commenter felt that wolves should remain federally protected on all Federal lands in the western Great Lakes. Other commenters indicated we failed to analyze forest management plans in Michigan, Minnesota, and Wisconsin and how those plans affect wolves through livestock grazing, maintenance of prey populations, and regulation of hunting and trapping activities. One of these commenters further opined that we should have analyzed plans

of every other Federal agency in the Midwest, and must evaluate every rule and regulation that may affect wolves and their habitat.

Our Response: Different Federal land management agencies have varied missions that guide the use of their lands, and some Federal lands play an essential role in wolf recovery. However, maintaining Federal protections for wolves on Federal lands is not necessary for the continued viability of wolves in the Great Lakes region. Unregulated take, inclusive of targeted poisoning across all land ownerships, was the primary factor leading to the near extirpation of wolves across the lower 48 United States. In addition to protections afforded by the Act, changes in State and Federal rules and regulations that provided regulatory mechanisms that prevented or limited take and prosecuted illegal take of wolves have allowed for the conservation and recovery of the gray wolf in the lower 48 United States to a level that warrants removal of both gray wolf listed entities from the Federal List of Endangered and Threatened Wildlife. For further information, see *Management on Federal Lands* section of this rule.

Comment 125: Several commenters noted that killing predators for sport or trophy hunts is morally and ethically wrong, and will threaten the viability of wolf populations post-delisting. One commenter objected to the use of hounds to legally harvest a wolf in Wisconsin when wolves were delisted.

Our Response: We recognize that many find some or all forms of human-caused wolf mortality ethically and morally objectionable. We have encouraged hunting as a long-term strategy to conserve wolf populations because it is a valuable, efficient, and cost-effective tool to help manage many wildlife populations (Bangs et al. 2009, p. 113). However, the methods that may be used to legally harvest wolves after delisting are not relevant to our analysis. The Act

requires that we make listing determinations based on whether the species meets the definition of a threatened species or an endangered species because of the five statutory factors. The manner in which individuals may be harvested post-delisting is not a factor we consider, unless it would affect the viability of the species. How wolves may be legally harvested post-delisting will be subject to State authority and regulation. Based on the available information, we do not find any persuasive information to indicate that the manner in which wolves may be harvested will affect their viability in the lower 48 United States.

Comment 126: One commenter indicated that, without protection provided by the Act, wolves will have a more difficult time establishing a population in California. The commenter stated that the Service failed to consider threats to gray wolves from "other manmade factors," specifically illegal killing and poaching.

Our Response: Our March 15, 2019, proposed rule and this final rule address human-caused mortality, as do multiple responses to comments from peer reviewers and State agencies (see *Human-Caused Mortality* section of this final rule and **Our Responses** to **Comments 15, 18,** and **52**. Our analysis of threats sufficiently considers "other manmade factors," including illegal killing and poaching.

Comment 127: One commenter stated that, while the Wisconsin population management goal of 350 wolves is above the goal required for Federal delisting, that goal was generally considered "unscientific and outdated" by Wisconsin wildlife professionals. The commenter stated that a goal of 650 was considered "more reasonable" and "realistic," and relatively "better" than the alternatives presented. The commenter further opined that the previous wolf management goal of 350 should be reevaluated, as it is no longer compatible with the scientific

understanding of wolf biological carrying capacity or human attitudes and tolerance of wolves in the State.

Our Response: After delisting, the States will be responsible for setting specific wolf management goals. Thus, Wisconsin may decide to manage for a higher number of wolves following delisting. For the purposes of this delisting determination, we evaluate whether wolves are endangered or likely to become endangered in the foreseeable future throughout all or a significant portion of their range. In that context, we considered all aspects of the Wisconsin Wolf Management Plan, including that they would manage for a minimum of 350 wolves in the State, and whether that, in combination with management in the rest of the entity evaluated, would maintain wolves such that they are not endangered or likely to become endangered in the foreseeable future throughout all or a significant portion of their range.

Comment 128: Several commenters expressed concern that the States would implement a public harvest or recreational hunting after wolves are federally delisted. Others commented that they support a public harvest or recreational hunting.

Our Response: Unregulated killing (specifically, killing through the use of poisons and government bounties) was the primary threat to the gray wolf in the lower 48 United States historically. Current rules and regulations as well as State management plans that will be implemented after delisting provide protection from unregulated killing. For the purposes of this rule, we are not required to decide whether a regulated harvest is an appropriate management tool. Instead, we evaluate whether the use of that management tool may reduce the number of wolves in the gray wolf entities to the extent that they would meet the definition of a threatened species or an endangered species under the Act. As has been observed in the NRM States of

Idaho, Montana, and Wyoming, we conclude that regulated wolf harvest can be carried out in a manner that would not threaten their recovered status.

Comment 129: Several commenters expressed distrust for State wolf protection, based on past State programs aimed at wolf eradication. Another commenter noted that delisting is based in part on the adequacy of State management plans, without taking into consideration the fact that aspects of these plans have been and will continue to be altered by State legislation. The commenter expressed concern that politically based management is a serious threat to wolves and cannot be underestimated.

Our Response: We acknowledge the past involvement of State and Federal Government agencies in intensive, and largely successful, programs to eradicate wolves. Based on existing State laws and State management plans, as well as the track record of States where wolves have been federally delisted, we conclude that it is appropriate to rely on the States to provide sufficient protection to wolves. We will monitor any changes in regulatory mechanisms affecting the protection or management of wolves, their prey, and their habitat for at least 5 years following delisting and evaluate whether, as a result of those changes, the delisted gray wolf entities meet the definition of a threatened species or an endangered species.

Comment 130: One commenter questioned whether Minnesota, Wisconsin, and Michigan adaptively managed wolves in the past to maintain wolf populations at or above minimum management levels or if it was just written into each State's management plans, and asked whether we analyzed this information.

Our Response: In responding to the comment, we assume that the commenter refers to the period between 2012 and 2014 when wolves were federally delisted in the western Great Lakes and States implemented regulated public harvests. During that time, the States of Minnesota, Wisconsin, and Michigan adaptively managed their respective wolf populations and maintained wolf populations well above minimum management levels defined in their respective management plans. This information is discussed in the **Post-delisting Management** section of the rule for each State. Nonetheless, we further clarify below how the western Great Lake States used an adaptive approach to manage wolf harvest between 2012 and 2014.

Adaptive management may be used to evaluate the effects of a management action to determine if it is being implemented effectively to achieve a desired outcome. In wildlife science, it is an effective method to manage populations when the effect of the management action is unknown or is not well understood, or if managers simply want to take a cautious approach. This allows managers to evaluate population responses over a set time period and then make minor adjustments, if necessary, prior to implementing the management action over another set time period in order to continue working toward the desired management outcome. In the case of wolf harvest in the western Great Lakes, States developed harvest quotas to achieve a management outcome using the best information possible. Managers then evaluated the results of harvest in conjunction with other population metrics obtained through population monitoring efforts, as well as other factors, and made minor adjustments to the following season's harvest regulation. These adjustments were evaluated and made on an annual basis and are likely to be evaluated annually post-delisting.

For example, Minnesota's wolf population objective is to maintain a late-winter wolf population of at least 1,600 wolves. Using the best information available, Minnesota Department

of Natural Resources set a quota of 400 wolves for the first season in 2012, and a total of 413 wolves were harvested. After evaluating the harvest and other factors, the Minnesota Department of Natural Resources decreased the quota to 220 wolves in 2013, and a total of 238 wolves were harvested. Once again, after evaluation, the 2014 quota was raised slightly to 250 wolves, and a total of 272 wolves were harvested. Population estimates indicated wolf numbers fluctuated between 2,200 and 2,400 animals during this time. Thus, harvest had minimal impact on the population, and it remained well above Minnesota's management objective.

Similarly, the Wisconsin Department of Natural Resources designed harvest zones and quotas for the first season in 2012, to begin reducing the population toward the management goal of 350 wolves off reservation lands, while concurrently directing harvest to areas with the greatest number of wolf-related conflicts. Although seasons were designed using a total quota system, separate quotas were developed for lands on and off reservations in the State. In 2012, a quota of 201 wolves (116 off reservation; 85 on reservation) was set, and a total of 117 wolves were harvested, all of which were taken off reservation lands. Harvest quotas were adjusted for the start of the 2013 season with a quota of 275 wolves (251 off reservation; 24 on reservation), and a total of 257 wolves were harvested, all of which were taken, again, off reservation lands. After evaluating harvest and population metrics, the 2014 quota was reduced to 156 wolves (150 off reservation; 6 on reservation), and 154 wolves were harvested (all off reservation lands). Meanwhile, between 2012 and 2015, Wisconsin's wolf population was estimated to be 815 and 746, respectively. Although this represented an 8 percent decline, the Wisconsin Department of Natural Resources partially achieved their objective of reducing wolf abundance while maintaining wolf populations well above State management goals.

The Michigan Department of Natural Resources implemented public harvest of wolves during the 2013 season only, and a total of 22 wolves were harvested during the season. Although the effect of harvest may have been evaluated by Michigan Department of Natural Resources biologists, no changes were implemented since no seasons occurred in subsequent years.

Post-delisting Monitoring

Comment 131: A few commenters urged the Service to update the 2008 post-delisting monitoring plan.

Our Response: The post-delisting monitoring plan that was developed in 2008 for wolves in the Great Lakes area is adequate under section 4(g)(1) of the Act and remains applicable today (for more information, see **Post-delisting Monitoring**). The post-delisting monitoring plan for wolves in the Great Lakes area relies on a continuation of State monitoring activities, similar to those that have been conducted by Minnesota, Wisconsin, and Michigan Departments of Natural Resources in recent years, and Tribal monitoring. Minnesota, Wisconsin, and Michigan Departments of Natural Resources have monitored wolves for several decades with significant assistance from numerous partners, including the U.S. Forest Service, National Park Service, Wildlife Services, Tribal natural resource agencies, and the Service. To maximize comparability of future post-delisting monitoring data with data obtained before delisting, all three State Departments of Natural Resources have committed to continue their previous wolf-population-monitoring methodology, or to make changes only if they will not reduce the comparability of pre- and post-delisting data.

General

Comment 132: A few commenters noted that the Federal Government has a public trust responsibility to maintain wolves for future generations and the ecosystem functions they support, and, generally, to preserve our Nation's heritage.

Our Response: Our responsibilities with respect to wolves and other listed species are not defined by general principles of public trust, but by the requirements of the Act. As a result of the efforts of many partners in the private and public sector to conserve, protect, and enhance gray wolf populations, the gray wolf entities evaluated in this rule do not qualify for protection under the Act.

Comment 133: One commenter submitted a petition for reclassification of gray wolves in the lower 48 United States. In this petition, they request that we determine the listing status of gray wolves (1) in the lower 48 United States, or (2) in two entities: the Eastern United States and the Western United States, or (3) in four entities: the U.S. West Coast region, the southern Rocky Mountains, the Northeastern United States, and the Midwestern United States. It is the same petition the commenter submitted directly to us on December 17, 2018, and supplemented on February 26, 2019, prior to the publication of our proposal (84 FR 9648, March 15, 2019) for this final rule.

Our Response: We have addressed the petition, as a separate action, elsewhere in this document (see **Evaluation of a Petition to Revise the Listings for the Gray Wolf Under the Act**). We reviewed all information submitted with the petition and incorporated information, as appropriate, into this final rule.

Policy

Comment 134: One commenter asserted that wolves are an "endangered species" or "threatened species" because they inhabit only about 15 percent of their historical range, which is not a significant portion of their historical range.

Our Response: The assertion that the gray wolf has not recolonized enough of its range in the lower 48 United States to reach the standard of a significant portion is inconsistent with Service policy because it equates the term "range" in the Act's definitions of "threatened species" and "endangered species" with historical range. (See **Our Response** to **Comment 37**).

Comment 135: One commenter suggested that data collected by the States may be biased against wolves and should therefore be excluded from our analysis. They also stated that our status assessment process for gray wolves is biased in favor of agencies, organizations, and individuals that support the killing of wolves and requested clarification on how agencies, organizations, and individuals are chosen to participate in the process.

Our Response: We are required by the Act to make our determinations based solely on the best scientific and commercial data available. Therefore, we include in our analysis any relevant data collected by the States, Tribes, or members of the public that falls into this category.

To assist us in gathering all available information, we ask all members of the public, including States, Tribes, organizations, and individuals, to submit relevant information to us for our consideration. The Act requires us to cooperate with the States to "the maximum extent practicable" (16 U.S.C. 1535(a)). However, although we acknowledge the unique positions of

States and our obligation to consult with them, we do not assign different weight to the scientific information that they provide. Rather, we evaluate all information we receive, from all sources, to determine whether it is relevant to our assessment and constitutes the best available scientific and commercial data. For additional information on data collected by States, see **Our Response** to **Comment 120**.

Comment 136: A few commenters stated that combining the two currently listed gray wolf entities, i.e., (1) Minnesota and (2) the lower 48 United States and Mexico outside of Minnesota, excluding the NRM DPS, for evaluation was inappropriate. They argued that combining the entities is arbitrary and not based on science. Some also maintained that we are obligated, through regulations, to assess each of the two entities separately.

Our Response: We clarify in this final rule our reasons for combining the two currently listed *C. lupus* entities for analysis, and our regulations regarding listed entities that are not "species" as defined by the Act (see **The Currently Listed *C. lupus* Entities Do Not Meet the Statutory Definition of a "Species**" and *Why and How We Address Each Configuration of Gray Wolf Entities*). Further, while not required by our regulations, in response to these and other comments we have added separate analyses of the status of each of the two currently listed entities to this rule (See **Approach for this Rule**).

Comment 137: Some commenters questioned our conclusion that West Coast States wolves are not discrete from NRM wolves. They felt that our application of "discreteness" is not consistent with our DPS policy (61 FR 4722, 4725, February 7, 1996), historical information on wolves in the Pacific Northwest, or wolf biology.

Our Response: Our DPS policy states that a population segment of a vertebrate species may be considered discrete if 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." We conducted a detailed analysis of the discreteness of "Pacific Northwest" wolves (wolves in the West Coast States portion of the combined listed entity and 44-State entity) in our 2013 status review for gray wolves in the Pacific Northwest (78 FR 35709–35713, June 13, 2013). This included analysis of discreteness based on physical, physiological, ecological, and behavioral factors and included analysis of historical information on wolves in the region. We concluded that wolves in the West Coast States are not discrete from wolves in the NRM DPS. Recent scientific information only confirms our 2013 conclusion. Wolf numbers on both sides of the NRM DPS boundary in Washington, Oregon, and California continue to increase, and wolf range in the West Coast States continues to expand (USFWS 2020, p. 28, Appendix 2). Also, data from collared wolves, as well as genetic analyses, show wolves are dispersing between West Coast States where gray wolves are federally protected (California, western Oregon, and western Washington) and the NRM where wolves are delisted (Idaho, Montana, Wyoming, eastern Oregon, eastern Washington, and north-central Utah) (USFWS 2020, pp. 5, 17–18, 28). Moreover, recent genetic research shows that most wolves in Washington and Oregon are dispersers from the NRM or descendants of those dispersers (Hendricks *et al*. 2018, entire). Thus, the best available information indicates that wolves in the West Coast States portion of the combined listed entity (and 44-State entity) are not discrete from NRM wolves.

Comment 138: Referring to statements in the **Approach for This Proposed Rule** section of our March 15, 2019, proposed rule, one commenter stated that "Pacific Northwest"

wolves (wolves in western Washington, western Oregon, and northern California) harbor genetic ancestry from Pacific coastal rainforest wolves not present in the northern Rocky Mountains and are not, therefore, simply an extension of the NRM population.

Our Response: Wolves with Pacific coastal wolf genetic ancestry have been reported from both the NRM DPS and the West Coast States. See **Our Response** to **Comment 43**.

Comment 139: One commenter indicated that the proposed rule requires further environmental assessment under the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 et seq.).

Our Response: As noted in the March 15, 2019, proposed rule, NEPA does not apply to our actions taken pursuant to section 4(a) of the Act (i.e., listings, delistings, and reclassifications). Thus, we are not required to prepare an environmental assessment or environmental impact statement, or otherwise meet the requirements of NEPA, before issuing this final rule. A notice outlining the Service's reasons for this determination was published in the *Federal Register* on October 25, 1983 (48 FR 49244).

Comment 140: One commenter indicated that a lack of reliable data precludes us from making a finding on the status of the gray wolves.

Our Response: The Act instructs us to make our determinations based on the best scientific and commercial data available. We cannot await the development of additional scientific information; rather, we must act on the basis of the data currently available to us. Moreover, we disagree with the commenter that we lack sufficient reliable data to support our

determination. Wolves are among the most studied mammals in the world. A great deal of reliable information exists on their ecology and population dynamics.

Comment 141: Several commenters questioned our SPR analysis. Some thought our SPR analysis was inadequate or inconsistent with case law because they believed we relied on the viability of the Great Lakes metapopulation to render all other portions insignificant, or because we did not assess areas of unoccupied historical range to determine if they are significant portions of the range of the combined listed entity. Some disagreed with our conclusions, providing arguments for why they believed specific portions were significant and in danger of extinction. Commenters focused mainly on the West Coast States portion and specific areas of unoccupied historical range.

Our Response: To determine whether any portions of the entity's range may be significant, and thus warrant further consideration in our SPR analysis, we evaluated whether any portions could be considered significant under any reasonable definition of "significant." We asked whether any portions of the range may be biologically meaningful in terms of the resiliency, redundancy, or representation of the entity being evaluated. This approach is consistent with the Act, our implementing regulations, our policies, and case law.

As explained in this rule, we consider the term "range" in the SPR phrase to be the area occupied by the species at the time we make our determination (see **Our Response** to **Comment 37**). Thus, we did not evaluate portions of unoccupied historical range in our SPR analysis. We also did not rely on the viability of the Great Lakes portion to determine whether portions might be significant. Rather, we determined whether any portions may be significant by looking at

whether they may be biologically meaningful in terms of the resiliency, redundancy, or representation of the entity being evaluated (see *Determination of Species Status*).

Comment 142: One commenter stated that the Washington Wolf Plan lacks regulatory assurances or binding commitments that we could reasonably rely upon to know how the Washington Department of Fish and Wildlife intends to manage wolves into the future. They also noted that the Washington Department of Fish and Wildlife is embarking on a State-level Environmental Policy Act process to consider potential changes to the Washington Wolf Plan and its guidance for wolf management in Washington. The commenter contended that this process could lead to fundamental changes to how Washington manages wolves, especially in a post-Federal listing environment, giving the Service no regulatory assurances as to whether gray wolves will be responsibly managed in Washington after a Federal delisting decision. The commenter believed this to be a clear violation of the Act.

Our Response: The commenter presents no information that would indicate that Washington is likely to abandon wolf recovery. To the contrary, Washington has been proactive in managing the recolonization of wolves. The State developed a science-based conservation and management plan that has been implemented since 2011. The plan was developed with the assistance of a 17-member citizen advisory wolf working group over nearly 5 years (2007–2011). The process included extensive public review (23 public meetings and nearly 65,000 comments submitted) and a blind scientific peer review. The Washington Fish and Wildlife Commission unanimously adopted the plan in December 2011. The purpose of the more recent planning effort, referenced by the commenter, is to proactively identify how Washington Department of Fish and Wildlife will manage wolves to ensure their continued conservation once

they are removed from the State's endangered species list. The Department is being proactive in seeking public input in designing their post-delisting management strategy. Following Federal delisting, wolves will retain regulatory protections under Washington State law (Revised Code of Washington 77.15.120; Washington Administrative Code 220–610–010) until they meet their State recovery criteria and are delisted by the Washington Department of Fish and Wildlife. As explained elsewhere in this rule, we find those regulatory protections to be sufficient to conserve wolves after delisting.

Evaluation of a Petition To Revise the Listings for the Gray Wolf Under the Act

Background

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations in title 50 of the Code of Federal Regulations (50 CFR part 424) set forth the procedures for adding species to, removing species from, or reclassifying species on the Federal Lists of Endangered and Threatened Wildlife and Plants (Lists or List) in 50 CFR part 17. Section 4(b)(3)(A) of the Act requires that we make a finding on whether a petition to add a species to the List (i.e., "list" a species), remove a species from the List (i.e., "delist" a species), or change a listed species' status from endangered to threatened or from threatened to endangered (i.e., "reclassify" a species) presents substantial scientific or commercial information indicating that the petitioned action may be warranted. To the maximum extent practicable, we are to make this finding within 90 days of our receipt of the petition and publish the finding promptly in the *Federal Register*.

Our regulations establish that substantial scientific or commercial information with regard to a 90-day petition finding refers to "credible scientific or commercial information in support of the petition's claims such that a reasonable person conducting an impartial scientific

review would conclude that the action proposed in the petition may be warranted" (50 CFR 424.14(h)(1)(i)).

A species may be determined to be an endangered species or a threatened species because of one or more of the five factors described in section 4(a)(1) of the Act (16 U.S.C. 1533(a)(1)). The five factors are:

(a) The present or threatened destruction, modification, or curtailment of its habitat or range (Factor A);

(b) Overutilization for commercial, recreational, scientific, or educational purposes (Factor B);

(c) Disease or predation (Factor C);

(d) The inadequacy of existing regulatory mechanisms (Factor D); and

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

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

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

not be sufficient to compel a finding that the information in the petition is substantial information indicating that the petitioned action may be warranted. The information presented in the petition must include evidence sufficient to suggest that these threats may be affecting the species to the point that the species may meet the definition of an endangered species or threatened species under the Act.

If we find that a petition presents such information, our subsequent status review will evaluate all identified threats by considering the individual-, population-, and species-level effects and the expected response by the species. We will evaluate individual threats and their expected effects on the species, then analyze the cumulative effect 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 are expected to have positive effects on the species—such as any existing regulatory mechanisms or conservation efforts that may ameliorate threats. It is only after conducting this cumulative analysis of threats and the actions that may ameliorate them, and the expected effect on the species now and in the foreseeable future, that we can determine whether the species meets the definition of an endangered species or threatened species under the Act. If we find that a petition presents substantial scientific or commercial information indicating that the petitioned action may be warranted, the Act requires that we promptly commence a review of the status of the species, and we will subsequently complete a status review in accordance with our prioritization methodology for 12-month findings (81 FR 49248, July 27, 2016).

Species and Range

The gray wolf (*Canis lupus*) is currently listed as: (1) threatened in Minnesota; and (2) endangered in all or portions of 44 of the contiguous United States. The petition includes three

alternatives, each representing a separate petitioned action, for revising the currently listed gray wolf entities. Each of the alternatives involve splitting and/or combining the gray wolf in the lower 48 United States into DPSs, and all exclude the Mexican wolf subspecies. Two of the alternatives involve relisting gray wolves in the Northern Rocky Mountains. Because each alternative represents a separate petitioned action, we evaluated them separately.

1. lower-48 DPS—list as threatened; or
2. Western and Eastern DPSs—both list both as threatened; or
3. Northern Rocky Mountains (NRM) DPS—remain delisted,

   Midwest DPS—list as threatened,

   West Coast DPS—list as endangered,

   Southern Rockies DPS—list as endangered, and

   Northeast DPSs – list as endangered.

Petition History

On December 17, 2018, we received a petition from the Center for Biological Diversity and the Humane Society of the United States, requesting that the existing listing for gray wolf be revised. The petition clearly identified itself as such and included the requisite identification information for the petitioners, required at 50 CFR 424.14(c). Additional supporting materials required under 50 CFR 424.14(b) were received on February 26, 2019. This finding addresses the petition.

Findings

Alternatives 1 and 2

We reviewed the petition, sources cited in the petition, and other readily available information. We considered the factors under section 4(a)(1) and assessed the cumulative effect that the threats identified within the factors may have on the species now and in the foreseeable future. We considered a "threat" as any action or condition that may be known to, or is reasonably likely to, negatively affect individuals of a species. This includes those actions or conditions that may have a direct impact on individuals, as well as those that may affect individuals through alteration of their habitat or required resources. The mere identification of threats is not sufficient to constitute substantial information indicating that revising the current gray wolf listed entities may be warranted. Based on our review of the petition, sources cited in the petition, and other readily available information, regarding development and unoccupied suitable habitat (Factor A), human-caused mortality and mortality rates (Factor B), disease (Factor C), and reduced genetic diversity (Factor E), we find that the petition does not provide substantial scientific or commercial information indicating that revising the listings for the gray wolf (*Canis lupus*) to: (1) a threatened lower-48 DPS; or (2) threatened Western and Eastern DPSs may be warranted.

Alternative 3

Based on our review of the petition, sources cited in the petition, and other readily available information, we find that the petition does not provide substantial scientific or commercial information indicating that the West Coast, Southern Rockies, or Northeast gray wolf petitioned entities may qualify as DPSs and, therefore, that they may be listable entities under the Act. Although we find the petition provides substantial information indicating that the

Midwest population may qualify as a valid DPS, we do not undertake further evaluation of Alternative 3 because the petitioners failed to present substantial information for us to conclude that this entire set of petitioned entities, comprising five DPSs (including the currently delisted NRM DPS), is a valid option for revising the current gray wolf (*Canis lupus*) listed entities. Petitioners presented substantial information only with respect to a Midwest DPS of gray wolf, and did not present any information that would allow us to evaluate whether the remainder of the currently listed 44-State entity may be a listable entity and, if so, whether it may warrant listing as threatened or endangered. Finally, we would reach this same conclusion even if the petitioner had provided substantial information that the Southern Rockies petitioned entity may qualify as a valid listable entity under the Act.

The basis for our findings on this petition, and other information regarding our review of the petition, can be found as an appendix at *http://www.regulations.gov* under Docket No. FWS–HQ–ES–2018–0097 under the Supporting Documents section.

Determination of Species Status

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of an "endangered species" or a "threatened species". The Act defines endangered species as a species "in danger of extinction throughout all or a significant portion of its range," and a threatened species as a species "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." For a more detailed discussion on the factors considered when determining whether a species meets the definition of an endangered species or

a threatened species and our analysis on how we determine the foreseeable future in making these decisions, see **Regulatory Framework**.

If we determine that any of the entities evaluated in this rule are not in danger of extinction now or likely to become so in the foreseeable future throughout all of its range, we then 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[6]— 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. Depending on the case, it might be more efficient for us to address the "significance" question or the "status" question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species' range.

Currently Listed Entities

Minnesota: Determination of Status Throughout All of Its Range

When wolves in Minnesota were first listed under the Act in 1974, there were approximately 750 wolves occupying the northeast corner of the State. The primary cause of the decline of wolves was targeted elimination by humans. However, gray wolves are highly adaptable; their populations are remarkably resilient as long as prey availability, habitat, and regulation of human-caused mortality are adequate. Wolf populations can rapidly overcome

[6]"Portion of its range" refers to the members of the species that occur in a particular geographic area of the species' current range (not the habitat in which those members occur). This is because, while "portion of the range" is part of the species' range (i.e., a geographical area), when we evaluate a significant portion of its range, we consider the contribution of the individuals in that portion.

severe disruptions, such as pervasive human-caused mortality or disease, once those disruptions are removed or reduced.

With the protections of the Act, gray wolves began to increase in numbers and expand their range in Minnesota; because of this progress toward recovery, they were reclassified as a threatened species in 1978. Since that time, the number of wolves and the overall extent of their range in Minnesota have increased further; wolves in Minnesota now exist as a large, stable population of about 2,655 individuals that are biologically connected to expansive and robust populations in Canada and adjacent States of Wisconsin and Michigan.

To sustain populations over time, a species must have a sufficient number and distribution of healthy populations to withstand annual variation in its environment (resiliency), novel changes in its biological and physical environment (representation), and catastrophes (redundancy) (Shaffer and Stein 2000, pp. 308–311; Smith et al. 2018, p. 304). A species with a sufficient number and distribution of healthy populations is generally better able to adapt to future changes and to tolerate stressors (factors that cause a negative effect to a species or its habitat).

Wolves in Minnesota are highly abundant, have a stable trend (USFWS 2020, pp. 20–22 and Appendix 1), and are broadly distributed throughout high-quality habitat in the State (see Great Lakes Area Suitable Habitat—MN discussion). Their high reproductive potential (USFWS 2020, p. 8) enables them to withstand high mortality levels and their ability to disperse long distances allows them to quickly expand and recolonize vacant habitats (USFWS 2020, p. 7). Wolves are also highly adaptable animals; they are able to inhabit and survive in a variety of habitats and are efficient at shifting their prey to exploit available food resources (USFWS 2020, p. 6). Furthermore, wolves in Minnesota do not function as an isolated population occurring only

within the boundaries of the State. They are interconnected with the large, expansive population of wolves in Canada and with wolves in Wisconsin and Michigan (USFWS 2020, p. 28). Populations that are connected to and interact with other populations of the same species (metapopulations) are 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 (USFWS 1994, appendix 9). This security arises because adverse effects experienced by one of its subpopulations resulting from genetic drift, demographic shifts, and local environmental fluctuations can be asynchronous and countered by occasional influxes of individuals from other subpopulations in the metapopulation, which can increase or better maintain genetic diversity. Thus, the high levels of genetic diversity evident in Minnesota wolves (see discussion under Genetic Diversity and Inbreeding) are supported through interconnections with wolves in Canada and neighboring States. This genetic diversity provides wolves in Minnesota with a greater ability to adapt to both short-term and long-term changes in their environment.

Wolves in Minnesota are highly resilient to perturbations because of their abundance and broad distribution across high-quality habitat in the State. Biological factors also play an important part in the resiliency of wolves in Minnesota, namely their high reproductive capacity and genetic diversity. Those factors provide resiliency in the face of stochastic variability (annual environmental fluctuations, periodic disturbances, and impacts of anthropogenic stressors). Life-history characteristics of the wolf, including high dispersal capability and adaptability, along with the high genetic diversity evident in Minnesota wolves, provides sufficient adaptive capacity such that their long-term survival in the State is assured. Additionally, catastrophic events have not affected wolf populations at a State-wide scale in Minnesota, and we found no

indication that these events would impact the long-term survival of wolves throughout this State in the future.

The recovery of wolves in Minnesota is attributable primarily to successful interagency cooperation in the management of human-caused mortality. That mortality is the most significant barrier to the long-term conservation of wolves. Therefore, this source of mortality remains the primary challenge in managing the wolf population to maintain its recovered status into the foreseeable future. Legal harvest and agency control to mitigate depredations on livestock are the primary human-caused mortality factors that managers can manipulate to achieve management objectives and minimize depredation risk associated with repeated conflicts, respectively, once delisting occurs. Wolves in Minnesota now greatly exceed the recovery criteria in the revised recovery plan that the Minnesota population must be stable or growing and its continued survival be assured, with a population goal of 1,251–1,400 wolves. As a result, we can expect to see some reduction in wolf populations in Minnesota as managers begin to institute management strategies with the objective of stabilizing or reversing population growth while continuing to maintain wolf populations well above Federal recovery criteria.

Using an adaptive-management approach that adjusts harvest based on population estimates and trends, the initial objectives of the State may be to reduce wolf populations and then manage for sustainable populations, similar to how States manage all other game species.

Based on our analysis, we conclude that Minnesota will maintain an abundant and well-distributed wolf population that will remain above recovery levels for the foreseeable future, and that the threat of human-caused mortality has been sufficiently addressed. The State of Minnesota has wolf-management laws, plans, and regulations that adequately regulate human-caused mortality. The State has committed to manage its wolf population at or above recovery

levels, has recently demonstrated this commitment, and expect this commitment to continue into the foreseeable future. Adequate wolf-monitoring programs, as described in the State wolf-management plan, are likely to identify high mortality rates or low birth rates that warrant corrective action by the management agency. Based on our review, we conclude that regulatory mechanisms in Minnesota are adequate to maintain the recovered status of wolves in the State once they are federally delisted.

Based on the biology of wolves and our analysis of threats, we conclude that wolf populations in Minnesota will continue to be maintained at or above identified recovery levels. As a result, wolf biology (namely the species' reproductive capacity, adaptability, and dispersal ability) and the availability of large, secure blocks of suitable habitat within the occupied areas will ensure the maintenance of populations capable of withstanding all other foreseeable threats. The amount and distribution of occupied wolf habitat currently provides, and will continue to provide into the foreseeable future, large core areas that contain high-quality habitat of sufficient size and with sufficient prey to support a recovered wolf population. Our analysis of land management shows these areas, specifically Minnesota wolf management zone A, will maintain their suitability into the foreseeable future. Therefore, we conclude that, Minnesota contains a sufficient amount of high-quality wolf habitat to support wolf populations above recovery levels into the future.

While disease and parasites can temporarily affect individuals, specific packs, or small, isolated populations (e.g., Isle Royale), seldom do they pose a significant threat to large wolf populations, such as those that occur in Minnesota. As long as wolf populations are managed above recovery levels, these factors are not likely to threaten the viability of the wolf population in Minnesota at any point in the foreseeable future. Climate change is also likely to remain an

insignificant factor affecting the population dynamics of wolves into the foreseeable future, due to the adaptability of the species. Finally, based on our analysis, we conclude that cumulative effects of threats do not now, nor are likely to within the foreseeable future, threaten the viability of wolves throughout their range in Minnesota.

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to wolves in Minnesota. We evaluated the status of wolves in Minnesota and assessed the factors likely to negatively affect them, including threats identified at listing, at the time of reclassification, now, and into the foreseeable future. The best available information indicates that wolves in Minnesota are recovered and do not meet the definition of an endangered species or a threatened species because of any one or a combination of the five factors set forth in the Act.

Specifically, we have determined, based on the best available information, that human-caused mortality (Factor C); habitat and prey availability (Factor A); disease and parasites (Factor C); genetic diversity and inbreeding (Factor E); commercial, recreational, scientific, or educational uses (Factor B); climate change (Factor E); or other threats, singly or in combination, are not of sufficient imminence, intensity, or magnitude to indicate that wolves in Minnesota are in danger of extinction or likely to become so within the foreseeable future throughout all of their range. We have also determined that ongoing effects of recovery efforts, which resulted in a significant expansion of the occupied range of and number of wolves in Minnesota over the past decades, in conjunction with State, Tribal, and Federal agency wolf management and regulatory mechanisms that will be in place following delisting across their occupied range, will be adequate to ensure the conservation of wolves in Minnesota. These activities will maintain an adequate prey base, preserve denning and rendezvous sites, monitor disease, restrict human take,

and maintain wolf populations well above the recovery criteria established in the revised recovery plan (USFWS 1992, pp. 25–28).

We have identified the best available scientific studies and information assessing human-caused mortality; habitat and prey availability; the impacts of disease and parasites; commercial, recreational, scientific, or educational uses; gray wolf adaptability, including with respect to changing climate; recovery activities and regulatory mechanisms that will be in place following delisting; and predictions about how these may affect wolves in Minnesota in making determinations about their future status, and we conclude that it is reasonable to rely on these sources. Therefore, after assessing the best available information, we have determined that wolves in Minnesota are not in danger of extinction throughout all of their range, nor are they likely to become so in the foreseeable future.

Because we determined that wolves in Minnesota are not in danger of extinction or likely to become so in the foreseeable future throughout all of their range, we will consider whether there are any significant portions of their range in Minnesota that are in danger of extinction or likely to become so in the foreseeable future.

Minnesota: Determination of Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species warrants listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range (SPR). Having determined that wolves in Minnesota are not in danger of extinction now or likely to become so in the foreseeable future throughout all of their range in Minnesota, we now consider whether they may be in danger of extinction or likely to become so in the foreseeable future in a significant portion of their range in Minnesota.

After reviewing the biology of and potential threats of wolves in Minnesota, we have not identified any portions of the State for which both (1) gray wolves may be in danger of extinction or likely to become so in the foreseeable future (i.e., areas in which threats may be concentrated) and (2) the portion may be significant. While some portions may be at increased risk from human-caused mortality or factors related to small numbers, we did not find that any of these portions may be significant. We provide our analysis below.

First, portions outside the core wolf range in northern Minnesota may be at greater risk from human-caused mortality or from factors related to small numbers of individuals. However, these portions are not biologically meaningful in terms of their contribution to the resiliency, redundancy, or representation of wolves in Minnesota because they contain only lone dispersers from the core wolf range that are not members of established breeding packs. Thus, they do not contribute to the overall demographic or genetic health of the Minnesota population and they lack genetic or ecological uniqueness relative to other wolves in Minnesota. Therefore, we find that these portions are not "significant" under any reasonable definition of that term because they are not biologically meaningful to the Minnesota entity in terms of its resiliency, redundancy, or representation.

Second, the State wolf-management zone (Zone B) in which post-delisting depredation control would be allowed under a broader set of circumstances than in the core population zone, and, thus, would likely experience higher levels of human-caused mortality upon delisting, is not significant under any reasonable definition of "significant." The wolves in this zone occur on the periphery of the large core population, occur in areas of limited habitat suitability, and do not contribute appreciably to (and are thus not biologically meaningful to) the resiliency, redundancy, or representation of the Minnesota entity.

Wolves in this higher intensity management zone are not meaningful to the resiliency of the Minnesota entity because they constitute a small proportion of wolves in Minnesota (Zone B contains about 15 percent of the Minnesota wolf population). Thus, wolves in the higher intensity management zone do not contribute meaningfully to the ability of wolves in Minnesota to withstand stochastic processes.

Likewise, the higher intensity management zone is not meaningful to the redundancy of the Minnesota entity because wolves in this zone represent a relatively small number and distribution of wolves in Minnesota and catastrophic events have not affected wolf populations at a State-wide scale in Minnesota, and we found no indication that these events would impact the long-term survival of wolves throughout this State in the future.. Thus, wolves in the higher intensity management zone do not contribute meaningfully to the ability of wolves in Minnesota to withstand catastrophic events. Wolves in the higher intensity management zone are not meaningful to the representation of wolves in Minnesota because they are genetically similar to other wolves in the core area of Minnesota and because gray wolves are a highly adaptable generalist species with high dispersal capability, thus allowing them to adapt to changing environmental conditions. Therefore, we do not find that these portions may be significant under any reasonable definition of "significant" because they are not biologically meaningful to wolves in Minnesota in terms of resiliency, redundancy, or representation.

Minnesota: Final Determination

After a thorough review of all available information and an evaluation of the five factors specified in section 4(a)(1) of the Act, as well as consideration of the definitions of "threatened species" and "endangered species" contained in the Act and the reasons for delisting as specified at 50 CFR 424.11(e), we conclude that removing the gray wolf (*Canis lupus*) in Minnesota from

the List of Endangered and Threatened Wildlife (50 CFR 17.11) is appropriate. Although this entity is not a species as defined under the Act, e have collectively evaluated the current and potential threats to gray wolves in Minnesota, including those that result from past loss of historical range. Wolves in Minnesota do not meet the definition of a threatened species or an endangered species as a result of the reduction of threats as described in the analysis of threats and are neither currently in danger of extinction, nor likely to become so in the foreseeable future, throughout all or a significant portion of their range within the State.

44-State Entity: Determination of Status Throughout All of Its Range

In 1978, when gray wolves were listed in the conterminous States other than Minnesota, there was a small group of wolves on Isle Royale (Michigan) in Lake Superior and perhaps a few individual wolves in northern Michigan and Wisconsin. The primary cause of the decline of wolves in the 44-State entity was targeted elimination by humans. However, gray wolves are highly adaptable; their populations are remarkably resilient as long as prey availability, habitat, and regulation of human-caused mortality are adequate. Wolf populations can rapidly overcome severe disruptions, such as pervasive human-caused mortality or disease, once those disruptions are removed or reduced.

With the protections of the Act, gray wolves began to repopulate Michigan and Wisconsin through expansion of the populations in Minnesota and Canada. Wolves in the 44-State entity now primarily exist as a large, stable to growing, population of about 1,576 individuals in Wisconsin and Michigan that is biologically connected to expansive and robust populations in Canada and the adjacent State of Minnesota. Within the 44-State entity there are also a small number of colonizing wolves in the West Coast States and central Rocky Mountains

that represent the expanding edge of a larger population outside the 44-State entity (in the northern Rocky Mountains and western Canada) (figure 2). We focus our analysis where wolves occur.

The recovery criteria for wolves in the Eastern United States, as outlined in the Eastern Timber Wolf Recovery Plan and Revised Recovery Plan, includes the maintenance of the Minnesota population and reestablishment of at least one viable wolf population within the historical range of the eastern timber wolf outside of Minnesota and Isle Royale, Michigan (see *Recovery Criteria for the Eastern United States*). The viable population outside of Minnesota has been reestablished in Wisconsin and Michigan.

Within the 44-State entity, the wolf population in Wisconsin and Michigan is stable to slightly increasing and currently numbers at least 1,576 (914 in Wisconsin and 695 in Michigan) (USFWS 2020, pp. 21–24 and Appendix 1). Wolves are broadly distributed throughout high-quality habitat in the northern portions of both States (see Great Lakes Area Suitable Habitat—WI and MI discussions). Their high reproductive potential (USFWS 2020, p. 8) enables them to withstand increased levels of human-caused mortality and their ability to disperse long distances allows them to quickly expand and recolonize vacant habitats (USFWS 2020, p. 7). Wolves are also highly adaptable animals; they are able to inhabit and survive in a variety of habitats and take advantage of available food resources (USFWS 2020, p. 6). Furthermore, biologically, wolves in Wisconsin and Michigan do not function as an isolated population. They are interconnected with the large, expansive population of wolves in Canada and with wolves in Minnesota (USFWS 2020, p. 28).

Populations that are connected to and interact with other populations of the same species (metapopulations) are 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 (USFWS 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 asynchronous and countered by occasional influxes of individuals from other subpopulations in the metapopulation, which can increase or better maintain genetic diversity. Thus, the genetic diversity of the wolves in Wisconsin and Michigan (see discussion under Genetic Diversity and Inbreeding) is supported through interconnections with wolves in Canada and neighboring Minnesota. This genetic diversity provides wolves in Wisconsin and Michigan with a greater ability to adapt to both short-term and long-term changes in their environment. A mixture of western gray wolves and eastern wolves in the Great Lakes area may provide additional adaptive capacity (USFWS 2020, pp. 2–3).

Wolves in Wisconsin and Michigan are highly resilient to perturbations because of their abundance and broad distribution across high-quality habitat in these States. Biological factors also play an important part in the resiliency of wolves in Wisconsin and Michigan, namely their high reproductive capacity and genetic diversity. Those factors provide resiliency in the face of stochastic variability (annual environmental fluctuations, periodic disturbances, and impacts of anthropogenic stressors). Life-history characteristics of the wolf, including high dispersal capability and adaptability, along with the high genetic diversity evident in wolves in Wisconsin and Michigan, provides sufficient adaptive capacity such that their long-term survival is assured. Additionally, catastrophic events have not affected wolf populations at a multi-State scale in Wisconsin and Michigan, and we found no indication that these events would impact the long-term survival of wolves throughout these States in the future.

The wolves in Wisconsin and Michigan contain sufficient resiliency, redundancy, and

representation to sustain populations within the 44-State entity over time. Therefore, we conclude that the relatively few wolves that occur within the 44-State entity outside of Wisconsin and Michigan, including those in the West Coast States and central Rocky Mountains as well as lone dispersers in other States, are not necessary for the recovered status of the 44-State entity. However, the viability of the entity is further enhanced by wolves that occur outside of Wisconsin and Michigan. Wolves from the northern Rocky Mountains and western Canada are expanding into the 44-State entity in Oregon, Washington, California, and Colorado (figure 2). With ongoing State management in the NRM DPS, further expansion of wolves into the 44-State entity is likely to continue in the West Coast States and possibly the central Rocky Mountains. Although wolves in these areas would add to resiliency, redundancy, and representation, they are not necessary in order to conserve wolves to the point that they no longer meet the definitions of endangered or threatened under the Act. Furthermore, although having wolves in unoccupied areas could also contribute to resiliency, redundancy, and representation, they are not necessary in order to conserve wolves to the point that they no longer meet the definitions of endangered or threatened under the Act.

The recovery of the 44-State entity is attributable primarily to successful interagency cooperation in the management of human-caused mortality. That mortality is the most significant barrier to the long-term conservation of wolves. Therefore, this source of mortality remains the primary challenge in managing the wolf population to maintain its recovered status into the foreseeable future. Legal harvest and agency control to mitigate depredations on livestock are the primary human-caused mortality factors that management agencies can manipulate to achieve management objectives and minimize depredation risk associated with repeated conflicts, respectively, once delisting occurs.

Wolves in Wisconsin and Michigan now greatly exceed the recovery criteria in the revised recovery plan for a second population outside Minnesota and Isle Royale (for both a population that is connected to Minnesota (at least 100 wolves) and a population that is separated from Minnesota (at least 200 wolves)). As a result, we can expect to see some reduction in wolf populations in Wisconsin and Michigan as those States begin to institute management strategies (such as increased depredation control and wolf-hunting seasons) with the objective of stabilizing or reversing population growth while continuing to maintain wolf populations well above Federal recovery requirements. Using an adaptive-management approach that adjusts harvest based on population estimates and trends, the initial objectives of States may be to reduce wolf populations and then manage for sustainable populations, similar to how States manage all other game species. For example, in 2013–2014, during a period when gray wolves were federally delisted in the Great Lakes area, Wisconsin reduced the State's wolf harvest quota by 43 percent in response to a reduced (compared to the previous year) estimated size of the wolf population. We expect Washington, Oregon and California will manage wolves through appropriate laws and regulations to ensure that the recovery objectives outlined in their respective wolf management plans are achieved, even though wolves in these areas are not necessary in order to conserve wolves to the point that they no longer meet the definitions of endangered or threatened under the Act.

Based on our analysis, we conclude that Wisconsin and Michigan will maintain an abundant and well-distributed wolf population in their States above recovery levels for the foreseeable future, and that the threat of human-caused mortality has been sufficiently reduced. Both States have wolf-management laws, plans, and regulations that adequately regulate human-caused mortality. Each of the States has committed to manage its wolf population at or above

viable population levels (at least 350 in Wisconsin and at least 200 in Michigan; see State Management in Minnesota, Wisconsin, and Michigan), and we do not expect this commitment to change. Adequate wolf-monitoring programs, as described in the State wolf-management plans, are likely to identify high mortality rates or low birth rates that warrant corrective action by the management agencies. Based on our review, we conclude that regulatory mechanisms in both States are adequate to maintain the recovered status of wolves in the 44-State entity once they are federally delisted. Further, while relatively few wolves occur in the west coast portion of the 44-State entity at this time, and State wolf-management plans for Washington, Oregon, and California do not yet include population management goals, these plans include recovery objectives intended to ensure the reestablishment of self-sustaining populations in these States. In addition, we expect wolves in the NRM and western Canada to continue to expand into unoccupied suitable habitats in the Western United States, as envisioned in State wolf conservation and management plans. Although this range expansion would provide for additional redundancy, it is not needed to recover the gray wolf in the 44-State entity.

Based on the biology of wolves and our analysis of threats, we conclude that, as long as wolf populations in Wisconsin and Michigan are maintained at or above identified recovery levels, wolf biology (namely, the species' reproductive capacity) and the availability of large, secure blocks of suitable habitat within the occupied areas will enable the maintenance of populations capable of withstanding all other foreseeable threats. Although much of the historical range of the 44-State entity is no longer occupied, we find that the amount and distribution of occupied wolf habitat currently provides, and will continue to provide into the foreseeable future, large core areas that contain high-quality habitat of sufficient size and with sufficient prey to support a recovered wolf population. Our analysis of land management shows

these areas, specifically Wisconsin Wolf Zone 1 and the Upper Peninsula of Michigan, will maintain their suitability into the foreseeable future. Therefore, we conclude that, despite the loss of large areas of historical range for the 44-State entity, Wisconsin and the Upper Peninsula of Michigan contain a sufficient amount of high-quality wolf habitat to support wolf populations above recovery levels into the future.

While disease and parasites can temporarily affect individuals, specific packs, or small, isolated populations (e.g., Isle Royale), seldom do they pose a significant threat to large wolf populations, such as those found in Wisconsin and Michigan. As long as wolf populations are managed above recovery levels, these factors are not likely to threaten the viability of the wolf population in the 44-State entity at any point in the foreseeable future. Climate change is also likely to remain an insignificant factor affecting the population dynamics of wolves into the foreseeable future, due to the adaptability of the species. Finally, based on our analysis, we conclude that cumulative effects of threats do not now, nor are they likely to within the foreseeable future, threaten the viability of the 44-State entity throughout the range of wolves in the 44-State entity.

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the 44-State entity. We evaluated the status of the 44-State entity and assessed the factors likely to negatively affect it, including threats identified at listing, at the time of reclassification, now, and into the foreseeable future. While wolves in the 44-State entity currently occupy only a portion of wolf historical range, the best available information indicates that the 44-State entity is recovered and does not meet the definition of an endangered species or a threatened species because of any one or a combination of the five factors set forth in the Act.

Specifically, we have determined, based on the best available information, that human-caused mortality (Factor C); habitat and prey availability (Factor A); disease and parasites (Factor C); genetic diversity and inbreeding (Factor E); commercial, recreational, scientific, or educational uses (Factor B); climate change (Factor E); or other threats, singly or in combination, are not of sufficient imminence, intensity, or magnitude to indicate that the 44-State entity is in danger of extinction or likely to become so within the foreseeable future throughout all of its range. We have also determined that ongoing effects of recovery efforts, which resulted in a significant expansion of the occupied range of and number of wolves in the 44-State entity over the past decades, in conjunction with State, Tribal, and Federal agency wolf management and regulatory mechanisms that will be in place following delisting of the entity across its occupied range, will be adequate to ensure the conservation of wolves in the 44-State entity. These activities will maintain an adequate prey base, preserve denning and rendezvous sites, monitor disease, restrict human take, and keep wolf populations well above the recovery criteria established in the revised recovery plan (USFWS 1992, pp. 25–28).

We have identified the best available scientific studies and information assessing human-caused mortality; habitat and prey availability; the impacts of disease and parasites; commercial, recreational, scientific, or educational uses; gray wolf adaptability, including with respect to changing climate; recovery activities and regulatory mechanisms that will be in place following delisting; and predictions about how these may affect the 44-State entity in making determinations about the 44-State entity's future status, and we conclude that it is reasonable to rely on these sources. Therefore, after assessing the best available information, despite the large amount of lost historical range (see **Historical Context of Our Analysis**), we have determined

that the 44-State entity is not in danger of extinction throughout all of its range, nor is it likely to become so in the foreseeable future.

Because we determined that the gray wolf 44-State entity is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, we will consider whether there are any significant portions of its range that are in danger of extinction or likely to become so in the foreseeable future.

44-State Entity: Determination of Status Throughout a Significant Portion of Its Range

After reviewing the biology of the 44-State entity and potential threats, we have not identified any portions of the 44-State entity for which both (1) gray wolves may be in danger of extinction or likely to become so in the foreseeable future (i.e., areas in which threats may be concentrated) and (2) the portion may be significant. We reiterate that "range" refers to the general geographical area within which the species is found at the time of our determination (see ***Definition and Treatment of Range***). "Portion of its range" refers to the members of the species that occur in a particular geographic area of the species' current range. This is because, while "portion of the range" is part of the species' range (i.e., a geographical area), when we evaluate a significant portion of its range, we consider the contribution of the individuals that are in that portion at the time we make a determination. While some portions may be at increased risk from human-caused mortality or factors related to small numbers, we did not find that any of these portions may be significant. We provide our analysis below.

First, portions peripheral to the Wisconsin–Michigan population that may frequently contain lone dispersing wolves (e.g., the Lower Peninsula of Michigan, eastern North and South Dakota) or may contain few wolves (e.g., Isle Royale) may be at greater risk from human-caused mortality or from factors related to small numbers of individuals. However, these portions are

not biologically meaningful to the 44-State entity in terms of resiliency, redundancy, or representation because they contain only lone dispersers from the core wolf range or few or no breeding pairs. Thus, they do not contribute to the overall demographic or genetic diversity of the Wisconsin–Michigan population and they lack genetic or ecological uniqueness relative to other wolves in the States. Therefore, we find that these portions are not "significant" under any reasonable definition of that term because they are not biologically meaningful to the 44-State entity in terms of its resiliency, redundancy, or representation.

Second, State wolf-management zones in which post-delisting depredation control would be allowed under a broader set of circumstances than in core population zones (and, thus, would likely experience higher levels of human-caused mortality upon the 44-State entity's delisting), such as Wisconsin Wolf Management Zones 3 and 4, are not significant under any reasonable definition of "significant." The wolves in these zones occur on the periphery of a large population (the Wisconsin–Michigan population), occur in areas of limited habitat suitability, and do not contribute appreciably to (and are thus not biologically meaningful to) the resiliency, redundancy, or representation of the 44-State entity.

Wolves in these higher intensity management zones are not meaningful to the resiliency of the 44-State entity because, even though they contain multiple established packs in addition to lone wolves, they constitute a small proportion of wolves in the Wisconsin–Michigan population and, consequently, the 44-State entity (Zones 3 and 4 contain about 6 percent of the Wisconsin wolf population). Upon delisting, a large population of wolves will still exist in Wisconsin and Michigan outside of these areas. Thus, wolves in these higher intensity management zones do not contribute meaningfully to ability of wolves in the 44-State entity to withstand stochastic processes.

Likewise, these higher intensity management zones are not meaningful to the redundancy of the 44-State entity because wolves in these zones represent a relatively small number and distribution of populations or packs in Wisconsin and Michigan and catastrophic events have not affected wolf populations at a multi-State scale in Wisconsin and Michigan, and we found no indication that these events would impact the long-term survival of wolves throughout these two States in the future. Thus, wolves in these higher intensity management zones do not contribute meaningfully to the ability of the Wisconsin–Michigan population, or 44-State entity, to withstand catastrophic events.

Finally, wolves in these higher intensity management zones are not meaningful to the representation of the 44-State entity because they are genetically similar to other wolves in the Wisconsin–Michigan area of the 44-State entity and because gray wolves are a highly adaptable generalist species with high dispersal capability, thus allowing them to adapt to changing environmental conditions. Therefore, we do not find that these portions may be significant under any reasonable definition of "significant" because they are not biologically meaningful to the 44-State entity in terms of its resiliency, redundancy, or representation.

Third, the small number of wolves occurring in the West Coast States and the central Rocky Mountains are not a significant portion of the 44-State entity. Our evaluation of whether any portions of the range may be "significant" is a biological inquiry. We consider whether any portions are biologically meaningful in terms of the resiliency, redundancy, or representation of gray wolves in the 44-State entity. When the gray wolf was listed in 1978, there were about 1,200 wolves in Minnesota, and those wolves later expanded into Wisconsin and Michigan (USFWS 2020, pp. 20–23). Unlike wolves that are dispersing from the Great Lakes metapopulation, the wolves that are presently found in the West Coast States and the central

Rocky Mountains originated primarily from the NRM wolves (USFWS 2020, pp. 3–5). As the delisted NRM population has continued to expand under State management, those wolves have moved into California, Oregon, and Washington, and most recently into Colorado. Those wolves are not connected biologically to the core populations in the 44-State entity, and are not biologically "significant" to this entity.

We acknowledge that both the West Coast States and central Rocky Mountains portions of the 44-State entity may be at greater risk from human-caused mortality or from factors related to small numbers of individuals. However, wolves in these portions are not meaningful to the redundancy or resiliency of the 44-State entity because they occur in small numbers and include relatively few breeding pairs. There are seven known breeding pairs in the West Coast States, and a single group of six known individuals in Colorado. Because these wolves represent the expanding edge of a recovered and stable source population (the NRM DPS), and are therefore not an independent population within the 44-State entity, the relatively small number of wolves there do not contribute meaningfully to the ability of any population to withstand stochastic events, nor to the entire entity's ability to withstand catastrophic events. These portions are also not meaningful in terms of representation, because (1) gray wolves are a highly adaptable generalist carnivore capable of long-distance dispersal, and (2) the gray wolves in this area are an extension of a large population of wolves in the northern Rocky Mountains. They are not an isolated population with unique or markedly different genotypic or phenotypic traits that is evolving separate from other wolf populations. They are also well-represented in the lower 48 United States as a result of recovery in the NRM DPS. Therefore, we do not find that this portion may be significant, under any reasonable definition of "significant," to the 44-State entity in terms of its resiliency, redundancy, or representation.

We conclude that there are no portions of the 44-State entity for which both (1) gray wolves may be in danger of extinction or likely to become so in the foreseeable future and (2) the portion may be significant. As discussed above, portions that may be in danger of extinction or likely to become so in the foreseeable future are not significant under any reasonable definition of that term. Conversely, other portions that are or may be significant (i.e., the core areas of the Wisconsin–Michigan population) are not in danger of extinction or likely to become so in the foreseeable future. Because we did not identify any portions of the 44-State entity where threats may be concentrated and where the portion may be biologically meaningful in terms of the resiliency, redundancy, or representation of the 44-State entity, a more thorough analysis is not required. Therefore, we conclude that the 44-State entity is not in danger of extinction or likely to become so in the foreseeable future within a significant portion of its range.

44-State Entity: Final Determination

After a thorough review of all available information and an evaluation of the five factors specified in section 4(a)(1) of the Act, as well as consideration of the definitions of "threatened species" and "endangered species" contained in the Act and the reasons for delisting as specified at 50 CFR 424.11(e), we conclude that removing the 44-State entity of the gray wolf (*Canis lupus*) from the List of Endangered and Threatened Wildlife (50 CFR 17.11) is appropriate. Although this entity is not a species as defined under the Act, we have collectively evaluated the current and potential threats to gray wolves in the 44-State entity, including those that result from past loss of historical range. Wolves in the 44-State entity do not meet the definition of a threatened species or an endangered species as a result of the reduction of threats as described in the analysis of threats and are neither currently in danger of extinction, nor likely to become so in the foreseeable future, throughout all or a significant portion of their range.

Although substantial contraction of gray wolf historical range occurred within the 44-State entity since European settlement, the range of the gray wolf has expanded significantly since its original listing in 1978, and the impacts of lost historical range are no longer manifesting in a way that threatens the viability of the species. The causes of the previous contraction (for example, targeted extermination efforts), and the effects of that contraction (for example, reduced numbers of individuals and populations, and restricted gene flow), in addition to the effects of all other threats, have been ameliorated or reduced such that the 44-State entity no longer meets the Act's definitions of "threatened species" or "endangered species."

Combined Listed Entity

Combined Listed Entity: Determination of Status Throughout All of Its Range

We have determined that Minnesota and the 44-State entity are each not an endangered species or a threatened species. Therefore, no entity which includes any of those components can be in danger of extinction or likely to become so in the foreseeable future throughout all of its range because we have already conclude that it is not threatened or endangered throughout some of its range. Nonetheless, below we independently analyze whether the combined listed entity is in danger of extinction or likely to become so throughout all of its range. Then we turn to the question, not already resolved, of whether that entity is in danger of extinction or likely to become so in a significant portion of its range.

Prior to listing in the 1970s, wolves in the combined listed entity had been reduced to about 1,000 individuals and extirpated from all of their range except northeastern Minnesota and Isle Royale, Michigan. The primary cause of the decline of wolves in the combined listed entity was targeted elimination by humans. However, gray wolves are highly adaptable; their

populations are remarkably resilient as long as prey availability, habitat, and regulation of human-caused mortality are adequate. Wolf populations can rapidly overcome severe disruptions, such as pervasive human-caused mortality or disease, once those disruptions are removed or reduced.

With the protections of the Act, the size of the gray wolf population increased to over four times that at the time of the initial gray wolf listings in the early 1970s, and more than triple that at the time of the 1978 reclassification (a figure which does not include the wolves currently found in the northern Rocky Mountains, which was part of those earlier listings, although not now part of the current combined listed entity). The range has expanded outside of northeastern Minnesota to central and northwestern Minnesota, northern and central Wisconsin, and the entire Upper Peninsula of Michigan, and is in the early stages of expanding into western Washington, western Oregon, northern California, and Colorado. Wolves in the combined listed entity now primarily exist as a large, stable to growing, metapopulation of about 4,200 individuals in the Great Lakes area and a small number of colonizing wolves in the West Coast States and Colorado that represent the expanding edge of a large metapopulation outside the combined listed entity (in the northern Rocky Mountains and western Canada and, more recently the central Rocky Mountains (figure 2)). We focus our analysis where wolves occur.

The recovery criteria for wolves in the Eastern United States, as outlined in the Eastern Timber Wolf Recovery Plan and Revised Recovery Plan, includes the maintenance of the Minnesota population and reestablishment of at least one viable wolf population within the historical range of the eastern timber wolf outside of Minnesota and Isle Royale, Michigan (see *Recovery Criteria for the Eastern United States*). The viable population outside of Minnesota has been reestablished in Wisconsin and Michigan.

Within the combined listed entity, the wolf metapopulation in the Great Lakes area is stable to slightly increasing, currently numbers at least 4,231 wolves (2,655 in Minnesota, 914 in Wisconsin, and 695 in Michigan) (USFWS 2020, pp. 21–24 and Appendix 1), is broadly distributed throughout high-quality habitat in the northern portions of the three States (see Great Lakes Area Suitable Habitat—MN, WI and MI discussions), and contains high levels of genetic diversity (see *Genetic Diversity and Inbreeding*). Further, the high reproductive potential of gray wolves (USFWS 2020, p. 8) enables them to withstand increased levels of mortality, their ability to disperse long distances allows them to quickly expand and recolonize vacant habitats (USFWS 2020, p. 7), and the fact that they are highly adaptable animals enables them to inhabit and survive in a variety of habitats and take advantage of available food resources (USFWS 2020, p. 6).

The wolf metapopulation in the Great Lakes area is highly resilient to perturbations because of its abundance and broad distribution across high-quality habitat in the Great Lakes area. Biological factors also play an important part in the resiliency of wolves in the Great Lakes area, namely their high reproductive capacity and genetic diversity. Those factors provide resiliency in the face of stochastic variability (annual environmental fluctuations, periodic disturbances, and impacts of anthropogenic stressors). Life-history characteristics of the wolf, including high dispersal capability and adaptability, along with the high genetic diversity evident in wolves in the Great Lakes area, provides sufficient adaptive capacity such that their long-term survival is assured. Additionally, catastrophic events have not affected wolf populations at a multi-State scale in the Great Lakes area, and we found no indication that these events would impact the long-term survival of wolves throughout the Great Lakes area in the future.

Thus, the metapopulation of wolves in the Great Lakes area and, consequently, the combined listed entity, contain sufficient resiliency, redundancy, and representation to sustain populations within the combined listed entity over time. Therefore, we conclude that the relatively few wolves that occur within the combined listed entity outside of the Great Lakes area, including those in the West Coast States and central Rocky Mountains as well as lone dispersers in other States, are not necessary for the recovered status of the combined listed entity. However, the viability of the entity is enhanced even further by wolves that occur outside of the Great Lakes area and also by those that occur outside the combined listed entity. First, the viability of the combined listed entity is increased even further via connectivity of the entity to populations in Canada. Connection of the metapopulation of wolves in the Great Lakes area to a population of about 12,000–14,000 wolves in eastern Canada further increases the resiliency and representation (via gene flow) of wolves in the Great Lakes area, increasing the viability of the combined listed entity. Second, wolves from the northern Rocky Mountains and western Canada are expanding into the combined listed entity in Oregon, Washington, California, and Colorado (figure 2). With ongoing State management in the NRM DPS, further expansion of wolves into the combined listed entity is likely to continue in the West Coast States and possibly the central Rocky Mountains. Although wolves in these areas would add to resiliency, redundancy, and representation, they are not necessary in order to conserve wolves to the point that they no longer meet the definitions of endangered or threatened under the Act. Furthermore, although having wolves in unoccupied areas could also contribute to resiliency, redundancy, and representation, they are not necessary in order to conserve wolves to the point that they no longer meet the definitions of endangered or threatened under the Act.

The recovery of the combined listed entity is attributable primarily to successful interagency cooperation in the management of human-caused mortality. That mortality is the most significant barrier to the long-term conservation of wolves. Therefore, this source of mortality remains the primary challenge in managing the wolf population to maintain its recovered status into the foreseeable future. Legal harvest and agency control to mitigate depredations on livestock are the primary human-caused mortality factors that management agencies can manipulate to achieve management objectives and minimize depredation risk associated with repeated conflicts, respectively, once delisting occurs. Wolves in the Great Lakes area greatly exceed the Federal recovery requirements defined in the revised recovery plan. As a result, we can expect to see some reduction in wolf populations in the Great Lakes areas as States begin to institute management strategies (such as increased depredation control and wolf-hunting seasons) with the objective of stabilizing or reversing population growth while continuing to maintain wolf populations well above Federal recovery requirements. Using an adaptive-management approach that adjusts harvest based on population estimates and trends, the initial objectives may be to reduce wolf populations and then manage for sustainable populations, similar to how States manage all other game species. For example, in 2013–2014, during a period when gray wolves were federally delisted in the Great Lakes area, Wisconsin reduced the State's wolf harvest quota by 43 percent in response to a reduced (compared to the previous year) estimated size of the wolf population. We expect Washington, Oregon, and California will manage wolves through appropriate laws and regulations to ensure that the recovery objectives outlined in their respective wolf management plans are achieved.

Based on our analysis, we conclude that Minnesota, Wisconsin, and Michigan will maintain an abundant and well-distributed metapopulation in the Great Lakes area that will

remain above recovery levels for the foreseeable future, and that the threat of human-caused mortality has been sufficiently reduced. All three States have wolf-management laws, plans, and regulations that adequately regulate human-caused mortality. Each of the three States has committed to manage its wolf population at or above viable population levels, and we do not expect this commitment to change. Adequate wolf-monitoring programs, as described in the State wolf-management plans, are likely to identify high mortality rates or low birth rates that warrant corrective action by the management agencies. Based on our review, we conclude that regulatory mechanisms in all three States are adequate to maintain the recovered status of wolves in the combined listed entity once they are federally delisted. Further, while relatively few wolves occur in the west coast portion of the combined listed entity at this time, and State wolf-management plans for Washington, Oregon, and California do not yet include population management goals, these plans include recovery objectives intended to ensure the reestablishment of self-sustaining populations in these States. In addition, we expect the wolf metapopulation in the western U.S. and western Canada to continue to expand into unoccupied suitable habitats in the Western United States, as envisioned in State wolf conservation and management plans.

Based on the biology of wolves and our analysis of threats, we conclude that, as long as wolf populations in the Great Lakes States are maintained at or above identified recovery levels, wolf biology (namely the species' reproductive capacity) and the availability of large, secure blocks of suitable habitat within the occupied areas will enable the maintenance of populations capable of withstanding all other foreseeable threats. Although much of the historical range of the combined listed entity is no longer occupied, we find that the amount and distribution of occupied wolf habitat currently provides, and will continue to provide into the foreseeable future,

large core areas that contain high-quality habitat of sufficient size and with sufficient prey to support a recovered wolf population. Our analysis of land management shows these areas, specifically Minnesota Wolf Management Zone A (Federal Wolf Management Zones 1–4), Wisconsin Wolf Zone 1, and the Upper Peninsula of Michigan, will maintain their suitability into the foreseeable future. Therefore, we conclude that, despite the loss of large areas of historical range for the combined listed entity, Minnesota, Wisconsin, and the Upper Peninsula of Michigan contain a sufficient amount of high-quality wolf habitat to support wolf populations into the future.

While disease and parasites can temporarily affect individuals, specific packs, or small, isolated populations (e.g., Isle Royale), seldom do they pose a significant threat to large wolf populations (e.g., core populations in the NRM DPS and Great Lakes area) as a whole. As long as wolf populations are managed above recovery levels, these factors are not likely to threaten the viability of the wolf population in the combined listed entity at any point in the foreseeable future. Climate change is also likely to remain an insignificant factor affecting the population dynamics of wolves into the foreseeable future, due to the adaptability of the species. Finally, based on our analysis, we conclude that cumulative effects of threats do not now, and are not likely to within the foreseeable future, threaten the viability of the combined listed entity throughout the range of wolves in the combined listed entity.

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the combined listed entity. We evaluated the status of the combined listed entity and assessed the factors likely to negatively affect it, including threats identified at listing, at the time of reclassification, now, and into the foreseeable future. While wolves in the combined listed entity currently occupy only a portion of wolf

historical range, the best available information indicates that the combined listed entity is recovered and does not meet the definition of an endangered species or a threatened species because of any one or a combination of the five factors set forth in the Act.

Specifically, we have determined, based on the best available information, that human-caused mortality (Factor C); habitat and prey availability (Factor A); disease and parasites (Factor C); genetic diversity and inbreeding (Factor E); commercial, recreational, scientific, or educational uses (Factor B); climate change (Factor E); or other threats, singly or in combination, are not of sufficient imminence, intensity, or magnitude to indicate that the combined listed entity is in danger of extinction or likely to become so within the foreseeable future throughout all of its range. We have also determined that ongoing effects of recovery efforts, which resulted in a significant expansion of the occupied range of and number of wolves in the combined listed entity over the past decades, in conjunction with State, Tribal, and Federal agency wolf management and regulatory mechanisms that will be in place following delisting of the entity across its occupied range, will be adequate to ensure the conservation of wolves in the combined listed entity. These activities will maintain an adequate prey base, preserve denning and rendezvous sites, monitor disease, restrict human take, and keep wolf populations well above the recovery criteria established in the revised recovery plan (USFWS 1992, pp. 25–28).

We have identified the best available scientific studies and information assessing human-caused mortality; habitat and prey availability; the impacts of disease and parasites; commercial, recreational, scientific, or educational uses; gray wolf adaptability, including with respect to changing climate; recovery activities and regulatory mechanisms that will be in place following delisting; and predictions about how these may affect the combined listed entity in making determinations about the combined listed entity's future status, and we conclude that it is

reasonable to rely on these sources. Therefore, after assessing the best available information, despite the large amount of lost historical range (see **Historical Context of Our Analysis**), we have determined that the combined listed entity is not in danger of extinction throughout all of its range, nor is it likely to become so in the foreseeable future.

Because we determined that the combined listed entity is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, we will consider whether there are any significant portions of its range that are in danger of extinction or likely to become so in the foreseeable future.

Combined Listed Entity: Determination of Status Throughout a Significant Portion of Its Range

After reviewing the biology of the combined listed entity and potential threats, we have not identified any portions of the combined listed entity for which both (1) gray wolves may be in danger of extinction or likely to become so in the foreseeable future (i.e., areas in which threats may be concentrated) and (2) the portion may be significant. We reiterate that "range" refers to the general geographical area within which the species is found at the time of our determination (see ***Definition and Treatment of Range***). "Portion of its range" refers to the members of the species that occur in a particular geographic area of the species' current range. This is because, while "portion of the range" is part of the species' range (i.e., a geographical area), when we evaluate a significant portion of its range, we consider the contribution of the individuals that are in that portion at the time we make a determination. While we identified some portions that may be at increased risk from human-caused mortality or factors related to small numbers, we did not find that any of these portions may be significant. We provide our analysis below.

First, portions peripheral to the Great Lakes metapopulation that may frequently contain lone dispersing wolves (e.g., Lower Peninsula of Michigan, eastern North and South Dakota) or may contain few wolves (e.g., Isle Royale) may be at greater risk from human-caused mortality or from factors related to small numbers of individuals. However, wolves in these portions are not meaningful to resiliency or redundancy of the combined listed entity because they are lone dispersers from core wolf range or few or no breeding pairs or are few in number and likely to remain so (e.g., Isle Royale). They are not contributing to representation of the combined listed entity because they dispersed or descend from the core wolf populations in the Great Lakes metapopulation or, in the case of Isle Royale, are genetically isolated and therefore have a low probability of long-term genetic health. Thus, these portions do not contribute to the overall demographic or genetic diversity of the lower 48 United States entity and they lack genetic uniqueness relative to other wolves in the entity. Further, gray wolves are a highly adaptable species with high dispersal capability, thus allowing them to adapt to changing environmental conditions. Therefore, we find that these portions are not "significant" because they are not biologically meaningful to the combined listed entity in terms of its resiliency, redundancy, or representation.

Second, State wolf-management zones in which post-delisting depredation control would be allowed under a broader set of circumstances than in core population zones (and, thus, would likely experience higher levels of human-caused mortality upon the combined listed entity's delisting), such as Minnesota Wolf Management Zone B (Federal Wolf Management Zone 5) or Wisconsin Wolf Management Zones 3 and 4 may be at greater risk from human-caused mortality or from factors related to small numbers of individuals. However, the wolves in these portions occur on the periphery of a large metapopulation (the Great Lakes metapopulation), occur in

areas of limited habitat suitability, and do not contribute appreciably to (and are thus not biologically meaningful to) the resiliency, redundancy, or representation of the combined listed entity. In fact, the Revised Recovery Plan for the Eastern Timber Wolf advises against restoration of wolves in State Zone B (Federal Zone 5).

Wolves in these higher intensity management zones are not meaningful to the resiliency of the combined listed entity because, even though they contain multiple established packs in addition to lone wolves, they constitute a small proportion of wolves in the Great Lakes metapopulation and, consequently, the combined listed entity (Zone B contains approximately 15 percent of the Minnesota wolf population; Zones 3 and 4 contain about 6 percent of the Wisconsin wolf population). Thus, wolves in these higher intensity management zones do not contribute meaningfully to the ability of wolves in the combined listed entity to withstand stochastic processes.

Likewise, these higher intensity management zones are not meaningful to the redundancy of the combined listed entity because wolves in these zones represent a relatively small number and distribution of packs in their respective States and catastrophic events have not affected wolf populations at a multi-State scale in the Great Lakes area, and we found no indication that these events would impact the long-term survival of wolves throughout these States in the future. Thus, wolves in these higher intensity management zones do not contribute meaningfully to the ability of wolf populations in these States, the Great Lakes metapopulation, or, consequently, the combined listed entity, to withstand catastrophic events. Wolves in these higher intensity management zones are not meaningful to the representation of the combined listed entity because they are genetically similar to other wolves in the Great Lakes area of the combined listed entity and because gray wolves are a highly adaptable species with high dispersal capability, thus

allowing them to adapt to changing environmental conditions. Therefore, we do not find that these portions may be significant because they are not biologically meaningful to the combined listed entity in terms of its resiliency, redundancy, or representation.

Third, the small number of wolves occurring in the West Coast States and the central Rocky Mountains are not a significant portion of the combined listed entity. Our evaluation of whether any portions of the range may be "significant" is a biological inquiry. We consider whether any portions are biologically meaningful in terms of the resiliency, redundancy, or representation of gray wolves in the combined listed entity. When the gray wolf was listed in 1978, there were about 1,200 wolves in Minnesota, and those wolves later expanded into Wisconsin and Michigan (USFWS 2020, pp. 20–23). Unlike wolves that are dispersing from the Great Lakes metapopulation, the wolves that are presently found in the West Coast States and the central Rocky Mountains originated primarily from the NRM wolves (USFWS 2020, pp. 3–5). As the delisted NRM population has continued to expand under State management, those wolves have moved into California, Oregon, and Washington, and most recently into Colorado. Those wolves are not connected biologically to the core populations in the combined listed entity, and are not biologically "significant" to this entity.

We acknowledge that both the West Coast States and central Rocky Mountain portions of the combined listed entity may be at greater risk from human-caused mortality or from factors related to small numbers of individuals. However, wolves in these portions are not meaningful to the redundancy or resiliency of the combined listed entity because they occur in extremely small numbers and include relatively few breeding pairs. There are seven known breeding pairs in the West Coast States, and a single group of six known individuals in Colorado. Because these wolves represent the expanding edge of a recovered and stable source population (the NRM

DPS), and are therefore not an independent population within the combined listed entity, the relatively small number of wolves there do not contribute meaningfully to the ability of any population to withstand stochastic events, nor to the entire entity's ability to withstand catastrophic events. These portions are also not meaningful in terms of representation, because (1) gray wolves are a highly adaptable generalist carnivore capable of long-distance dispersal, and (2) the gray wolves in this area are an extension of a large population of wolves in the northern Rocky Mountains. They are not an isolated population with unique or markedly different genotypic or phenotypic traits that is evolving separate from other wolf populations. They are also well-represented in the lower 48 United States as a result of recovery in the NRM DPS. Therefore, we do not find that this portion may be significant to the combined listed entity in terms of its resiliency, redundancy, or representation.

We conclude that there are no portions of the combined listed entity for which both (1) gray wolves may be in danger of extinction or likely to become so in the foreseeable future and (2) the portion may be significant. As discussed above, some may be in danger of extinction or likely to become so in the foreseeable future, but we do not find that these portions may be significant under any reasonable definition of that term because they are not biologically meaningful to the combined listed entity in terms of its resiliency, redundancy, or representation. Conversely, other portions that are or may be significant (i.e., the core areas of the Great Lakes metapopulation) are not in danger of extinction or likely to become so in the foreseeable future. Because we could not answer both screening questions in the affirmative for these portions, we conclude that these portions of the range do not warrant further consideration as a significant portion of its range. Therefore, we conclude that the combined listed entity is not in danger of

extinction or likely to become so in the foreseeable future within a significant portion of its range.

Combined Listed Entity: Final Determination

After a thorough review of all available information and an evaluation of the five factors specified in section 4(a)(1) of the Act, as well as consideration of the definitions of "threatened species" and "endangered species" contained in the Act and the reasons for delisting as specified at 50 CFR 424.11(e), we conclude that removing the two currently listed entities of gray wolf (*Canis lupus*) from the List of Endangered and Threatened Wildlife (50 CFR 17.11) is appropriate. Although this entity is not a species as defined under the Act, we have collectively evaluated the current and potential threats to the combined listed entity, including those that result from past loss of historical range. Wolves in the combined listed entity do not meet the definition of a threatened species or an endangered species as a result of the reduction of threats as described in the analysis of threats and are neither currently in danger of extinction, nor likely to become so in the foreseeable future, throughout all or a significant portion of their range.

Although substantial contraction of gray wolf historical range occurred within the combined listed entity since European settlement, the range of the gray wolf has expanded significantly since its original listing in 1978, and the impacts of lost historical range are no longer manifesting in a way that threatens the viability of the species. The causes of the previous contraction (for example, targeted extermination efforts), and the effects of that contraction (for example, reduced numbers of individuals and populations, and restricted gene flow), in addition to the effects of all other threats, have been ameliorated or reduced such that the combined listed entity does not meet the Act's definitions of "threatened species" or "endangered species."

Lower 48 United States Entity

Lower 48 United States Entity: Determination of Status Throughout All of Its Range

We have determined that Minnesota, the 44-State entity, and the combined listed entity are each not an endangered species or a threatened species. Therefore, no entity which includes any of those components can be in danger of extinction or likely to become so in the foreseeable future throughout all of its range because we have already conclude that it is not threatened or endangered throughout some of its range. Nonetheless, below we independently analyze whether the lower 48 United States entity is in danger of extinction or likely to become so throughout all of its range. Then we turn to the question, not already resolved, of whether that entity is in danger of extinction or likely to become so in a significant portion of its range.

At the time gray wolves were first listed under the Act in the 1970s, wolves in the lower 48 United States had been reduced to about 1,000 individuals and extirpated from all of their range except northeastern Minnesota and Isle Royale, Michigan, a small fraction of the species' historical range in the lower 48 United States. The primary cause of the decline of wolves in the lower 48 United States was targeted elimination by humans. However, gray wolves are highly adaptable; their populations are remarkably resilient as long as prey availability, habitat, and regulation of human-caused mortality are adequate. Established wolf populations can rapidly overcome severe disruptions, such as pervasive human-caused mortality or disease, once those disruptions are removed or reduced.

Provided the protections of the Act, the number of gray wolves in the lower 48 United States (greater than 6,000 wolves) has increased more than sixfold since the initial listings and about fivefold since the 1978 reclassification. The range of the species has expanded from

northeast Minnesota and Isle Royale, Michigan, to include central and northwestern Minnesota, the entire Upper Peninsula of Michigan, and northern and central Wisconsin in the Eastern United States. In addition, wolves in the Western United States were functionally extinct at the time of listing, but now viable populations occupy large portions of Idaho, Montana, Wyoming, eastern Washington, and eastern Oregon in the Western United States. They are also currently expanding from the NRM region into the West Coast States (western Washington, western Oregon, northern California), and Colorado.

Despite the substantial increase in gray wolf numbers and distribution within the lower 48 United States since 1978, the species currently occupies only a small portion of its historical range within this area. This loss of historical range has resulted in a reduction of gray wolf individuals, populations, and suitable habitat within the lower 48 United States compared to historical levels. Changes resulting from range contraction for the lower 48 United States have increased the vulnerability of the lower 48 United States entity to threats such as reduced genetic diversity and restricted gene flow (reduced representation), catastrophic events (reduced redundancy), or stochastic disturbances (reduced resiliency), such as annual environmental fluctuations (prey availability, pockets of disease outbreaks) and anthropogenic stressors.

Wolves in the lower 48 United States now exist primarily as two large, genetically diverse, stable to growing metapopulations, one currently numbering over 4,200 individuals in the Eastern United States (in the Great Lakes area) and another numbering about 1,900 individuals in 2015 in the Western United States (in the NRM and West Coast States) (figure 3). The current number of individuals in the western U. S. metapopulation is similar to that in 2015, and this metapopulation is currently recolonizing western Washington, western Oregon, northern California, and Colorado. Gray wolf metapopulations—populations that are connected to and

interact with other populations of the same species—are 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 (USFWS 1994, appendix 9). This outcome 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 other subpopulations in the metapopulation. Furthermore, the high reproductive potential of gray wolves (USFWS 2020, p. 8) enables them to withstand increased levels of mortality and their ability to disperse long distances allows them to quickly expand and recolonize vacant habitats (USFWS 2020, p. 7). Gray wolves are also able to inhabit and survive in a variety of habitats and take advantage of available food resources (USFWS 2020, p. 6).

Gray wolves in the lower 48 United States entity are highly resilient to perturbations because of their abundance and broad distribution across high-quality habitat in the entity. Biological factors also play an important part in the resiliency of wolves in the entity, namely their high reproductive capacity and genetic diversity. The large sizes of the two metapopulations in the entity, the high quality of the habitat they occupy, and those biological factors provide the entity resiliency in the face of stochastic (random) variability (annual environmental fluctuations in, for example, prey availability, pockets of disease outbreaks; periodic disturbances, and anthropogenic stressors). Further, the two metapopulations and their broad distribution across several States provides the entity the redundancy to survive a catastrophic event because such an event is unlikely to simultaneously affect gray wolf populations in all the States across which these metapopulations are distributed. Lastly, the gray wolf is a highly adaptable species that can inhabit a variety of ecosystem types and exploit available food resources in a diversity of areas. Genetic, general size, habitat, and dietary differences between gray wolves currently found in the

Eastern United States (Great Lakes area) and Western United States (NRM and West Coast States) provide the entity additional adaptive capacity. Thus, the lower 48 United States entity contains sufficient capacity to adapt to future changes in the environment such that their long-term survival is assured. In sum, wolves in the Eastern and Western United States contain sufficient resiliency, redundancy, and representation to sustain populations in the lower 48 United States entity over time. This alone is sufficient for us to determine that the lower 48 United States entity is not currently in danger of extinction throughout all of its range.

While the lower 48 United States entity contains sufficient resiliency, redundancy, and representation to sustain the entity over time, the viability of the entity is increased even further via connectivity of the entity to populations in Canada. Connection of the Great Lakes metapopulation and western U.S. metapopulation to a population of about 12,000–14,000 wolves in eastern Canada and 15,000 gray wolves in western Canada, respectively, further increases the resiliency, and representation (via gene flow), of the Great Lakes and western U.S. metapopulations, increasing the viability of the entity. Further, with ongoing State management in the NRM States, expansion of the western U. S. metapopulation into unoccupied suitable habitat in the West is likely to continue, as envisioned in State wolf conservation and management plans, further increasing the resiliency and redundancy of the lower 48 United States entity in the future.

Our conclusion that the lower 48 United States entity is not currently in danger of extinction in all of its range is consistent with our historical view of the recovery of the species. We have long considered gray wolf recovery in the lower 48 states to mean recovery in three regions: the NRM, Eastern United States, and, as explained above, Southwestern United States. Wolves in the Southwestern United States (Mexican wolves) are listed separately with ongoing

recovery efforts, and that listing is not affected by this final rule. Wolves in the remaining two regions, the NRM and Eastern United States, exist in two metapopulations that greatly exceed the recovery criteria for gray wolves in each region. Gray wolves in the NRM and Eastern United States (the Great Lakes area) meet the long-held recovery criteria set by the NRM Recovery Team and Eastern Timber Wolf Recovery Team (respectively) because these areas contain sufficient wolf numbers and distribution, threats have been alleviated, and the States and Tribes are committed to continued management such that the long-term survival of the gray wolf in these two regions is ensured. Although there is no requirement that the criteria in a recovery plan be satisfied before a species may be delisted, the fact that wolves in the NRM and Eastern United States regions have met the recovery criteria supports our conclusion that the metapopulations together contain sufficient wolf numbers and distribution to ensure the long-term survival of the lower 48 United States entity.

The recovery of the lower 48 United States entity is attributable primarily to successful interagency cooperation in the management of human-caused mortality. That mortality is the most significant barrier to the long-term conservation of wolves. We expect that wildlife managers will implement, or continue to use, an adaptive management approach to wolves that ensures maintenance of a recovered wolf population into the foreseeable future. Legal harvest and lethal control to reduce depredations on livestock are the primary human-caused mortality factors that State, Tribal, and Federal agencies can manipulate to achieve management objectives and minimize depredation risk once delisting occurs.

In the Western United States, the NRM States have successfully managed for sustainable wolf populations since the NRM DPS was first delisted in 2008–2009 (Idaho, Montana, eastern one-third of Washington and Oregon, north-central Utah) and 2008 and 2012 (Wyoming). Even

with increased levels of human-caused mortality, gray wolf numbers have remained relatively stable in Idaho, Montana, and Wyoming since the delisting of the NRM DPS and have increased in the broader Western United States as NRM wolves have expanded their range into the Washington and Oregon part of the NRM DPS, the West Coast States (western Washington, western Oregon, and northern California), and Colorado.

The core NRM wolf populations occur in Idaho, Montana, and Wyoming. These States have demonstrated their commitment to managing their wolf populations at or above recovery levels for years, and we do not expect this commitment to change. Further, while State wolf-management plans for Washington, Oregon, and California do not yet include population management goals, these plans include recovery objectives intended to ensure the reestablishment of self-sustaining populations in these States. We expect Washington, Oregon, and California will manage wolves through appropriate laws and regulations to ensure that the recovery objectives outlined in their respective wolf management plans are achieved.

Wolves in the Eastern United States are well above Federal recovery levels defined in the revised Eastern Timber Wolf Recovery Plan. As a result, we can expect to see some reduction in wolf populations in the Great Lakes area as States begin to institute management strategies designed to stabilize or reverse population growth, while continuing to maintain wolf populations well above Federal recovery levels in their respective States. Using an adaptive-management approach that adjusts harvest based on population estimates and trends, the initial objectives of States may be to reduce wolf populations and then manage for sustainable populations, similar to how States manage all other game species. For example, in 2013–2014, during a period when gray wolves were federally delisted in the Great Lakes area, Wisconsin

reduced the State's wolf harvest quota by 43 percent in response to a population count that was lower than expected compared to the previous year.

Based on our analysis, we conclude that eastern U.S. States will maintain, and NRM States will continue to maintain, wolf populations that will remain above recovery levels for the foreseeable future because the threat of unregulated human-caused mortality has been sufficiently reduced. The NRM States have successfully managed gray wolves well above recovery levels for years and we have no reason to believe this will change. As demonstrated by current State management, maintenance of the recovered wolf population in the NRM States is likely to continue, providing ample opportunities for wolves to continue to recolonize vacant suitable habitat in the West. In the Eastern United States, States have wolf-management laws, plans, and regulations that adequately regulate human-caused mortality and each has committed to manage its wolf population at or above recovery levels. We expect this commitment to continue into the foreseeable future. Wolf-monitoring programs, as described in the State wolf-management plans, are likely to identify population parameters and trends that warrant corrective action, and we have no information that would lead us to question the commitment of wildlife management agencies to implementing these adaptive changes to ensure the recovered status of wolves. Based on our review, we conclude that regulatory mechanisms are adequate to maintain the recovered status of wolves in the two metapopulations in the lower 48 United States and, consequently, the lower 48 United States entity, once the currently listed gray wolf entities are federally delisted.

Although much of the historical range of the lower 48 United States is no longer occupied, we find that the amount and distribution of occupied wolf habitat currently provides, and will continue to provide, large core areas that contain high-quality habitat of sufficient size

and with sufficient prey to support recovered wolf populations. Our analysis of land management shows these areas, specifically Minnesota Wolf Management Zone A (Federal Wolf Management Zones 1–4), Wisconsin Wolf Zone 1, and the Upper Peninsula of Michigan in the Eastern United States, and large areas of Idaho, Montana, and Wyoming in the Western United States, will maintain their suitability into the foreseeable future. Therefore, we conclude that, despite the loss of large areas of historical range in the lower 48 United States, the States of Minnesota, Michigan, and Wisconsin in the East and Idaho, Montana, and Wyoming, in the West contain a sufficient amount of high-quality wolf habitat to support viable and recovered wolf populations into the foreseeable future. Further, Washington, Oregon, California, Colorado, and Utah contain suitable wolf habitat, much of which is currently unoccupied, that is capable of supporting additional wolves. Expansion of the NRM population into unoccupied suitable habitat in the Western United States is ongoing and is likely to continue post-delisting, which will increase wolf abundance and distribution in the United States. Although wolves in these areas would add additional redundancy, they are not necessary in order to conserve wolves to the point that they no longer meet the definitions of endangered or threatened under the Act.

While disease and parasites can temporarily affect individuals, specific packs, or small, isolated populations (e.g., Isle Royale), seldom do they pose a significant threat to large wolf populations (e.g., core populations in the western United States and Great Lakes area) as a whole. As long as wolf populations are managed above recovery levels, these factors are not likely to threaten the viability of the wolf population in the lower 48 United States entity at any point in the foreseeable future. Similarly, while changes in genetic diversity or population structuring may occur post-delisting, they are not likely to be of such a magnitude that they pose a significant threat to the entity; available evidence indicates that continued dispersal, even at a

lower rate, within and among areas of the lower 48 United States will be adequate to maintain sufficient genetic diversity for continued viability. Climate change is also likely to remain an insignificant factor affecting the population dynamics of wolves into the foreseeable future, due to the adaptability of the species. Finally, based on our analysis, we conclude that cumulative effects of threats do not now, nor are likely to within the foreseeable future, threaten the viability of the lower 48 United States entity throughout its range.

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the lower 48 United States. We evaluated the status of the lower 48 United States entity and assessed the factors likely to negatively affect it, including threats identified at listing, at the time of reclassification, now, and into the foreseeable future. While wolves currently occupy only a portion of their historical range in the lower 48 United States, the best available information indicates that the lower 48 United States entity does not meet the definition of an endangered species or a threatened species because of any one or a combination of the five factors set forth in the Act.

Specifically, we have determined, based on the best available information, that human-caused mortality (Factor C); habitat and prey availability (Factor A); disease and parasites (Factor C); genetic diversity and inbreeding (Factor E); commercial, recreational, scientific, or educational uses (Factor B); climate change (Factor E); or other threats, singly or in combination, are not of sufficient imminence, intensity, or magnitude to indicate that the lower 48 United States entity is in danger of extinction or likely to become so within the foreseeable future throughout all of its range. We have also determined that ongoing recovery efforts, which resulted in a significant expansion of the occupied range of and number of wolves in the lower 48 United States over the past decades, in conjunction with regulatory mechanisms developed

and implemented by State, Tribal, and Federal managers, are or will be adequate to ensure the conservation of wolves in the lower 48 United States. These recovery efforts will maintain an adequate prey base, preserve denning and rendezvous sites, monitor disease, regulate human take, and maintain wolf populations well above the recovery criteria established in the revised Eastern Timber Wolf Recovery Plan and NRM recovery plan (USFWS 1992, pp. 25–28; USFWS 1987, p. 12). Based on our analysis of threats we conclude that, as long as wolf populations in the Eastern United States are maintained at or above identified recovery levels and core wolf populations in the NRM States continue to be maintained well above recovery levels, wolf biology (namely the species' reproductive capacity and dispersal capability) and the availability of large, secure blocks of suitable habitat within the occupied areas will allow wolf populations to withstand all other foreseeable threats.

Therefore, after assessing the best available information, despite the large amount of lost historical range (see **Historical Context of Our Analysis**), we have determined that the lower 48 United States entity is not in danger of extinction throughout all of its range, nor is it likely to become so in the foreseeable future.

Because we determined that the lower 48 United States entity is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, we will consider whether there are any significant portions of its range that are in danger of extinction or likely to become so in the foreseeable future.

Lower 48 United States Entity: Determination of Status Throughout a Significant Portion of Its Range

After reviewing the biology of the lower 48 United States entity and potential threats, we have not identified any portions of the entity's range for which both (1) gray wolves may be in

danger of extinction or likely to become so in the foreseeable future (i.e., areas in which threats may be concentrated) and (2) the portion may be significant. We reiterate that “range” refers to the general geographical area within which the species is found at the time of our determination (see *Definition and Treatment of Range*). “Portion of its range” refers to the members of the species that occur in a particular geographic area of the species' current range. This is because, while "portion of the range" is part of the species' range (i.e., a geographical area), when we evaluate a significant portion of its range, we consider the contribution of the individuals that are in that portion at the time we make a determination. While we identified some portions that may be at increased risk from human-caused mortality or factors related to small numbers, we did not find that any of these portions may be significant. We provide our analysis below.

First, portions peripheral to the Great Lakes metapopulation within the lower 48 United States that may frequently contain lone dispersing wolves (e.g., the Lower Peninsula of Michigan, North and South Dakota) or contain relatively few wolves (e.g., Isle Royale) may be at greater risk from human-caused mortality or from factors related to small numbers of individuals. However, wolves in these portions are not meaningful to resiliency or redundancy because they contain few wolves, or few or no breeding pairs. They are not contributing to representation because they dispersed or descend from the core wolf populations in the Great Lakes metapopulation or, in the case of Isle Royale, are genetically isolated. Thus, these portions do not contribute to the overall demographic or genetic diversity of the lower 48 United States entity, and they lack genetic uniqueness relative to other wolves in the entity. Further, gray wolves are a highly adaptable species with high dispersal capability, thus allowing them to adapt to changing environmental conditions. Therefore, we do not find that these portions may be

"significant" because they are not biologically meaningful to the lower 48 United States entity in terms of its resiliency, redundancy, or representation.

Second, portions peripheral to the western United Sates metapopulation within the lower 48 United States entity that may frequently contain lone dispersing wolves or contain relatively few wolves (e.g., central Rocky Mountains, western Washington, western Oregon, northern California) may be at greater risk from human-caused mortality or from factors related to small numbers of individuals. However, wolves in these portions are not meaningful to resiliency or redundancy because they contain few wolves, or few or no breeding pairs. They are not contributing to representation because they dispersed or descend from the core wolf populations in the NRM. Thus, these portions do not contribute to the overall demographic or genetic diversity of the lower 48 United States entity and they lack genetic uniqueness relative to other wolves in the entity. Further, gray wolves are a highly adaptable species with high dispersal capability, thus allowing them to adapt to changing environmental conditions. Therefore, we do not find that these portions may be "significant" because they are not biologically meaningful to the lower 48 United States entity in terms of its resiliency, redundancy, or representation.

Third, State wolf-management zones in which post-delisting depredation control would be, or is, allowed under a broader set of circumstances than in core population zones (and, thus, would likely experience higher levels of human-caused mortality when the currently listed *C. lupus* entities are delisted), such as Minnesota Wolf Management Zone B, Wisconsin Wolf Management Zones 3 and 4, and areas of Wyoming in which wolves are managed as predators, may be at greater risk from human-caused mortality or from factors related to small numbers of individuals. However, the wolves in these portions occur on the periphery of large populations, occur in areas of limited habitat suitability, and do not contribute appreciably to (and are thus not

biologically meaningful to) the resiliency, redundancy, or representation of the lower 48 United States entity.

Wolves in these higher intensity management zones are not meaningful to the resiliency of the lower 48 United States entity because, even though they may contain multiple established packs in addition to lone wolves, they constitute a small proportion of wolves in their respective populations and, consequently, the lower 48 United States entity (Minnesota Zone B contains about 15 percent of the Minnesota wolf population, Wisconsin Zones 3 and 4 contain about 6 percent of the Wisconsin wolf population, and the Wyoming predator zone contains about 8 percent of the Wyoming wolf population (based on an estimated population of 26 wolves in this zone in 2019)). Thus, wolves in the higher intensity management zones do not contribute meaningfully to the ability of wolves in the lower 48 United States entity to withstand stochastic processes.

Likewise, these higher intensity management zones are not meaningful to the redundancy of the lower 48 United States entity because wolves in these zones represent a relatively small number and distribution of packs or individuals in their respective States, and we found no indication that catastrophic events are likely to occur at a scale that would impact the long-term survival of wolves throughout these States. Thus, wolves in these higher intensity management zones do not contribute meaningfully to the ability of wolf populations in these States, the two metapopulations, or, consequently, the lower 48 United States entity, to withstand catastrophic events. Wolves in these higher intensity management zones are not meaningful to the representation of the lower 48 United States entity because they are genetically similar to other wolves in the western U.S. or Great Lakes metapopulation and because gray wolves are a highly adaptable species with high dispersal capability, thus allowing them to adapt to changing

environmental conditions. Therefore, we do not find that these portions may be significant because they are not biologically meaningful to the lower 48 United States entity in terms of its resiliency, redundancy, or representation.

We conclude that there are no portions of the lower 48 United States entity for which both (1) gray wolves may be in danger of extinction or likely to become so in the foreseeable future and (2) the portion may be significant. As discussed above, some may be in danger of extinction or likely to become so in the foreseeable future, but we do not find that these portions may be significant under any reasonable definition of that term because they are not biologically meaningful to the lower 48 United States entity in terms of its resiliency, redundancy, or representation. Conversely, other portions that are or may be significant (i.e., the core areas of the Great Lakes and western U.S. metapopulations) are not in danger of extinction or likely to become so in the foreseeable future. Therefore, because we could not answer both screening questions in the affirmative for these portions, we conclude that these portions of the range do not warrant further consideration as a significant portion of its range. Therefore, we conclude that the lower 48 United States entity is not in danger of extinction or likely to become so in the foreseeable future within a significant portion of its range.

Lower 48 United States Entity: Final Determination

After a thorough review of all available information and an evaluation of the five factors specified in section 4(a)(1) of the Act, as well as consideration of the definitions of "threatened species" and "endangered species" contained in the Act and the reasons for delisting as specified at 50 CFR 424.11(e), we conclude that removing gray wolves currently listed in the lower 48 United States from the List of Endangered and Threatened Wildlife (50 CFR 17.11) is appropriate. Although this entity is not a species as defined under the Act, we have collectively

evaluated the current and potential threats to the lower 48 United States entity, including those that result from past loss of historical range. Wolves in the lower 48 United States entity do not meet the definition of a threatened species or an endangered species as a result of the reduction of threats as described in the analysis of threats and are neither currently in danger of extinction, nor likely to become so in the foreseeable future, throughout all or a significant portion of their range.

Although substantial contraction of gray wolf historical range occurred within the lower 48 United States entity since European settlement, the range of the gray wolf has expanded significantly since its original listing in 1978, and the impacts of lost historical range are no longer manifesting in a way that threatens the viability of the species. The causes of the previous contraction (for example, targeted extermination efforts), and the effects of that contraction (for example, reduced numbers of individuals and populations, and restricted gene flow), in addition to the effects of all other threats, have been ameliorated or reduced such that the lower 48 United States entity does not meet the Act's definitions of "threatened species" or "endangered species."

Determination of Species Status: Conclusion

Gray wolves were listed under the Act in the 1970s, when the species numbered only about 1,000 individuals and occupied only northeastern Minnesota and Isle Royale, Michigan, a small fraction of its historical range in the lower 48 United States. Since then, our longstanding approach to gray wolf recovery has been to establish healthy populations of gray wolves in three areas of ecological or genetic diversity: the Western United States (the NRM), the Eastern United States, and the Southwestern United States. In two of those areas—the NRM and Eastern United States—wolves are now recovered. As a result, gray wolves in the lower 48 states

(excepting the Mexican wolf) are recovered. The western U.S. metapopulation, with stable populations of about 1,900 wolves (in 2015) distributed across several States, has been delisted for years and remains recovered. The successful recovery of wolves in the NRM is highlighted by the recent and ongoing extension of the population farther westward, into western Washington, western Oregon, northern California, and southward into Colorado. The Great Lakes metapopulation, with stable or growing populations totaling over 4,200 wolves in three States, is also recovered for the reasons explained in this final rule. In the third area on which we have focused our recovery efforts—the Southwestern United States—the Mexican wolf subspecies of gray wolf is now separately listed as an endangered species and has not yet recovered. Recovery and delisting of gray wolves in the NRM and Eastern United States is consistent with the requirements of the Act and will further its conservation purposes by allowing us to focus our recovery efforts on imperiled wolves in the Southwestern United States.

Effects of This Rule

This rule revises 50 CFR 17.11(h) by removing the two existing *C. lupus* listed entities from the Federal List of Endangered and Threatened Wildlife. This rule also removes the special regulations found at 50 CFR 17.40(d) for wolves in Minnesota and the designation of critical habitat found at 50 CFR 17.95(a) for gray wolves in Minnesota and on Isle Royale, Michigan.

Post-delisting Monitoring

Section 4(g)(1) of the Act, added in the 1988 reauthorization, requires us to implement a system, in cooperation with the States, to monitor for not less than 5 years the status of all species that have recovered and been removed from the Lists of Endangered and Threatened Wildlife and Plants (50 CFR 17.11 and 17.12). The purpose of this post-delisting monitoring

(PDM) is to verify that a species delisted due to recovery remains secure from risk of extinction after it no longer has the protections of the Act. To do this, PDM generally focuses on evaluating (1) demographic characteristics of the species, (2) threats to the species, and (3) implementation of legal and/or management commitments that have been identified as important in reducing threats to the species or maintaining threats at sufficiently low levels. Under section 4(g)(2) of the Act, we are required to make prompt use of the emergency-listing authority under section 4(b)(7) of the Act to prevent a significant risk to the well-being of any recovered species.

Section 4(g) of the Act explicitly requires cooperation with the States in development and implementation of PDM programs. However, we remain responsible for compliance with section 4(g) and, therefore, must remain actively engaged in all phases of PDM. We also will seek active participation of other State and Federal agencies or Tribal governments that are expected to assume management authority for the species' conservation. In some cases, agencies have already devoted significant resources toward wolf monitoring efforts.

Our monitoring activities will focus on wolves within Minnesota, Wisconsin, and Michigan. Although the entities evaluated in this rule include wolves outside of those states, we have determined that it is appropriate to focus on the Great Lakes area because it includes the currently-listed Minnesota entity and that portion of the 44-State entity that is most significant in terms of vulnerability of the species following removal of the Act's protections. Therefore, by evaluating the monitoring data from the Great Lakes states, we can effectively monitor the status of the species. As explained above (see Determination of Species Status), wolves occupying other portions of the lower 48 United States (the West Coast States and the central Rocky Mountains) occur in small numbers and are part of the recovered and delisted population of gray wolves in the NRM DPS. In the NRM states, post-delisting monitoring is either already

completed (Idaho and Montana) or currently in place (Wyoming). This rule does not affect the status of wolves in the NRM DPS because they are already delisted and we are not revisiting that determination. Thus, even though we evaluated a lower 48 United States entity, the wolves in the NRM states are not included in our post-delisting monitoring activities for this rule.

We will monitor wolves in the Great Lakes area in accordance with our February 2008 Post-Delisting Monitoring Plan for the Western Great Lakes Distinct Population Segment of the Gray Wolf, which we developed with the assistance of the Eastern Timber Wolf Recovery Team.

The 2008 plan, although written for a distinct population segment that no longer exists, is still applicable within the Great Lakes area because it focuses on monitoring wolves within the borders of Minnesota, Wisconsin, and the Upper Peninsula of Michigan, and we have determined that there is no new information that would cause us to revise the plan. The plan is available on our website at https://www.fws.gov/midwest/wolf/population/index.html.

Under the plan, we will rely on a continuation of State monitoring activities, similar to those that have been conducted by the Minnesota, Wisconsin, and Michigan Departments of Natural Resources in recent years, and Tribal monitoring. These activities will include both population monitoring and health monitoring of individual wolves. During the PDM period, the Service will conduct a review of the monitoring data and program. We will consider various relevant factors (including, but not limited to, mortality rates, population changes and rates of change, disease occurrence, and range expansion or contraction) to determine if the population of wolves within the borders of Minnesota, Wisconsin, and the Upper Peninsula of Michigan warrants expanded monitoring, additional research, consideration for relisting as threatened or endangered, or emergency listing.

Minnesota, Wisconsin, and Michigan Departments of Natural Resources have monitored wolves for several decades with significant assistance from numerous partners, including the U.S. Forest Service, National Park Service, Wildlife Services, Tribal natural resource agencies, and the Service. To maximize comparability of future PDM data with data obtained before delisting, all three State Departments of Natural Resources have committed to continue their previous wolf-population-monitoring methodology, or will make changes to that methodology only if those changes will not reduce the comparability of pre- and post-delisting data. Occupancy modeling has emerged as a scientifically valid technique for estimating population size (Rich et al. 2013, entire; Ausband et al. 2014, entire) and is currently used by numerous States to track wolf numbers (e.g., Idaho, Minnesota, Montana). Wisconsin has begun to explore using data from traditional track surveys and radio-collared wolves in an occupancy modeling framework to develop model-driven estimates of wolf population size. However, current count-based estimates based on track surveys and data from radio-collared wolves will continue to be reported in future years, ensuring comparability of pre- and post-delisting population size estimates and allowing validation of estimates derived from occupancy models. Wisconsin may modify data collection methods in the future to more fully embrace the occupancy modeling approach, but only after validation of occupancy models for a minimum of 3 years and in consultation with Service staff.

In addition to monitoring wolf population numbers and trends, post-delisting monitoring will evaluate post-delisting threats, in particular human-caused mortality, disease, and implementation of legal and management commitments. If at any time during the monitoring period we detect a substantial downward change in the populations or an increase in threats to the degree that population viability may be threatened, we will work with the States and Tribes

to evaluate and change (intensify, extend, and/or otherwise improve) the monitoring methods, if appropriate, and consider relisting the gray wolf, if warranted.

We will implement post-delisting monitoring for 5 years beyond the effective date of this rule (see **DATES**, above). We believe that 5 years of post-delisting monitoring is sufficient for the reasons stated in the 2008 plan: (1) the Great Lakes population is estimated to be several times greater than the numerical delisting criteria in the recovery plan; and (2) we do not envision any threat or combination of threats that is or are likely to lead to a rapid decline in wolf numbers in those states. At the end of the 5-year monitoring period, we will conduct a final review and we may request reviews by former members of the Eastern Gray Wolf Recovery Team and other independent specialists. We will post the results of the review on our website. Based on the final review, we will determine whether to continue monitoring and evaluate whether the gray wolf meets the definition of a threatened species or an endangered species.

Required Determinations

National Environmental Policy Act

We determined that we do not need to prepare an environmental assessment or an environmental impact statement, as defined under the authority of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.), in connection with regulations adopted pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the *Federal Register* on October 25, 1983 (48 FR 49244).

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994, Government-to-Government Relations with Native American Tribal Governments (59 FR 22951), E.O. 13175, and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our

responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes.

We coordinated the proposed rule with the affected Tribes and, furthermore, throughout several years of development of earlier related rules and the March 15, 2019, proposed rule, we have endeavored to consult with Native American Tribes and Native American organizations in order to both (1) provide them with a complete understanding of the changes, and (2) to understand their concerns with those changes. Upon publication of the proposed rule, we invited federally recognized Tribes to consult on a government-to-government basis on our March 15, 2019, proposed rule. We also presented an overview of the proposed rule at the 37th Annual-Native American Fish and Wildlife Society Conference. In preparation of this rule, we met with the Chippewa Ottawa Resources Authority Board and the Great Lakes Indian Fish and Wildlife Commission's Voigt Inter-Tribal Task Force to discuss the proposal. We also offered to meet individually with and discuss the proposal with any Tribe that wanted to do so and met with the Keweenaw Bay Indian Community Natural Resources Program, Fond du Lac Band of Chippewa Indians, and the Nez Perce. Additionally, we have fully considered all of the comments on the proposed rule submitted by Tribes and Tribal organizations and have attempted to address concerns, new data, and new information where appropriate.

If requested, we will conduct additional consultations with Native American Tribes and multi-Tribal organizations subsequent to this final rule to facilitate the transition to State and Tribal management of wolves within the lower 48 United States outside of the NRM DPS, where wolves are already under State and Tribal management.

References Cited

A complete list of all references cited in this rule is available at http://www.regulations.gov under Docket No. FWS–HQ–ES–2018–0097 or upon request from the Service's Headquarters Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this rule are Service staff members.

List of Subjects in 50 CFR Part 17

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

Regulation Promulgation

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

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

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

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

§ 17.11 [Amended]

2. Amend § 17.11(h) by removing both entries for "Wolf, gray (*Canis lupus*)" under MAMMALS in the List of Endangered and Threatened Wildlife.

§ 17.40 [Amended]

3. Amend § 17.40 by removing and reserving paragraph (d).

§ 17.95 [Amended]

4. Amend § 17.95(a) by removing the critical habitat entry for "Gray Wolf (*Canis lupus*)."

Aurelia Skipwith,

Director, U.S. Fish and Wildlife Service.

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