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Endangered and Threatened Wildlife and Plants; Proposed Rule To Revise the List of Endangered and Threatened Wildlife for the Gray Wolf (*Canis lupus*) in the Eastern United States, Initiation of Status Reviews for the Gray Wolf and for the Eastern Wolf (*Canis lycaon*); Proposed Rule

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R3–ES–2011–0029; 92220–1113–000; ABC Code: C6]

RIN 1018–AX57

Endangered and Threatened Wildlife and Plants; Proposed Rule To Revise the List of Endangered and Threatened Wildlife for the Gray Wolf (*Canis lupus*) in the Eastern United States, Initiation of Status Reviews for the Gray Wolf and for the Eastern Wolf (*Canis lycaon*)

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule, initiation of status reviews.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service or USFWS) are re-evaluating the listing of the Minnesota population of gray wolves (*Canis lupus*) and propose to revise it to conform to current statutory and policy requirements. We propose to identify the Minnesota population as a Western Great Lakes (WGL) Distinct Population Segment (DPS) of the gray wolf and to remove this DPS from the List of Endangered and Threatened Wildlife. We propose these actions because the best available scientific and commercial information indicates that the WGL DPS does not meet the definitions of threatened or endangered under the Act.

This proposed rule, if made final, would remove the currently designated critical habitat for the gray wolf in Minnesota and Michigan and the current special regulations for gray wolves in Minnesota. We also propose to revise the range of the gray wolf (the species *C. lupus*) by removing all or parts of 29 eastern states that we now recognize were not part of the historical range of the gray wolf. New information indicates that these areas should not have been included in the original listing of the gray wolf.

In this proposed rule, we recognize recent taxonomic information indicating that the gray wolf subspecies *Canis lupus lycaon* should be elevated to the full species *C. lycaon.* Given that a complete status review of this newly recognized species has never been conducted, we are initiating a rangewide review of the conservation status of *C. lycaon* in the United States and Canada. This rule also constitutes the initiation of our five-year review of the status of gray wolves under section 4(c)(2) of the Act, as well as the initiation of status reviews specific to gray wolves in the Pacific Northwest and Mexican wolves in the Southwest United States and Mexico.

DATES: *Comment submission:* We will accept comments received or postmarked on or before July 5, 2011.

Public hearings: We will hold two public hearings on this proposed rule scheduled on May 18, 2011 and on June 8, 2011. Informational meetings will be held from 6 p.m. to 7:15 p.m., followed by the public hearings from 7:30 p.m. to 9 p.m.

ADDRESSES: *Comment submission:* You may submit comments by one of the following methods:

Electronically: Go to the Federal eRulemaking Portal: *http://www.regulations.gov.* In the Enter Keyword or ID box, enter FWS–R3–ES–2011–0029, which is the docket number for this rulemaking. Then, in the Search panel at the top of the screen, under the Document Type heading, click on the Proposed Rules link to locate this document. You may submit a comment by clicking on "Submit a Comment."

By hard copy: Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R3–ES–2011–0029; Division of Policy and Directives Management; U.S. Fish and Wildlife Service; 4401 N. Fairfax Drive, MS 2042–PDM; Arlington, VA 22203.

We will post all comments on *http://www.regulations.gov.* This generally means that we will post any personal information you provide us (see the Public Comments section below for more information).

Public hearings: We have scheduled an informational meeting followed by a public hearing in Ashland, Wisconsin, on May 18, 2011, at the Northern Great Lakes Center, 29270 County Highway G. We have scheduled an informational meeting followed by a public hearing in Augusta, Maine, on June 8, 2011, at the Augusta Civic Center, 16 Cony Street. See the Public Hearings section below for more details.

FOR FURTHER INFORMATION CONTACT: Laura Ragan, 612–713–5350. Direct all questions or requests for additional information to: GRAY WOLF QUESTIONS, U.S. Fish and Wildlife Service, Federal Building, 1 Federal Drive, Ft. Snelling, Minnesota 55111–4056. Additional information is also available on our Web site at *http://www.fws.gov/midwest/wolf.* Individuals who are hearing-impaired or speech-impaired may call the Federal Relay Service at 1–800–877–8337 for TTY assistance.

SUPPLEMENTARY INFORMATION:

Public Comments

We intend that any final action resulting from this proposal will be as accurate and as effective as possible. Therefore, comments, new information, or suggestions from the public, other concerned governmental agencies, the scientific community, industry, or any other interested party concerning this proposed rule are hereby solicited. In particular, we are seeking targeted information and comments on our national wolf strategy and our proposed revision of the Minnesota listing; see items (1)-(2) below. Also, as part of this proposed rule we are announcing initiation of a 5-year status review for *C. lupus* in the conterminous United States and Mexico; initiation of status reviews specific to, respectively, gray wolves in the Pacific Northwest and in the Southwest United States and Mexico; and initiation of a status review for *C. lycaon* throughout its range in the United States and Canada. For these status reviews to be complete and based on the best available scientific and commercial information, we request information on items (9)–(11) below from governmental agencies, Native American Tribes, the scientific community, industry, and any other interested parties.

(1) Biological, commercial trade, or other relevant information concerning our analysis of the current gray wolf listing and the adequacy of our national wolf strategy, with particular respect to our recommended gray wolf listing units (*i.e.,* taxonomic or population units);

(2) Information that forms the basis for revising the currently listed Minnesota group of gray wolves under section 4(c) of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*), with particular respect to the factors in section 4(a) of the Act, which are:

(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.

(3) Biological, commercial trade, or other relevant data concerning any current or likely future threat, or lack thereof, to wolves in the WGL DPS;

(4) Additional information concerning the range, distribution, population size, population trends, and threats with respect to wolves in the WGL DPS;

(5) Current or planned activities in the WGL DPS and their possible impacts on the wolves and their habitat;

(6) Information concerning the adequacy of the recovery criteria described in the 1992 Recovery Plan for the Eastern Timber Wolf;

(7) The extent and adequacy of Federal, state, and Tribal protection and management that would be provided to wolves in the WGL DPS as delisted species; and

(8) The proposed geographic boundaries of the WGL DPS, and scientific and legal supporting information for alternative boundaries that might result in a larger or smaller DPS, including information on the discreteness and significance of the proposed DPS.

(9) New information concerning the biology and conservation of the gray wolf in the conterminous United States and Mexico that may be informative to the 5-year status review of *Canis lupus,* with particular attention to the listing units described under (1) above, including:

(a) Habitat requirements for feeding, breeding, and sheltering;

(b) Genetics and taxonomy;

(c) Historical and current range including distribution patterns;

(d) Historical and current population levels, and current and projected trends;

(e) Historical, current, and projected levels of suitable gray wolf habitat;

(f) Past, ongoing, and emerging threats to extant gray wolf populations, their habitat, or both; and

(g) Past and ongoing conservation measures for the gray wolf, its habitat, or both.

(10) Information concerning the status of the gray wolf in the Pacific Northwest United States and the gray wolf subspecies *baileyi* (Mexican wolf) in the Southwest United States and Mexico, including:

(a) Habitat requirements for feeding, breeding, and sheltering;

(b) Genetics and taxonomy;

(c) Historical and current range including distribution patterns;

(d) Historical and current population levels, and current and projected trends;

(e) Historical, current, and projected levels of suitable habitat;

(f) Past, ongoing, and emerging threats to these populations, their habitat, or both; and

(g) Past and ongoing conservation measures for these populations, their habitat, or both.

(11) Information concerning the biology, range, and population trends of *Canis lycaon,* including:

(a) Habitat requirements for feeding, breeding, and sheltering;

(b) Genetics and taxonomy;

(c) Historical and current range including distribution patterns;

(d) Historical and current population levels, and current and projected trends;

(e) Historical, current, and projected levels of suitable habitat;

(f) Past, ongoing, and emerging threats to extant populations, their habitat, or both;

(g) Past and ongoing conservation measures for the species, its habitat, or both; and

(h) The potential role that any portion of the historical range of the *C. lycaon* in the United States may play in the persistence and viability of the species.

You may submit your comments and materials by one of the methods listed in **ADDRESSES**. We will not accept comments sent by e-mail or fax or to an address not listed in **ADDRESSES**. Comments must be submitted to *http://www.regulations.gov* before midnight (Eastern Daylight Time) on the date specified in **DATES.** Finally, we will not consider hand-delivered comments that we do not receive, or mailed comments that are not postmarked, by the date specified in **DATES**.

We will post your entire comment—including your personal identifying information—on *http://www.regulations.gov.* If you provide personal identifying information, such as your street address, phone number, or e-mail address, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so.

Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on *http://www.regulations.gov* at Docket No. FWS–R3–ES–2011–0029, or by appointment, during normal business hours at the following Ecological Services offices:

- Twin Cities, Minnesota Ecological Services Field Office, 4101 American Blvd. E., Bloomington, MN; 612–725–3548.
- Green Bay, Wisconsin Ecological Services Field Office, 2661 Scott Tower Dr., New Franken, WI; 920–866–1717.
- East Lansing, Michigan Ecological Services Field Office, 2651 Coolidge Road, Suite 101, East Lansing, MI; 517–351–2555.
- New England Ecological Services Field Office, U.S. Fish and Wildlife Service, 70 Commercial St., Suite 300, Concord, NH; 603–223–2541.

Public Hearings

We have scheduled an informational meeting followed by a public hearing in Ashland, Wisconsin, on May 18, 2011, at the Northern Great Lakes Center, 29270 County Highway G. The informational meeting will be held from 6 p.m. to 7:15 p.m., followed by a public hearing from 7:30 p.m. to 9 p.m.

A second informational meeting followed by a public hearing will be held in Augusta, Maine, on June 8, 2011, at the Augusta Civic Center, 16 Cony Street. The informational meeting will be held from 6 p.m. to 7:15 p.m., followed by a public hearing from 7:30 p.m. to 9 p.m.

Peer Review

In accordance with our policy, "Notice of Interagency Cooperative Policy for Peer Review in Endangered Species Act Activities," which was published on July 1, 1994 (59 FR 34270), we will seek the expert opinion of at least three appropriate independent specialists regarding scientific data and interpretations contained in this proposed rule. The purpose of such review is to ensure that our decisions are based on scientifically sound data, assumptions, and analysis. We will send copies of this proposed rule to the peer reviewers immediately following publication in the **Federal Register**.

Background

National Overview

Below we provide an overview of our proposed national approach to recovery of wolves in the conterminous United States and Mexico. This overview provides the context for our proposed actions for wolves in the eastern United States. In this overview, we discuss the listing history for the gray wolf, evaluate the current gray wolf listing, present the structured decision-making process we have used to date to formulate our national wolf strategy, and describe the strategy itself.

Gray Wolf Listing History

Here we present a brief overview of previous Federal actions relating to the listing of gray wolves and the recovery plans that have been developed pursuant to these listing actions. Additional Federal actions for western Great Lakes wolves are discussed in *Previous Federal Actions for WGL Wolves* below.

Gray wolves were originally listed as subspecies or as regional populations of subspecies in the conterminous United States and Mexico. In 1967, we listed the eastern timber wolf (*Canis lupus lycaon*) in the Great Lakes region (32 FR 4001, March 11, 1967), and in 1973 we listed *C. l. irremotus* in the northern

Rocky Mountains (38 FR 14678, June 4, 1973). Both listings were promulgated under the Endangered Species Conservation Act of 1969; subsequently, on January 4, 1974, these subspecies were listed under the Endangered Species Act of 1973 (39 FR 1171). We listed a third gray wolf subspecies, the Mexican wolf (*C. l. baileyi*) as endangered on April 28, 1976 (41 FR 17740), in the southwestern United States and Mexico. On June 14, 1976 (41 FR 24064), we listed the Texas gray wolf subspecies (*C. l. monstrabilis*) as endangered in Texas and Mexico.

In 1978, we published a rule (43 FR 9607, March 9, 1978) reclassifying the gray wolf as an endangered population at the species level (*C. lupus*) throughout the conterminous 48 States and Mexico, except for the Minnesota gray wolf population, which was classified as threatened. At that time, we considered the Minnesota group of gray wolves to be a listable entity under the Act, and we considered the gray wolf group in Mexico and the 48 conterminous States other than Minnesota to be another listable entity (43 FR 9607, 9610, respectively, March 9, 1978). This 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.

However, the 1978 rule also stated 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, March 9, 1978). Accordingly, recovery plans were developed for the wolf populations in the following regions of the United States: the northern Rocky Mountains in 1980, revised in 1987; the Great Lakes in 1978, revised in 1992; and the Southwest in 1982, the revision of which is now underway.

More detail on previous Federal actions for the Southwest and northern Rocky Mountains wolves is provided, respectively, within the 90-day finding for Mexican wolves (75 FR 46894) and in various notices and rulemakings for the management of northern Rocky Mountains wolves (59 FR 60252, November 22, 1994; 59 FR 60266, November 22, 1994; 68 FR 15804, April 1, 2003; 68 FR 15879, April 1, 2003; 70 FR 1286, January 6, 2005; 71 FR 6634, February 8, 2006; 71 FR 43410, August 1, 2006; 73 FR 4720, January 28, 2008; 73 FR 10514, February 27, 2008; 74 FR 15123, April 2, 2009) . Further detail on previous Federal actions related to the WGL DPS is provided in *Previous Federal Actions for WGL Wolves* below.

Evaluation of the 1978 Gray Wolf Listing

The Service now considers the 1978 *Canis lupus* listing rule at 43 FR 9607 to be in need of revision. This need has been identified based on our review of the best available taxonomic information, which indicates that *C. lupus* historically did not occupy large portions of the eastern United States and on our reconsideration of the listing in light of current statutory and policy requirements under the Act. These considerations are discussed in turn below.

Taxonomy and Historical Ranges of Wolves in the United States

Our review of the best available taxonomic information indicates that *Canis lupus* did not occupy large portions of the eastern United States: *i.e.,* the northeastern United States was occupied by the eastern wolf (*C. lycaon*), now considered a separate species of *Canis* rather than a subspecies of *lupus,* and the southeastern United States was occupied by the red wolf (*Canis rufus*) rather than the gray wolf. Our review of North American wolf taxonomy also suggests that changes in listing classification are warranted in other portions of the country.

At the time the gray wolf was listed in 1978, and until the molecular genetics studies of the last few years, the range of the gray wolf prior to European settlement was generally believed to include most of North America. The only areas that were believed to have lacked gray wolf populations were the coastal and interior portions of California, the arid deserts and mountaintops of the western United States, and parts of the eastern and southeastern United States (Young and Goldman 1944, Hall 1981, Mech 1974, and Nowak 1995). We note, however, that some authorities have questioned the reported historical absence of gray wolves in parts of California (Carbyn *in litt.* 2000, Mech *in litt.* 2000).

Furthermore, we note long-held differences of opinion regarding the precise boundary of the gray wolf's historical range in the eastern and southeastern United States. Some researchers regarded Georgia's southeastern corner as the southern extent of gray wolf range (Young and Goldman 1944, Mech 1974); others believed gray wolves did not extend into the Southeast at all (Hall 1981) or did so to a limited extent, primarily at somewhat higher elevations (Nowak 1995). The southeastern and mid-Atlantic States were generally recognized as being within the historical range of the red wolf (*Canis rufus*), and it is not known how much range overlap historically occurred between the two *Canis* species. Morphological work by Nowak (2000, 2002, 2003) supported extending the historical range of the red wolf into southern New England or even farther northward, indicating either that the historical range of the gray wolf in the eastern United States was more limited than previously believed, or that the respective ranges of several wolf species expanded and contracted in the eastern and northeastern United States, intermingling in post-glacial times along contact zones.

The results of recent molecular genetic analyses (*e.g.,* Wilson *et al.* 2000, Wilson *et al.* 2003, Wheeldon and White 2009, Wilson *et al.* 2009, Fain *et al.* 2010, Wheeldon *et al.* 2010) and morphometric studies (*e.g.,* Nowak 1995, 2000, 2002, 2003) explain some of the past difficulties in establishing the gray wolf's range in the eastern United States. These studies show that the mid-Atlantic and southeastern United States historically were occupied by the red wolf (*C. rufus*), and that New England and portions of the upper Midwest (eastern and western Great Lakes regions) historically were occupied by *C. lycaon;* they also indicate that the gray wolf (*C. lupus*) did not occur in the eastern United States.

Based on these recent studies, we view the historical range of the gray wolf as the central and western United States, including portions of the western Great Lakes region, the Great Plains, portions of the Rocky Mountains, the Intermountain West, the Pacific Northwest, and portions of the Southwest. All or parts of 29 southern and eastern States (Maine, Massachusetts, Connecticut, New Hampshire, Rhode Island, Vermont, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida, Ohio (the part outside WGL DPS), West Virginia, Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Texas (east of Interstate Highway 35), Oklahoma (east of Interstate Highway 35 and southeast of Interstate Highway 44 north of Oklahoma City), Arkansas, Missouri (southeast of Interstate Highway 44 and southeast of Interstate Highway 70 east of St. Louis), Indiana (the part outside WGL DPS), and Illinois (the part outside WGL DPS)) were not within the gray wolf's historical range.

In sum, we now recognize three wolf species with ranges in the conterminous United States: *Canis lupus, Canis lycaon,* and *Canis rufus.* The ranges of *C. lupus* and *C. lycaon* overlap in the western Great Lakes region, as discussed in *Taxonomy of Wolves in the Western Great Lakes Region* below; however, in the eastern United States, the historical range of *C. lupus* is considered to fall outside the historical ranges of *C. lycaon* and *C. rufus.*

Conformance With the Act's Definition of Species

Given the assurances we provided in the 1978 *C. lupus* listing that we would continue to treat gray wolf subspecies as separate entities for conservation purposes (as noted in Gray Wolf Listing History, above), we identified a need to reconsider the listing in light of current statutory and policy standards regarding the Act's definition of species. The Act provides for listing at various taxonomic and subtaxonomic levels through its definition of "species" in section 3(16): The term species includes any *subspecies* of fish or wildlife or plants, and any *distinct population segment* of any species of vertebrate fish or wildlife which interbreeds when mature (16 U.S.C. 1532(16) (italics added). As a matter of procedure, then, the Service determines whether it is most appropriate to list an entity as a full species, a subspecies, or a DPS of either a species or subspecies. The gray wolf has a Holarctic range; the current listing encompasses the United States-Mexico segment of the population and consists, in turn, of multiple entities.

The specific provision for listing distinct population segments of vertebrates was enacted through the 1978 Amendments to the Act (Pub. L. 95–362, November 10, 1978); these amendments replaced the ability to list "populations" with the ability to list "distinct population segments" and treat them as species under the Act. To interpret and implement the 1978 DPS amendment, the Service and the National Marine Fisheries Service jointly published the Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act (DPS policy) (61 FR 4722, February 7, 1996), setting policy standards for designating populations as "distinct."

The March 1978 gray wolf listing predated the November 1978 amendments to the Act. Although the 1978 rule lists two *C. lupus* entities, *i.e.,* the endangered and threatened entities described above, these listings were not predicated upon a formal DPS analysis and do not comport with current policy standards. Nonetheless, subsequent recovery plans and all gray wolf rulemakings since 1996 have focused on units reflective of the evident intent of the 1978 rule to manage and recover gray wolves as "separate entities" (43 FR 9609), *i.e.,* subspecies or populations. This proposed rule and our proposed National Wolf Strategy, below, constitute an effort to bring the 1978 listing in line, insofar as possible, with the Act's requirements and current policy standards.

Structured Decision-Making for Wolves

In 2008, the Service embarked on a structured decision-making process as a means of developing a more integrated and comprehensive strategy for gray wolf conservation in the lower 48 States and Mexico. The overall intent of the process was to identify appropriate wolf entities (*i.e.,* listing units) for full status review, anticipating that such review would lead to either confirmation or revision of the existing gray wolf listing. We aimed to identify a coherent set of listing units based on best available scientific and commercial information, conformance with existing regulatory and policy requirements, and fundamental wolf management objectives.

We first conducted several iterations of the process in an internal Service effort to develop a viable framework for considering the scientific and policy questions that drive decision-making for wolves. The resulting framework incorporated decision analysis principles and techniques for crafting alternative listing units and then assessing the relative performance of each alternative in terms of achieving management objectives.

Management of wolves is shared among the Service, States, and Tribes. Thus, following our development of a satisfactory decision-making framework, representatives from several States involved with gray wolf conservation joined us to further explore alternative units that could qualify for future status review (Tribal representatives declined to participate). After acquainting state participants with the decision-making framework, we convened a State-Federal workshop in August 2010 to generate and assess alternative taxonomic and population units at various scales and in various configurations, including the 1978 listing as the *status quo* alternative.

Workshop participants also explored the different values that drive wolf decision-making; these values were expressed as the following fundamental management objectives: (1) Promote and sustain wolf recovery; (2) comply with the requirements of the Act; (3) minimize the regulatory burden on States, Tribes, and the general public; (4) facilitate State and Tribal management of wolves; (5) minimize wolf-human conflicts; and (6) promote public acceptance of wolf listing and recovery actions.

Workshop outcomes provided important input to our continuing effort to formulate a comprehensive vision of wolf conservation. Based on further Service deliberations, this comprehensive vision has evolved into the proposed national wolf strategy discussed below. It is important to note that this strategy is a broad outline, the components of which are in various stages of execution.

National Wolf Strategy

The Service's national wolf strategy is 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.

The strategy is based on three precepts. First, in order to qualify for any type of listing or delisting action, wolf entities must conform to the Act's definition of "species," whether as taxonomic species or subspecies or as distinct population segments. Second, the strategy promotes the continued representation in this country of all substantially unique genetic lineages found historically in the lower 48 States. Third, wolf conservation under the Act is concerned with reducing extinction risks to imperiled entities; the strategy thus focuses on conservation of the four extant gray wolf entities identified through the structured decision-making process and being considered for section 4 actions: (1) The western Great Lakes population, (2) the northern Rocky Mountains (NRM) population, (3) gray wolves in the Pacific Northwest, and (4) the Southwestern population of Mexican wolves.

Various reviews and listing actions are underway for these gray wolf populations. The WGL DPS is proposed for delisting in the proposed rule being published in today's **Federal Register**. With regard to the NRM gray wolf population, Congress is considering legislation that would direct us to reissue our 2009 final rule (74 FR 15123, April 2, 2009), that delisted the NRM DPS in the States of Idaho and Montana,

and in portions of Oregon, Washington, and Utah. This rule retained ESA protections of wolves in Wyoming as non-essential experimental. If passed, we would publish a separate notice in the **Federal Register**. Negotiations regarding potential future post-delisting wolf management in Wyoming are ongoing.

The biological and conservation status of wolves in the Pacific Northwest (we are considering this to be the area west of the NRM gray wolf population, including portions of Oregon, Washington, northern California, and western Nevada) is being assessed to determine their appropriate listing classification. When this review is completed, we will evaluate a potential Pacific Northwest DPS in accordance with our DPS policy and will reclassify this population as appropriate through an additional rulemaking process. The status of the Southwestern population (*i.e.,* Mexican wolves within their historical range) is being reviewed pursuant to our 90-day finding on two listing petitions (75 FR 46894, August 4, 2010). We anticipate that the Southwestern population will be proposed for listing as either the subspecies *C. l. baileyi* or as a DPS of *C. lupus;* in the meantime, recovery planning will continue to proceed for these wolves.

As separate actions move forward for the NRM, Pacific Northwest, and Southwest, wolves in these regions will retain their current classification as endangered, except where delisted and where currently listed as non-essential experimental populations (see 50 CFR 17.84(k)). We plan to move forward with a rulemaking to replace the remainder of the 1978 listing with more targeted regional units, as appropriate, concurrently with publication of the final rule for the WGL DPS.

It is likely that revision of the 1978 gray wolf listing into finer-scale taxonomic or population units will result in removal of the Act's protections in areas of the historical *C. lupus* range, such as the Great Plains States and areas of the western States, that do not support extant wolf populations *and* do not play a role in the recovery of any of the four gray wolf entities. Although some of these areas are within the species' historical range, these areas lack sufficient suitable habitat for wolf pack persistence. Thus, we believe recovery in these areas is both unrealistic and unnecessary. We note, however, that such areas would not necessarily be precluded from wolf conservation efforts under other authorities, *e.g.,* Tribes, States, and Federal land management agencies.

Our national wolf strategy also addresses the two other wolf taxa that fall within the range described for *Canis lupus* in the 1978 listing, *C. lycaon* and *C. rufus.* With regard to *Canis lycaon,* we are announcing a rangewide status review of this species, which occurs in Canada and the western Great Lakes region of the United States. The historical range of *C. lycaon* also extends into the northeastern United States, which the 1978 listing inaccurately treated as part of the range of *C. lupus.* The role of the Northeast region in conservation of *C. lycaon* will be considered in the rangewide review, which will look at the status of extant populations in terms of uniqueness, demography, and extinction risks. A determination as to whether to proceed with any *C. lycaon* listing action—and, if listing is warranted, whether or not to include the northeastern United States in the listed range—will depend on the results of the status review. Notification of our intentions with regard to *C. lycaon* will be provided in conjunction with publication of the final rule for the WGL DPS. Meanwhile, we propose to revise the range of the gray wolf (the species *C. lupus*) by removing all or parts of 29 eastern states that we now recognize were not part of the historical range of the gray wolf. New information indicates that these areas should not have been included in the original listing of the gray wolf. These States are specified under *Taxonomy and Historical Ranges of Wolves in the United States,* above.

Finally, with regard to *Canis rufus,* we propose to remove the southeastern states included in the 1978 gray wolf listing from the List due to error, because we now recognize were not part of the historical range of the gray wolf. These states instead constitute the range of *Canis rufus;* see *Taxonomy and Historical Ranges of Wolves in the United States,* above. Red wolves currently are listed as endangered where found (32 FR 4001, March 11, 1967); this listing will be retained and recovery efforts for red wolves will continue as warranted (Red Wolf Recovery and Species Survival Plan; Service 1990).

Five-Year Review of Gray Wolves

Under section 4(c)(2) of the Act, we have a duty to review listed species' status every 5 years and determine whether a change in listing status is appropriate. We announce initiation of the 5-year review for the gray wolf in this rule and seek new information as requested in Public Comments above.

Western Great Lakes Wolves

Previous Federal Actions for WGL Wolves

The eastern timber wolf (*Canis lupus lycaon*) was listed as endangered in Minnesota and Michigan in the first list of species that were protected under the 1973 Act, published in May 1974 (USDI 1974). On March 9, 1978, we published a rule (43 FR 9607) reclassifying the gray wolf at the species level (*Canis lupus*) as endangered throughout the conterminous 48 States and Mexico, except for the Minnesota population, which we classified to threatened. The separate subspecies listings, including *C. l. lycaon,* thus were subsumed into the listings for the gray wolf in Minnesota and the gray wolf in the rest of the conterminous United States and Mexico. In that 1978 rule, we also identified Isle Royale National Park, Michigan, and Minnesota wolf management zones 1, 2, and 3, as critical habitat. We also promulgated special regulations under section 4(d) of the Act for operating a wolf management program in Minnesota at that time. The depredation control portion of the special regulation was later modified (50 FR 50793; December 12, 1985); these special regulations are found in 50 CFR 17.40(d)(2).

On April 1, 2003, we published a final rule revising the listing status of the gray wolf across most of the conterminous United States (68 FR 15804). Within that rule, we identified three DPSs for the gray wolf (see Gray Wolf Listing History, above), including an Eastern DPS, which was reclassified from endangered to threatened, except where already classified as threatened. In addition, we established a second section 4(d) rule that applied provisions similar to those previously in effect in Minnesota to most of the Eastern DPS. The special rule was codified in 50 CFR 17.40(o).

U.S. District Court rulings in Oregon and Vermont on January 31, 2005, and August 19, 2005, respectively, invalidated the April 1, 2003, final rule. Consequently, the status of gray wolves outside of Minnesota reverted back to endangered status, as had been the case prior to the 2003 reclassification. The courts also invalidated the three DPSs identified in the April 1, 2003, rule, as well as the associated special regulations.

On March 27, 2006, we published a proposal (71 FR 15266–15305) to identify a WGL DPS of the gray wolf, to remove the WGL DPS from the protections of the Act, to remove designated critical habitat for the gray wolf in Minnesota and Michigan, and to

remove special regulations for the gray wolf in Minnesota. The proposal was followed by a 90-day comment period, during which we held four public hearings on the proposal.

On February 8, 2007, the Service issued a rule that identified and delisted the WGL DPS of the gray wolf (*Canis lupus*) (72 FR 6052). Three parties challenged this rule (*Humane Society of the United States* v. *Kempthorne,* 579 F. Supp. 2d 7 (D.D.C. 2008)), and on September 29, 2008, the court ruled in favor of the plaintiffs and vacated the rule and remanded it to the Service. On remand, the Service was directed to provide an explanation as to how simultaneously identifying and delisting a DPS is consistent with the Act's text, structure, policy objectives, legislative history, and any relevant judicial interpretations.

The court's primary question was whether the Service has the authority to identify a DPS within a larger already-listed entity and, in the same decision, determine the DPS does not warrant the Act's protections even though the other populations of the species retain the old listing status. Our authority to make these determinations and to revise the list accordingly is a reasonable interpretation of the language of the Act, and our ability to do so is an important component of the Service's program for the conservation of threatened and endangered species.

Our authority to revise the existing listing of a species (the gray wolf in Minnesota and the gray wolf in the lower 48 States and Mexico, excluding Minnesota) to identify a Western Great Lakes DPS and determine that it is healthy enough that it no longer needs the Act's protections is found in the precise language of the Act. Moreover, even if that authority were not clear, our interpretation of this authority to make determinations under section 4(a)(1) and to revise the endangered and threatened species list to reflect those determinations under section 4(c)(1) is reasonable and fully consistent with the Act's text, structure, legislative history, relevant judicial interpretations, and policy objectives.

We consulted with the Solicitor of the Department of the Interior to address the issue in the court's opinion. On December 12, 2008, a formal opinion was issued by the Solicitor, "U.S. Fish and Wildlife Service Authority Under Section 4(c)(1) of the Endangered Species Act to Revise Lists of Endangered and Threatened Species to 'Reflect Recent Determinations'" (U.S. DOI 2008). The Service fully agrees with the analysis and conclusions set out in the Solicitor's opinion. This proposed action is consistent with the opinion. The complete text of the Solicitor's opinion can be found at *http://www.fws.gov/midwest/wolf/.*

On December 11, 2008, we published a notice reinstating protections for the gray wolf in the western Great Lakes (and northern Rocky Mountains) pursuant to court orders (73 FR 75356).

On April 2, 2009, we published a final rule identifying the western Great Lakes populations of gray wolves as a DPS and revising the list of Endangered and Threatened Wildlife by removing the DPS from that list (74 FR 15070). We did not seek additional public comment on the 2009 final rule. On June 15, 2009, five parties filed a complaint against the Department and the Service alleging that we violated the Act, the Administrative Procedure Act (APA), and the court's remand order by publishing the 2009 final rule (74 FR 15070). On July 2, 2009, pursuant to a settlement agreement between the parties, the court issued an order remanding and vacating the 2009 final rule.

On March 1, 2000, we received a petition from Mr. Lawrence Krak of Gilman, Wisconsin, and on June 28, 2000, we received a petition from the Minnesota Conservation Federation. Mr. Krak's petition requested the delisting of gray wolves in Minnesota, Wisconsin, and Michigan. The Minnesota Conservation Federation requested the delisting of gray wolves in a Western Great Lakes DPS. Because the data reviews resulting from the processing of these petitions would be a subset of the review begun by our July 13, 2000, proposal (65 FR 43450) to revise the current listing of the wolf across most of the conterminous United States, we did not initiate separate reviews in response to those two petitions. While we addressed these petitions in our February 8, 2007, final rule (72 FR 6052), this rule was vacated by the subsequent District Court ruling. While we view our actions on these petitions as final upon publication of the **Federal Register** determinations, we nevertheless restate our 90-day findings that the action requested by each of the petitions may be warranted, as well as our 12-month finding that the action requested by each petition is warranted.

On March 15, 2010, we received a petition from the Minnesota Department of Natural Resources requesting that the gray wolf in Minnesota be removed from the List of Endangered or Threatened Wildlife under the Act. Likewise, on April 26, 2010, we received a petition from the Wisconsin Department of Natural Resources requesting that the gray wolf in Minnesota and Wisconsin be delisted. On April 26, 2010, we received a petition from the Sportsmen's Alliance, representing five other organizations, requesting that gray wolves in the Great Lakes area be delisted. On June 17, 2010, we received a petition from Safari Club International, Safari Club International Foundation and the National Rifle Association of America requesting that wolves of the western Great Lakes be delisted. In response to those four petitions, on September 14, 2010, we published a 90-day finding determining that the petitions presented substantial information that delisting may be warranted and reinitiated a full status review. Therefore, this delisting proposal constitutes our 12-month finding that the action requested by each petition is warranted.

In response to a separate petition, on June 10, 2010, we made a 90-day finding that there was no evidence of any breeding population of wolves to support the requested listing of a DPS of the gray wolf in New England (75 FR 32869).

Species Concepts

As noted in Conformance with the Act's Definition of Species above, the Act defines "species" as including any species or subspecies of fish or wildlife or plants, and any distinct vertebrate population segment of fish or wildlife that interbreeds when mature (16 U.S.C. 1532(16)). It has not been uncommon in the years since the Act was passed for significant controversy to arise over the propriety of recognizing various groups of organisms as eligible for protection under the Act. Our implementing regulations (50 CFR 424.11) require us to use standard taxonomic distinctions (such as species and subspecies) when they are available, clearly defined, and generally accepted. In determining that a taxonomic entity qualifies as a species or subspecies we carefully evaluate the best available taxonomic data to determine whether we have sufficient information to conclude that a taxonomic entity qualifies as a species under the Act.

In identifying species, there is not a single set of criteria, and, therefore, no single species concept that is accepted by all taxonomists. In 1942, Ernst Mayr identified five different species concepts (Mayr 1942), and many more have been recognized since then (Wilkins 2006; 2003; Mayden 1997, pp. 381–384). Many of these species concepts can be associated with one of two major classes of concepts or approaches. The first is the biological species concept (BSC). This concept is based on reproductive relationships among populations. The

ability to interbreed and realize gene flow between two populations is the indication that they belong to the same species. The concept is most commonly associated with Mayr (1963), but has antecedents during the development of evolutionary biology in the 20th century. The second major class of concepts is the phylogenetic species concept (PSC). Under this group of concepts, species are identified by their genealogical (lineages) or phylogenetic (evolutionary) relationships and diagnosability. The many variations of these concepts and others are reviewed by Wiley (1981), Avise (2004), and Coyne and Orr (2004).

There is, likewise, no scientific consensus on what constitutes a subspecies, and some authorities (Wilson and Brown 1953) have questioned the utility of the subspecies level of classification. Following is a description of various subspecies criteria that have been proposed and applied in the taxonomic literature. Because some criteria are more stringent than others, a putative, or generally accepted, subspecies may meet the criteria and be recognized following one concept, but found to be invalid under a more stringent concept. Nowak (1995, p. 394) discussed the standards he used when he revised the subspecies of *Canis lupus:* "My investigation largely disregarded such questions [concerning use of very localized characters] and concentrated on general trends in measurable size and proportion that could be evaluated on a continent-wide or worldwide basis. Substantive statistical breaks in such trends, as discussed above, were taken as evidence of taxonomic division." In The Mammals of North America, Hall (1981, p. viii) included the following in his "Criteria for Species versus Subspecies."

> If crossbreeding occurs in nature at a place or places where the geographic ranges of two kinds of mammals meet, the two kinds are to be treated as subspecies of one species. If no crossbreeding occurs, the two kinds are to be regarded as two distinct, full species.

Mayr (1963, glossary) defined subspecies as, "an aggregate of local populations of a species inhabiting a geographic subdivision of the range of the species, and differing taxonomically from other populations of the species." He further explains "differing taxonomically" as differing "by diagnostic morphological characters" (Mayr 1963, p. 348). Mayr (1969, p. 190) also describes a quantitative method for determining whether populations differ taxonomically: "A so-called 75-percent rule is widely adopted. According to this, a population is recognized as a valid subspecies if 75 percent of the individuals differ from "all" (97 percent) of the individuals of a previously recognized subspecies. At the point of intersection between the two curves where this is true, about 90 percent of population A will be different from about 90 percent of the individuals of population B (to supply a symmetrical solution)".

Patten and Unitt (2002, p. 27) provide another definition of subspecies as "diagnosable clusters of populations of biological species occupying distinct geographic ranges." They do not require that diagnosability be absolute, but advocate 90 percent separation as a more stringent criterion than the 75-percent rule.

Avise (2004, p. 362) attempted to incorporate phylogenetic information within a biological species concept in providing the following guidance on recognizing subspecies: "Within such units [=species], "subspecies" warranting formal recognition could then be conceptualized as groups of actually or potentially interbreeding populations (normally mostly allopatric) that are genealogically highly distinctive from, but reproductively compatible with, other such groups. Importantly, the empirical evidence for genealogical distinction must come, in principle, from concordant genetic partitions across multiple, independent, genetically based molecular (or phenotypic; Wilson and Brown 1953) traits."

A common feature of all of the above definitions is that they recognize that subspecies are groups of populations, and most recognize that subspecies can be variable and overlap, to some degree, in distinguishing characters. Taxonomists do not assign an individual to one subspecies or another; instead individuals are assigned a specific taxonomic classification based on the population in which they exist.

The existence of multiple concepts of species and subspecies is not the only complicating factor in the debate surrounding the classification of organisms; it is further complicated by the way organisms occur in the natural world. Taxonomists are determined to categorize natural organisms into specific groups and identify and name those groups, while also striving to understand the evolutionary processes that give rise to these specific groups (Hey 2001, pp. 328–329). When viewed on the ground, a particular organism may appear to clearly fit into one group or another, but when their evolutionary history is viewed, these groups are revealed as changeable and without clear boundaries. In the reverse, individuals may appear different (that is be morphometrically distinct) but in fact be of the same taxon (that is, genetically similar). In many situations, it is difficult to determine where one species ends and another begins. This is especially true in wide-ranging species and in the zones where multiple forms (for example, where either two species or two subspecies) contact each other or meet, which is the situation with wolves in the WGL region. Ultimately, species are evolving, dynamic populations, and at times are difficult to categorize. Nevertheless, Congress directs that the Service classify populations as species, subspecies, and DPSs, despite the difficulty and complexity of various taxonomic concepts.

Taxonomy of Wolves in the Western Great Lakes Region

The taxonomic status of the wolves in the western Great Lakes region has long been debated. They have been considered a subspecies of gray wolf, *Canis lupus lycaon* (Goldman 1944), Nowak 1995, 2002, 2003); a *Canis lupus* population that has been influenced by interbreeding with coyotes (Lehman *et al.* 1991); members of a full species, *Canis lycaon* (or eastern wolf) that is separate from *Canis lupus* (Wilson *et al.* 2000, Baker *et al.* 2003); possibly the same species as the red wolf, *C. rufus* (Wilson *et al.* 2000); the result of hybridization between *C. rufus* and *C. lupus* (Nowak 2002, 2003, 2009); and, most recently, as a mixed population of *C. lupus, C. lycaon,* and their intercrosses (for example, Wheeldon and White 2009, Fain *et al.* 2010, Wheeldon *et al.* 2010). These varying interpretations of the taxonomic status of western Great Lakes wolves are summarized, respectively, below.

Wolves in Michigan, Wisconsin, and eastern Minnesota were considered by Goldman (1944, p. 437 and Figure 14) to be within the range of the subspecies *Canis lupus lycaon.* Goldman based his classification on variation in body size and proportions, and in pelage (coat) color. According to Goldman, this was the subspecies of gray wolf historically found across a wide range east of the Mississippi River in the United States and in southeastern Canada. Wolves immediately to the west of the Mississippi River were considered to be part of the subspecies *Canis lupus nubilus.* This taxonomic interpretation was followed by Hall and Kelson (1959, p. 849) and Hall (1981, p. 932).

Nowak's (1995, p. 396; 2003, p. 243) revision of the subspecies taxonomy reduced the range of *C. l. lycaon* to southern Ontario and Quebec and northern portions of New York,

Pennsylvania, and Ohio. Nowak's classification was primarily based on statistical analysis of measurements of skull features. He considered gray wolves that historically occupied Michigan, Wisconsin, and Minnesota to be within the range of *C. l. nubilus.* Based on analysis of additional specimens, Nowak (2002, p. 119; 2003; 2009, p. 238) continued to recognize western Great Lakes wolves as *C. l. nubilus,* but noted that historical specimens from the Upper Peninsula (UP) of Michigan were somewhat transitional between the two subspecies.

Based on a study of DNA variation in North American wolves, Wilson *et al.* (2000, p. 2165) proposed that the taxonomic standing of eastern wolves be restored to full species as *Canis lycaon.* They found that eastern wolves were divergent from *Canis lupus* in both mitochondrial DNA (mtDNA) and autosomal microsatellite DNA composition. They considered the geographic range of *C. lycaon* as extending west across the Great Lakes region to Minnesota and Manitoba.

Leonard and Wayne (2008, pp. 2–3) have reported on maternally inherited mtDNA sequence haplotypes (DNA sequences or groups of alleles of different genes on a single chromosome that are inherited together as a single unit) from historical ("prerecovery") wolves from Ontario, Quebec, Michigan, and Wisconsin compared with the recent population of the area. Their interpretation of these results is that the 6 unique haplotypes) identified in 15 historical individuals indicate that the pre-recovery population was "an endemic American wolf," which they call "the Great Lakes wolf" (p. 1). However, only the two haplotypes most common in the historical sample still occur in the modern wolf population of the western Great Lakes area. Leonard and Wayne (2007) conclude that the modern population does not contain the diversity of Great Lakes wolf haplotypes found in the prerecovery population and that the current population is primarily a mixture of *Canis lupus* and coyote hybrids, with minor influence from the endemic Great Lakes wolf (p. 3).

Koblmüller *et al.* (2009) examined wolves from the western Great Lakes region using three types of genetic markers: mtDNA; Y-chromosome haplotypes based on microsatellite DNA loci on the Y-chromosome, which is a paternally-inherited marker; and autosomal microsatellite DNA, which provides information on recent and ongoing interactions among populations rather than evolutionary lineage information. The historical sample from Minnesota was found to exhibit a third Great Lakes wolf mtDNA haplotype that is common in the modern population. However, the Y-chromosome haplotypes identified in the historical sample were more similar to those of western gray wolves, suggesting that interbreeding between Great Lakes wolves and western gray wolves had taken place before 1910, the year of collection.

Koblmüller *et al.* (2009) conclude that, despite what they consider both ancient and recent incidences of interbreeding with coyotes and western gray wolves, Great Lakes wolves remain morphologically distinct and represent a "distinct taxon" of gray wolf (*Canis lupus*) that is adapted to the region. They do not, however, conclude that this taxon is differentiated enough to be recognized as a species separate from gray wolves, as proposed by Wilson *et al.* (2000).

Several recent studies conclude that the eastern wolf is a unique species and should be recognized as *C. lycaon* (Wheeldon and White 2009; Wilson *et al.* 2009; Fain *et al.* 2010, p. 15; Wheeldon *et al.* 2010). Wheeldon and White (2009, pp. 3–4) state that both the present-day and pre-recovery wolf populations in the western Great Lakes region are genetically similar and that both were derived from hybridization between *C. lupus* and the eastern wolf, *C. lycaon.* Fain *et al.* (2010, p. 10) recognize *C. lycaon* as a unique species of North American wolf, and based on mtDNA and Y-chromosome haplotypes and autosomal microsatellite markers, they establish that the population of wolves in the western Great Lakes region comprise *C. lupus, C. lycaon,* and their hybrids. Contrary to Koblmüller *et al.* (2009), Fain *et al.* (2010, p. 14) found no evidence of interbreeding with coyotes. Furthermore, they conclude that the western Great Lakes States were included in the historical range of *C. lycaon* and that hybridization between the two species "predates significant human intervention" (Fain *et al.* 2010, pp. 13–14).

Wheeldon *et al.* (2010, p. 2) used multiple genetic markers to clarify the taxonomic status of *Canis* species in the western Great Lakes region of Minnesota, Wisconsin, Michigan, and western Ontario. They conclude that the current western Great Lakes wolf population is "composed of gray-eastern wolf hybrids that probably resulted from historic hybridization between the parental species" (Wheeldon *et al.* 2010, p. 10), and that the appropriate taxonomic designation for the western Great Lakes hybrid wolves is *C. lupus* × *lycaon,* replacing Nowak's (2009) wolf subspecies designation of *C. lupus lycaon.* We note, however, that a name in the form of *C. lupus* × *lycaon* has no standing as an available species name under the rules of zoological nomenclature (ICZN 1999).

It is clear from the studies discussed above that the taxonomic classification of wolves in the western Great Lakes region is one that has been, and will continue to be, of great debate in the scientific community. Most researchers, however, appear to agree that there is a unique and genetically identifiable form of wolf that occupies the western Great Lakes region, and that this form has hybridized with *Canis lupus,* whose origins were from elsewhere in North America. Researchers differ in whether this unique form of wolf should be recognized as a species (Wilson *et al.* 2000; Fain *et al.* 2010, p. 15; Wheeldon *et al.* 2010), a subspecies (Nowak 1995), or a distinct taxon or ecotype but without applying a formal scientific name to that form (Koblmüller *et al.* 2009). In choosing among these three alternatives, we find that the large divergence of both mtDNA and Y-chromosome haplotypes between Great Lakes wolves and *C. lupus* is greater than that found between subspecies of *Canis lupus* and favors recognition of the eastern wolf as a species. Currently, the best available scientific information supports recognition of the eastern wolf, *C. lycaon,* as a species (rather than, as previous believed, as a subspecies of gray wolf), and establishes that this species has intercrossed with *C. lupus* in the western Great Lakes region to constitute a population composed of *C. lupus, C. lycaon,* and their hybrids (Wheeldon and White 2009, p. 1; Fain *et al.* 2010, p. 14; Mech *et al.* 2010; Wheeldon *et al.* 2010).

The existence of two wolf species in the western Great Lakes region was not known or suspected in 1978, when the Service replaced the listings of four subspecies of gray wolf, including *C. lupus lycaon,* with the listing of all *Canis lupus* and *Canis lupus* subspecies in the conterminous United States and Mexico as endangered, except for the Minnesota population, which was listed as threatened (USFWS 1978). Since that time, increasingly powerful genetic techniques for the characterization of populations have been developed and applied to wild populations, including wolves. These advances have shown that hybridization between species is much more prevalent than was appreciated in 1978 (Schwenk *et al.* 2011); thus the detection of hybridization in western Great Lakes wolves is not unique among mammalian species.

Nowak's (1995, 2002, 2003) exclusion of the western Great Lakes region from *C. l. lycaon* was likely influenced by his inclusion of both *C. lupus* and *C. lycaon* in his western Great Lakes sample. In any event, the various genetic investigations of western Great Lakes wolves clearly show a distribution of eastern wolf (*C. lycaon*) genetic markers throughout the region.

We do not accept the proposal of Wilson *et al.* (2000) that *C. lycaon* and *C. rufus* (red wolf) are the same species. Their conclusion was based on red wolf and *C. lycaon* occurring on the same branch of a phylogenetic network representing mtDNA differences (Wilson *et al.* 2000, Figure 5A). This relationship has not been found in subsequent studies (Wilson *et al.* 2003; Leonard and Wayne 2008, p. 2; Fain *et al.* 2010, p. 9), which placed the red wolf and *C. lycaon* on different branches separated by intervening coyote lineages. This suggests that the red wolf and *C. lycaon* may have evolved independently from common ancestors with modern coyotes, but does not support uniting them as a single species.

Genetic Composition of Wolves in the Western Great Lakes Region

Estimates of the genetic composition of the wolves of the western Great Lakes region with respect to the two species (*C. lupus* and *C. lycaon*) are based on the frequencies of different paternal (Y-chromosome) and maternal (mtDNA) markers specific to the each species in samples of wolves from the region. For mtDNA, 66 percent of sampled wolves had *C. lycaon* haplotypes (Fain *et al.* 2010, p. 13; Wheeldon *et al.* 2010). For Y-chromosome haplotypes, 54 percent (Wheeldon *et al.* 2010) or 50 percent (Fain *et al.* 2010, p. 7) of sampled wolves had haplotypes of *C. lycaon.* Male wolves carry both paternal and maternal markers. Of male wolves sampled by Fain *et al.* (2010, p. 12), 41 percent had both maternal and paternal haplotypes of *C. lycaon,* and 13 percent had both maternal and paternal haplotypes of *C. lupus.* Based on a larger sample that also included some wolves from western Ontario, Wheeldon *et al.* (2010) reported 42 percent of the sampled male wolves had both maternal and paternal haplotypes of *C. lycaon* and 21 percent had both maternal and paternal haplotypes of *C. lupus.* Maternal and paternal haplotypes were mixed with respect to the two species for the remaining wolves in both studies.

Although it is clear that *C. lycaon* and *C. lupus* have hybridized in the western Great Lakes region, same-species combinations of paternal and maternal markers in male wolves are more common than expected by random mating (Wheeldon *et al.* 2010). This suggests that there is some constraint on complete hybridization between the two species and that complete blending of the two components of the population is not inevitable. The limited number of historical specimens from the western Great Lakes region that have been genetically characterized all have mtDNA indicative of *C. lycaon* (Leonard and Wayne 2008, pp. 2–3; Wheeldon and White 2009, p. 1), but four of these from the early 20th century also had *C. lupus* Y-chromosome haplotypes, which indicates that hybridization had occurred by that time. The opportunity for hybridization between *C. lycaon,* which belongs to a North American lineage, and *C. lupus,* which evolved in Eurasia, has existed since *C. lupus* entered North America about 500,000 years ago (Kurtén and Anderson 1980), yet a predominantly *C. lycaon* population of wolves still persists in the western Great Lakes region.

Wolf-Coyote Relationships

For a discussion on interpretations of wolf-coyote relationships in the western Great Lakes, see the discussion under Factor E. Other Natural or Manmade Factors Affecting Its Continued Existence in this proposed rule.

Procedural Aspects of Proposal Applying to the Gray Wolf (C. lupus)

When the Service revised the endangered species list in 1978 to include the species *Canis lupus* in the lower 48 States and Mexico, regulatory protections were applied to all gray wolves in the lower 48 States, including all subspecies of gray wolves, which were subsumed at that time into *C. lupus.* That rule classified the Minnesota gray wolf population as a threatened "species" and gray wolves elsewhere in the lower 48 States and Mexico as another "species" with endangered status. The best scientific information available supports the existence of distinct taxa and populations within the *C. lupus* listing and changes our understanding of North American wolf taxonomy. With regard to the WGL wolf population, current scientific data indicate that *Canis lycaon,* which was understood in 1978 to be a subspecies of *C. lupus,* should be recognized as a full species, and that *C. lycaon* and *C. lupus* both occur, and to some extent, interbreed in the western Great Lakes area (see *Taxonomy of Wolves in the Western Great Lakes Region*).

The existence of this new information does not by itself change the regulatory status of the gray wolf (*C. lupus*) under the Act—such changes must be made through rulemaking. This proposed rule recognizes the taxonomic changes and the improved status of the WGL gray wolf populations and proposes those appropriate and necessary administrative changes for the gray wolf in the WGL and portions of the eastern United States.

Based on our current understanding of wolf systematics, we recognize that not all individual wolves in the WGL region are in fact, gray wolves, *Canis lupus.* Within this rule we are proposing changes to the listing for *C. lupus* and are initiating a status review for *C. lycaon.* These two actions combined will address all wolves in the WGL region.

The procedural aspects of this proposed rule (*e.g.,* the revision of the 1978 listing of the group of gray wolves in Minnesota as a "species" to a DPS and the delisting of that DPS) refer to the gray wolf (*C. lupus*), because that is the named entity currently on the List of Endangered and Threatened Wildlife. Our proposed action here is to establish the existence of a WGL distinct population segment of *C. lupus* and to determine that the DPS is neither endangered nor threatened, despite its proximity to a closely related species, *C. lycaon*—a species whose status we will evaluate for possible protection under the Act in the near future.

Biology and Ecology of Wolves in the Western Great Lakes

Gray wolves are the largest wild members of the Canidae, or dog family, with adults ranging from 18 to 80 kilograms (kg) (40 to 175 pounds (lb)) depending upon sex and subspecies (Mech 1974). The average weight of male wolves in Wisconsin is 35 kg (77 lb) and ranges from 26 to 46 kg (57 to 102 lb), while females average 28 kg (62 lb) and range from 21 to 34 kg (46 to 75 lb) (Wisconsin Department of Natural Resources (WI DNR) 1999). Wolves' fur color is frequently a grizzled gray, but it can vary from pure white to coal black. Wolves may appear similar to coyotes (*Canis latrans*) and some domestic dog breeds (such as the German shepherd or Siberian husky) (*C. lupus familiaris*). Wolves' longer legs, larger feet, wider head and snout, and straight tail distinguish them from both coyotes and dogs.

Wolves primarily are predators of medium and large mammals. Wild prey species in North America include white-tailed deer (*Odocoileus virginianus*) and mule deer (*O. hemionus*), moose (*Alces alces*), elk (*Cervus elaphus*), woodland caribou (*Rangifer caribou*) and barren

ground caribou (*R. arcticus*), bison (*Bison bison*), muskox (*Ovibos moschatus*), bighorn sheep (*Ovis canadensis*) and Dall sheep (*O. dalli*), mountain goat (*Oreamnos americanus*), beaver (*Castor canadensis*), snowshoe hare (*Lepus americanus*), and muskrat (*Ondatra zibethicus*), with small mammals, birds, and large invertebrates sometimes being taken (Chavez and Gese 2005, Mech 1974, Stebler 1944, WI DNR 1999, Huntzinger *et al.* 2005). In the WGL DPS, during the last 25 years, wolves have also killed domestic animals including horses (*Equus caballus*), cattle (*Bos taurus*), sheep (*Ovis aries*), goats (*Capra hircus*), llamas (*Lama glama*), pigs (*Sus scrofa*), geese (*Anser sp.*), ducks (*Anas sp.*), turkeys (*Meleagris gallopavo*), chickens (*Gallus sp.*), guinea fowl (*Numida meleagris*), pheasants (*Phasianus colchicus*), dogs, cats (*Felis catus*), and captive white-tailed deer (Paul 2004, 2005; Wydeven 1998; Wydeven *et al.* 2001; Wydeven and Wiedenhoeft 1999, 2000, 2001, 2005).

Wolves are social animals, normally living in packs of 2 to 12 wolves. Winter pack size in Michigan's Upper Peninsula (UP) averaged from 2.7 to 4.6 wolves during the 1995 through 2005 period and ranged from 2 to 14 wolves per pack (Huntzinger *et al.* 2005). Pack size in Wisconsin is similar, averaging 3.8 to 4.1 wolves per pack, and ranging from 2 to 11 wolves in winter 2004–05 (Wydeven and Wiedenhoeft 2005). In Minnesota the average pack size found in the 1988–89, 1997–98, and 2003–04 winter surveys was higher—5.55, 5.4, and 5.3 wolves per pack, respectively (Erb and Benson 2004).

Packs are primarily family groups consisting of a breeding pair, their pups from the current year, offspring from one or two previous years, and occasionally an unrelated wolf. Packs typically occupy, and defend from other packs and individual wolves, a territory of 20 to 214 square (sq) miles (mi) (50 to 550 sq kilometers (km)). Midwest wolf packs tend to occupy territories on the lower end of this size range. Michigan Upper Peninsula territories averaged 103 sq mi (267 sq km in 2000–01 (Drummer *et al.* 2002), Wisconsin territories 37 sq mi (96 sq km) in 2004–05 (Wydeven and Wiedenhoeft 2005), and Minnesota territory size averaged 39 sq mi (102 sq km) in 2003–04 (Erb and Benson 2004). Normally, only the top-ranking ("alpha") male and female in each pack breed and produce pups. Litters are born from early April into May; they range from 1 to 11 pups, but generally include 4 to 6 pups (Michigan Department of Natural Resources (MI DNR) 1997; USFWS 1992; USFWS *et al.* 2001). Normally a pack has a single litter annually, but the production of 2 or 3 litters in one year has been routinely documented in Yellowstone National Park (USFWS *et al.* 2002; Smith *et al.* 2005).

Yearling wolves frequently disperse from their natal packs, although some remain with their natal pack. Adult wolves and pups older than 5 months also may disperse but at much lower frequencies (Fuller 1989). Dispersers may range over large areas as lone animals after leaving their natal pack or they may locate suitable unoccupied habitat and a member of the opposite sex and begin their own pack. These dispersal movements allow a wolf population to quickly expand and colonize areas of suitable habitat that are nearby or even those that are isolated by a broad area of unsuitable habitat. Additional details on extraterritorial movements are found in *Delineating the Boundaries of the Proposed WGL Gray Wolf DPS,* below.

Recovery of Western Great Lakes Wolves

Recovery Criteria

Recovery plans are not regulatory documents and are instead intended to provide guidance to the Service, States, and other partners on methods of minimizing threats to listed species and achieving recovery. These documents include, among other elements required under section 4(f) of the Act, criteria for determining when a species can be delisted. There are many paths to accomplishing recovery of a species; in fact, recovery of a species is a dynamic process requiring adaptive management that may, or may not, strictly adhere to the guidance provided in a recovery plan.

We use recovery criteria in concert with evidence that threats have been minimized sufficiently and populations have achieved long-term viability to judge when a species can be reclassified from endangered to threatened or delisted. Recovery plans, including recovery criteria, are subject to change based upon new information and are revised accordingly and when practicable. In a similar sense, implementation of planned actions is subject to changing information and availability of resources. We have taken these considerations into account in the following discussion.

The 1978 Recovery Plan (hereafter Recovery Plan) and the 1992 Revised Recovery Plan for the Eastern Timber Wolf (hereafter Revised Recovery Plan) contain the same two recovery criteria. The first recovery criterion states that the survival of the wolf in Minnesota must be assured. We, and the Eastern Timber Wolf Recovery Team (Peterson in litt. 1997, 1998, 1999a, 1999b), have concluded that this recovery criterion remains valid. It 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.

The Recovery Plan for the Eastern Timber Wolf was based on the best available information on wolf taxonomy at the time of its original publication and subsequent revision. As discussed above in *Taxonomy of Wolves in the Western Great Lakes Region,* since the publication of those plans, several studies have produced conflicting results regarding the taxonomic identity of the wolf that historically occupied the eastern States. Currently, the Service subscribes to the view that what was formerly recognized as the subspecies *C. lupus lycaon* should be recognized as a unique species, *C. lycaon.* Regardless of its taxonomic identity, however, this recovery program has always focused on recovering the wolf population that survived in, and has expanded outward from, northeastern Minnesota. Thus, the Plans guide our analysis of recovery of the wolves in the western Great Lakes area.

Although the recovery criteria identified in the Recovery Plan predate the scientific field of conservation biology, the conservation principles of representation (conserving the genetic diversity of a taxon), resilience (the ability to withstand demographic and environmental variation), and redundancy (sufficient populations to provide a margin of safety) were incorporated into these criteria. Maintenance of the Minnesota wolf population is vital in terms of representation and resilience, because the remaining genetic diversity of wolves in the eastern United States (other than red wolves) was carried by the several hundred wolves that survived in Minnesota into the early 1970s. The Recovery Team insisted that the remnant Minnesota wolf population be maintained and protected to achieve wolf recovery in the eastern United States. The successful growth of the remnant Minnesota population has maintained and maximized the representation of that genetic diversity among wolves in the WGL. Although the Revised Recovery Plan did not establish a specific numerical criterion for the Minnesota wolf population, it did identify, for planning purposes only, a population goal of 1,251–1,400

animals for that Minnesota population (USFWS 1992, p. 28). A population of this size would increase the likelihood of maintaining its genetic diversity over the long term. This large Minnesota wolf population also provides resiliency to reduce the adverse impacts of unpredictable demographic and environmental events. Furthermore, the Revised Recovery Plan specifies 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 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). The reestablished population enhances both the resiliency and redundancy of the WGL metapopulation.

The Recovery Plan provides two options for reestablishing this second population. If it is an isolated population, that is, located more than 100 mi (160 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 geographically close enough to exchange wolves with the Minnesota population (that is, they would function as a metapopulation), thereby bolstering the smaller second population both genetically and numerically.

The original Recovery Plan did not specify where in the eastern United States the second population should be re-established. 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 UP 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 suggest that the restoration of the gray wolf throughout all or most of what was thought to be its historical range in the eastern United States, or to all of these potential re-establishment areas, is necessary to achieve recovery under the Act.

In 1998, the Eastern Timber Wolf Recovery Team clarified the application of the recovery criterion for the second population to the wolf population that had developed in northern Wisconsin and the adjacent UP of Michigan. This second population is less than 100 mi (160 km) from the Minnesota wolf population. The Recovery Team recommended that the numerical recovery criterion for the Wisconsin–Michigan population be considered met when consecutive late-winter wolf surveys document that the population equals or exceeds 100 wolves (excluding Isle Royale wolves) for the 5 consecutive years between the first and last surveys (Peterson in litt. 1998).

Recovery Trends for Wolves in the Western Great Lakes Region

Minnesota Recovery

During the pre-1965 period of wolf bounties and legal public trapping, wolves persisted in the remote northeastern portion of Minnesota but were eliminated from the rest of the State. Estimated numbers of Minnesota wolves before their listing under the Act in 1974 include 450 to 700 wolves in 1950–53 (Fuller *et al.* 1992, p. 43, based on data in Stenlund 1955, p. 19), 350 to 700 wolves in 1963 (Cahalane 1964, p. 10), 750 wolves in 1970 (Leirfallom 1970, p. 11), 736 to 950 wolves in 1971–72 (Fuller *et al.* 1992, p. 44), and 500 to 1,000 wolves in 1973 (Mech and Rausch 1975, p. 85). Although these estimates were based on different methodologies and are not directly comparable, each puts the pre-listing abundance of wolves in Minnesota at 1,000 or less. This was the only significant wolf population in the United States outside Alaska during those time periods.

After the gray wolf was listed as endangered under the Act in 1974, the Minnesota population estimates increased (see table 1 below). Mech estimated the population to be 1,000 to 1,200 wolves in 1976 (USFWS 1978, pp. 4, 50–52), and Berg and Kuehn (1982, p. 11) estimated that there were 1,235 wolves in 138 packs in the winter of 1978–79. In 1988–89, the Minnesota Department of Natural Resources (MN DNR) repeated the 1978–79 survey and also used a second method to estimate wolf numbers in Minnesota. The resulting independent estimates were 1,500 and 1,750 wolves in at least 233 packs; the lower number was derived by a method comparable to the 1978–79 survey (Fuller *et al.* 1992, pp. 50–51).

During the winter of 1997–98, the MN DNR repeated a statewide wolf population and distribution survey, using methods similar to those of the two previous surveys. Field staff of Federal, State, Tribal, and county land management agencies and wood products companies were queried to identify occupied wolf range in Minnesota. Data from 5 concurrent radio telemetry studies tracking 36 packs, representative of the entire Minnesota wolf range, were used to determine average pack size and territory area. Those figures were then used to calculate a statewide estimate of wolf and pack numbers in the occupied range, with single (non-pack) wolves factored into the estimate (Berg and Benson 1999, pp. 1–2).

TABLE 1—MINIMUM WINTER WOLF POPULATIONS IN MINNESOTA, WISCONSIN, AND MICHIGAN (EXCLUDING ISLE ROYALE) FROM 1976 THROUGH 2010. (NOTE THAT THERE ARE SEVERAL YEARS BETWEEN THE FIRST THREE ESTIMATES. MINNESOTA DOES NOT CONDUCT ANNUAL SURVEYS.)

Year	Number of wolves			
	Minnesota	Wisconsin	Michigan	Wisconsin and Michigan total
1976	1,000–1,200			
1978–79	1,235			
1988–89	1,500–1,750	31	3	34

TABLE 1—MINIMUM WINTER WOLF POPULATIONS IN MINNESOTA, WISCONSIN, AND MICHIGAN (EXCLUDING ISLE ROYALE) FROM 1976 THROUGH 2010. (NOTE THAT THERE ARE SEVERAL YEARS BETWEEN THE FIRST THREE ESTIMATES. MINNESOTA DOES NOT CONDUCT ANNUAL SURVEYS.)—Continued

Year	Number of wolves			
	Minnesota	Wisconsin	Michigan	Wisconsin and Michigan total
1989–90		34	10	44
1990–91		40	17	57
1991–92		45	21	66
1992–93		40	30	70
1993–94		57	57	114
1994–95		83	80	163
1995–96		99	116	215
1996–97		148	113	261
1997–98	2,445	180	139	319
1998–99		205	169	374
1999–2000		248	216	464
2000–01		257	249	506
2001–02		327	278	604
2002–03		335	321	656
2003–04	3,020	373	360	733
2004–05		435	405	840
2005–06		467	434	899
2006–07		546	509	1,055
2007–08	2,921	549	520	1,069
2008–09		637	577	1,214
2009–10		690	557	1,247

The 1997–98 survey concluded that approximately 2,445 wolves existed in about 385 packs in Minnesota during that winter period (90 percent confidence interval from 1,995 to 2,905 wolves) (Berg and Benson 1999, p. 4). This figure indicated the continued growth of the Minnesota wolf population at an average rate of about 3.7 percent annually from 1970 through 1997–98. Between 1979 and 1989 the annual growth rate was approximately 3 percent, and it increased to between 4 and 5 percent in the next decade (Berg and Benson 1999, p. 5; Fuller *et al.* 1992, p. 51). As of the 1998 survey, the number of Minnesota wolves had reached approximately twice the number specified in the recovery planning goal for Minnesota (USFWS 1992, p. 28).

Minnesota DNR conducted another survey of the State's wolf population and range during the winter of 2003–04, again using methodology similar to the previous surveys. That survey concluded that an estimated 3,020 wolves in 485 packs occurred in Minnesota (90 percent confidence interval for this estimate is 2,301 to 3,708 wolves) (Erb and Benson 2004, pp. 7, 9). The MN DNR conducted its most recent survey of wolf population and range during the winter of 2007–08. That survey concluded that an estimated 2,921 wolves in 503 packs occurred in Minnesota (90 percent confidence interval for this estimate is 2,192 to 3,525 wolves). The results of the past three surveys suggest that the wolf population has been numerically stable over the past 10 or more years (Erb 2008, p. 6).

As wolves increased in abundance in Minnesota, they also expanded their distribution. During 1948–53, the primary wolf range was estimated at 11,954 sq mi (31,080 sq km) (Stenlund 1955, p. 19). A 1970 questionnaire survey in Minnesota resulted in an estimated wolf range of 14,769 sq mi (38,400 sq km) (calculated by Fuller *et al.* 1992, p. 43, from Leirfallom 1970). Fuller *et al.* (1992, p. 44), using data from Berg and Kuehn (1982), estimated that Minnesota primary wolf range encompassed 14,038 sq mi (36,500 sq km) during the winter of 1978–79. By 1982–83, pairs or breeding packs of wolves were estimated to occupy an area of 22,000 sq mi (57,050 sq km) in northern Minnesota (Mech *et al.* 1988, p. 86). That study also identified an additional 15,577 sq mi (40,500 sq km) of peripheral range, where habitat appeared suitable but no wolves or only lone wolves existed. The 1988–89 study produced an estimate of 23,165 sq mi (60,200 sq km) as the contiguous wolf range at that time in Minnesota (Fuller *et al.* 1992, pp. 48–49; Berg and Benson 1999, p. 3, 5), an increase of 65 percent over the primary range calculated for 1978–79.

The 1997–98 study concluded that the contiguous wolf range had expanded to 33,971 sq mi (88,325 sq km), a 47 percent increase in 9 years (Berg and Benson 1999, p. 5). By that time the Minnesota wolf population was using most of the available primary and peripheral range identified by Mech *et al.* (1988, p. 86). The wolf population in Minnesota had increased in abundance and distribution to the point that its contiguous range covered approximately 40 percent of the State during 1997–98. In contrast, the 2003–04 survey failed to show a continuing expansion of wolf range in Minnesota, and any actual increase in wolf numbers since 1997–98 was attributed to increased wolf density within a stabilized range (Erb and Benson 2004, p. 7). The results of the 2007–08 survey also indicated that wolf range in Minnesota remained "essentially unchanged" since 2004 (Erb 2008, not paginated).

Although the Minnesota DNR does not conduct a formal wolf population survey annually, it includes the species in its annual carnivore track survey. This survey, standardized and operational since 1994, provides an annual index of abundance for several species of large carnivores by counting their tracks along 20-mile (32-km) long standardized survey routes in northern Minnesota. In 2009, wolves were detected on 71 percent of the 58 routes surveyed, and the resulting indices of abundance and distribution were not appreciably different from recent years (Erb 2009, not paginated).

Summary for Minnesota

The Minnesota wolf population has increased from an estimated 1,000 individuals in 1976 to nearly 3,000 today and the estimated wolf range in the State has expanded by approximately 225 percent (from approximately 15,000 sq mi (24,100 sq km) to approximately 34,000 sq mi (54,700 sq km)) since 1970. Over the past 10–12 years, the population size and range have remained stable, as most of the primary and peripheral habitat has been occupied. Based on the current abundance and distribution of the Minnesota wolf population, we believe its continued survival is ensured, and it achieves the first recovery criterion of the Revised Recovery Plan.

Wisconsin Recovery

Wolves were considered to have been extirpated from Wisconsin by 1960. No formal attempts were made to monitor the State's wolf population from 1960 through 1978. Although individual wolves and an occasional wolf pair were reported from 1960 through 1975, (Thiel 1978, Thiel 1993), there was no documentation of wolf reproduction occurring in Wisconsin, and the wolves that were reported may have been dispersing animals from Minnesota.

Wolves are believed to have reestablished breeding packs in Wisconsin in the winter of 1975–76. The Wisconsin Department of Natural Resources (WI DNR) began wolf population monitoring in 1979–80, estimating a statewide population of 25 wolves at that time (Wydeven and Wiedenhoeft 2000, pp. 151, 159; Wydeven *et al.* 2009c, pp. 93–97). This population remained relatively stable for several years, and then declined to approximately 15 to 19 wolves in the mid-1980s. In the late 1980s, the Wisconsin wolf population began an increase that has continued into 2010, when 690 wolves were counted (Wydeven *et al.* 2010, Figure 3).

Since 1979, WI DNR has intensively surveyed its wolf population on an annual basis using a combination of aerial, ground, and satellite radio telemetry complemented by snow tracking and wolf sign surveys (Wydeven *et al.* 2006a, pp. 4–5; Wydeven *et al.* 2009c, pp. 90–91). Wolves are trapped from May through September and fitted with radio collars, with a goal of having at least one radio collared wolf in approximately half of the wolf packs in Wisconsin. Aerial locations are obtained from each functioning radio collar about once per week, and pack territories are estimated and mapped from the movements of the individuals who exhibit localized patterns. From December through March, the pilots make special efforts to visually locate and count the individual wolves in each radio-tracked pack.

Snow tracking is used to supplement the information gained from aerial sightings and to provide pack size estimates for packs lacking a radio-collared wolf. Tracking is done by assigning survey blocks to trained trackers, who then drive snow-covered roads in their blocks and follow all wolf tracks they encounter. Snowmobiles are used to locate wolf tracks in more remote areas with few roads. The results of the aerial and ground surveys are carefully compared to properly separate packs and to avoid over-counting (Wydeven *et al.* 2006a, pp. 4–5). The estimated number of wolves in each pack is based on the aerial and ground observations made of the individual wolves in each pack over the winter.

Because the monitoring methods focus on wolf packs, lone wolves are likely undercounted in Wisconsin. As a result, the annual population estimates are probably slight underestimates of the actual wolf population within the State during the late-winter period. Fuller (1989, p. 19) noted that lone wolves are estimated to compose from 2 to 29 percent of the total population in the area. Wisconsin DNR surveys have estimated 2–15 percent of the winter population as loners (Wydeven *et al.* 2009c, p. 96). These surveys, however, are focused on heavily forested portions of northern and central Wisconsin; therefore, dispersing wolves traveling other portions of the State are less likely to be detected, and often such wolves are only documented after vehicle collisions or accidental shootings. Broader use of trail cameras by members of the public is improving the WI DNR's ability to detect lone wolves across the State.

As previously stated, population estimates are made at the low point of the annual wolf population cycle. Thus, Wisconsin wolf population estimates are conservative in two respects. They undercount lone wolves, and the count is made at the annual low point of the population. This methodology is consistent with the recovery criteria established in the Revised Recovery Plan, which established numerical criteria to be measured with data obtained by late-winter surveys. Based on these considerations, an estimated 690 to 733 wolves in 181 packs, including 35 wolves on Native American reservations, were in Wisconsin in early 2010, representing an 8 percent increase from 2009 (Wydeven *et al.* 2010, pp. 12–13).

In the winter of 1994–95, wolves were first documented in Jackson County, Wisconsin, well to the south of the area occupied by other Wisconsin wolf packs in the northern part of the State (Thiel *et al.* 2009, pp. 109–110). The number of wolves in this central Wisconsin area has dramatically increased since that time. During the winter of 2009–10, there were 100–106 wolves in 25 packs in the central forest wolf range (Zone 2 in the Wisconsin Wolf Management Plan; Wydeven *et al.* 2010, p. 5) and an additional 46 to 48 wolves in 12 or 13 packs in the marginal habitat in Zone 3, located between Zone 1 (northern forest wolf range) and Zones 2 and 4 (Wydeven *et al.* 2010, p. 5).

During the winter of 2004–05, 11 to 13 wolves were believed to be primarily occupying Native American reservation lands in Wisconsin (Wydeven in litt. 2005); this increased to 16 to 17 in 2005–06, 17 to 19 in 2007–08 (Wydeven and Wiedenhoeft 2008, Summary), approximately 27 in 2008–2009 (Wydeven and Wiedenhoeft 2008, p. 1), and approximately 35 in 2009–10 (Wydeven *et al.* 2010, p. 1). The 2009–10 survey consisted of 3 packs totaling 10–11 wolves on the Bad River Chippewa Reservation and a pack of 2 wolves on the Lac Courtes Oreilles Chippewa Reservation, both in northwestern Wisconsin. There also were two packs of five wolves each on the Lac du Flambeau Reservation in north-central Wisconsin. A pack of four wolves and three pairs occurred on the Menominee Reservation and a three-wolf pack occurred on the Stockbridge Reservation, both in northeastern Wisconsin (Wydeven *et al.* 2010, Table 6). A pack of four to five wolves spent time on portions of the Red Cliff Chippewa Reservation along the Lake Superior shoreline. Wolf packs also used scattered lands of the St. Croix Chippewa in northwest Wisconsin, the Ho Chunk Nation in central Wisconsin, and Potawatomi in northeast Wisconsin. The Tribal land of the Ho-Chunk, St. Croix Chippewa, and Potawatomi are composed mostly of scattered parcels of land, and are not likely to provide significant amounts of wolf habitat. About 90 percent of packs in northern Wisconsin Zone 1, and northern portions of Zone 3 are located in ceded territory where Chippewa Bands have retained hunting and gathering rights.

In 2002, wolf numbers in Wisconsin alone surpassed the 1992 Revised Recovery Plan criterion for a second population within 100 miles of the Minnesota population (100 wolves for a minimum of 5 consecutive years (USFWS 1992, p. 4)). Furthermore, in 2004, Wisconsin wolf numbers

exceeded the 1992 recovery criterion of 200 animals for 6 successive late-winter surveys for an isolated wolf population (USFWS 1992, p. 4). Wisconsin population estimates for 1985 to 2010 increased from 15 to 690 wolves (see table 1 above) and from 4 to 181 packs (Wydeven *et al.* 2010, figure 3). This represents an annual population increase of 21 percent through 2000, and an average annual increase of 6 percent for the most recent 6 years. The slower rates of increase since 2000 are an indication that the State's wolf population growth and geographic expansion are beginning to level off.

Michigan Recovery

Except for Isle Royale, wolves were extirpated from Michigan as a reproducing species long before they were listed as endangered under the Act in 1974. Prior to 1989, the last known breeding population of wild Michigan wolves outside Isle Royale occurred in the mid-1950s. However, as wolves began to reoccupy northern Wisconsin, the Michigan Department of Natural Resources (MI DNR) began noting single wolves at various locations in the UP of Michigan. Wolf recovery in Michigan began with the documentation of three wolves traveling together and making territorial marks in the central UP during the fall of 1988; and the subsequent birth of pups in this territory during spring 1989 (Beyer *et al.* 2009, p. 73). Since that time, wolf packs have spread throughout the UP, with immigration occurring from Wisconsin on the west and possibly from Ontario on the east. Wolves now are found in every county of the UP, with the possible exception of Keweenaw County (Huntzinger *et al.* 2005, p. 6; Roell 2009, pers. comm.).

The MI DNR annually monitors the wolf population in the UP by conducting a winter survey. Roads and trails are searched intensively and extensively for wolf tracks and other wolf sign using trucks and snowmobiles (Potvin *et al.* 2005). Complete surveys conducted from 1999 to 2006 provided an opportunity to evaluate multiple sampling approaches (MI DNR 2008). Based on these evaluations, it was determined that a geographically stratified sampling protocol produced unbiased, precise estimates of wolf abundance (Potvin *et al.* 2005; Drummer, unpublished data). The sampling protocol implemented in 2007 allows trackers to spend more time in smaller areas (MI DNR 2008).

The UP is divided into 21 survey units from which a stratified random sample is drawn, covering roughly 50 percent of the UP every year (MI DNR 2008). Pack locations are derived from previous surveys, citizen reports, and extensive ground and aerial tracking of radio-collared wolves. During the winter of 2009–10, 557 wolves in 109 packs were resident in the UP (MI DNR in litt. 2010, Table 1). Surveys along the border of adjacent survey units are coordinated to avoid double counting of wolves and packs occupying those border areas. In areas with a high density of wolves, ground surveys by four to six surveyors with concurrent aerial tracking are used to accurately delineate territories of adjacent packs and count their members (Beyer *et al.* 2004, pp. 2–3; Huntzinger *et al.* 2005, pp. 3–6; Potvin *et al.* 2005, p. 1661). As with Wisconsin, the Michigan surveys likely miss lone wolves, thus underestimating the actual population.

Based on annual surveys in late winter, estimates of wolves in the UP increased from 57 wolves in 1994 to 557 in late winter 2009–10 (see table 1 above). Over the last 10 years, the annualized rate of increase has been about 12 percent (MI DNR in litt. 2010, table 1). This rate has varied from year to year, but there appear to be two distinct phases of population growth, with relatively rapid growth (25.8 percent average) from 1995 through 2000 and slower growth (10.1 percent average) from 2001 through 2010. In 2005, the number of wolves in the Michigan population alone surpassed the recovery criterion for an isolated wolf population of 200 animals for 6 successive late-winter surveys, as specified in the Revised Recovery Plan (USFWS 1992, pp. 24–26).

To date, no wolf packs are known to be primarily using Tribal-owned lands in Michigan (Roell 2011, pers. comm.). Native American Tribes in the UP of Michigan own small, scattered parcels of land relative to the size of wolf pack territories. Thus, no one Tribal property would likely support a wolf pack. However, as wolves occur in all counties in the UP and are wide-ranging, Tribal land is likely used periodically by wolves.

In October 2004, a coyote trapper mistakenly captured and killed a wolf in Presque Isle County in the northern Lower Peninsula (LP) of Michigan. This was the first verification of a wolf in the northern LP in at least 65 years (Roell *et al.* 2010, p. 4). This wolf had been trapped and radio-collared by the MI DNR the previous year (2003) while it was a member of an eastern UP pack. Since 2004, Michigan has surveyed the northern LP to determine whether wolves had successfully colonized the area. From 2005 through 2007, the survey had two components: A prioritized area search and a targeted area search based on citizen reports of wolves or wolf sign. USDA–Wildlife Services, Little Traverse Bay Band of Odawa Indians, and Central Michigan University worked cooperatively on the surveys. Nine units ranging in size from 200–400 sq mi (322–644 sq km) were surveyed; however, no wolf sign was found (Roell *et al.* 2010, p. 4). Beginning in 2008, a targeted search approach was used. The MI DNR issued a press release asking citizens to report any wolves or wolf sign; again, no wolves were detected in winters of 2008–10 (Roell *et al.* 2009, p. 5; Roell 2010, pers. comm.).

In the summer of 2009, video images of single wolves were recorded in two of the three northern LP counties nearest to the UP (Roell *et al.* 2010, p. 4). The videos, taken in Emmet County in May 19, 2009, and Presque Isle County in July 27, 2009, may have been of the same animal (Roell 2009, pers. comm.). In 2010, USDA Wildlife Services and MI DNR staff confirmed a single breeding pair with three pups in Cheboygan County in the northern LP (MI DNR 2010). This is the first time a wolf pack has been verified in the LP since the early 1900s. In 2008, the DNR recognized the likelihood that small numbers of wolves would eventually move into the northern LP and form persistent packs (Potvin 2003, pp. 29–30; Gehring and Potter 2005, p. 1242; Beyer *et al.* 2006, p. 35), and revised its Wolf Management Plan in part to incorporate provisions for wolf management in the northern LP (MI DNR 2008a, p. 46).

The wolf population of Isle Royale National Park, Michigan, is not considered to be an important factor in the recovery of wolves in the WGL. The Park population is small and isolated and lacks genetic uniqueness (Wayne *et al.* 1991, pp. 47–49). In addition, this island population probably has not had any contact with mainland wolf populations since its founding pair crossed the Lake Superior ice in the late 1940s (Peterson *et al.* 1998, p. 828). For genetic reasons and constraints on expansion due to 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 ranged from 12 to 50 wolves since 1959, and was 19 wolves in the winter of 2009–2010 (Vucetich and Peterson 2010, p. 5).

Summary for Wisconsin and Michigan

The two-State wolf population, excluding Isle Royale wolves, has

exceeded 100 wolves since late-winter 1993–94 and has exceeded 200 wolves since late-winter 1995–96. Therefore, the combined wolf population for Wisconsin and Michigan has exceeded the second recovery criterion of the 1992 Revised Recovery Plan for a nonisolated wolf population, since 1999. Furthermore, the two-State population has exceeded the recovery criterion for an isolated second population since 2001.

Other Areas In and Near the Proposed Western Great Lakes DPS

No surveys have been conducted to document the number of wolves present in North Dakota or South Dakota, but an increasing number of wolves has apparently been detected in the eastern portions of these States. The eastern boundaries of North Dakota and South Dakota are approximately 19 and 81 mi (30 and 130 km), respectively, from occupied habitat in Minnesota. Biologists who are familiar with wolves in these States, however, generally agree that the wolves found there are primarily lone dispersers, although there were reports of pups being seen in the Turtle Mountains of North Dakota, in 1994 (Collins in litt. 1998).

Other records include an adult male shot near Devil's Lake, North Dakota in 2002, another adult male shot in Richland County in extreme southeastern North Dakota in 2003 (Fain in litt. 2006), and a vehicle-killed adult male found near Sturgis, South Dakota, in 2006 (Larson in litt. 2006). In contrast to the other South Dakota wolves of the last 25 years, the animal found near Sturgis was genetically identified as having come from the Greater Yellowstone area (Fain in litt. 2006). Most recently, a wolf was shot in Roberts County, South Dakota in January 2009 (reportedly running with two or three other wolves) (Prieksat in litt. 2009), and another wolf was found dead in a foothold trap that was set as part of an ongoing USDA Wildlife Service's coyote control operation in southeastern Eddy County, North Dakota (Bicknell in litt. 2009). See *Delineating the Boundaries of the Proposed WGL Gray Wolf DPS* in this proposed rule for a detailed discussion of movement of wolves.

Wolf dispersal is expected to continue as wolves travel away from the more saturated habitats in the primary range into peripheral areas where wolves are extremely sparse or absent. Unless they return to the primary range and join or start a pack there, they are unlikely to contribute to long-term maintenance of WGL wolf populations.

Although it is possible for these dispersers to encounter and mate with a mature wolf outside the primary range, the lack of large expanses of unfragmented habitat make it unlikely that wolf packs will persist in these peripheral areas; lack of contiguous habitat is expected to seriously impede further expansion. The only exception is the northern LP of Michigan, where several studies indicate that a persistent wolf population may develop (Gehring and Potter 2005, p. 1242; Potvin 2003, pp. 29–30), albeit dependent on occasional to frequent immigration of UP wolves. Despite the constraints on further expansion described here, however, current wolf populations in Minnesota, Wisconsin, and the UP of Michigan have already greatly exceeded the recovery levels defined in the 1992 Revised Recovery Plan, and maintenance of these numbers is not contingent on recruitment of wolves from areas outside the primary range that has been established for the WGL.

Summary of Wolf Recovery in the Western Great Lakes Region

Wolves in the proposed WGL DPS 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 for 5 successive years. Based on the criteria set by the Eastern Wolf Recovery Team in 1992 and reaffirmed in 1997 and 1998 (Peterson in litt. 1997, in litt. 1998), the proposed DPS contains sufficient wolf numbers and distribution to ensure their long-term survival within the DPS.

The maintenance and expansion of the Minnesota wolf population has maximized the preservation of the genetic diversity that remained in the proposed WGL DPS when its wolves were first protected in 1974. Furthermore, the Wisconsin–Michigan wolf population has exceeded the numerical recovery criterion even for a completely isolated second population. Therefore, even in the unlikely event that this two-State population was 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 11 and 10 years, respectively, so if either were somehow to become isolated, they would remain viable, and each State has committed to manage its wolf population at or above viable population levels. The wolf's numeric and distributional recovery criteria in the WGL have been met.

Have the Wolves of the Western Great Lakes Region Been Restored?

Leonard and Wayne (2008, p. 3) have stated that Great Lakes wolves have not been restored based on absence of certain historical mtDNA haplotypes from the current population, an estimated historical population size far greater than the current population size, and the admixture of coyote and western wolf haplotypes in the current population.

The spatial representativeness of both the historical and recent samples reported by Leonard and Wayne (2008) has been questioned by Mech (2009). For example, 16 recent but no historical samples from Minnesota were included in the study. Leonard and Wayne (2009) responded that they did not believe that genetic differences were likely to be pronounced at the geographic scale discussed by Mech and Paul (2008) and Mech (2009).

The current population of wolves in Minnesota, Wisconsin, and Michigan is derived from expansion of the remnant population in northeastern Minnesota (Fain *et al.* 2010, p. 12), which was likely to have included both *C. lupus* and *C. lycaon* (Mech and Frenzel 1971; Mech 2010, p. 135), and in the case of UP Michigan, with possible contributions from *C. lycaon* from southern Ontario (Fain *et al.* 2010, p. 12).

Subsequent studies with larger samples of the current wolf population find, despite acknowledged influence of western wolves, the current population is generally representative of the historical population (Fain *et al.* 2010, p. 14; Wheeldon *et al.* 2010). Koblmüller *et al.* (2009, pp. 10–11) found "comparatively slight" differentiation at autosomal microsatellite DNA loci between historical and current Great Lakes wolves. Wheeldon and White (2009, p. 4) present microsatellite DNA evidence that the hybridization processes noted by Leonard and Wayne (2008) were taking place over a century ago, so that the current population is comparable to the historical population with respect to admixture. Hybridization between eastern wolves and western wolves in the western Great Lakes region occurred prior to significant human effects on population size or habitat (Fain *et al.* 2010, p. 14). According to Fain *et al.* (2010, p. 14), the current population of wolves in the western Great Lakes "represents an ancient component of the northeast ecosystem and have been

established throughout the region for thousands of years."

The loss of mtDNA haplotypes found in historical but not the current western Great Lakes wolf population reported by Leonard and Wayne (2008, pp. 2–3) and the loss of allelic diversity (Fain *et al.* 2010, p. 11), indicate that a genetic bottleneck occurred when wolves were nearly extirpated from the western Great Lakes region and the period of slow recovery that immediately followed. Despite these "founder effects" on the genetic composition of the western Great Lakes population, various measures of genetic diversity remain comparable to other wolf populations (Koblmüller *et al.* 2009; Fain *et al.* 2010, p. 12; Wheeldon *et al.* 2010), at least partially owing to contributions from western wolves (*C. lupus*).

Wolves in the WGL region display a healthy level of heterozygosity (Fain *et al.* 2010, p. 12), and show no evidence of genetic bottlenecks (Koblmuller *et al.* 2009, p. 1). Schwartz and Vucetich (2009, p. 2) have stated that "By all accounts, the return of wolves to the Great Lakes region has been successful * * * they are doing superbly—both in terms of population viability and ecological function." Cronin and Mech (2009, p. 2) state, "We suggest that wolves in the [W]GL region can simply be called a wolf population with mixed ancestry." They further state that, "It is generally acknowledged that the Great Lakes wolf population is fit, with abundant genetic variation" (Cronin and Mech 2009, p. 2).

Distinct Vertebrate Population Segment Policy Overview

Pursuant to the Act, we consider whether information is sufficient to indicate that listing, reclassifying, or delisting any species, subspecies, or, for vertebrates, any DPS of these taxa may be warranted. To interpret and implement the DPS provision of the Act and congressional guidance, the Service and the National Marine Fisheries Service (NMFS) published a policy regarding the identification of distinct vertebrate population segments under the Act (Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 FR 4722, February 7, 1996) (hereafter DPS Policy). Under the DPS policy, two factors are considered in a decision regarding the potential identification of a DPS: (1) Discreteness of the population segment in relation to the remainder of the taxon, and (2) the significance of the population segment to the taxon to which it belongs. If a population meets both tests, it can be identified as a DPS. Then a third factor, the DPS's conservation status, is evaluated in relation to the Act's standards for listing, delisting, or reclassification, meaning that we undertake an analysis to determine whether the DPS is endangered or threatened or does not meet the criteria for listing. All three steps are necessary components of a complete DPS analysis.

Past Practice and History of Using DPSs

As of February 1, 2011, of the 392 native vertebrate listings, 85 are listed as less than an entire taxonomic species or subspecies (henceforth referred to in this discussion as populations) under one of several authorities, including the "distinct population segment" language in the Act's definition of species (section 3(16)). Thirty-three of these 85 populations, which span 52 different taxa, predate the 1996 DPS Policy; as such, the final listing determinations for these populations did not include formal policy-based analyses or expressly designate the listed entity as a DPS. In several instances, however, the Service and National Marine Fisheries Service (NMFS) have established a DPS and revised the List of Endangered and Threatened Wildlife in a single action, as shown in the following examples.

In February 1985, the Service delisted the brown pelican (*Pelecanus occidentalis*) in the southeastern United States and continued to identify it as endangered throughout the remainder of its range (50 FR 4938). In June 1994, NMFS revised the entry for the gray whale (*Eschrichtius robustus*) to remove the eastern North Pacific population from the List while retaining the western North Pacific population as endangered (59 FR 31094). In July 2003, the Service established two DPSs of the Columbian white-tailed deer (*Odocoileus virginianus leucurus*)—the Douglas County DPS and the Columbia River DPS—and delisted only the Douglas County DPS, while listing the Columbia River DPS (68 FR 43647). In March 2007, the Service established a DPS of the grizzly bear (*Ursus arctos horribilis*) for the Greater Yellowstone Area and surrounding area within the existing grizzly bear listing in the lower 48 States, and delisted this DPS (72 FR 14865). Also in March 2007, the Service identified the American crocodile (*Crocodylus acutus*) in Florida as a DPS within the existing endangered listing of the American crocodile in the United States and reclassified the Florida DPS from endangered to threatened (71 FR 13027). Revising and delisting the WGL DPS of wolves is consistent with the Service's past practice and does not represent a change in agency position.

Proposed Western Great Lakes Distinct Population Segment

In 1978, based on what was at that time the "best available biological data," the Service stated that there were two "species" of gray wolves in the conterminous United States: "For purposes of this rulemaking, the gray wolf (*Canis lupus*) group in Mexico and the 48 conterminous States of the United States, other than Minnesota, is being considered as one "species," and the gray wolf group in Minnesota is being considered as another "species." (43 FR 9607, 9610, March 9, 1978). The Service then assigned a different status under the Act to each of those two "species," finding the Minnesota gray wolf "species" to be threatened, while the other gray wolf "species" (the 48 conterminous States, except Minnesota, and in Mexico) to be endangered. The 1978 rule referred to the Minnesota listing as the listing of a "species" when, clearly, based on the information available at that time, the Minnesota wolves did not taxonomically constitute a separate species of wolf. Therefore, the 1978 listing either effectively established a Minnesota DPS or listed an entity in a portion of its broader range.

The DPS Policy (61 FR 4725, February 7, 1996) expressly provides for reexamining pre-policy DPS listings: "Any DPS of a vertebrate taxon that was listed prior to implementation of this policy will be reevaluated on a case-by-case basis as recommendations are made to change the listing status for that distinct population segment. The appropriate application of the policy will also be considered in the 5-year reviews of the status of listed species required by section 4(c)(2) of the Act." Based on this provision, we are, within this proposed rule, (1) recognizing that a Minnesota DPS was established in 1978, (2) reevaluating that DPS listing, and (3) proposing to revise that DPS to meet the criteria in the DPS policy and to reflect the "best available biological data."

A gray wolf DPS that includes only Minnesota does not meet the criteria in the DPS policy because it is not discrete "* * * in relation to the remainder of the species to which it belongs" (61 FR 4725, February 7, 1996). The Minnesota wolf population has expanded beyond State boundaries and is connected to the wolf population in Wisconsin and Michigan, as evidenced by frequent movements of wolves among the States (Van Deelen 2009, p. 140; Treves *at al.* 2009, pp. 192–195) and genetic analyses

that demonstrate the Wisconsin and Michigan wolves are mostly from the same genetic mix as Minnesota wolves (Wheeldon and White 2009, p. 4; Fain *et al.* 2010). Therefore, we are proposing to revise the boundaries of the Minnesota DPS to meet the criteria in the DPS policy as discussed under the *Distinct Population Segment Analysis,* below.

Geographical Area of the Proposed Western Great Lakes DPS

The geographical area of the proposed WGL DPS is shown in figure 1, below, and is described as all of Minnesota, Wisconsin, and Michigan; the portion of North Dakota north and east of the Missouri River upstream to Lake Sakakawea and east of the centerline of Highway 83 from Lake Sakakawea to the Canadian border; the portion of South Dakota north and east of the Missouri River; the portions of Iowa, Illinois, and Indiana north of the centerline of Interstate Highway 80; and the portion of Ohio north of the centerline of Interstate Highway 80 and west of the Maumee River at Toledo.

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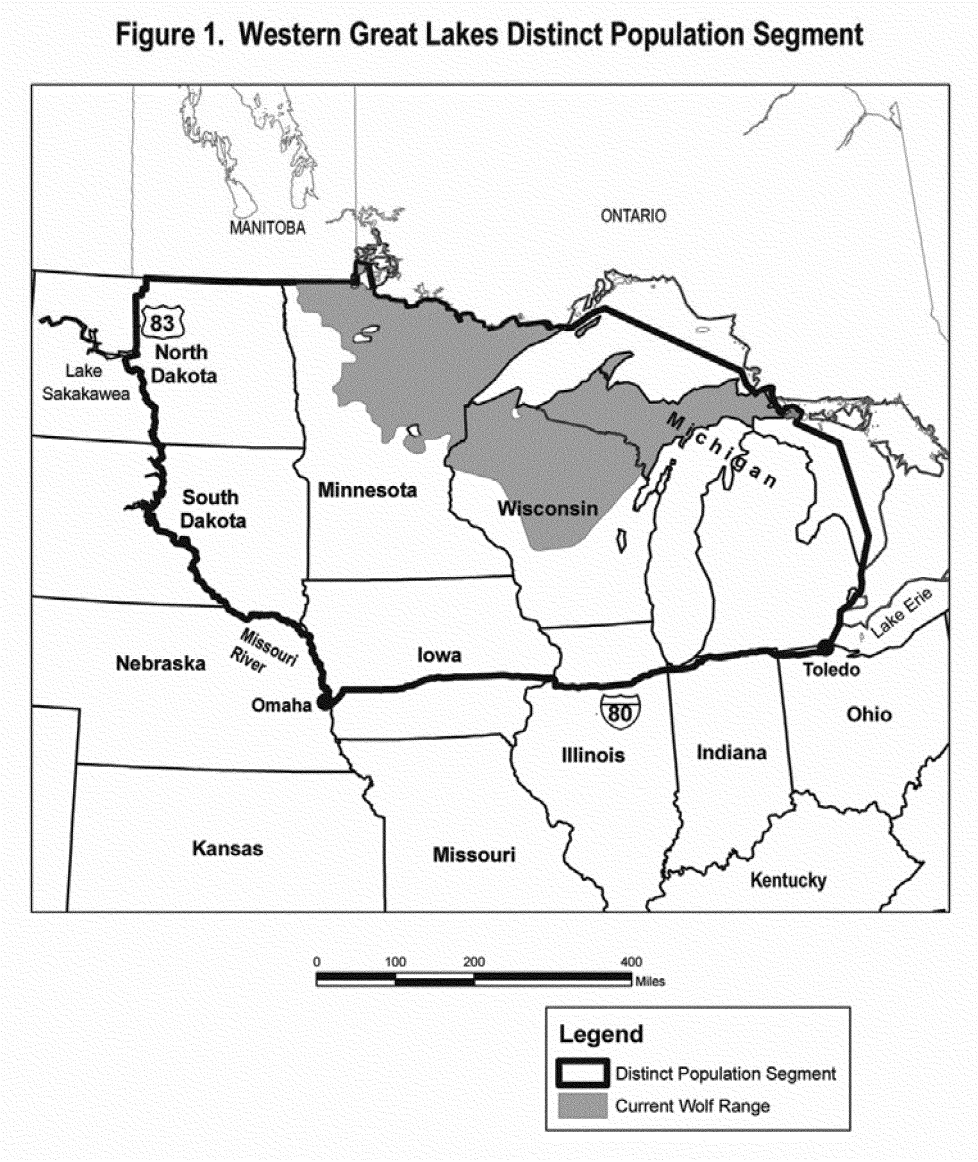

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Distinct Population Segment Analysis

Analysis for Discreteness

Under the 1996 DPS Policy (61 FR 4722), a population segment of a vertebrate taxon may be considered discrete if it satisfies either of the following conditions: (1) it is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors (quantitative measures of genetic or morphological discontinuity may provide evidence of this separation); or (2) it is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

Markedly Separated from Other Populations of the Same Taxon—The western boundaries of the proposed WGL DPS are approximately 400 mi (644 km) from the nearest known gray wolf packs in Wyoming and Montana. The distance between those western packs and the nearest packs within the proposed WGL DPS is nearly 600 mi

(966 km). The area between Minnesota packs and northern Rocky Mountain (NRM) packs largely consists of unsuitable habitat, with only scattered islands of possibly suitable habitat, such as the Black Hills of eastern Wyoming and western South Dakota. There are no known populations of gray wolves to the south or east of the proposed WGL DPS within the United States.

As discussed in the previous section, wolves are known to disperse over vast distances, but straight line documented dispersals of 400 mi (644 km) or more are very rare. Although we cannot rule out the possibility of a WGL wolf traveling 600 mi (966 km) or more and joining or establishing a pack in the northern Rockies, such a movement has not been documented and is expected to happen very infrequently, if at all. Similar movements from the NRM wolf population into the proposed WGL DPS are unknown and are expected to happen infrequently. The 2006 Sturgis (South Dakota) wolf is the closest that an NRM wolf has come to entering the proposed WGL DPS (Fain in litt. 2006); however, the Sturgis wolf would still have had to travel over 300 mi (500 km) before encountering the nearest wolf pack in the proposed WGL DPS. As the discreteness criterion requires that the DPS be "markedly separated" from other populations of the taxon rather than requiring complete isolation, this high degree of physical separation between the WGL DPS and the northern Rocky Mountains satisfies the discreteness criterion.

Delimited by International Boundaries with Significant Management Differences—The DPS policy allows us to use international borders to delineate the boundaries of a DPS if there are differences in control of exploitation, conservation status, or regulatory mechanisms between the countries. The border between the United States and Canada has been used as the northern boundary of the listed entity since gray wolves were reclassified in the lower 48 States and Mexico in 1978. There remain significant cross-border differences in exploitation, management, conservation status, and regulatory mechanisms. About 52,000 to 60,000 wolves occur in Canada, where suitable habitat is abundant (Boitani 2003, p. 322). Because of this abundance, wolves in Canada are not protected by Federal laws and are only minimally protected in most Canadian provinces (Pletscher *et al.* 1991, p. 546). In the United States, unlike Canada, Federal protection and intensive management has been necessary to recover the wolf (Carbyn 1983).

In general, Canadian gray wolf populations are sufficiently large and healthy so that population regulation, rather than protection and close monitoring, is the management focus. There are an estimated 4,000 wolves in Manitoba (Manitoba Conservation undated). Hunting is allowed nearly province-wide, including in those provincial hunting zones adjoining northwestern Minnesota, with last year's season running from August 31, 2009, through March 31, 2010 (Manitoba Conservation 2009a). Trapping wolves is allowed province-wide, except in and immediately around Riding Mountain National Park (southwestern Manitoba), with last year's season running from October 14, 2008, through February 28 or March 31, 2009 (varies with trapping zone) (Manitoba Conservation 2009b).

The Ontario Ministry of Natural Resources estimates there are 8,850 wolves in the province, based on prey composition and abundance, topography, and climate and wolf numbers in most parts of the province are believed to be stable or increasing since about 1993 (Ontario MNR 2005a, pp. 7–9). In 2005, Ontario limited hunting and trapping of wolves by closing the season from April 1 through September 14 in central and northern Ontario (Ontario MNR 2005b). In southern Ontario, the portion of the province that is adjacent to the proposed WGL DPS, wolf hunting and trapping is permitted year round (Ontario MNR 2005c). If delisted, Minnesota, Wisconsin, and Michigan would carefully monitor and manage wolves to retain populations at or above the recovery goal (see Factor D). Therefore, even though biologically the WGL wolf population is simply a well-connected southern extension of wolves in Canada, we will continue to use the United States-Canada border to mark the northern boundary of the DPS due to the difference in control of exploitation, conservation status, and regulatory mechanisms between the two countries.

Conclusion—We find, based on our analysis of the best available scientific information, that the proposed WGL DPS is markedly separated from other United States populations of gray wolves and difference in control of exploitation, conservation status, and regulatory mechanisms justifies discreteness between United States and Canadian wolf populations. Therefore, the proposed WGL DPS meets the criterion for discreteness under the DPS policy.

Analysis for Significance

If we determine that a population segment is discrete, we next consider available scientific evidence of its significance to the taxon to which it belongs. Our DPS policy states that this consideration may include, but is not limited to, the following: (1) Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon; (2) evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon; (3) evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range; and/or (4) evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics. Factor 2 applies to the proposed WGL DPS and is included in our analysis for significance. Factors 1, 3, and 4 do not apply to the proposed WGL DPS and thus are not included in our analysis for significance.

Significant Gap in the Range of the Taxon—Wolves once lived throughout most of North America. Wolves have been extirpated from most of the southern portions of their historical North American range. The successful restoration of a viable wolf metapopulation to large parts of Minnesota, Wisconsin, and Michigan has filled a significant gap in the holarctic range of gray wolves in the United States, and it provides an important extension of the range of gray wolves in North America. The loss of the WGL wolf population would, therefore, represent a significant gap in the species' holarctic range in that the WGL wolf population is the only wolf population in the conterminous States east of the Rocky Mountains, except for the red wolves (a different species) being restored along the Atlantic Coast, and currently holds about 40 percent of North American gray wolves known to occur south of Canada.

Finding—We find, based on our analysis of the best available scientific information, that the proposed WGL DPS is significant to the taxon to which it belongs because its loss would result in a significant gap in the range of the taxon. Therefore, the proposed WGL DPS meets the criterion for significance under the DPS policy.

Discrete Vertebrate Population Segment Conclusion

We propose, based on our review of the best available scientific data, that the WGL DPS is discrete from other gray

wolf populations as a result of physical separation from other gray wolf populations in the United States and the international border with Canada. The DPS is significant to the taxon to which it belongs because it contains a wolf metapopulation that fills a large gap in the historical range of the taxon in the conterminous States. Therefore, we have determined that this population segment of wolves satisfies the discreteness and significance criteria required for a DPS. The evaluation of the appropriate conservation status for the proposed WGL DPS is found below.

Delineating the Boundaries of the Proposed WGL Gray Wolf DPS

In contrast to a species or a subspecies, a DPS is a biological population that is delineated by a boundary that is based on something other than established taxonomic distinctions. Therefore, the starting point for delineating a DPS is the biological population or metapopulation, and a geographical delineation of the DPS must reasonably represent the population or metapopulation and its biological characteristics and recovery needs.

To delineate the boundary of the proposed WGL DPS, we considered the current distribution of wolves in the Midwest and the characteristic movements of those wolves and of wolves elsewhere. We examined the best available scientific data on long-distance movements, including long-distance movements followed by return movements to the vicinity of the natal pack. We concluded that wolf behavior and the nature of wolf populations require that we include within the area of the DPS some subset of known long-distance movement locations. However, as explained below, wolf biology and common sense argue against including all known or potential long-distance movements within the DPS's boundaries.

The analysis detailed below resulted in the proposed boundaries of the WGL DPS that are shown in figure 1. This DPS has been delineated to include the core recovered wolf population plus a wolf movement zone around the core wolf populations. This geographic delineation is not intended to include all areas to which wolves have moved from the Great Lakes population. Rather, it includes the area currently occupied by wolf packs in Minnesota, Wisconsin, and Michigan; the nearby areas in these States in which wolf packs may become established in the foreseeable future; and a surrounding area into which Minnesota, Wisconsin, and Michigan wolves occasionally move but where persistent packs are not expected to be established because suitable habitat is rare and exists only as small patches. The area surrounding the core wolf populations includes the locations of most known dispersers from the core populations, especially the shorter and medium-distance movements from which wolves are most likely to return to the core areas and contribute to the wolf population. Therefore, the DPS encompasses the current range of the population, which is considered to be viable, including the primary range and the peripheral range.

The WGL areas that are regularly occupied by wolf packs are well documented in Minnesota (Erb and Benson 2004, p. 12, fig. 3; Erb and Don Carlos 2009, pp. 57–60), Wisconsin (Wydeven *et al.* 2006, p. 33, fig. 1; Wydeven *et al.* 2009c, pp. 93–98), and the UP of Michigan (Huntzinger *et al.* 2005, pp. 25–27, figs. 4–6; Beyer *et al.* 2009, pp. 73–75). Wolves have successfully colonized most, perhaps all, suitable habitat in Minnesota. Minnesota data from the winter of 2007–08 indicate that wolf numbers and density have stabilized since 1997–98, and there was no expansion of occupied range in the State (Erb 2008, pp. 5–7). Wisconsin wolves now occupy most habitat areas believed to have a high probability of wolf occurrence except for some areas of northeastern Wisconsin, and the State's wolf population continues to annually increase in numbers and, to a lesser degree, in area (Wydeven and Wiedenhoeft 2009, p. 2). The UP of Michigan has wolf packs throughout the peninsula. In the last 22 years, the wolf population in the UP has grown every year except 1997 and 2010 (Roell 2010, pers. comm.). Over the past 5 years, the average annual growth has been about 7 percent. While the population trend continues to increase, the rate of increase has slowed, consistent with any population expanding into and then filling available habitat. The population may continue to grow or remain steady; however, a small or even negative growth rate may occur any year and should be considered a natural fluctuation seen in any wildlife population.

When delineating the proposed WGL DPS, we had to consider the high degree of mobility shown by wolves. The dispersal of wolves from their natal packs and territories is a normal and important behavioral attribute of the species that facilitates the formation of new packs, the occupancy of vacant territories, and the expansion of occupied range by the "colonization" of vacant habitat. Data on wolf dispersal rates from numerous North American studies (summarized in Fuller *et al.* 2003, p. 179, Table. 6.6; Boyd and Pletscher 1999, p. 1102, Table 6) show dispersal rates of 13 to 48 percent of the individuals in a pack. Sometimes the movements are temporary, and the wolf returns to a location in or near its natal territory. In some cases, a wolf may continue its movement for scores or even hundreds of miles until it locates suitable habitat, where it may establish a territory or join an existing pack. In other cases, a wolf is found dead at a distance from its original territory, leaving unanswered the questions of how far it would have gone and whether it eventually would have returned to its natal area or population.

Minnesota—The current record for a documented movement by a wolf in North America is held by a Minnesota wolf that moved a minimum (that is, the straight-line distance from known starting point to most distant point) of at least 550 mi (886 km) northwest into Saskatchewan (Fritts 1983, pp. 166–167). Nineteen other primarily Minnesota movements summarized by Mech (in litt. 2005) averaged 154 mi (248 km). Their minimum distance of travel ranged from 32 to 532 mi (53–886 km) with the minimum dispersal distance shown by known returning wolves ranging from 54 mi (90 km) to 307 mi (494 km).

Wisconsin—In 2004, a wolf tagged in Michigan was killed by a vehicle in Rusk County in northwestern Wisconsin, 295 mi (475 km) west of his original capture location in the eastern UP (Wydeven *et al.* 2005b, p. 4). A north-central Wisconsin yearling female wolf traveled a similar distance (298 mi, 480 km) to the Rainy Lake region of Ontario during 1988–89 (Wydeven *et al.* 1995, p. 149).

Michigan—Drummer *et al.* (2002, pp. 14–15) reported 10 long-distance dispersal events involving UP wolves. One of these wolves moved to north-central Missouri and another to southeastern Wisconsin, both beyond the core wolf areas in the WGL. The average straight-line distance traveled by those two wolves was 377 mi (608 km), while the average straight-line distance for all 10 of these wolves was 232 mi (373 km). Their straight-line distances ranged from 41 to 468 mi (66 to 753 km).

Illinois and Indiana—In December 2002, a Marshall County (Illinois) wolf likely dispersed from the Wisconsin wolf population, nearly 200 mi (322 km) to the north (Great Lakes Directory 2003). The Randolph County (Indiana) wolf had traveled a minimum distance of at least 428 mi (689 km) to get around

Lake Michigan from its central Wisconsin birthplace; it likely traveled much farther than that unless it went through the city or suburbs of Chicago (Wydeven *et al.* 2004, pp. 10–11; Treves *et al.* 2009, p. 194). The Pike County (Illinois) wolf that was shot in late 2005 was about 300 mi (180 km) from the nearest wolf packs in central Wisconsin.

North Dakota, South Dakota, and Nebraska—Licht and Fritts (1994, p. 77) tabulated seven wolves found dead in North Dakota and South Dakota from 1981 through 1992 that are believed to have originated from Minnesota, based on skull morphometrics. Although none of these wolves were marked or radio-tracked, making it impossible to determine the point of initiation of their journey, a minimum travel distance for the seven can be determined from the nearest wolf breeding range in Minnesota. For the seven, the average distance to the nearest wolf breeding range was 160 mi (257 km) and ranged from 29 to 329 mi (46 to 530 km). One of these seven wolves moved west of the Missouri River before it died.

Genetic analysis of a wolf killed in Harding County, in extreme northwestern South Dakota, in 2001 indicated that it originated from the Minnesota-Wisconsin-Michigan wolf populations (Fain in litt. 2006). The straight-line travel distance to the nearest Minnesota wolf pack is nearly 400 mi (644 km).

The wolf from the Greater Yellowstone area that was killed by a vehicle on Interstate 90 near Sturgis, South Dakota, in March of 2006 traveled a minimum straight-line distance of about 270 mi (435 km) from the nearest known Greater Yellowstone pack before it died (USFWS *et al.* 2006, in USFWS Program Report, Figure 1).

A large canid was shot by a Boyd County (Nebraska) rancher in late 1994 or early 1995, likely after crossing the frozen Missouri River from South Dakota (Anschutz in litt. 2006, Jobman in litt. 1995). It was determined to be a wolf that originated from the Great Lakes wolf populations (Fain in litt. 2006), whose nearest pack would have been about 300 mi (480 km) away. A wolf illegally killed near Spalding, Nebraska, in December of 2002 also originated from the Minnesota-Wisconsin-Michigan wolf population, as determined by genetic analysis (Anschutz in litt. 2003, Fain in litt. 2006). The nearest Minnesota wolf pack is nearly 350 mi (563 km) from this location.

Other notable extra-territorial movements—The extra-territorial movements of several wolves were radio-tracked in sufficient detail to provide insight into their actual travel routes and total travel distances for each trek, rather than only documenting straight-line distance from beginning to end-point. Merrill and Mech (2000, pp. 429–431) reported on four such Minnesota wolves with documented travel distances ranging from 305 to 2,640 mi (490 to 4,251 km) and an average travel route length of 988 mi (1590 km). Wydeven (1994, pp. 20–22) described a Wisconsin wolf that moved from northwestern Wisconsin to the northern suburbs of St. Paul, Minnesota, for 2 weeks (apparently not seen or reported to authorities by the local residents), then moved back to north-central Wisconsin. The total travel distance was 278 mi (447km) from her natal pack into Minnesota and on to the north-central Wisconsin location where she settled down.

While investigating the origins of Scandinavian wolf populations, Linnell *et al.* (2005, p. 387) compiled wolf dispersal data from 21 published studies, including many cited separately here. Twenty-two of 298 compiled dispersals (7.4 percent) were over 300 km (186 mi). Eleven dispersals (3.7 percent) were over 500 km (311 mi). Because of the likelihood that many long-distance dispersers are never reported, they conclude that the proportion of long-distance dispersers is probably severely underestimated.

From these extra-territorial movement records, we conclude that wolf movements of over 200 mi (320 km) straight-line distance have been documented on numerous occasions, while shorter distance movements are more frequent. Movements of 300 mi (480 km) straight-line distance or more are less common, but include one Minnesota wolf that journeyed a straight-line distance of 300 mi (480 km) and a known minimum-travel distance of 2,640 mi (4,251 km) before it reversed direction, as determined by its satellite-tracked collar. This wolf ultimately returned to a spot only 24 mi (40 km) from its natal territory (Merrill and Mech 2000, p. 430). Although much longer movements have been documented, including some by midwestern wolves, return movements to the vicinity of natal territories have not been documented for extra-territorial movements beyond 300 mi (480 km).

Based on these extra-territorial movement data, we conclude that affiliation with the midwestern wolf population is diminished and essentially lost when dispersal takes a Midwest wolf a distance of 250 to 300 mi (400 to 480 km) beyond the outer edge of the areas that are continuously occupied by wolf packs. Although some WGL wolves will move beyond this distance, available data indicate that longer distance dispersers are unlikely to return to their natal population. Therefore, they have lost their functional connection with, and potential conservation value to, the WGL wolf population.

Wolves moving substantial distances outward from the core areas of Minnesota, Wisconsin, and Michigan will encounter landscape features that are at least partial barriers to further wolf movement and that may, if crossed, impede attempts of wolves to return toward the WGL core areas. If such partial barriers are in a location that has separate utility in delineating the biological extent of a wolf population, they can and should be used to delineate the DPS boundary. Such landscape features are the Missouri River in North Dakota and downstream to Omaha, Nebraska, and Interstate Highway 80 from Omaha eastward through Illinois, Indiana, and into Ohio, ending where this highway crosses the Maumee River in Toledo, Ohio. We do not believe these are absolute barriers to wolf movement. There is evidence that several Minnesota-origin wolves have crossed the Missouri River (Licht and Fritts 1994, pp. 75 & 77, Fig. 1 and Table 1; Anschutz in litt. 2003, 2006) and some Midwest wolves have crossed interstate highways (Merrill and Mech 2000, p. 430). There is also evidence that some wolves are hesitant to cross highways (Whittington *et al.* 2004, pp. 7, 9; Wydeven *et al.* 2005b, p. 5; but see Blanco *et al.* 2005, pp. 315–316, 319–320 and Kohn *et al.* 2000, p. 22). Interstate highways and smaller roads are a known mortality factor for wolves and, therefore, pose a partial barrier to wolf movements (Blanco *et al.* 2005, p. 320). The death of a NRM wolf near Sturgis in western South Dakota (Fain in litt. 2006) suggests that the area of the Dakotas west of the Missouri River may be traversed by a small number of wolves coming from both the NRM and WGL wolf populations, as well as wolves from Canada (Licht and Fritts 1994, pp. 75–77). Wolves in this area cannot be assumed to belong to the WGL wolf population, supporting our belief that the boundary should not be designed to include the locations of all known dispersers.

Summary of Factors Affecting the Species

Section 4 of the Act and its implementing regulations (50 CFR part 424) set forth the procedures for listing species, reclassifying species, or removing species from listed status.

"Species" is defined by the Act as including any species or subspecies of fish or wildlife or plants, and any distinct vertebrate population segment of fish or wildlife that interbreeds when mature (16 U.S.C. 1532(16)). Once the "species" is identified, we then evaluate whether that species may be endangered or threatened because of one or more of the five factors described in section 4(a)(1) of the Act. We must consider these same five factors in delisting a species. We may delist a species according to 50 CFR 424.11(d) if the best available scientific and commercial data indicate that the species is neither endangered nor threatened because (1) the species is extinct, (2) the species has recovered and is no longer endangered or threatened, or (3) the original scientific data used at the time the species was classified were in error.

A recovered species is one that no longer meets the Act's definition of threatened or endangered. The analysis for a delisting due to recovery must be based on the five factors outlined in section 4(a)(1) of the Act. This analysis must include an evaluation of threats that existed at the time of listing, those that currently exist, and those that could potentially affect the species once the protections of the Act are removed.

In the context of the Act, the term "threatened species" means any species or subspecies or, for vertebrates, Distinct Population Segment (DPS) that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The term "endangered species" means any species that is in danger of extinction throughout all or a significant portion of its range. The Act does not define the term "foreseeable future." For the purpose of this proposal, 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 the WGL DPS. For the proposed WGL DPS, the foreseeable future differs for each factor potentially affecting the DPS.

It took a considerable length of time for public attitudes and regulations to result in a social climate that promoted and allowed for wolf recovery in the proposed WGL DPS. The length of time over which this shift occurred, and the ensuing stability in those attitudes, gives us confidence that this social climate will persist. Also, the States have had a solid history of cooperating and assisting in wolf recovery and have made a commitment, through legislative actions, to continue these activities. We believe this commitment will continue. When evaluating the available information, with respect to foreseeable future, we take into account reduced confidence as we forecast further into the future. As explained previously, our analysis of the factors affecting the WGL DPS refer to the gray wolf (*C. lupus*), because that is the named entity currently on the List of Endangered and Threatened Wildlife (see *Procedural Aspects of Proposal Applying to the Gray Wolf* above).

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

A common misconception is that wolves inhabit only remote pristine forests or mountainous areas, where human developments and other activities have produced negligible change to the natural landscape. Their extirpation south of Canada and Alaska, except for the heavily forested portions of northeastern Minnesota, reinforced this popular belief. However, the primary reason wolves survived in those areas was not because of habitat conditions, but, rather, because remote areas were sufficiently free of the human persecution that elsewhere killed wolves faster than the species could reproduce (Mech 1995a, p. 271).

In the western Great Lakes region, wolves in the densely forested northeastern corner of Minnesota have expanded into the more agricultural portions of central and northwestern Minnesota, northern and central Wisconsin, and the entire UP of Michigan. Habitats currently being used by wolves span the broad range from the mixed hardwood-coniferous forest wilderness area of northern Minnesota, through sparsely settled, but similar habitats in Michigan's UP and northern Wisconsin, and into more intensively cultivated and livestock-producing portions of central and northwestern Minnesota and central Wisconsin.

Wolf research and the expansion of wolf range over the last three decades have shown that wolves can successfully occupy a wide range of habitats, and they are not dependent on wilderness areas for their survival. In the past, for instance, wolf populations occupied nearly every type of habitat north of mid-Mexico that contained large ungulate prey species, including bison, elk, white-tailed deer, mule deer, moose, and woodland caribou; thus, wolves historically occupied the entire Midwest. Inadequate prey density or high levels of human-caused mortality appear to be the only factors that limit wolf distribution (Mech 1995a, p 271; 1995b, p. 544).

Suitable Habitat Within the Proposed Western Great Lakes DPS

Various researchers have investigated habitat suitability for wolves in the central and eastern portions of the United States. In recent years, 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; 1998, pp. 1–8, 1999; pp. 39–43; Harrison and Chapin 1997, p. 3; 1998, p. 769–770; Wydeven *et al.* 2001a, pp. 110–113; Erb and Benson 2004, p. 2; Potvin *et al.* 2005, pp. 1661–1668; Mladenoff *et al.* 2009, pp. 132–135).

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-related 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 miles per sq mi (0.6 to 0.7 km per sq km) (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 sq mi (0.45 km per sq km) (Mladenoff *et al.* 1995, p. 289). However, recent work in the UP 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 UP. In Minnesota, a combination of road density and human density is used by MN DNR to model suitable habitat. Areas with a human density up to 8 people per sq km are suitable if they also have a road density less than 0.5 km per sq km. Areas with a human density of less than 4 people per sq km are suitable if they have road densities up to 0.7 km per sq km (Erb and Benson 2004, Table 1).

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-related wolf mortality factors. 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 controlled by government agents 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). Based on mortality data from radio-collared Wisconsin wolves from 1979 to 1999, natural causes of death predominate (57 percent of mortalities) in areas with road densities below 1.35 mi per sq mi (0.84 km per sq km), but human-related factors produced 71 percent of the wolf deaths in areas with higher road densities (Wydeven *et al.* 2001a, pp. 112–113).

Some researchers have used a road density of 1 mi per sq mi (0.6 km per sq km) 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 sq mi (0.45 km per sq km) 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 sq mi (0.6 km per sq km) 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). Wisconsin researchers view areas with greater than 50 percent probability 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 (WI DNR 1997, 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 broad 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 and, therefore, less-suitable areas (Mech 1989, pp. 387–388; Wydeven *et al.* 2001a, p. 112). The predictive ability of this model was questioned (Mech 2006a, 2006b) and responded to (Mladenoff *et al.* 2006), and an updated analysis of Wisconsin pack locations and habitat has been completed (Mladenoff *et al.* 2009). This new 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 wolves occupy.

It appears that essentially all suitable habitat in Minnesota is now occupied, range expansion has slowed or possibly ceased, and the wolf population within the State has stabilized (Erb and Benson 2004, p. 7; Erb and Don Carlos 2009, pp. 57, 60). 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 (see Figure 2, below; MN DNR 2001, Appendix III).

Recent surveys for Wisconsin wolves and wolf packs show that wolves have now recolonized the areas predicted by habitat models to have high and moderate probability of occupancy (primary and secondary wolf habitat). The late-winter 2008–09 Wisconsin wolf survey identified packs occurring throughout the central Wisconsin forest area (Wolf Management Zone 2, Figure 3) and across the northern forest zone (Zone 1, Figure 3), with highest pack densities in the northwest and north-central forest; pack densities are lower, but increasing, in the northeastern corner of the State (Wydeven and Wiedenhoeft 2009, Figure 1).

Michigan wolf surveys in winter 2009–10 continue to show wolf pairs or packs (defined by Michigan DNR as two or more wolves traveling together) in every UP county except Keweenaw County (Huntzinger *et al.* 2005, p. 6; Roell 2011, pers. comm.), which probably lacks a suitable ungulate prey base during winter months (Potvin *et al.* 2005, p. 1665).

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 LP 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 these areas could host 46 to 89 wolves; a graduate thesis estimates that 110–480 wolves could exist in the northern LP (Potvin 2003, p. 39). The northern LP is separated from the UP 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 several documented occurrences of wolves in the northern LP, but until 2010, there had been no indication of persistence beyond several months. Prior to those occurrences, the last recorded wolf in the LP was in 1910.

In the first instance a radio-collared female wolf from the eastern UP was trapped and killed by a coyote trapper in Presque Isle County in late October 2004. In late November 2004, tracks from two wolves were verified in the same northern LP county. Follow-up winter surveys by the DNR in early 2005 failed to find additional wolf tracks in the northern LP (Huntzinger *et al.* 2005, p. 7); additional surveys conducted in 2006–10 also failed to find evidence of continued northern LP wolf presence (Roell *et al.* 2009, p. 5; Roell 2010, pers. comm.). A video of a single wolf was taken near Mackinac City in Cheboygan County in May 2009, and another trail-camera video-recorded a wolf in Presque Isle County in July 2009. These two sightings may have been the same animal (Roell 2009, pers. comm.). In 2010, USDA Wildlife Services and MI DNR staff confirmed a single breeding pair with pups in Cheboygan County in the northern LP (MI DNR 2010).

These northern LP patches of potentially suitable habitat contain a great deal of private land, are small in comparison to the occupied habitat on the UP and in Minnesota and Wisconsin, and are intermixed with agricultural and higher road density areas (Gehring and Potter 2005, p. 1240). Therefore, continuing wolf immigration from the UP may be necessary to maintain a future northern LP population. The Gehring and Potter study (2005, p. 1239) predicted 850 sq mi (2,198 sq km) of suitable habitat (areas with greater than a 50 percent probability of wolf occupancy) in the northern LP. Potvin (2003, p. 21), using deer density in addition to road density, believes there are about 3,090 sq mi (8,000 sq km) of suitable habitat in the northern LP. Gehring and Potter (2005, p. 1239) exclude from their calculations those northern LP low-road-density patches that are less than 19 sq mi (50 sq km), 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 sq mi (25,600 sq km) of contiguous suitable habitat is needed for a viable isolated gray wolf population, and half that area (5,000 sq mi or 12,800 sq km) is needed to maintain a viable wolf population that is subject to wolf immigration from a nearby population (USFWS 1992, pp. 25–26).

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 proposed WGL DPS can be determined by considering four

factors: Road density, human density, prey base, and size. An adequate prey base is an absolute requirement, but in much of the proposed WGL DPS the white-tailed deer density is well above adequate levels, causing the other factors to become the determinants of suitable habitat. Prey base is primarily of concern in the UP where severe winter conditions cause deer to move away from some lakeshore areas, making otherwise suitable areas locally and seasonally unsuitable. Road density and human density frequently are highly correlated; therefore, road density is the best single 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 persist as a viable population if they occupy a small isolated island of otherwise unsuitable habitat. The 1992 Revised Recovery Plan indicates that a wolf population needs to occupy at least 10,000 contiguous sq mi (25,600 sq km) to be considered viable if it is isolated from other wolf populations, and must occupy at least half that area if it is not isolated from another self-sustaining population (USFWS 1992, pp. 25–26).

Based on the information discussed above, we conclude that Minnesota Wolf Management Zone A (Federal Wolf Management Zones 1–4, Figure 2), Wisconsin Wolf Zones 1 and 2 (Figure 3), and the UP of Michigan contain a sufficient amount of suitable wolf habitat. The other areas within the DPS are unsuitable habitat, or are potentially habitat that is too small or too fragmented to be suitable for maintaining a viable wolf population.

Wolf Populations on Federal Lands

National forests, and the prey species found in their various habitats, have been important to wolf conservation and recovery in the core areas of the proposed WGL DPS. There are five national forests in Minnesota, Wisconsin, and Michigan (Superior, Chippewa, Chequamegon-Nicolet, Ottawa, and Hiawatha National Forests) with wolf packs that exclusively or partially reside on them. Their wolf populations range from approximately 484 on the Superior National Forest in northeastern Minnesota, to an estimated 182 on the UP's Ottawa National Forest, 164 on the Chequamegon–Nicolet National Forest in northeastern Wisconsin, and another estimated 49 on the Hiawatha National Forest in the eastern UP (Delphey 2009, pers. comm.; Eklund 2009, pers. comm.; Roell 2011, pers. comm., Wydeven 2011, pers. comm.).

Voyageurs National Park, along Minnesota's northern border, has a land base of nearly 340 sq mi (882 sq km). As of the last survey in 2008, there were 31 to 46 wolves within 7 to 9 packs that exclusively or partially reside within the park, and at least 5 packs are located wholly inside the Park boundaries (Ethier *et al.* 2008, p. 5). The 2008 estimates fall within the range of wolf estimates for the Park from the 1990s (Gogan *et al.* 2004) and early 2000s (Fox *et al.* 2001, pp. 6–7).

Within the boundaries of the proposed WGL DPS, we currently manage seven units within the National Wildlife Refuge System with significant wolf activity. Primary among these are Agassiz National Wildlife Refuge (NWR), Tamarac NWR, and Rice Lake NWR in Minnesota; Seney NWR in the UP of Michigan; and Necedah NWR in central Wisconsin. Agassiz NWR has had as many as 20 wolves in 2 to 3 packs in recent years. Although in 1999 mange and illegal shootings reduced them to a single pack of five wolves and a separate lone wolf, since 2001, two packs with a total of 10 to 12 wolves have been using the Refuge. About 60 percent of the packs' territories are located on the Refuge or on an adjacent State-owned wildlife management area (Huschle in litt. 2005).

Data collected by Agassiz NWR staff during winter wolf sign surveys conducted in cooperation with the MN DNR during both the winters of 2007–08 and 2008–09 support the above wolf totals. Winter track data from 2007–08 suggest that one pack on Agassiz had a minimum size of five and one had a minimum size of six. The following winter's survey information suggested a minimum pack size of five for both packs (Knutson 2009, pers. comm.). Two packs of wolves that currently include about eight and five members, respectively, use Tamarac NWR and the territory of a third occurs partly on the Refuge (Brininger 2009, pers. comm.). The size of the one pack using Rice Lake NWR, in Minnesota, has been reported at six to nine in previous years; in 2009 a maximum of three wolves were confirmed on the Refuge (McDowell 2009, pers. comm.), although total pack size may be greater.

Other single or paired wolves pass through the Refuge frequently (Stefanski 2004, pers. comm.; McDowell in litt. 2005). Seney NWR has three packs, representing 8–10 wolves, which partially reside on the Refuge (Roell 2010, pers. comm.). In 2010, two packs of six wolves each and at least one loner were detected on Necedah NWR (Wydeven *et al.* 2010, p. 41). Over the past 10 years, Sherburne and Crane Meadows NWR Complex in central Minnesota have had intermittent, but reliable, observations and signs of individual wolves each year. To date, no established packs have been documented on either of those Refuges. The closest established packs are within 15 mi (24 km) of Crane Meadows NWR at Camp Ripley Military Installation and 30 mi (48 km) north of Sherburne NWR at Mille Lacs State Wildlife Management Area (Berkley 2009, pers. comm.).

Suitable Habitat Ownership and Protection

In Minnesota, public lands, including national forests, a national park, national wildlife refuges, tax-forfeit lands (managed mostly by counties), State forests, State wildlife management areas, and State parks, encompass approximately 42 percent of current wolf range. American Indians and Tribes own 3 percent, an additional 1,535 sq mi (2,470 sq km), in Minnesota's wolf range (see Erb and Benson 2004, Table 1). In its 2001 Minnesota Wolf Management Plan, MN DNR states that it "will continue to identify and manage currently occupied and potential wolf habitat areas to benefit wolves and their prey on public and private land, in cooperation with landowners and other management agencies" (MN DNR 2001, p. 25). MN DNR will monitor deer and moose habitat and, when necessary and appropriate, improve habitat for these species. MN DNR maintains that several large public land units of State parks and State forests along the Wisconsin border will likely ensure that the connection between the two States' wolf populations will remain open to wolf movements. Nevertheless, MN DNR stated that it would cooperate with Wisconsin DNR to incorporate the effects of future development "into long-term viability analyses of wolf populations and dispersal in the interstate area" (MN DNR 2001, p. 27).

The MN DNR Divisions of Forestry and Wildlife directly administer approximately 5,330 sq mi (13,805 sq km) of land in Minnesota's wolf range. The DNR has set goals of enlarging and protecting its forested land base by, in part, "minimizing the loss and fragmentation of private forest lands" (MN DNR 2000, p. 20) and by connecting forest habitats with natural corridors (MN DNR 2000, p. 21). It plans to achieve these goals and objectives via several strategies, including the development of (Ecological) Subsection

Forest Resource Management Plans (SFRMP) and to expand its focus on corridor management and planning.

In 2005, the Forest Stewardship Council (FSC) certified that 4.84 million acres (1.96 million hectares) of State-administered forest land are "well managed" (FSC 2005); the Sustainable Forestry Initiative (SFI) also certified that MN DNR was managing these lands to meet its standards. For the FSC certification, independent certifiers assessed forest management against FSC's Lakes States Regional Standard, which includes a requirement to maximize habitat connectivity to the extent possible at the landscape level (FSC 2005, p. 22).

Efforts to maximize habitat connectivity in the range of wolves would complement measures the MN DNR described in its State wolf plan (MN DNR 2001, pp. 26–27). If the Service ultimately delists the DPS as proposed, the Service will review certification evaluation reports issued by FSC to assess MN DNR's ongoing efforts in this area as part of its post-delisting monitoring.

Counties manage approximately 3,860 sq mi (9,997 sq km) of tax forfeit land in Minnesota's wolf range (MN DNR unpublished data). We are aware of no specific measures that any county in Minnesota takes to conserve wolves. If most of the tax-forfeit lands are maintained for use as timber lands or natural areas, however, and if regional prey levels are maintained, management specifically for wolves on these lands will not be necessary. MN DNR manages ungulate populations "on a regional basis to ensure sustainable harvests for hunters, sufficient numbers for aesthetic and nonconsumptive use, and to minimize damage to natural communities and conflicts with humans such as depredation of agricultural crops" (MN DNR 2001, p. 17). Moreover, although counties may sell tax-forfeit lands subject to Minnesota State law, they generally manage these lands to ensure that they will retain their productivity as forests into the future. For example, Crow Wing County's mission for its forest lands includes the commitment to "sustain a healthy, diverse, and productive forest for future generations to come." In addition, at least four counties in Minnesota's wolf range—Beltrami, Carlton, Koochiching, and St. Louis—are certified by SFI, and four others (Aitkin, Cass, Itasca, and Lake) have been certified by FSC. About ten private companies with industrial forest lands in Minnesota's wolf range have also been certified by FSC.

There are no legal or regulatory requirements for the protection of wolf habitat, per se, on private lands in Minnesota. Land management activities such as timber harvest and prescribed burning carried out by public agencies and by private land owners in Minnesota's wolf range incidentally and significantly improves habitat for deer, the primary prey for wolves in the State. The impact of these measures is apparent from the continuing high deer densities in Minnesota's wolf range. The State's second largest deer harvest occurred in 2006, and approximately one-half of the Minnesota deer harvest is in the Forest Zone, which encompasses most of the occupied wolf range in the State (MN DNR 2009, Table 1).

Given the extensive public ownership and management of land within Minnesota's wolf range, as well as the beneficial habitat management expected from Tribal lands, we believe suitable habitat, and especially an adequate wild prey base, will remain available to the State's wolf population for the foreseeable future. Management of private lands for timber production will provide additional habitat suitable for wolves and white-tailed deer.

Similarly, current lands in northern and central Wisconsin that are judged to be primary and secondary wolf habitat are well protected from significant adverse development and habitat degradation due to public ownership or protective management that preserves the habitat and wolf prey base. Primary habitat (that is, areas with greater than 50 percent probability of wolf pack occupancy; Wydeven *et al.* 1999, pp. 47–48) totals 5,812 sq mi (15,053 sq km). The 1999 Wisconsin wolf plan listed land ownership of primary and secondary wolf habitat (Wydeven *et al.* 1999, p. 48). In 2006, Sickley (2006, pers. comm.) provided an update of the data with more accurate land ownership data. That data show that about 55 percent of primary habitat was in public land including, Federal, State, or county ownership, and 7 percent was on Tribal land. County lands, mostly county forests, comprised 29 percent of the primary habitat, and Federal lands mostly the Chequamegon–Nicolet National Forest, included another 17 percent.

Most Tribal land (7 percent of primary habitat), while not public land, will likely remain as suitable deer and wolf habitat for the foreseeable future. State forest ownership protects 10 percent. Private industrial forest lands comprised another 10 percent of the primary habitat, although some of these lands have been subdivided for second or vacation home sites, reducing this acreage in recent years. The remaining 29 percent is in other forms of private ownership and is vulnerable to loss from the primary habitat category to an unknown extent (Sickley in litt. 2006, unpublished data updating Table C2 of WI DNR 1999, p. 48).

Areas judged to be secondary wolf habitat by WI DNR (10 to 50 percent probability of occupancy by wolf packs; Wydeven *et al.* 1999, pp. 47–48) were somewhat more developed or fragmented habitats and were less well protected overall, because only 43 percent were in public ownership and 5 percent were in Native American reservations. Public land that maintained secure habitat included county (17 percent) and national (18 percent) forests ownership protecting the largest segments, and State land protected 7 percent. Private industrial forest ownership provided protection to 5 percent, and the remaining 47 percent was in other forms of private ownership (Sickley in litt. 2006).

County forest lands represent the single largest category of primary wolf habitat in Wisconsin. Wisconsin Statute 28.11 guides the administration of county forests, and directs management for production of forest products together with recreational opportunities, wildlife, watershed protection, and stabilization of stream flow. This Statute also provides a significant disincentive to conversion for other uses. Any proposed withdrawal of county forest lands for other uses must meet a standard of a higher and better use for the citizens of Wisconsin, and be approved by two-thirds of the County Board. As a result of this requirement, withdrawals are infrequent, and the county forest land base is actually increasing.

This analysis shows that nearly three-quarters of the primary habitat in Wisconsin receives substantial protection due to ownership or management for sustainable timber production. Over half of the secondary habitat is similarly protected. Portions of the primary habitat in northeastern Wisconsin remained sparsely populated with wolf packs until recently, but are filling in lately (Wydeven *et al.* 2010, Fig. 2, p. 66), although still allowing for some continuing wolf population expansion. In general, we believe this degree of habitat protection is more than adequate to support a viable wolf population in Wisconsin for the foreseeable future.

In the UP of Michigan, State and Federal ownership comprises 2.0 and 2.1 million acres respectively, representing 19.3 percent and 20.1 percent of the land surface of the UP. The Federal ownership is composed of

87 percent national forest, 8 percent national park, and 5 percent national wildlife refuge. The management of these three categories of Federal land is discussed elsewhere, but clearly will benefit wolves and their prey.

State lands on the UP are 94 percent State forest land, 6 percent State park, and less than 1 percent in fishing and boating access areas and State game areas. Part 525, Sustainable Forestry on State Forestlands, of the Michigan Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, directs State forestland management in Michigan. It requires the MI DNR to manage the State forests in a manner consistent with sustainable forestry, to prepare and implement a management plan, and to seek and maintain a third party certification that the lands are managed in a sustainable fashion (MI DNR 2005c, p. 1).

Much of the private land on the UP is managed or protected in a manner that will maintain forest cover and provide suitable habitat for wolves and white-tailed deer. Nearly 1.9 million acres (0.8 million hectares) of large-tract industrial forest lands and another 1.9 million acres (0.8 million hectares) of smaller private forest land are enrolled in the Commercial Forest Act (CFA). These 3.7 million acres (1.5 million hectares) are managed for long-term sustainable timber production under forest management plans written by certified foresters; in return, the landowners benefit from a reduction in property taxes. In addition, nearly 37,000 acres on the UP are owned by The Nature Conservancy, and continue to be managed to restore and preserve native plant and animal communities. Therefore, these private land management practices currently are preserving an additional 36 percent of the UP as suitable habitat for wolves and their prey species.

In total, 39 percent of the UP is Federally and State-owned land whose management will benefit wolf conservation for the foreseeable future, and another 36 percent is private forest land that is being managed, largely under the incentives of the CFA, in a way that provides suitable habitat and prey for wolf populations. Therefore, a minimum of nearly three-quarters of the UP should continue to be suitable for wolf conservation, and we do not envision UP habitat loss or degradation as a problem for wolf population viability in the foreseeable future.

Hearne *et al.* (2003), determined that a viable wolf population (one having less than 10 percent chance of extinction over 100 years), should consist of at least 175 to 225 wolves (p. 170), and they modeled various likely scenarios of habitat conditions in the UP of Michigan and northern Wisconsin through the year 2020 to determine whether future conditions would support a wolf population of that size. Most scenarios of future habitat conditions resulted in viable wolf populations in each State through 2020. When the model analyzed the future conditions in the two States combined, all scenarios produced a viable wolf population through 2020. Their scenarios included increases in human population density, changes in land ownership that may result in decreased habitat suitability, and increased road density (pp. 101–151).

The large areas of unsuitable habitat in the eastern Dakotas; the northern portions of Iowa, Illinois, Indiana, and Ohio; and the southern areas of Minnesota, Wisconsin, and Michigan; as well as the relatively small areas of unoccupied potentially suitable habitat, will not contribute to the viability of wolves in the proposed WGL DPS. Therefore, we have determined that the existing and likely future threats to wolves outside the currently occupied areas, and especially to wolves outside of Minnesota, Wisconsin, and the UP, do not rise to the level that they threaten the long-term viability of wolf populations in Minnesota, Wisconsin, and the UP of Michigan.

In summary, wolves currently occupy the vast majority of the suitable habitat in the proposed WGL DPS, and that habitat is adequately protected for the foreseeable future. Unoccupied areas that have the characteristics of suitable habitat exist in small and fragmented parcels and are not likely to develop viable wolf populations. Threats to those habitat areas will not adversely impact the recovered wolf metapopulation in the DPS.

Prey

Wolf density is heavily dependent on prey availability (for example, expressed as ungulate biomass, Fuller *et al.* 2003, pp. 170–171), but prey availability is not likely to threaten wolves in the proposed WGL DPS. Conservation of primary wolf prey in the proposed WGL DPS, white-tailed deer and moose, is clearly a high priority for State conservation agencies. As Minnesota 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 regulation of human harvest of deer and moose, MN DNR also plans to continue to monitor and improve habitat for these species.

Land management carried out by other public agencies and by private land owners 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. The success of these measures is apparent from the continuing high deer densities in the Forest Zone of Minnesota, and the fact that the State's five largest deer harvests have occurred in the last 6 years, with a deer harvest averaging 241,000 deer over the last 5 years. 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 core wolf range. Therefore, lack of prey availability is not likely to pose a threat to wolves in the foreseeable future in the State.

The deer populations in Wisconsin and the UP of Michigan declined somewhat from historically high levels in recent years. Wisconsin's preseason deer population has exceeded 1 million animals since 1984 (WI DNR undated a; Rolley 2007, p. 6; Rolley 2008, p. 6), and hunter harvest has exceeded 400,000 deer in 10 of the last 12 years (WI DNR 2010, p.57). Across northern Wisconsin wolf range (Zone 1), winter deer density in northern deer management units averaged from 22–30 deer per sq mi (8.5–11.6 deer per sq km) between 2001–07, but declined to 17–18 deer per sq mi (6.6–6.9 deer per sq km) in 2009 and 2010. In Central Forest wolf range (Zone 2), winter deer density in deer management units averaged 29–50 deer per sq mi (11.2–19.3 deer per sq km) from 2001 to 2007, and was 35 deer per sq mi (13.5 deer per sq km) in 2009, and 26 deer per sq mi (10.0 deer per sq km) in 2010 (WI DNR data).

Michigan's 2009 October forecast for the deer population was approximately 1.8 million deer, with about 312,800 residing in the UP; the 2010 estimates projected a slightly higher UP deer population (Doepker 2010, pers. comm.; Rudolph 2010, pers. comm.). Because of severe winter conditions (persistent, deep snow) in the UP, deer populations

can change dramatically from year to year. Recently (2010) 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 2010, p. 20). Additionally, the Michigan wolf management plan addresses maintaining a sustainable population of wolf prey (MI DNR 2008, p. 36). 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.

Summary of Factor A

The wolf population in the proposed WGL DPS currently occupies all the suitable habitat area identified for recovery in the Midwest in the 1978 Recovery Plan and 1992 Revised Recovery Plan and most of the potentially suitable habitat in the WGL DPS. Viable wolf populations are unlikely to develop and persist in unsuitable habitat and the small fragmented areas of suitable habitat away from these core areas. Although they may have been historical habitat, many of these areas are no longer suitable for wolves and they have not been considered necessary for the recovery of the proposed DPS.

The wolf population in the proposed WGL DPS exceeds its numerical, temporal, and distributional goals for recovery. The amount of habitat likely to support a delisted wolf population is considered to be adequate for maintaining the WGL population at or above recovery levels for the foreseeable future. Because much important wolf habitat in the DPS is in public ownership, the States will likely continue to manage for high ungulate populations, and the States, Tribes, and Federal land management agencies will adequately regulate human-caused mortality of wolves and wolf prey. This will allow these States to easily support a recovered and viable wolf metapopulation into the foreseeable future. We conclude that wolves within this proposed DPS are not in danger of extinction now, or likely to be in danger of extinction in the foreseeable future, as a result of destruction, modification, or curtailment of the species' habitat or range.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Threats to wolves resulting from uses for scientific or educational purposes are not likely to increase substantially following delisting of the proposed WGL DPS, and any increased use for these purposes will be regulated and monitored by the States and Tribes in the core recovery areas. Since their listing under the Act, no wolves have been legally killed or removed from the wild in any of the nine States included in the proposed WGL DPS for either commercial or recreational purposes. Some wolves may have been illegally killed for commercial use of the pelts and other parts, but illegal commercial trafficking in wolf pelts or parts and illegal capture of wolves for commercial breeding purposes happens rarely. State wolf management plans for Minnesota, Wisconsin, and Michigan help ensure that wolves will not be killed for commercial or recreational purposes for many years following the proposed Federal delisting, so these forms of mortality will not likely emerge as new threats upon delisting. See Factor D for a detailed discussion of State wolf management plans, and for applicable regulations in States without wolf management plans.

We do not expect the use of wolves for scientific purposes to increase in proportion to total wolf numbers in the proposed WGL DPS after delisting. While listed, the intentional or incidental killing, or capture and permanent confinement, of endangered or threatened wolves for scientific purposes has only legally occurred under permits or subpermits issued by the Service (under section 10(a)(1)(A)) or by a State agency operating under a cooperative agreement with the Service pursuant to section 6 of the Act (50 CFR 17.21(c)(5) and 17.31(b)). Although exact figures are not available, throughout the conterminous 48 States, such permanent removals of wolves from the wild have been very limited and probably comprise an average of not more than two animals per year since the species was first listed as endangered. In the proposed WGL DPS, these animals were either taken from the Minnesota wolf population during long-term research activities (about 15 wolves) or were accidental takings as a result of research activities in Wisconsin (5 to 6 mortalities and 1 long-term confinement) and in Michigan (4 mortalities) (Berg in litt. 1998; Mech in litt. 1998; Roell in litt. 2004; Roell in litt. 2005a; Roell 2011, pers. comm.; Wydeven 2009, pers. comm.).

The Minnesota DNR plans to encourage the study of wolves with radio-telemetry after delisting, with an emphasis on areas where they expect wolf–human conflicts and where wolves are expanding their range (MN DNR 2001, p. 19). Similarly, Wisconsin and Michigan DNRs plan to continue to trap wolves for radio-collaring, examination, and health monitoring for the foreseeable future (WI DNR 1999, pp. 19–21; MI DNR 2008a, pp. 31–32; WI DNR 2006a, p. 14). The continued handling of wild wolves for research, including the administration of drugs, may result in some accidental deaths of wolves. We believe that capture and radio-telemetry-related injuries or mortalities will not increase significantly above the level observed to date in proportion to wolf abundance; adverse effects to wolves associated with such activities have been minimal and would not constitute a threat to wolves in the proposed WGL DPS.

No wolves have been legally removed from the wild for educational purposes in recent years. Wolves that have been used for such purposes are the captive-reared offspring of wolves that were already in captivity for other reasons, and this is not likely to change as a result of Federal delisting. We do not expect taking for educational purposes to constitute any threat to Midwest wolf populations in the proposed DPS for the foreseeable future.

See Factor E for a discussion of Taking of Wolves by Native Americans for Certain Purposes. See the Depredation Control Programs sections under Factor D for discussion of other past, current, and potential future forms of intentional and accidental take by humans, including depredation control, public safety, and under public harvest. While public harvest may include recreational harvest, it is likely that public harvest will also serve as a management tool, so it is discussed in Factor D.

Summary of Factor B

Taking wolves for scientific or educational purposes in the other States in the proposed WGL DPS may not be regulated or closely monitored in the future, but the threat to wolves in those States will not be significant to the long-term viability of the wolf population in the proposed WGL DPS. The potential limited commercial and recreational harvest that may occur in the DPS will be regulated by State and/or Tribal conservation agencies and is discussed under Factor D. Therefore, we conclude that overutilization for commercial, recreational, scientific, or educational purposes will not be a threat sufficient to cause wolves in the proposed WGL DPS to be in danger of extinction in the foreseeable future in all or a significant portion of the range within the proposed WGL DPS.

C. Disease or Predation.

Disease

Many diseases and parasites have been reported for the wolf, and several of them have had significant impacts during the recovery of the species in the 48 conterminous States (Brand *et al.* 1995, p. 419; WI DNR 1999, p. 61). If not monitored and controlled by States, these diseases and parasites, and perhaps others, may threaten wolf populations in the future. Thus, to avoid a future decline caused by diseases or parasites, States and their partners will have to diligently monitor the prevalence of these pathogens in order to effectively respond to significant outbreaks.

Canine parvovirus (CPV) is a relatively new disease that infects wolves, domestic dogs, foxes, coyotes, skunks, and raccoons. Recognized in the United States in 1977 in domestic dogs, it appeared in Minnesota wolves (based upon retrospective serologic evidence) live-trapped as early as 1977 (Mech *et al.* 1986, p. 105). Minnesota wolves, however, may have been exposed to the virus as early as 1973 (Mech and Goyal 1995, p. 568). Serologic evidence of wolf exposure to CPV peaked at 95 percent for a group of Minnesota wolves live-trapped in 1989 (Mech and Goyal 1993, p. 331). In a captive colony of Minnesota wolves, pup and yearling mortality from CPV was 92 percent of the animals that showed indications of active CPV infections in 1983 (Mech and Fritts 1987, p. 6), demonstrating the substantial impacts this disease can have on young wolves. It is believed that the population impacts of CPV occur via diarrhea-induced dehydration leading to abnormally high pup mortality (WI DNR 1999, p. 61). CPV has been detected in nearly every wolf population in North America including Alaska (Bailey *et al.* 1995, p. 443) and exposure in wolves is now believed to be almost universal.

There is no evidence that CPV has caused a population decline or has had a significant impact on the recovery of the Minnesota wolf population. Mech and Goyal (1995, p. 566, Table 1, p. 568, Fig. 3), however, found that high CPV prevalence in the wolves of the Superior National Forest in Minnesota occurred during the same years in which wolf pup numbers were low. Because the wolf population did not decline during the study period, they concluded that CPV-caused pup mortality was compensatory, that is, it replaced deaths that would have occurred from other causes, especially starvation of pups. They theorized that CPV prevalence affects the amount of population increase and that a wolf population will decline when 76 percent of the adult wolves consistently test positive for CPV exposure. Their data indicate that CPV prevalence in adult wolves in their study area increased by an annual average of 4 percent during 1979–93 and was at least 80 percent during the last 5 years of their study (Mech and Goyal 1995, pp. 566, 568).

Additional data gathered since 1995 suggests that CPV reduced pup survival both in the Superior National Forest and statewide, between 1984 and 2004; however, statewide there is some evidence of a slight increase in pup survival since about 1995. These conclusions are based on an inverse relationship between pup numbers in summer captures and seroprevalence of CPV antibodies in summer-captured adult wolves (Mech *et al.* 2008, pp. 827–830).

In a more recent study, Mech and Goyal (2010) looked more specifically at CPV influence on the Superior National Forest population by evaluating five 7-year periods to determine when CPV had its greatest effects. They found the strongest effect on wolf pup survival was from 1981 to 1993, and that after that time, little effect was seen despite the continued seroprevalence of CPV antibodies (Mech and Goyal 2010, pp. 6–7). They conclude that after CPV became endemic in the population, the population developed immunity and was able to withstand severe effects from the disease (Mech and Goyal 2010, p. 7). The observed population effects in the Superior National Forest population are consistent with results for studies in smaller, isolated populations in Wisconsin and on Isle Royale, Michigan (Wydeven *et al.* 1995; Peterson *et al.* 1998), but indicate that CPV also had only a temporary population effect in a larger population.

The WI DNR and the WI DNR Wildlife Health, in conjunction with the U.S. Geological Survey National Wildlife Health Center in Madison, Wisconsin, (formerly the National Wildlife Health Laboratory) have an extensive dataset on the incidence of wolf diseases, beginning in 1981. Canine parvovirus exposure was evident in 5 of 6 wolves tested in 1981, and probably stalled wolf population growth in Wisconsin during the early and mid-1980s when numbers there declined or were static; at that time 75 percent of 32 wolves tested positive for CPV. During the following years of population increase (1988–96), only 35 percent of the 63 wolves tested positive for CPV (WI DNR 1999, p. 62). More recent exposure rates for CPV continue to be high in Wisconsin wolves, with annual rates ranging from 60 to 100 percent among wild wolves handled from 2001 through mid-2006. Part of the reason for high exposure percentages is likely an increased emphasis in sampling pups and Central Forest wolves starting in 2001, so comparisons of post- and pre-2001 data are of limited value.

CPV appears not to be a significant cause of mortality, as only a single wolf (male pup) is known to have died from CPV during this period (Wydeven and Wiedenhoeft 2002, p. 8 Table 4; 2003a, pp. 11–12 Table 4; 2004a, pp. 11–12 Table 5; 2005, pp. 19–20 Table 4; 2006, pp. 23–25 Table 4; 2009, Table 2; Wydeven *et al.* 2007, pp. 12–14; 2008, pp. 19–21). While the difficulty of discovering CPV-killed pups must be considered, and it is possible that CPV-caused pup mortality is being underestimated, the continuing increase of the Wisconsin wolf population indicates that CPV mortality is no longer impeding wolf population growth in the State. It may be that many Wisconsin wolves have developed some degree of resistance to CPV, and this disease is no longer a significant threat in the State.

Similar to Wisconsin wolves, serological testing of Michigan wolves captured from 1992 through 2001 (most recent available data) shows that the majority of UP wolves have been exposed to CPV. Fifty-six percent of 16 wolves captured from 1992 to 1999 and 83 percent of 23 wolves captured in 2001 showed antibody titers at levels established as indicative of previous CPV exposure that may provide protection from future infection from CPV (Beheler in litt. undated, in litt. 2004). There are no data showing any CPV-caused wolf mortality or population impacts to the wolf population on the UP, but few wolf pups are handled in the UP (Hammill in litt. 2002, Beyer in litt. 2006a), so low levels of CPV-caused pup mortality may go undetected there. Mortality data are primarily collected from collared wolves, which until 2004 received CPV inoculations. Therefore, mortality data for the UP should be interpreted cautiously.

Sarcoptic mange is caused by a mite (*Sarcoptes scabiei*) infection of the skin. The irritation caused by the feeding and burrowing mites results in scratching and then severe fur loss, which in turn can lead to mortality from exposure during severe winter weather. The mites are spread from wolf to wolf by direct body contact or by common use of "rubs" by infested and uninfested animals. Thus, mange is frequently passed from infested females to their young pups, and from older pack members to their pack mates. In a long-

term Alberta, Canada, 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, p. 428).

From 1991 to 1996, 27 percent of live-trapped Wisconsin wolves exhibited symptoms of mange. During the winter of 1992–93, 58 percent showed symptoms, and a concurrent decline in the Wisconsin wolf population was attributed to mange-induced mortality (WI DNR 1999, p. 61). Seven Wisconsin wolves died from mange from 1993 through October 15, 1998, and severe fur loss affected five other wolves that died from other causes. During that period, mange was the third largest cause of death in Wisconsin wolves, behind trauma (usually vehicle collisions) and shooting (Thomas in litt. 1998). Largely as a result of mange, pup survival was only 16 percent in 1993, compared to a normal 30 percent survival rate from birth to one year of age (WI DNR 1999, p. 61).

Mange continues to occur on wolves in Wisconsin. From 2003 through 2007, 25 percent of live-trapped wolves showed signs of mange, but that declined to 11 percent of wolves handled in 2009 and 2010. Mortality data from closely monitored radio-collared wolves provides a relatively unbiased estimate of mortality factors, especially those linked to disease or illegal actions, because nearly all carcasses are located within a few days of deaths. Diseased wolves suffering from hypothermia or nearing death generally crawl into dense cover and may go undiscovered if they are not radio-tracked (Wydeven *et al.* 2001b, p. 14). Data from those closely monitored radio-collared wolves show that mange mortality ranged from 22 percent of deaths in 2006 and 12 percent in 2007 to 21 percent of deaths in 2008 (Wydeven in litt. 2009), 15 percent in 2009 (Wydeven *et al.* 2010, p. 13), and 6 percent in 2010 (Wydeven *et al.* 2011, p. 2).

Mange mortality does appear to be stabilizing or perhaps declining in Wisconsin. Not all mangy wolves succumb; other observations showed that some mangy wolves are able to survive the winter (Wydeven *et al.* 2001b, p. 14). Mange has been detected in Wisconsin wolves every year since 1991 when 45 to 52 wolves occurred in the State, and may have slowed the growth of the wolf population in the early 1990s (Wydeven *et al.* 2009c), but despite its constant presence as an occasional mortality factor, the wolf population grew to its present (2010) level of 690 or more wolves.

The survival of pups during their first winter is believed to be strongly affected by mange. The highest to date wolf mortality (30 percent of radio-collared wolves; Wydeven and Wiedenhoeft 2004a, p. 12) from mange in Wisconsin in 2003 may have had more severe effects on pup survival than in previous years. The prevalence of the disease may have contributed to the relatively small population increase in 2003 (2.4 percent in 2003 as compared to the average 18 percent to that point since 1985). However, mange has not caused a decline in the State's wolf population, and even though the rate of population increase has slowed in recent years, the wolf population continues to increase despite the continued prevalence of mange in Wisconsin wolves. Although mange mortality may not be the primary limiting factor for wolf population growth in the State, the impacts of mange in Wisconsin need to be closely monitored, as identified and addressed in the Wisconsin wolf management plan (WI DNR 1999, p. 21; 2006a, p. 14).

Disease monitoring in Wisconsin has identified a second form of mange in the wild wolf population—demodectic mange (Wydeven and Wiedenhoeft 2008, p. 8). Demodectic mange mites are relatively common in domestic dogs, where symptoms are often minor. The WI DNR is closely monitoring wolf pups and examining all dead wolves to determine if this becomes a significant new cause of wolf mortality.

Seven Michigan wolves died from mange during 1993–97, making it responsible for 21 percent of all mortalities, and all disease-caused deaths, during that period (MI DNR 1997, p. 39). During bioyears (mid-April to mid-April) 1999–2009, mange-induced hypothermia killed 18 radio-collared Michigan wolves, representing 15 percent of the total mortality during those years. Since 2004, 11 radio-collared wolves are known to have died from mange in the State (Roell 2010, pers. comm.). Before 2004, MI DNR treated all captured wolves with Ivermectin if they showed signs of mange. In addition, MI DNR vaccinated all captured wolves against CPV and canine distemper virus (CDV). These inoculations were discontinued in 2004 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. 2005b).

Wisconsin wolves similarly had been treated with Ivermectin and vaccinated for CPV and CDV when captured, but the practice was stopped in 1995 to allow the wolf population to experience more natural biotic conditions. Since that time, Ivermectin has been administered only to captured wolves with severe cases of mange. In the future, Ivermectin and vaccines will be used sparingly on Wisconsin wolves, but will be used to counter significant disease outbreaks (Wydeven in litt. 1998).

Among Minnesota wolves, mange may always have been present at low levels and may currently infect less than 10 percent of the State's wolves. Of the 407 wolves trapped by Wildlife Services during 2006–08 in response to depredation complaints, 52 (13 percent) exhibited signs of mange (Hart 2009, pers. comm.); the proportion of wolves with signs of mange decreased from 17 percent in 2006 to 10 percent in 2008. During the previous 3-year period (2003–05), the proportion of trapped wolves with signs of mange was also about 13 percent, suggesting that mange has not increased in prevalence among wolves in Minnesota since 2003. The incidence of mange among wolves targeted by Wildlife Services is likely not representative of the prevalence of the disease in the statewide wolf population; wolves targeted for depredation control appear to be more likely to carry the disease (Hart 2009, pers. comm.).

In a separate study, mortality data from 12 years (1994–05) of monitoring radio-collared wolves in 7 to 9 packs in north-central Minnesota show that 11 percent died from mange (DelGiudice in litt. 2005). However, the sample size (17 total mortalities, 2 from mange in 1998 and 2004) is far too small to deduce trends in mange mortality over time. Furthermore, these data are from mange mortalities, while the Wildlife Services' data are based on mange symptoms, not mortalities.

It is hypothesized that the current incidence of mange is more widespread than it would have otherwise been, because the WGL wolf range has experienced a series of mild winters beginning with the winter of 1997–98 (Van Deelen 2005, Fig. 2). Mange-induced mortality is chiefly a result of winter hypothermia, thus the less severe winters resulted in higher survival of mangy wolves, and increased spread of mange to additional wolves during the following spring and summer. The high wolf population, and especially higher wolf density on the landscape, may also be contributing to the increasing occurrence of mange in the WGL wolf population.

Lyme disease, caused by the spirochete *Borrelia burgdorferi,* is another relatively recently recognized disease, first documented in New England in 1975, although it may have

occurred in Wisconsin as early as 1969. It is spread by ticks that pass the infection to their hosts when feeding. Host species include humans, horses, dogs, white-tailed deer, white-footed mice, eastern chipmunks, coyotes, and wolves. The prevalence of Lyme disease exposure in Wisconsin wolves averaged 70 percent of live-trapped animals in 1988–91, dropped to 37 percent during 1992–97 and was back up to 56 percent (32 of 57 tested) in 2002–04 (Wydeven and Wiedenhoeft 2004b, pp. 23–24 Table 7; 2005, pp. 23–24 Table 7). Clinical symptoms have not been reported in wolves, but infected dogs can experience debilitating conditions, and abortion and fetal mortality have been reported in infected humans and horses. It is possible that individual wolves may be debilitated by Lyme disease, perhaps contributing to their mortality; however, Lyme disease is not believed to be a significant factor affecting wolf populations (Kreeger 2003, p. 212).

The dog louse (*Trichodectes canis*) has been detected in wolves in Ontario, Saskatchewan, Alaska, Minnesota, and Wisconsin (Mech *et al* 1985, pp. 404–405; Kreeger 2003, p. 208; Paul in litt. 2005). Dogs are probably the source of the initial infections, and subsequently wild canids transfer lice by direct contact with other wolves, particularly between females and pups. Severe infestations result in irritated and raw skin, substantial hair loss, particularly in the groin. However, in contrast to mange, lice infestations generally result in loss of guard hairs but not the insulating under fur, thus, hypothermia is less likely to occur and much less likely to be fatal (Brand *et al.* 1995, p. 426). Even though observed in nearly 4 percent in a sample of 391 Minnesota wolves in 2003–05 (Paul in litt. 2005), dog lice infestations have not been confirmed as a cause of wolf mortality, and are not expected to have a significant impact even at a local scale.

Canine distemper virus (CDV) is an acute disease of carnivores that has been known in Europe since the sixteenth century and is now infecting dogs worldwide (Kreeger 2003, p. 209). CDV generally infects dog 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). CDV mortality among wild wolves has been documented only in two littermate pups in Manitoba (Carbyn 1982, pp. 111–112), in two Alaskan yearling wolves (Peterson *et al.* 1984, p. 31), and in two Wisconsin wolves (an adult in 1985 and a pup in 2002 (Thomas in litt. 2006; Wydeven and Wiedenhoeft 2003b, p. 20). Carbyn (1982, pp. 113–116) concluded that CDV was a contributor to a 50 percent decline of the wolf population in Riding Mountain National Park (Manitoba, Canada) in the mid-1970s. Serological evidence indicates that exposure to CDV is high among some Midwest wolves—29 percent in northern Wisconsin wolves and 79 percent in central Wisconsin wolves in 2002–04 (Wydeven and Wiedenhoeft 2004b, pp. 23–24 Table 7; 2005, pp. 23–24 Table 7). However, the continued strong recruitment in Wisconsin and elsewhere in North American wolf populations indicates that distemper is not likely a significant cause of mortality (Brand *et al.* 1995, p. 421).

Other diseases and parasites, including rabies, canine heartworm, blastomycosis, bacterial myocarditis, granulomatous pneumonia, brucellosis, leptospirosis, bovine tuberculosis, hookworm, coccidiosis, and canine hepatitis have been documented in wild wolves, but their impacts on future wild wolf populations are not likely to be significant (Brand *et al.* 1995, pp. 419–429; Hassett in litt. 2003; Johnson 1995, pp. 431, 436–438; Mech and Kurtz 1999, pp. 305–306; Thomas in litt. 1998, Thomas in litt. 2006, WI DNR 1999, p. 61; Kreeger 2003, pp. 202–214). Continuing wolf range expansion, however, likely will provide new avenues for exposure to several of these diseases, especially canine heartworm, raccoon rabies, and bovine tuberculosis (Thomas in litt. 2000, in litt. 2006), further emphasizing the need for disease monitoring programs.

In addition, the possibility of new diseases developing and existing diseases, such as chronic wasting disease (CWD), West Nile Virus (WNV) and canine influenza (Crawford *et al.* 2005, 482–485), moving across species barriers or spreading from domestic dogs to wolves must all be taken into account, and monitoring programs will need to address such threats. Currently there is no evidence that CWD can directly affect canids (Thomas in litt. 2006). Wisconsin wolves have been tested for WNV at necropsy since the first spread of the virus across the State: To date, all results have been negative. Although experimental infection of dogs produced no ill effects, WNV is reported to have killed two captive wolf pups, so young wolves may be at some risk (Thomas in litt. 2006).

In aggregate, diseases and parasites were the cause of 21 percent of the diagnosed mortalities of radio-collared wolves in Michigan from 1999 through 2004 (Beyer 2005, unpublished data) and 27 percent of the diagnosed mortalities of radio-collared wolves in Wisconsin from October 1979 through December 2009 (Wydeven *et al.* 2010, p. 45). In recent years (2006–10), disease has been the cause of death for 14 percent (10 of 70 dead wolves) of the diagnosed mortalities of radio-collared wolves in Wisconsin and 3 to 7 percent of all wolves (radio-collared and not collared) found dead in the State (72 to 94 wolves). During that time period, disease was the cause of death of 12 percent (5 of 43) of the diagnosed mortalities of radio-collared wolves in Michigan, and of 3 percent (6 of 199) of the total known wolf mortalities in Minnesota.

Many of the diseases and parasites are known to be spread by wolf-to-wolf contact. Therefore, the incidence of mange, CPV, CDV, and canine heartworm may increase as wolf densities increase in the more recently colonized areas (Thomas in litt. 2006). Because wolf densities generally are relatively stable following the first few years of colonization, wolf-to-wolf contacts will not likely lead to a continuing increase in disease prevalence in areas that have been occupied for several years or more and are largely saturated with wolf packs (Mech in litt. 1998).

Disease and parasite impacts may increase because several wolf diseases and parasites are carried and spread by domestic dogs. This transfer of pathogens from domestic dogs to wild wolves may increase as wolves continue to colonize non-wilderness areas (Mech in litt. 1998). Heartworm, CPV, and rabies are the main concerns (Thomas in litt. 1998) but dogs may become significant vectors for other diseases with potentially serious impacts on wolves in the future (Crawford *et al.* 2005, pp. 482–485). However, to date wolf populations in Wisconsin and Michigan have continued their expansion into areas with increased contacts with dogs and have shown no adverse pathogen impacts since the mid-1980s impacts from CPV.

Disease and parasite impacts are a recognized concern of the Minnesota, Michigan, and Wisconsin DNRs. The Michigan Gray Wolf Recovery and Management Plan states that necropsies will be conducted on all dead wolves, and that all live wolves that are handled will be examined, with blood, skin, and fecal samples taken to provide disease information. The Michigan Plan states that the Michigan DNR will continue to monitor the prevalence and impact of disease on wolf health following Federal delisting (MI DNR 2008, pp. 32, 40–42).

Similarly, the Wisconsin Wolf Management Plan states that as long as the wolf is State-listed as a threatened

or endangered species, the WI DNR will conduct necropsies of dead wolves and test a sample of live-captured wolves for diseases and parasites, with a goal of screening 10 percent of the State wolf population for diseases annually. However, the plan anticipates that since State delisting (which occurred on March 24, 2004), disease monitoring will be scaled back because the percentage of the wolf population that is live-trapped each year will decline. Disease monitoring of captured wolves currently is focusing on diseases known to be causing noteworthy mortality, such as mange, and other diseases for which data are judged to be sparse, such as Lyme disease and ehrlichiosis (Wydeven and Wiedenhoeft 2006, p. 8). The State will continue to test for disease and parasite loads through periodic necropsy and scat analyses. The 2006 update to the 1999 plan also recommends that all wolves live-trapped for other studies should have their health monitored and reported to the WI DNR wildlife health specialists (WI DNR 1999, p. 21; 2006c, p. 14). Furthermore, the 2006 update identifies a need for "continued health monitoring to document significant disease events that may impact the wolf population and to identify new diseases in the population * * *." (WI DNR 2006a, p. 24).

The Minnesota Wolf Management Plan states that MN DNR "will collaborate with other investigators and continue monitoring disease incidence, where necessary, by examination of wolf carcasses obtained through depredation control programs, and also through blood or tissue physiology work conducted by the MN DNR and the U.S. Geological Survey. The DNR will also keep records of documented and suspected incidence of sarcoptic mange (MN DNR 2001, p. 32)." In addition, it will initiate "(R)egular collection of pertinent tissues of live captured or dead wolves" and periodically assess wolf health "when circumstances indicate that diseases or parasites may be adversely affecting portions of the wolf population (MN DNR 2001, p. 19)." Unlike Michigan and Wisconsin, Minnesota has not established minimum goals for the proportion of its wolves that will be assessed for disease nor does it plan to treat any wolves, although it does not rule out these measures. Minnesota's less intensive approach to disease monitoring and management seems warranted in light of its much greater abundance of wolves than in the other two States.

In areas within the proposed WGL DPS, but outside Minnesota, Wisconsin, and Michigan, we lack data on the incidence of diseases or parasites in transient wolves. However, the boundary of the proposed WGL DPS is laid out in a manner such that the vast majority of, and perhaps all, wolves that will occur in the DPS in the foreseeable future will have originated from the Minnesota–Wisconsin–Michigan wolf metapopulation. Therefore, they will be carrying the "normal" complement of Midwest wolf parasites, diseases, and disease resistance with them. For this reason, any new pairs, packs, or populations that develop within the DPS are likely to experience the same low to moderate adverse impacts from pathogens that have been occurring in the core recovery areas.

The most likely exceptions to this generalization would arise from exposure to sources of novel diseases or more virulent forms that are being spread by other canid species that might be encountered by wolves dispersing into currently unoccupied areas of the DPS. To increase the likelihood of detecting such novel or more virulent diseases and thereby reduce the risk that they might pose to the core meta-population after delisting, we will encourage these States and Tribes to provide wolf carcasses or suitable tissue, as appropriate, to the USGS Madison Wildlife Health Center or the Service's National Wildlife Forensics Laboratory for necropsy. This practice should provide an early indication of new or increasing pathogen threats before they reach the core metapopulation or impact future transient wolves to those areas.

Disease Summary

We believe that several diseases have had noticeable impacts on wolf population growth in the Great Lakes region in the past. These impacts have been both direct, resulting in mortality of individual wolves, and indirect, by reducing longevity and fecundity of individuals or entire packs or populations. Canine parvovirus stalled wolf population growth in Wisconsin in the early and mid-1980s and has been implicated in the decline in the mid-1980s of the isolated Isle Royale wolf population in Michigan, and in attenuating wolf population growth in Minnesota (Mech in litt. 2006). Sarcoptic mange has affected wolf recovery in Michigan's UP and in Wisconsin over the last 12 years, and it is recognized as a continuing issue.

Despite these and other diseases and parasites, the overall trend for wolf populations in the proposed WGL DPS continues to be upward. Wolf management plans for Minnesota, Michigan, and Wisconsin include disease monitoring components that we expect will identify future disease and parasite problems in time to allow corrective action to avoid a significant decline in overall population viability. We conclude that diseases and parasites will not prevent continued population growth or the maintenance of viable wolf populations in the DPS. Delisting of wolves in the proposed WGL DPS will not significantly change the incidence or impacts of disease and parasites on these wolves. Furthermore, we conclude that diseases and parasites will not be threats sufficient to cause wolves in the proposed WGL DPS to be likely to become endangered in the foreseeable future in all or a significant portion of the range within the proposed WGL DPS.

Natural Predation

No wild animals habitually prey on wolves. Large prey such as deer, elk, or moose (Mech and Nelson 1989, pp. 207–208; Smith *et al.* 2001, p. 3), or other predators, such as mountain lions (*Felis concolor*) or grizzly bears (*Ursus arctos horribilis*) where they are extant (USFWS 2005, p. 3), occasionally kill wolves, but this has only been rarely documented. This very small component of wolf mortality will not increase with delisting.

Wolves frequently are killed by other wolves, most commonly when packs encounter and attack a dispersing wolf as an intruder or when two packs encounter each other along a territorial boundary (Mech 1994, p. 201). This form of mortality is likely to increase as more of the available wolf habitat becomes saturated with wolf pack territories, as is the case in northeastern Minnesota, but such a trend is not yet evident from Wisconsin or Michigan data. From October 1979 through June 1998, 7 (12 percent) of the mortalities of radio-collared Wisconsin wolves resulted from wolves killing wolves, and 8 of 73 (11 percent) mortalities were from this cause during 2000–05 (Wydeven 1998, p. 16 Table 4; Wydeven and Wiedenhoeft 2001, p. 8 Table 5; 2002, pp. 8–9 Table 4; 2003a, pp. 11–12 Table 4; 2004a, pp. 11–12 Table 5, 2005, p. 21 Table 5).

Among radio-collared wolves dying from known causes between October 1979 and December 2009, overall rate of intraspecific strife was similar at 17 of 151 mortalities or 11 percent (Wydeven *et al.* 2010, p. 45). Gogan *et al.* (2004, p. 7) studied 31 radio-collared wolves in northern Minnesota from 1987 to 1991 and found that 4 (13 percent) were killed by other wolves, representing 29 percent of the total mortality of radio-collared wolves. Intra-specific strife

caused 50 percent of mortality within Voyageurs National Park and 20 percent of the mortality of wolves adjacent to the Park (Gogan *et al.* 2004, p. 22). The DelGiudice data (in litt. 2005) show a 17 percent mortality rate from other wolves in another study area in north-central Minnesota from 1994 to 2005. This behavior is normal in healthy wolf populations and is an expected outcome of dispersal conflicts and territorial defense, as well as occasional intra-pack strife. This form of mortality is something with which the species has evolved and it should not pose a threat to wolf populations in the proposed WGL DPS if this DPS is delisted.

Human Predation

Because our concern about human predation is its overall effect on wolf mortality, the following discussion addresses the major human causes of wolf mortality, including illegal killing, depredation control, and vehicle collisions.

Humans have functioned as highly effective predators of the wolf in North America for several hundred years. European settlers in the Midwest attempted to eliminate the wolf entirely in earlier times, 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. In Michigan, an 1838 wolf bounty became the ninth law passed by the First Michigan Legislature; this bounty remained in place until 1960. A Wisconsin bounty was instituted in 1865 and was repealed about the time wolves were extirpated from the State in 1957. Minnesota maintained a wolf bounty until 1965.

Subsequent to the gray wolf's listing as a Federally endangered species, the Act and State endangered species statutes prohibited the killing of wolves except under very limited circumstances, such as in defense of human life, for scientific or conservation purposes, or under special regulations intended to reduce wolf depredations of livestock or other domestic animals. The resultant reduction in human-caused wolf mortality is the main cause of the wolf's reestablishment in large parts of its historical range. It is clear, however, that illegal killing of wolves has continued in the form of intentional mortality and incidental deaths.

Illegal killing of wolves occurs for a number of reasons. Some of these killings are accidental (for example, wolves are hit by vehicles, mistaken for coyotes and shot, or caught in traps set for other animals); some of these accidental killings are reported to State, Tribal, and Federal authorities. It is likely that most illegal killings, however, are intentional and are never reported to government authorities. Because they generally occur in remote locations and the evidence is easily concealed, we lack reliable estimates of annual rates of intentional illegal killings.

In Wisconsin, all forms of human-caused mortality accounted for 56 percent of the diagnosed deaths of radio-collared wolves from October 1979 through December 2009 (Wydeven *et al.* 2010, p. 45). Thirty-four percent of the diagnosed mortalities, and 62 percent of the human-caused mortalities, were from illegal killing (mainly shootings). Another 9 percent of all the diagnosed mortalities (15 percent of the human-caused mortalities) resulted from vehicle collisions. (These percentages and those in the following paragraphs exclude seven radio-collared Wisconsin wolves that were killed in depredation control actions by USDA–APHIS—Wildlife Services. The wolf depredation control programs in the Midwest are discussed separately under Depredation Control, below.) Data from 2006 through 2010 (68 diagnosed mortalities of radio-collared wolves) show the mortality percentages for disease to be slightly lower and illegal kills to be similar, with 14 percent of the mortalities resulting from mange or disease and 35 percent from being illegally killed. The mortality percentage for vehicle collisions during this time period remained constant (13 percent) (Wydeven *et al.* 2007, p. 10; and Wydeven and Wiedenhoeft 2008, Summary). Most recently for 2010, mortality data from actively monitored wolves show that of wolves that died, 38 percent were killed illegally (all shootings); 12 percent were euthanized for human safety concerns; 6 percent of the deaths were disease related; 6 percent died from apparent old age, 6 percent from intraspecific strife, and 12 percent from vehicle collisions; and the causes for 19 percent of the deaths were unknown (Wydeven *et al.* 2011, p. 2).

During the periods that wolves were Federally delisted (from March 2007 through September 2008 and from April through early July 2009), 92 wolves were killed for depredation control, 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).

As the Wisconsin population has increased in numbers and range, vehicle collisions have increased as a percentage of radio-collared wolf mortalities. During the October 1979 through June 1992 period, only 1 of 27 (4 percent) known mortalities was from that cause; but from July 1992 through June 1998, 5 of the 26 (19 percent) known mortalities resulted from vehicle collisions (Wydeven 1998, p. 6). From 2002 through 2004, 7 of 45 (16 percent) known mortalities were from that cause (Wydeven and Wiedenhoeft 2003a, pp. 11–12 Table 4; 2004a, pp. 11–12 Table 5; 2005, pp. 19–20 Table 4); and from 2005 through 2009, 126 of 459 (27 percent) known mortalities were from that cause (Wydeven and Wiedenhoeft 2005, p. 20; Wydeven and Wiedenhoeft 2006, p. 20; Wydeven *et al.* 2007a, p. 7; Wydeven *et al.* 2007b, p. 10; Wydeven and Wiedenhoeft 2008, p. 7; Wydeven *et al.* 2009a, pp. 19–21; Wydeven and Wiedenhoeft 2009, Table 3; Wydeven *et al.* 2010, Table 7).

A comparison over time for diagnosed mortalities of radio-collared Wisconsin wolves shows that 18 of 57 (32 percent) were illegally killed from October 1979 through 1998, while 12 of 42 (29 percent) were illegally killed from 2002 through 2004 and 24 of 72 (33 percent) were illegally killed from 2005 to March 2007 (WI DNR 1999, p. 63; Wydeven and Wiedenhoeft 2003a, pp. 11–12 Table 4; 2004a, pp. 11–12 Table 4; 2005. pp. 19–20 Table 4; Wydeven *et al.* 2006a, p. 6; 2006b, p. 8; 2007, pp. 6–7; 2008a, p. 10). In 2006, prior to the Federal delisting the following year, 17 of 72 wolves found dead in the state were killed illegally. Among nine radio-collared wolves that had died in 2006, six (67 percent) were illegally killed. In 2007, after Federal delisting, 10 of 90 dead wolves found in the State were illegally killed, and 3 (19 percent) of the radio-collared wolves found dead were illegally killed. In 2008, 14 of 94 dead wolves found in Wisconsin were illegally killed, and 4 (28 percent) of 14 radio-collared wolves found dead were illegal kills. In 2009, when wolves were again Federally listed for most of the year, 20 of the 72 dead wolves found in Wisconsin were illegally killed, and 8 (62 percent) of 13 radio-collared wolves found dead were illegal kills. In 2010, when wolves continued to be Federally listed, 14 of 72 dead wolves were illegally killed, and 6 (38 percent) of 16 radio-collared wolves were illegally killed.

Thus the number of known illegally killed wolves declined slightly from 17 in 2006, to 10 in 2007 and 14 in 2008, increased to 20 in 2009, and declined to 14 in 2010. Among radio-collared wolves found dead, illegal killing represented 67 percent of all mortality in 2006, 19 percent in 2007, 23 percent in 2008, 62 percent in 2009, and 38

percent in 2010 (Wydeven *et al.* 2010, p. 13; Wydeven *et al.* 2011, p. 2).

In the UP of Michigan, human-caused mortalities accounted for 75 percent of the diagnosed mortalities, based upon 34 wolves recovered from 1960 to 1997, including mostly non-radio-collared wolves. Twenty-eight percent of all the diagnosed mortalities and 38 percent of the human-caused mortalities were from shooting. In the UP during that period, about one-third of all the known mortalities were from vehicle collisions (MI DNR 1997, pp. 5–6). During the 1998 Michigan deer hunting season, three radio-collared wolves were shot and killed, resulting in one arrest and conviction (Hammill in litt. 1999, Michigan DNR 1999). During the subsequent 3 years, eight additional wolves were killed in Michigan by gunshot, and the cut-off radio-collar from a ninth animal was located, but the animal was never found. These incidents resulted in six guilty pleas, with three cases remaining open.

Data collected from radio-collared wolves from the 1999 to 2009 bioyears (mid-April to mid-April) show that human-caused mortalities still account for the majority of the wolf mortalities (66 percent) in Michigan. Deaths from vehicular collisions were about 18 percent of total mortality (27 percent of the human-caused mortality) and showed no trend over this 11-year period. Deaths from illegal killing constituted 39 percent of all mortalities (60 percent of the human-caused mortality) over the period. From 1999 through 2001, illegal killings were 31 percent of the mortalities, but this increased to 42 percent during the 2002 through 2004 bioyears and to 40 percent during bioyears 2005 through 2010 (Roell 2010, pers. comm.).

Most Michigan residents place a high priority on wolf management actions that address public concerns for human safety (Beyer *et al.* 2006). Quick and professional responses to wolf conflicts have been important for wolf recovery (Ruid *et al.* 2009, p. 280). In most cases, people can take simple, sensible measures to avoid those situations and protect themselves against harm. Other cases may warrant higher levels of concern and professional assistance. Michigan DNR solved most wolf-human conflicts using nonlethal methods (Roell 2010, pers. comm.). However, in a few incidents lethal control was warranted and carried out under Federal regulations (50 CFR 17.21, which allows the take of an endangered species when there is a "demonstrable but nonimmediate threat" to protect human safety, or to euthanize a sick or injured wolf, but only if it is not reasonably possible to translocate the animal alive), or while wolves were not Federally protected (Roell 2010 *et al.,* p. 9). Since 2004 the Michigan DNR and USDA–Wildlife Services have killed 13 animals (12 involving human safety and 1 sick wolf) under the authority of this regulation (Roell 2010 *et al.,* p. 9). Two others were killed for human safety concerns while wolves were Federally delisted (Roell 2010, pers. comm.).

North-central Minnesota data from 16 diagnosed mortalities of radio-collared wolves over a 12-year period (1994–2005) show that human-causes resulted in 69 percent of the diagnosed mortalities. This includes 1 wolf accidentally snared, 2 vehicle collisions, and 8 (50 percent of all diagnosed mortalities) that were shot (DelGiudice in litt. 2005). However, this data set of only 16 mortalities over 12 years is too small for reliable comparison to Wisconsin and Michigan data.

A smaller mortality dataset is available from a 1987–91 study of wolves in, and adjacent to, Minnesota's Voyageurs National Park, along the Canadian border. Of 10 diagnosed mortalities, illegal killing outside the Park was responsible for a minimum of 60 percent of the deaths (Gogan *et al.* 2004, p. 22).

Two Minnesota studies provide some limited insight into the extent of human-caused wolf mortality before and after the species' listing. On the basis of 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) provided 1980–86 data from a north-central Minnesota study area and found an annual human-caused mortality rate of 29 percent, a figure that includes 2 percent mortality from legal depredation control actions. Drawing conclusions from comparisons of these two studies, however, is difficult due to the confounding effects of habitat quality, exposure to humans, prey density, differing time periods, and vast differences in study design. Although these figures provide support for the contention that human-caused mortality decreased after the wolf's protection under the Act, it is not possible at this time to determine if human-caused mortality (apart from mortalities from depredation control) has significantly changed over the nearly 35-year period that the gray wolf has been listed as threatened or endangered.

Wolves were largely eliminated from the Dakotas in the 1920s and 1930s and were rarely reported from the mid-1940s through the late 1970s. Ten wolves were killed in these two States from 1981 to 1992 (Licht and Fritts 1994, pp. 76–77). Seven more were killed in North Dakota since 1992, with four of these mortalities occurring in 2002 and 2003; in 2001, one wolf was killed in Harding County in extreme northwestern South Dakota. The number of reported sightings of wolves in North Dakota is increasing. From 1993 to 1998, six wolf depredation reports were investigated in North Dakota, and adequate signs were found to verify the presence of wolves in two of the cases. A den with pups was also documented in extreme north-central North Dakota near the Canadian border in 1994. From 1999 to 2003, residents of North Dakota reported 16 wolf sightings or depredation incidents to USDA–APHIS–Wildlife Services, and 9 of these incidents were verified. Additionally, one North Dakota wolf sighting was confirmed in early 2004, two wolf depredation incidents were verified north of Garrison in late 2005, and one wolf was found dead in Eddy County in 2009. USDA–APHIS–Wildlife Services also confirmed a wolf sighting along the Minnesota border near Gary, South Dakota, in 1996, and a trapper with the South Dakota Game, Fish, and Parks Department sighted a lone wolf in the western Black Hills in 2002.

Several other unconfirmed sightings have been reported from these States, including two reports in South Dakota in 2003. Wolves killed in North and South Dakota were most often shot by hunters after being mistaken for coyotes, or were killed by vehicles. The 2001 mortality in South Dakota and one of the 2003 mortalities in North Dakota were caused by M–44 devices that had been legally set in response to complaints about coyotes.

In and around the core recovery areas in the Midwest, a continuing increase in wolf mortalities from vehicle collisions, both in actual numbers and as a percent of total diagnosed mortalities, is expected as wolves continue their colonization of areas with more human developments and a denser network of roads and vehicle traffic. In addition, the growing wolf populations in Wisconsin and Michigan are producing greater numbers of dispersing individuals each year, and this also will contribute to increasing numbers of wolf-vehicle collisions. This increase in accidental deaths would be unaffected by a removal of wolves in the proposed WGL DPS from the protections of the Act.

In those areas of the proposed WGL DPS that are beyond the areas currently occupied by wolf packs in Minnesota, Wisconsin, and Michigan, we expect that human-caused wolf mortality in the form of vehicle collisions, shooting, and

trapping have been removing all, or nearly all, the wolves that disperse into these areas. We expect this to continue after Federal delisting. Road densities are high in these areas, with numerous interstate highways and other freeways and high-speed thoroughfares that are extremely hazardous to wolves attempting to move across them. Shooting and trapping of wolves also is likely to continue as a threat to wolves in these areas for several reasons. Especially outside of Minnesota, Wisconsin, and Michigan, hunters will not expect to encounter wolves, and may easily mistake them for coyotes from a distance, resulting in unintentional shootings.

It is important to note that, despite the difficulty in measuring the extent of illegal killing of wolves, all sources of wolf mortality, including legal (for example, depredation control) and illegal human-caused mortality, have not been of sufficient magnitude to stop the continuing growth of the wolf population in Wisconsin and Michigan, nor to cause a wolf population decline in Minnesota. This indicates that total wolf mortality does not threaten the continued viability of the wolf population in these three States, or in the proposed WGL DPS.

Human Predation Summary

The high reproductive potential of wolves allows wolf populations to withstand relatively high mortality rates, including human-caused mortality. The principle of compensatory mortality is believed to occur in wolf populations. This means that human-caused mortality is not simply added to "natural" mortality, but rather replaces a portion of it. For example, some of the wolves that are killed during depredation control actions would have otherwise died during that year from disease, intraspecific strife, or starvation. Thus, the addition of intentional killing of wolves to a wolf population will reduce the mortality rates from other causes on the population. Based on 19 studies by other wolf researchers, Fuller *et al.* (2003, pp. 182–186) concludes that human-caused mortality can replace about 70 percent of other forms of mortality.

Fuller *et al.* (2003, p. 182 Table 6.8) has summarized the work of various researchers in estimating mortality rates, especially human harvest, that would result in wolf population stability or decline. They provide a number of human-caused and total mortality rate estimates and the observed population effects in wolf populations in the United States and Canada. While variability is apparent, in general, wolf populations increased if their total average annual mortality was 30 percent or less, and populations decreased if their total average annual mortality was 40 percent or more. Four of the cited studies showed wolf population stability or increases with human-caused mortality rates of 24 to 30 percent. The clear conclusion is that a wolf population with high pup productivity—the normal situation in a wolf population—can withstand levels of overall and of human-caused mortality without suffering a long-term decline in numbers.

The wolf populations in Minnesota, Wisconsin, and Michigan will stop growing when they have saturated the suitable habitat and are curtailed in less suitable areas by natural mortality (disease, starvation, and intraspecific aggression), depredation management, incidental mortality (for example, road kill), illegal killing, and other means. At that time, we should expect to see population declines in some years followed by short-term increases in other years, resulting from fluctuations in birth and mortality rates. Adequate wolf monitoring programs, however, as described in the Michigan, Wisconsin, and Minnesota wolf management plans, are likely to identify high mortality rates or low birth rates that warrant corrective action by the management agencies (see Regulatory Mechanisms in Minnesota, Wisconsin, and Michigan, below). The goals of all three State wolf management plans are to maintain wolf populations well above the numbers recommended in the Recovery Plan for the Eastern Timber Wolf to ensure long-term viable wolf populations. The State management plans recommend a minimum wolf population of 1,600 in Minnesota, 350 in Wisconsin, and 200 in Michigan.

Despite human-caused mortalities of wolves in Minnesota, Wisconsin, and Michigan, these wolf populations have continued to increase in both numbers and range. If wolves in the proposed WGL DPS are delisted, as long as other mortality factors do not increase significantly and monitoring is adequate to document, and if necessary counteract (see Post-Delisting Monitoring, below), the effects of excessive human-caused mortality should that occur, the Minnesota–Wisconsin–Michigan wolf population will not decline to nonviable levels in the foreseeable future as a result of human-caused killing or other forms of predation. Therefore, we conclude that predation, including all forms of human-caused mortality, will not be a sufficient future threat to cause wolves in the proposed WGL DPS to be likely to become endangered in the foreseeable future in all or a significant portion of the range within the proposed WGL DPS.

D. The Inadequacy of Existing Regulatory Mechanisms

The inadequacy of existing regulatory mechanisms is one of five factors that, under the Endangered Species Act (Act), may result in a determination as to whether a species should be listed or not. In analyzing whether the existing regulatory mechanisms are adequate, the Service reviews relevant Federal, state, and Tribal laws, plans, regulations, Memorandum of Understandings, Cooperative Agreements and other such factors that influence conservation of the species in question, including analyzing the extent those mechanism can be relied upon. Other examples include State governmental actions enforced under a State statute or constitution, or Federal action under statute.

Strongest weight is given to statutes and their implementing regulations, and management direction that stems from those laws and regulations. Some other agreements are more voluntary in nature; in those cases we analyze the specific facts to determine the extent to which it can be relied on in the future, including how it addresses threats to the species. We consider all pertinent information, including the efforts and conservation practices of State governments, whether or not these are enforceable by law. Regulatory mechanisms, if they exist, may preclude the need for listing if such mechanisms are judged to adequately address the threat to the species such that listing is not warranted. Conversely, threats on the landscape are exacerbated when not addressed by existing regulatory mechanisms, or when the existing mechanisms are not adequate (or not adequately implemented or enforced).

The following sections discuss the adequacy of regulatory mechanisms that would be implemented if the WGL DPS were delisted, that is, removed from the List of Endangered and Threatened Wildlife. For the reasons described in the following section, the Service has determined that, if delisted, adequate regulatory mechanisms would be in place to ensure that this DPS of wolves is neither threatened nor endangered.

Regulatory Mechanisms in Minnesota, Wisconsin, and Michigan

State Wolf Management Planning

During the 2000 legislative session, the Minnesota Legislature passed wolf

management provisions addressing wolf protection, taking of wolves, and directing 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 (MN Plan) in early 2001 (MN DNR 2001, pp. 8–9).

The Wisconsin Natural Resources Board (NRB) approved the Wisconsin Wolf Management Plan in October 1999 (WI Plan). 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 WI DNR presented the Plan updates and modifications to the Wisconsin NRB on June 28, 2006, and the NRB approved them at that time, with the understanding that some numbers would be updated and an additional reference document would be added (Holtz in litt. 2006). The updates were completed and received final NRB approval on November 28, 2006 (WI DNR 2006a, p. 1).

In late 1997, the Michigan Wolf Recovery and Management Plan (MI Plan) was completed and received the necessary State approvals. It primarily focused on wolf recovery, rather than long-term management of a large wolf population and the conflicts that result as a consequence of successful wolf restoration. In 2006 the MI DNR convened a Michigan Wolf Management Roundtable committee (Roundtable) to provide guiding principles to the DNR on changes and revisions to the 1997 Plan and to guide management of Michigan wolves and wolf-related issues following Federal delisting of the species. The MI DNR relied heavily on those guiding principles as it drafted a new wolf management plan. The Roundtable was composed of representatives from 20 Michigan stakeholder interests in wolf recovery and management, and its membership is roughly equal in numbers from the UP and the LP. During 2006, the Roundtable provided its "Recommended Guiding Principles for Wolf Management in Michigan" to the DNR in November (Michigan Wolf Management Roundtable 2006. p. 2). Based on those Roundtable recommendations, a revised Michigan Wolf Management Plan was completed in July 2008 (MI DNR 2008a). The complete text of the Wisconsin, Michigan, and Minnesota wolf plans can be found on our Web site (see **FOR FURTHER INFORMATION CONTACT**).

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). This law 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 the proposed delisting, Minnesota DNR's management of wolves would differ from their current management while listed as threatened under the Act. Most of these differences deal with the control of wolves that attack or threaten domestic animals.

The Minnesota Plan divides the State into two wolf management zones—Zones A and B (see Figure 2 below). Zone A corresponds to Federal Wolf Management Zones 1 through 4 (approximately 30,000 sq mi (48,000 sq km) in northeastern Minnesota) in the Service's Recovery Plan for the Eastern Timber Wolf, whereas Zone B constitutes Zone 5 in that recovery plan (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 than in Zone A (see Post-delisting Depredation Control in Minnesota below).

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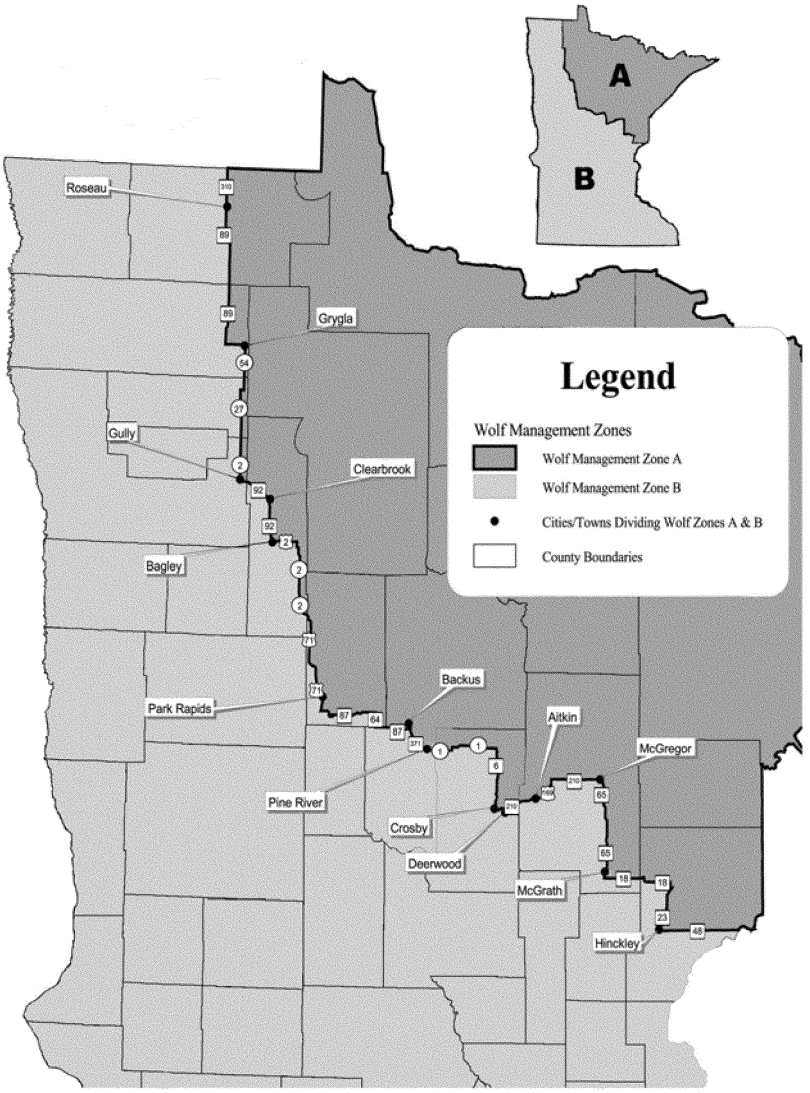
Figure 2. Minnesota wolf management zones.



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The MN DNR plans to allow wolf numbers and distribution to naturally expand, with no maximum population goal, and if any winter population estimate is below 1,600 wolves, it 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. The MN DNR plans to conduct another statewide population survey in the winter of 2012–13 and at subsequent 5-year intervals. 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) to help ascertain annual trends in wolf population or range (MN DNR 2001, pp. 18–19). The agency is currently evaluating alternatives to its current methodology with the potential to improve the efficiency and accuracy of its statewide population estimates (Stark 2009a, pers. comm.).

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 believe these measures will be crucial in ensuring that illegal mortality does not significantly increase if this proposed delisting is finalized.

The likelihood of illegal take increases in relation to road density and human population density, but

changing attitudes towards wolves may allow them to survive in areas where road and human densities were previously thought to be too high (Fuller *et al.* 2003, p. 181). The MN DNR does not plan to reduce current levels of road access, but would encourage managers of land areas large enough to sustain one or more wolf packs to "be cautious about adding new road access that could exceed a density of one mile of road per square mile of land, without considering the potential effect on wolves" (MN DNR 2001, pp. 27–28).

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 one year. The restitution value of an illegally killed wolf is $2,000 (MN DNR 2001, p. 29). The MN DNR acknowledges that increased enforcement of the State's wolf laws and regulations would be dependent on increases in staff and resources, additional cross-deputization of Tribal law enforcement officers, and continued cooperation with Federal law enforcement officers. Minnesota 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 2009a, pers. comm.).

Minnesota DNR will consider wolf population management measures, including public hunting and trapping seasons and other methods, in the future. However, State law and the Minnesota Plan state that such consideration will occur no sooner than 5 years after Federal delisting, and there would be opportunity for full public comment on such possible changes at that time (Minnesota Statutes 97B.645 Subdiv. 9, see MN DNR 2001 Appendix 1, p. 6; MN DNR 2001, p. 20). The Minnesota Plan requires that these 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, implementing such management measures under that requirement would ensure the wolf's continued survival in Minnesota.

Depredation Control in Minnesota—Although Federally protected as a threatened species in Minnesota (since their 1978 reclassification), wolves that have attacked domestic animals have been killed by designated government employees under the authority of a special 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 sq mi (7,200 sq km) 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 of the depredation site. Young-of-the-year captured on or before August 1 must be released. The regulations that allow for this take (50 CFR 17.40(d)(2)(i)(B)(4)) do not specify a maximum duration for depredation control, but Wildlife Services personnel have followed internal guidelines under which they trap for no more than 10–15 days, except at sites with repeated or chronic depredation, where they may trap for up to 30 days (Paul 2004, pers. comm.).

During the period 1980–2009, the Federal Minnesota wolf depredation control program euthanized from 20 (in 1982) to 216 (in 1997) wolves annually. Annual averages (and percentage of statewide population) were 30 (2.2 percent) wolves killed from 1980 to 1984, 49 (3.0 percent) from 1985 to 1989, 115 (6.0 percent) from 1990 to 1994, 152 (6.7 percent) from 1995 to 1999, and 128 wolves (4.2 percent) from 2000 to 2005. During 2006–10 an average of 157 wolves were killed each year—approximately 5.4 percent of wolves in the State (Erb 2008; USDA–Wildlife Services 2010, p. 3). 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 1997 (Paul 2004, pp. 2–7; 2006, p. 1). Following the return of wolves in Minnesota to the list of threatened species in 2009, 195 and 192 wolves were killed in 2009 and 2010, respectively, in response to depredation of domestic animals in Minnesota. This is the highest 22-year consecutive total since authorization to control depredating wolves was allowed by special regulation under section 4(d) of the Act while wolves were Federally listed.

This level of wolf removal for depredation control has not interfered with wolf recovery in Minnesota, although it may have slowed the increase in wolf numbers in the State, especially since the late-1980s, and may be contributing to the possibly stabilized Minnesota wolf population suggested by the 2003–04 and 2007–08 estimates (see additional information in Minnesota Recovery). Minnesota wolf numbers grew at an average annual rate of nearly 4 percent between 1989 and 1998 while the depredation control program was taking its highest percentages of wolves (Paul 2004, pp. 2–7).

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 (BMPs) to incorporate new practices that it finds would reduce wolf depredation (Minnesota Statutes 2010, Section 3.737, subdivision 5).

Post-delisting Depredation Control in Minnesota—If the WGL DPS is 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. Zone A is composed of Federal Wolf Management Zones 1–4, covering 30,728 sq mi (49,452 sq km), approximately the northeastern third of the State. Zone B is identical to the current Federal Wolf Management Zone 5, and contains the 54,603 sq mi (87,875 sq km.) that make up the rest of the State (MN DNR 2001, pp. 19–20 and Appendix III; USFWS 1992, p. 72). The statewide survey conducted during the winter of 2003–04 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 above,* the Federal planning goal is 1,251–1,400 wolves for Zones 1–4 and no wolves in Zone 5 (USFWS 1992, p. 28).

In Zone A wolf depredation control is limited to situations of (1) immediate threat and (2) following verified loss of domestic animals. In this zone, if the DNR 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 may take wolves (specific number to be determined on a case-by-case basis) within a 1-mile radius of the depredation site (depredation control area) for up to 60 days. In contrast, in Zone B, predator controllers 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 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 head off repeat depredation incidents (MN DNR 2001, p. 22).

State law and the Minnesota Plan will also allow for private wolf depredation control throughout the State. Persons may shoot or destroy a wolf that poses "an immediate threat" to their livestock, guard animals, or domestic animals on lands that they own, lease, or occupy. 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 may 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. The MN DNR will investigate any private taking of wolves in Zone A (MN DNR 2001, p. 23).

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 to trap a wolf on their land or within 1 mile of their land (with permission of the landowner) to protect their livestock, domestic animals, or pets (MN DNR 2001, p. 23–24).

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.

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 in Zone 1, however, has been limited to 2 to 4 reported incidents per year, mostly of wolves killing dogs, although Wildlife Services received one livestock depredation complaint in Zone 1 in 2008 (Hart pers. comm. 2009), and some dog kills in this zone probably go unreported. 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.

The final change in Zone A is the ability for owners or lessees to respond to situations of immediate threat by shooting wolves in the act of stalking, attacking, or killing livestock or other domestic animals. We believe this 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 belief shared by the most experienced wolf depredation agent in the lower 48 States (Paul in litt. 2006, p. 5). It is also possible that illegal killing of wolves in Minnesota will decrease, because the expanded options for legal control of problem wolves may lead to an increase in public tolerance for wolves (Paul in litt. 2006, p. 5).

Within Zone B, State law and the Minnesota Plan 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. 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, and at the extreme, wolves could be eliminated from Zone B. However, there is no way to reasonably evaluate in advance the extent to which residents of Zone B will use this new authority, nor how vulnerable Zone B wolves will be. While wolves were under State management in 2007–08, landowners in Zone B shot six wolves under this authority. One additional wolf was trapped and euthanized in Zone B by a State certified predator controller in 2009 (Stark 2009b, pers. comm.).

The limitation of this broad take authority to Zone B is fully consistent with the Recovery Plan for the Eastern Timber Wolf's advice that wolves should be restored to the rest of Minnesota but not to Zone B (Federal Zone 5) because that area "is not suitable for wolves" (USFWS 1992, p. 20). The 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 will not threaten the continued survival of wolves in the State or the long-term viability of the wolf population in Zone A, the large part 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 may still persist in Zone B despite the likely increased take there. The Eastern Timber Wolf Recovery Team concluded that the changes in wolf management in the State's Zone A would be "minor" and would not likely result in "significant change in overall wolf numbers in Zone A." They found that, despite an expansion of the individual depredation control areas and an extension of the control period to 60 days, depredation control will 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).

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). These and other activities contained in their plan will be essential 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).

The Wisconsin Wolf Management Plan

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. We support this approach and believe it provides strong assurances that the wolf in both States

will remain a viable component of the proposed WGL DPS for the foreseeable future.

The WI Plan allows for differing levels of protection and management within four separate management zones (see figure 3). The Northern Forest Zone (Zone 1) and the Central Forest Zone (Zone 2) now 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 (see Wolf Range Ownership and Protection, above), so most of the State's wolf packs will continue to inhabit those parts of Wisconsin for the foreseeable future. At the time the Wisconsin Wolf Management 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. That state reclassification occurred in 1999, after the population exceeded that level for 5 years.

The Wisconsin Plan further recommends that the State manage for a wolf population 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 that would trigger 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). The Wisconsin Plan will be reviewed annually by the Wisconsin Wolf Advisory Committee and will be reviewed by the public every 5 years. Recently the WI DNR began work on updating the State's wolf management plan, which may include increasing the State management goal (Wydeven and Wiedenhoeft 2009, p. 3).

The WI Plan was updated during 2004–06 to reflect current wolf numbers, additional knowledge, and issues that have arisen since its 1999 completion. This update is in the form of text changes, revisions to two appendices, and the addition of a new appendix to the 1999 plan, rather than as a major revision to the plan. Several components of the plan that are key to our delisting evaluation are unchanged. 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 access management on public lands and the protection of active den sites. Protection of pack rendezvous sites, however, is no longer considered to be needed 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 underway 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 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 WI 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. This monitoring will include health monitoring of captured wolves and necropsies of dead wolves that are found. Wolf scat will be collected and analyzed to monitor for canine viruses and parasites. Health monitoring will be part of the capture protocol for all studies that involve the live capture of Wisconsin wolves (WI DNR 2006a, p. 14).

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 den sites, and seasonal restrictions to reduce disturbance within one-half mile 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).

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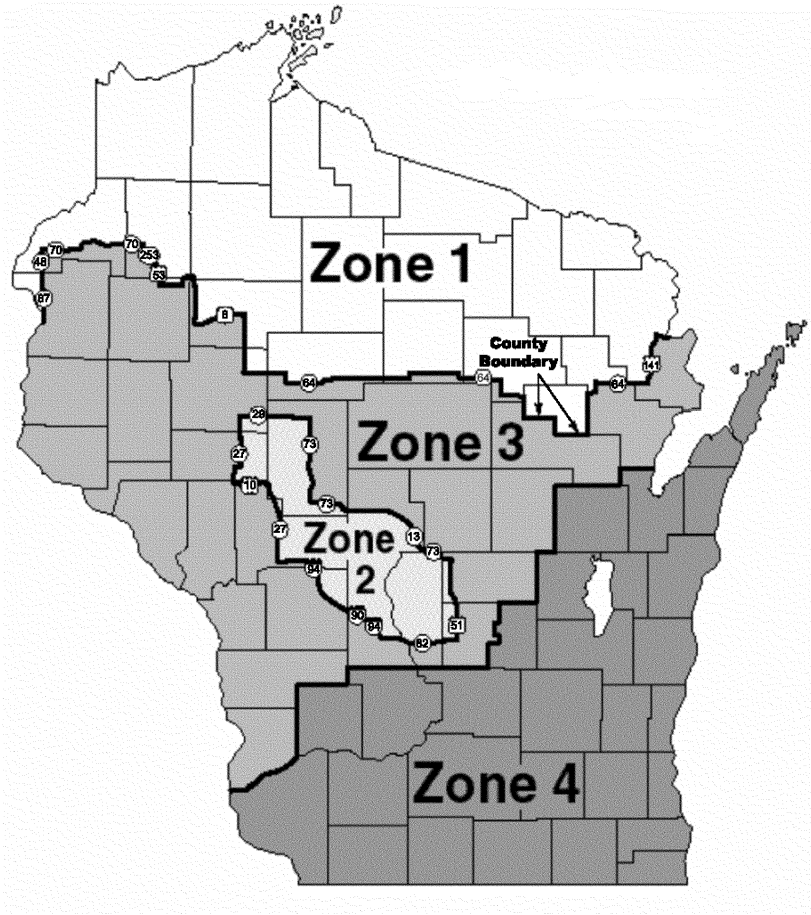
Figure 3. Wisconsin wolf management zones.



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The 1999 WI Plan contains, and the 2006 update retains, other recommendations that will provide protection to assist in maintenance of a viable wolf population in the State: (1) Continue the protection of the species as a "protected wild animal" with penalties similar to those for unlawfully killing large game species (fines of $1,000–$2,000, loss of hunting privileges for 3–5 years, and a possible 6-month jail sentence), (2) maintain closure zones where coyotes cannot be shot during deer hunting season in Zone 1, (3) legally protect wolf dens under the Wisconsin Administrative Code, (4) require State permits to possess a wolf or wolf-dog hybrid, and (5) establish a restitution value to be levied in addition to fines and other penalties for wolves that are illegally killed (WI DNR 1999, pp. 21, 27–28, 30–31; 2006a, pp. 3–4).

The 2006 update of the WI 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 continues the State 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).

Given the decline and ultimate termination in Federal funding for wolf monitoring that would occur upon delisting, Wisconsin and Michigan DNRs are seeking an effective, yet cost-efficient, method for detecting wolf population changes to replace the current labor-intensive and expensive monitoring protocols. Both DNRs have considered implementing a "Minnesota-type" wolf survey. Such methodology is less expensive for larger wolf populations than the intensive radio monitoring and track survey methods currently used by the two States, and if the wolf population continues to grow there will be increased need to develop and implement a less expensive method. However, each State conducted independent field testing of the Minnesota method several years ago and found that method to be unsuitable for both States' lower wolf population density and uneven pack distribution. In both States the application of that method resulted in an overestimate of wolf abundance, possibly due to the more patchy distribution of wolves and packs in these States and the difficulty in accurately delineating occupied wolf range in areas where wolf pack density is relatively low in comparison to Minnesota and where agricultural lands are interspersed with forested areas (Wiedenhoeft 2005, pp. 11–12; Beyer in litt. 2006b).

Both States remain interested in developing accurate but less costly alternate survey methods. WI DNR might test other methods following any Federal delisting, but the State will not replace its traditional radio tracking/snow tracking surveys during the 5 year post-delisting monitoring period (Wydeven in litt. 2006b). The 2006 update to the Wisconsin Wolf Management Plan has not changed the

WI DNR's commitment to annual wolf population monitoring in a manner that ensures accurate and comparable data (WI DNR 1999, pp.19–20), and we are confident that adequate annual monitoring will continue for the foreseeable future.

Depredation Control in Wisconsin—The rapidly expanding Wisconsin wolf population has resulted in an increased need for depredation control. From 1979 through 1989, there were only five cases (an average of 0.4 per year) of verified wolf depredations in Wisconsin. Between 1990 and 1997, there were 27 verified depredation incidents in the State (an average of 3.4 per year), and 82 incidents (an average of 16.4 per year) occurred from 1998 to 2002. Depredation incidents increased to 23 cases (including 50 domestic animals killed and 4 injured) in 2003, 35 cases (53 domestic animals killed, 3 injured, and 6 missing) in 2004, and to 45 cases (53 domestic animals killed and 11 injured) in 2005 (Wydeven and Wiedenhoeft 2004a, pp. 2–3, 7–8 Table 3; Wydeven *et al.* 2005b, p. 7; Wydeven *et al.* 2006b, p. 7). From 2005 to 2008, depredation incidents continued to increase, with 52 cases (92 domestic animals killed (includes 50 chickens) and 16 injured) in 2006, 60 cases (51 domestic animals killed, 18 injured, and 14 missing) in 2007, and 57 cases (67 domestic animals killed and 10 injured) in 2008 (Wydeven *et al.* 2007a, p. 7; Wydeven and Wiedenhoeft 2008, pp. 8, 25–32; Wydeven *et al.* 2009a, p. 6). Similar levels of depredations continued to occur in 2009, with 55 cases (65 domestic animals killed and 11 injured), but increased again to 81 cases (99 domestic animals killed and 20 injured) in 2010 (Wydeven *et al.* 2010, pp. 9–10; Wydeven *et al.* 2011, p. 3).

The number of farms experiencing wolf depredations has increased from 5 farms in 2000, to 28–32 farms from 2007 to 2009, and to 47 farms in 2010, a nearly ten-fold increase in the number of farms experiencing depredations during the last decade. The number of counties with wolf depredations on farms also grew during that time period from 5 to 17 counties, indicating that wolf depredation problems on farms are continuing to expand (Wydeven in litt. 2009; Wydeven *et al.* 2009a, p. 23; Wydeven *et al.* 2011, p.3). Between 1995 and 2002, an average of 7 percent of packs in Wisconsin were involved in livestock depredations (Wydeven *et al.* 2004, p.36), and between 2002 and 2010, an average of 13 percent (from 7 to 17) of the State's packs were involved in livestock depredation (WI DNR data). More aggressive lethal controls possible in 2007 and 2008 through State management following a temporary period of Federal delisting appear to have started to stabilize levels of livestock depredation in 2007–09, but loss of those control methods allowed major increases in levels of depredation in 2010.

A significant portion of depredation incidents in Wisconsin involve attacks on dogs, primarily those engaged in bear hunting activities or dogs being trained in the field for hunting. 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. Between 1986 and 2010, 206 dogs were killed and 80 were injured by wolves in Wisconsin (WI DNR data files and summary of wolf survey reports). Generally about 90 percent of dogs killed were hunting hounds and about 50 percent of dogs injured were pet dogs attacked near homes (Ruid *et al.* 2009).

More than 80 percent of the dog kills occurred since 2001, with an average of 17.2 dogs killed annually (range 6 to 25 dogs killed per year), and 6.8 injured each year (range 1 to 14 dogs) during the period 2001–10 (WI DNR files). Data on recent depredations in 2009 and 2010 show a continued increase in wolf attacks on dogs, with 23 dogs killed and 11 injured by 20 wolf packs (12 percent of Wisconsin packs) in 2009, and 24 dogs killed and 14 injured by 21 wolf packs in 2010 (Wydeven *et al.* 2010, pp. 51–52; Wydeven *et al.* 2011 p.3). 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 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 Web site (see *http://www.dnr.state.wi.us/org/land/er/mammals/wolf/dogdepred.htm*). In 2010, 14 wolf attacks on dogs had occurred near homes, which was the highest level seen of this type of depredation (Wydeven *et al.* 2011, p.3).

Post-delisting Depredation Control in Wisconsin—Following the proposed 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 2008), and any Tribal wolf management plans or guidelines that may be developed for reservations in occupied wolf range. The 2006 updates have not significantly changed 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 USDA–APHIS–Wildlife Services, working under a cooperative 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, and private landowner 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 to the landowner 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 WI DNR compensates livestock and pet owners for confirmed losses to depredating wolves. 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). Compensation costs have been funded from the endangered resources tax check-off and sales of the endangered resources license plates. 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 $68,907.88 (2007) to $203,943.51 (2010). From 1985 through December 24, 2010, the WI DNR had spent $1,083,162.62 on

reimbursement for damage caused by wolves in the State, with 82 percent of that total spent since 2000 (*http://dnr.wi.gov/org/land/er/mammals/wolf/pdfs/wolf_damage_payments_2010.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. As noted above, 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 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).

Following the proposed Federal delisting, Wisconsin landowners who have had a verified wolf depredation will be able 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 would be issued to: (1) Landowners with verified permits on their property within the last 2 years; (2) landowners within 1 mile 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). Limit on number of wolves to control will be based on estimated number of wolves in the pack causing depredation problems. In addition, landowners and lessees of land statewide will be allowed to kill a wolf without obtaining a permit "in the act of killing, wounding, or biting a domestic animal," 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 the 19 months wolves were Federally delisted in 2007 and 2008, 5 wolves were shot in the act of depredations on domestic animals, and 2 wolves were shot by one landowner out of 67 permits issued. One wolf was shot in the act of attack on domestic animals during 2 months when wolves were delisted in 2009.

The updated Wisconsin Plan also envisions the possibility of intensive control management actions in sub-zones of the larger wolf management zones (WI DNR 2006a, pp. 22–23). Triggering actions and type of controls planned for these "proactive control areas" are listed in recent versions of 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 would likely 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 will be adapted as experience is gained with implementing and evaluating localized control actions (Wydeven 2006, pers. comm.).

We have evaluated future 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.* 2008, pp. 8–9; Wydeven *et al.* 2009, pp. 6–7; Wydeven *et al.* 2010, p. 15; Wydeven *et al.* 2011, p. 3). Although these lethal control authorities applied to Wisconsin and Michigan DNRs 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 2003–05, and thus provide a reasonable measure of annual lethal depredation control. Lethal control authority only occurred for about 3.5 months in 2006.

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. Note that some of the wolves euthanized after August 1 were young-of-the-year who were not present during the late-winter survey, so the cited percentages are overestimates.

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.* 2006a, p. 10). Limited lethal control authority was granted to WI DNR in 2006 by a section 10 permit resulting in removal of 18 wolves (3.9 percent of winter wolf population), and this permit remained in effect for 3.5 months (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 only occurred for 2 months in 2009. During that time, eight wolves were euthanized for depredation control by USDA–WS, and one wolf was shot by a landowner; additionally a wolf was captured and euthanized by USDA–WS for human safety concerns later in 2009 after relisting (Wydeven *et al.* 2010, p. 15). Thus in 2009, 10 wolves, or 2 percent of the winter wolf population, were removed in control activities.

The Wisconsin wolf population in winter 2010 grew to 690 wolves, an increase of 8 percent from the wolf population in 2009 (Wydeven *et al.* 2010, pp. 12–13). 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). This provides strong evidence that this form and magnitude of depredation control will not adversely impact the viability of the Wisconsin 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 will not impact most of the Wisconsin wolf population (WI DNR 2006a, p. 30).

Control actions in Wisconsin also resulted in removal of wolf-dog hybrids from the wild that had begun associating with packs. Wolf-dog hybrid removal in depredation control activity by USDA–WS included 3 in 2005, 1 in 2007, 2 in 2008, and 1 in 2010 (WI DNR files).

One substantive change to lethal control that will result from the proposed Federal delisting is the ability of a small number of private landowners, whose farms have a history of recurring wolf depredation, to obtain DNR permits to kill depredating wolves (WI DNR 2006a, p. 23; WI DNR 2008, p. 8). During the time wolves were Federally delisted from March 12, 2007 through September 29, 2008, the 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. During that same time period, under Wisconsin depredation management guidelines, landowners were allowed to shoot wolves in the act of attacks on domestic animals on private land without a permit; under that authority, landowners killed a total of five wolves. The death of these seven additional wolves—only one percent of the State's wolves in 2008—did not affect the viability of the population. Another substantive change after the proposed delisting may be potential proactive trapping or "intensive control" of wolves in limited areas as described above. We are confident that the number of wolves killed by these actions will not impact the long-term viability of the Wisconsin wolf population, because generally less than 15 percent of packs cause depredations that would 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 will 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 would be applied on wolves depredating pet dogs attacked near homes and wolves attacking livestock, which in 2010 included 25 packs attacking livestock (23 packs that were also documented in the previous winter surveys), 8 packs attacking dogs at homes, and 5 packs attacking both livestock and dogs. Thus control would have been applied to 31 packs (17 percent of State packs) previously detected and 2 new packs. Because of these state-imposed limitations, we believe 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, Wisconsin regulations for deer farm fencing have been strengthened, and it is unlikely that more than an occasional wolf will need to be killed to end wolf depredations inside deer farms in the foreseeable future. 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 establishing in more marginal habitat with high acreage of pasture land are more likely to become depredators (Treves *et al.* 2004, p. 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 would 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 no impact on wolf population viability in Wisconsin because of the much larger wolf populations in Zones 1 and 2.

For the foreseeable future, the wolf population in Zones 1 and 2 will continue to greatly exceed the recovery goal in the Recovery Plan for the Eastern Timber Wolf of 200 late-winter wolves for an isolated population and 100 wolves for a subpopulation 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.

The possibility of a public harvest of wolves is acknowledged in the Wisconsin Wolf Management Plan and in plan updates (WI DNR 1999, Appendix D; 2006c, p. 23). However, the question of whether a public harvest will be initiated and the details of such a harvest are far from resolved. Public attitudes toward a wolf population in excess of 350 would have to be fully evaluated, as would the impacts from other mortalities, before a public harvest could be initiated.

The Wisconsin Conservation Congress, a group that advises the WI DNR on issues of fishing and hunting regulations, held hearings in 2008 (while wolves were Federally delisted in the WGL) to gather information on the public's attitudes toward a public harvest of wolves in the State. Of the people attending those meetings, 86 percent recommended that efforts begin to develop public harvest regulations for wolves in the State, indicating a strong interest among hunters and anglers to begin such development. Establishing a public harvest, however, would be preceded by extensive public input, including public hearings, and would require legislative authorization and approval by the Wisconsin Natural Resources Board. Because of the steps that must precede a public harvest of wolves and the uncertainty regarding the possibility of, and the details of, any such program, we consider public harvest of Wisconsin wolves to be highly speculative at this time. The Service will closely monitor any steps taken by States and Tribes within the proposed WGL DPS to establish any public harvest of wolves during our post-delisting monitoring program.

Future updates for the Wisconsin wolf management and conservation plan will likely contain more specific language on any potential public harvest for the State. The WI DNR is committed to maintaining a wolf population at 350 wolves outside of Indian reservations, which translates to a statewide population of 361 to 385 wolves in late winter. No harvest would be considered if the wolf population fell below this goal (WI DNR 1999, pp. 15, 16). Any harvest would consist of limited permits

on limited portions of the wolf range to reduce wolf-human conflict, and extensive areas in wolf range would be closed to harvest of wolves (WI DNR 1999, p. 21). 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 future 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 believe that any public harvest plan would continue to maintain the State wolf population well above the recovery goal of 200 wolves in late winter.

The Michigan Wolf Management Plan

In 1997, the Michigan DNR finalized the Michigan Gray Wolf Recovery and Management Plan (MI DNR 1997). That plan was developed when the number of wolves in the State was relatively small, and focused on recovery. In 2001, the MI DNR began reevaluating the 1997 Plan and appointed a committee to evaluate wolf recovery and management in the State. As a result of that evaluation, MI DNR concluded that the 1997 Plan needed revising, which prompted a more formal review, including extensive stakeholder input. Recognizing that wolf recovery had been achieved in Michigan, additional scientific knowledge had been gained, and new social issues had arisen since the 1997 Plan was drafted, the focus of the revised plan shifted from a recovery plan to a wolf management plan. To assist in this endeavor, the DNR convened a Michigan Wolf Management Roundtable, composed of a diverse group of citizens spanning the spectrum of those interested in, and impacted by, wolf recovery and management in Michigan, including Tribal entities and organizations focused on agriculture, hunting and trapping, the environment, animal protection, law enforcement and public safety, and tourism.

The Roundtable was asked to review the 1997 wolf management goal, to set priorities for management issues, and to recommend strategic goals or policies the DNR should use in addressing the management issues. The Roundtable provided "guiding principles" for managing wolves and wolf-related issues following Federal delisting (Michigan Wolf Management Roundtable 2006, pp. 6–7). Those guiding principles strongly influenced the 2008 Michigan Wolf Management Plan (MI Plan) (MI DNR 2008a).

The 2008 MI Plan describes the wolf recovery goals and management actions needed to maintain a viable wolf population in the UP of Michigan, while facilitating wolf-related benefits and minimizing conflicts. The four principal goals are to "1) maintain a viable Michigan wolf population above a level that would warrant its classification as threatened or endangered; 2) facilitate wolf-related benefits; 3) minimize wolf-related conflicts; and 4) conduct science-based wolf management with socially acceptable methods" (MI DNR 2008a, p. 22). The Michigan Plan details wolf management actions, including public education and outreach activities, annual wolf population and health monitoring, research, depredation control, ensuring adequate legal protection for wolves, and prey and habitat management. It does not address the potential need for wolf recovery or management in the Lower Peninsula, nor wolf management within Isle Royale National Park (where the wolf population is fully protected by the National Park Service).

As with the WI 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 UP. This number is consistent with the Federal Recovery Plan for the Eastern Timber Wolf's definition of a viable, isolated wolf population (USFWS 1992, p. 25). The MI 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 2008a, pp. 22–23). We strongly support this approach, as it provides assurance that a viable wolf population will remain in the UP regardless of the future fate of wolves in Wisconsin or Ontario.

The 2008 Michigan Plan identifies wolf population monitoring as a priority activity, and specifically states that the WI DNR will monitor wolf abundance annually for at least 5 years post-delisting (MI DNR 2008a, pp. 31–32). This includes monitoring to assess wolf presence in the northern Lower Peninsula. As discussed previously, the size of the wolf population in Michigan is determined by extensive radio and snow tracking surveys. Recently the MI DNR also conducted a field evaluation of a less expensive "Minnesota-type" wolf survey. However, similar to WI DNR's experience, the evaluation concluded that the method overestimated wolf numbers, and is not suitable for use on the State's wolf population as it currently is distributed (Beyer in litt. 2006b).

From 1989 through 2006, the WI DNR attempted to count wolves throughout the entire UP. As the wolf population increased, this method became more difficult. In the winter of 2006–07, 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 UP was stratified into three sampling areas, and within each stratum the DNR intensively surveys roughly 40 to 50 percent of the wolf habitat area annually. Computer simulations have shown that such a geographically stratified monitoring program will produce unbiased and precise estimates of the total wolf population which can be statistically compared to estimates derived from the previous method to detect significant changes in the UP wolf population (Beyer in litt 2006b, 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. 2005b). 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 will again consider more active management similar to that conducted prior to 2004.

The 2008 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 2008a, pp. 36–41).

The Plan does not determine whether a public harvest will be used as a management strategy in Michigan, but it discusses developing a "socially and biologically responsible policy regarding public harvest" (MI DNR 2008a, p. 65). Instituting public harvest during a regulated season would first require that the wolf be classified as a "game animal" in the State. Game-animal status in Michigan may be designated only by the State Legislature and, additionally, only the State Legislature could authorize the first harvest season. If such designation and authorization were conferred, the Michigan Natural Resources Commission would then need to enact regulations pertaining to the methods of a public harvest.

To minimize illegal take, the 2008 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 threatened, endangered, game, or protected animal, all of which prohibit killing (or harming) the species except under a permit, license, or specific conditions. As discussed above, designating a species as a "game animal" would require action by the State Legislature. Michigan reclassified wolves from endangered to threatened in June 2002, and in April 2009, removed gray wolves from the State's Threatened and Endangered species list and amended the Wildlife Conservation Order to grant "protected animal" status to the gray wolf in the State (Roell 2009, pers. comm.). A person who commits a violation regarding the possession or taking of most wildlife species with the four legal designations (threatened, endangered, game, or protected animal) in Michigan is guilty of a misdemeanor punishable by imprisonment for not more than 90 days, or a fine of not less than $100 or more than $1,000, or both. Penalties may also include costs of prosecution, loss of hunting privileges, and reimbursing the value of the animal ($1,500 for a threatened or endangered species, $100 to $500 for most game species, and $100 for protected animals) (MI DNR 2008a, p. 35).

The 2008 Plan emphasizes the need for public education efforts that focus on living with a recovered wolf population and ways to manage wolves and wolf-human interaction (both positive and negative). The Plan recommends continuing reimbursement for depredation losses, citizen stakeholder involvement in the wolf management program, continuing important research efforts, and minimizing the impacts of captive wolves and wolf-dog hybrids on the wild wolf population (MI DNR 2008a, pp. 31, 59, 61, and 66).

The 2008 Michigan Plan calls for establishing a wolf management advisory group that would 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 2008a, p. 66). The plan also addresses currently available and potential new sources of funding to offset costs associated with wolf management.

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 revised 2008 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 2008a, p. 22).

Depredation Control in Michigan—Data from Michigan show a general increase in confirmed events of wolf depredations on livestock (Table 2). These livestock depredations occurred at 59 different UP farms (approximately 7 percent of the existing farms); 16 (27 percent) of those 59 farms have experienced more than one depredation event. Over 80 percent of the depredation events were on cattle, with the rest on sheep, poultry, rabbits, and captive cervids (Roell *et al.* 2009, pp. 9, 11). In 2010, 26 (57 percent) of the depredation events occurred on a single farm. The relationship between the number of wolves and the number of depredation events suggests that for every 100 additional wolves in the population there will be about 3 additional livestock depredation events per year (Roell *et al.* 2010, p. 6).

TABLE 2—NUMBER OF VERIFIED LIVESTOCK DEPREDATION EVENTS BY WOLVES IN MICHIGAN BY YEAR

Year	Number of animals killed
1998	3
1999	1
2000	5
2001	3
2002	5
2003	13
2004	11
2005	5
2006	10
2007	14
2008	14
2009	12
2010	46

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. 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 between 1996 and 2010 was 34; 12 additional dogs were injured in wolf attacks during that same period. Of the 34 wolf-related dog deaths during that time, 50 percent involved hounds used to hunt bears (Roell 2010, pers. comm.). Similar to Wisconsin, MI DNR has guidelines for its depredation control program, stating that lethal control will not be used when wolves kill dogs that are free-roaming, hunting, or training on public lands. Lethal control of wolves, however, would be considered if wolves have killed confined pets and remain in the area where more pets are being held (MI DNR 2005a, p. 6). However, in 2008, the Michigan Legislature passed a law that would 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 is no evidence of resulting adverse impacts to the maintenance of a viable wolf population in the UP. A total of 41 wolves were killed by the MI DNR and USDA –Wildlife Services 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 threatened and endangered species (Roell *et al.* 2010, p. 8). Four, five, two, seven, fourteen, eight, and one wolves, respectively,

were euthanized in 2003, 2004, 2005, 2006, 2007, 2008, and 2009 (2 months) (Beyer *et al.* 2006, p. 88; Roell in litt. 2006, p. 1; Roell *et al.* 2010, p. 19; Roell 2010, pers. comm.). This represents 1.2 percent, 1.7 percent, 0.5 percent, 1.6 percent, 2.7 percent, 2.5 percent, and 0.2 percent, respectively, of the UP's late-winter population of wolves during the previous winter. Following this level of lethal depredation control, the UP wolf population increased 12 percent from 2003 to 2004, 13 percent from 2004 to 2005, 7 percent from 2005 to 2006, 17 percent from 2006 to 2007, 2 percent from 2007 to 2008, and 11 percent from 2008 to 2009, demonstrating that the wolf population continues to increase at a healthy rate (Huntzinger *et al.* 2005, p. 6; MI DNR 2006a, Roell *et al.* 2009, p. 4). Lethal control of wolves during livestock depredation was not available in 2010.

Post-delisting Depredation Control in Michigan—Following the proposed Federal delisting, wolf depredation control in Michigan would be carried out according to the 2008 Michigan Wolf Recovery and Management Plan (MI DNR 2008) 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 2005a). Verification of wolf depredation incidents will be conducted by MI DNR or USDA–APHIS—Wildlife Services personnel (working under a cooperative agreement with MI DNR 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 2005a, Append. B, pp. 9–10). 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 UP 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 2008a, 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, noise-making devices) are judged to be inadequate. As wolf numbers continue to increase on the UP, the number of verified depredations will also increase, and will probably do so at a rate that exceeds the rate of wolf population increase. This will occur as wolves increasingly disperse into and occupy areas of the UP with more livestock and more human residences, leading to additional exposure to domestic animals. In a previous application for a lethal take permit under section 10(a)(1)(A) of the Act, MI DNR requested authority to euthanize up to 10 percent of the late-winter wolf population annually (MI DNR 2005b, p. 1). However, based on 2003–05 and 2007–09 depredation data, it is likely that significantly less than 10 percent lethal control will be needed over the next several years.

The MI 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 MI 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 impacting 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 MI Plan and the stated goal for maintaining wolf populations at or above recovery goals, the Service believes any wolf management changes implemented following the proposed delisting would 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 2008a, p. 9).

Similar to Wisconsin, Michigan livestock owners are compensated when they lose livestock as a result of a confirmed wolf depredation. Currently there are two complementary compensation programs in Michigan, one funded by the MI DNR and implemented by Michigan Department of Agriculture (MI DA) and another set up through donations (from Defenders of Wildlife and private citizens) and administered by the International Wolf Center (IWC), a nonprofit organization. From the inception of the program to 2000, MI DA has paid 90 percent of full market value of depredated livestock at the time of loss. The IWC account was used to pay the remaining 10 percent from 2000 to 2002 when MI DA began paying 100 percent of the full market value of depredated livestock. The IWC account continues to be used to pay the difference between value at time of loss and the full fall market value for depredated young-of-the-year livestock, and together the two funds have provided nearly $38,000 in livestock loss compensation through 2008 (Roell *et al.,* p. 15). Neither of these programs provides compensation for pets or for veterinary costs to treat wolf-inflicted livestock injuries. The MI DNR plans to continue cooperating with MI DA and other organizations to maintain the wolf depredation compensation program (MI DNR 2008a, pp. 59–60).

In 2009, Michigan passed two House Bills that would become effective after Federal delisting. Those bills authorized 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. We are confident that the limited number of wolves expected to be taken under these Bills would not affect the viability of the Michigan wolf population.

Regulatory Mechanisms in Other States and Tribal Areas Within the Proposed WGL DPS

North Dakota and South Dakota

North Dakota lacks a State endangered species law or regulation. Any wolves in the State currently are classified as furbearers, with a closed season. North

Dakota Game and Fish Department is unlikely to change the species' State classification immediately following the proposed Federal delisting. Wolves are included in the State's Wildlife Action Plan as a "Level 3" Species of Conservation Priority. Level 3 species are those "having a moderate level of conservation priority, but are believed to be peripheral or do not breed in North Dakota." Placement on this list gives species greater access to conservation funding, but does not afford any additional regulatory or legislative protection (Bicknell in litt. 2009).

Currently any wolves that may be in South Dakota are not State listed as threatened or endangered, nor is there a hunting or trapping season for them. Upon the effective date of any Federal delisting, gray wolves in eastern South Dakota will fall under general protections afforded all State wildlife. These protections require specific provisions—seasons and regulations—be established prior to initiating any form of legal take. Thus, the State could choose to implement a hunting or trapping season for wolves east of the Missouri River; however, absent some definitive action to establish a season, wolves would remain protected. Following the proposed Federal delisting, any verified depredating wolves east of the Missouri will likely be trapped and killed by the USDA–APHIS–Wildlife Services program (Larson in litt. 2005). Non-depredating wolves in North and South Dakota not on the Federal list will continue to receive protection by the States' wildlife protection statutes unless specific action is taken to open a hunting or trapping season or otherwise remove existing protections.

Post-delisting Depredation Control in North and South Dakota—Since 1993, five incidents of verified wolf depredation have occurred in North Dakota, with one in September 2003 and two more in December 2005. There have been no verified wolf depredations in South Dakota in recent decades. Following the proposed Federal delisting we assume that lethal control of a small number of depredating wolves will occur in one or both of these States. Lethal control of depredating wolves may have adverse impacts on the ability of wolves to occupy any small areas of suitable or marginally suitable habitat that may exist in the States. However, lethal control of depredating wolves in these two States will have no adverse effects on the long-term viability of wolf populations in the proposed WGL DPS as a whole, because the existence of a wolf or a wolf population in the Dakotas will not make a meaningful contribution to the maintenance of the current viable, self-sustaining, and representative metapopulation of wolves in the proposed WGL DPS.

Other States in the Western Great Lakes DPS

The proposed DPS includes the portion of Iowa that is north of Interstate Highway 80, which is approximately 60 percent of the State. The Iowa Natural Resource Commission currently lists wolves as furbearers, with a closed season (Howell in litt. 2005). If the State retains this listing following the proposed Federal delisting of the DPS, wolves dispersing into northern Iowa will be protected by State law.

The portion of Illinois that is north of Interstate Highway 80, less than one-fifth of the State, is included in the DPS, and is part of the geographic area where wolves are proposed for removal from Federal protection. Gray wolves are currently protected in Illinois as a threatened species under the Illinois Endangered Species Protection Act (520 ILCS 10). Thus, following the proposed Federal delisting, wolves dispersing into northern Illinois would continue to be protected from human take by State law.

The extreme northern portions of Indiana and northwestern Ohio are included within the proposed DPS. If this proposal is made final, any wolves that are found in this area would no longer be Federally protected under the Act. The State of Ohio classifies the gray wolf as "extirpated," and there are no plans to reintroduce or recover the species in the State. The species lacks State protection, but State action is likely to apply some form of protection if wolves begin to disperse into the State (Caldwell in litt. 2005). Indiana DNR lists the gray wolf as extirpated in the State, and the species would receive no State protection under this classification following any Federal delisting. The only means to provide State protection would be to list them as State-endangered, but that is not likely to occur unless wolves become resident in Indiana (Johnson in litt. 2005, in litt. 2006). Thus, if this proposal is made final, Federally delisted wolves that might disperse into Indiana and Ohio would lack State protection there, unless these two States take specific action to provide new protections.

Because the portions of Iowa, Illinois, Indiana, and Ohio within the proposed WGL DPS do not contain suitable habitat or currently established packs, depredation control in these States would not have any significant impact on the continued viability of wolf populations in the proposed WGL DPS.

Tribal Management and Protection of Wolves

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 core recovery areas of the proposed WGL DPS. The wolf retains great cultural significance and traditional value to many Tribes and their members (additional discussion is found in Factor E), 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. Traditional natural resource harvest practices, however, often include only a minimum amount of regulation by the Tribal governments (Hunt in litt. 1998).

Although not all Tribes with wolves that visit or reside on their reservations have completed management plans specific to the wolf, several Tribes have informed us that they have no plans or intentions to allow commercial or recreational hunting or trapping of the species on their lands after the proposed Federal delisting. The Red Lake Band of Chippewa Indians (Minnesota) and the Little Traverse Bay Band of Odawa Indians (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 reservation lands.

As a result of many past contacts with, and previous written comments from, the Midwestern Tribes and their inter-Tribal natural resource management agencies—the Great Lakes Indian Fish and Wildlife Commission (GLIFWC), 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 that viable wolf populations remain 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, this would be carried out in a manner that would not impact 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. Agricultural 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 Reservation currently has seven or eight packs with an estimated 40–48 wolves within its boundaries (Red Lake Band of Chippewa Indians 2010, p. 12).

In 2009, the Little Traverse Bay Bands of Odawa Indians (LTBB) finalized a management plan for the 1855 Reservation and portions of the 1936 ceded territory in the northern LP 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 LP should a population become established by (1) prescribing scientifically sound biological wolf management, research, and monitoring strategies; (2) addressing wolf-related conflicts; (3) facilitating wolf-related benefits; and (4) developing and implementing wolf-related education and public information.

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 Council is revising the Reservation Conservation Code to allow Tribal members to harvest some wolves after Federal delisting (Googgleye, Jr. in litt. 2004). The Tribe is currently developing a wolf management plan (Mortensen 2011, pers. comm.). In 2005, the Leech Lake Reservation was home to an estimated 75 wolves, the largest population of wolves on a Native American reservation in the 48 conterminous States (Mortensen 2006, pers. comm.; White in litt. 2003). Although no recent surveys have been conducted, the number of wolves on the reservation likely remains the same (Mortensen 2009, pers. comm.).

The Fond du Lac Band (Minnesota) 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 this prohibition is rescinded, the Band's Resource Management Division will 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 Red Cliff Band (Wisconsin) has strongly opposed State and Federal delisting of the gray wolf. Current Tribal law protects wolves from harvest, although harvest for ceremonial purposes would likely be permitted after Federal delisting (Symbal in litt. 2003).

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. They are currently working on developing a Menominee Wolf Management Plan (Cox 2011, pers. comm.).

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. 2006a). When that pair produced pups in 2006, but the adult female was killed, Reservation biologists and staff worked diligently with the WI DNR and the Wildlife Science Center (Forest Lake, Minnesota) to raise the pups in captivity 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), and were subsequently transferred to the International Wolf Center in Ely, Minnesota, where they remain in captivity.

The Menominee Tribe continues to support wolf conservation and monitoring activity in Wisconsin. In recent years the Menominee Tribe has assisted the WI DNR in radio-telemetry wolf flights, allowing more regular flights to occur across all of northern 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 (Mike Donofrio 1998, pers. comm.). Furthermore, the Keweenaw Bay Community plans to develop a management plan that will address wolves (Donofrio in litt. 2003; Warner 20010, pers. comm.). At least three other Tribes (Stock-bridge Munsee Community, Lac Courte Oreilles Band of Ojibwe, the Mille Lacs Band of Ojibwe, and Grand Portage Band of Lake Superior Chippewa) have indicated that they are currently developing Tribal wolf management plans.

Several Midwestern Tribes (for example, the Bad River Band of Lake Superior Chippewa Indians and the LTBB) have expressed concern that Federal delisting will 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 (Kiogama and Chingwa in litt. 2000). The Tribe's 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. If this and similar agreements are implemented, they will provide additional protection to certain wolf packs in the western Great Lakes area.

The GLIFWC 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 GLIFWC 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). The 1854 Authority is currently developing a wolf management plan for the 1854 Ceded Territory, based on the above principles (Edwards 2011, pers. comm.).

While there are few written Tribal protections currently in place for wolves, the highly protective and reverential attitudes that have been expressed by Tribal authorities and members have assured us that any post-delisting harvest of reservation wolves would be very limited and would not adversely impact the delisted wolf populations. Furthermore, any off-reservation harvest of wolves by Tribal members in the ceded territories would be limited to a portion of the harvestable surplus at some future time. Such a harvestable surplus would be determined and monitored jointly by State and Tribal biologists, and would 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 impact the viability of the wolf population, either locally or across the proposed WGL DPS.

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. If we ultimately determine that delisting the WGL DPS is supported by the best available science, the Department, the Service, the Bureau of Indian Affairs (BIA), 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 is available to assist in the exercise of any such rights. If biological assistance is needed, the Service may provide it via our field offices. Upon delisting, the Service would remain involved in the post-delisting monitoring of the wolves in the WGL, but all Service management and protection authority under the Act would end. Legal assistance would be provided to the Tribes by the Department of the Interior, and the BIA will be involved, when needed. If this proposal is finalized, we strongly encourage the States and Tribes to work cooperatively toward post-delisting wolf management.

Consistent with our responsibilities to Tribes and our goal to have the most comprehensive data available for our post-delisting monitoring, if the proposal to delist the WGL DPS is made final, we will annually contact Tribes and their designated intertribal natural resource agencies within the DPS 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 within the WGL DPS 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. We encourage the States and Tribes within the WGL DPS to work together on management and monitoring issues post-delisting.

Federal Lands

The five national forests with resident wolves (Superior, Chippewa, Chequamegon-Nicolet, Hiawatha, and Ottawa National Forests) in Minnesota, Wisconsin, and Michigan are all operating in conformance with standards and guidelines in their management plans that follow the 1992 Recovery Plan for the Eastern Timber Wolf's recommendations for the eastern timber wolf (USDA 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). Delisting is not expected to lead to an immediate change in these standards and guidelines; in fact, the Regional Forester for U.S. Forest Service Region 9 is expected to maintain the classification of the wolf as a Regional Forester Sensitive Species for at least 5 years after Federal delisting (Moore in litt. 2003). Under these standards and guidelines, a relatively high prey base will be maintained, and road densities will 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 would likely 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 neither likely to be a frequent occurrence, nor constitute a significant mortality factor, for the wolves in the proposed WGL DPS. 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 would likely include hunting and trapping within the national forests (Lindquist in litt. 2005; Williamson in litt. 2005; Piehler in litt. 2005; Evans in litt. 2005). The continuation of current national forest management practices will be important in ensuring the long-term viability of wolf populations in Minnesota, Wisconsin, and Michigan.

Wolves regularly use four units of the National Park System in the proposed WGL DPS and may occasionally use three or four other 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. National Park Service 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 the proposed 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. Sport 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, which seems unlikely due to the current absence of agricultural activities adjacent to the park, the park would work with the State to conduct control activities where necessary (West in litt. 2004).

The wolf population in Isle Royale National Park is described above (see Michigan Recovery). The NPS has indicated that it will continue to closely monitor and study these wolves. This wolf population is very small and isolated from the other wolf populations in the proposed WGL DPS; as described above, it is not considered to be significant to the recovery or long-term viability of the wolf (USFWS 1992, p. 28).

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 would 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. Approximately 54–58 wolves from 11 packs used the Riverway on the Wisconsin side in 2010 (Wydeven 2011, pers. comm.). 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 Lake Shore, with a major deer yard area 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. It is not known if wolves periodically swim to this and other islands, or if they only travel to islands on ice in winter.

Wolves occurring on NWRs in the proposed WGL DPS will be monitored, and refuge habitat management will maintain the current prey base for them for a minimum of 5 years after delisting. Trapping or hunting by government trappers for depredation control will not be authorized on NWRs. Because of the relatively small size of these NWRs, however, most or all of these packs and individual wolves also spend significant amounts of time off these NWRs.

Wolves also occupy the Fort McCoy military installation in Wisconsin. In 2003, one pack containing five adult wolves occupied a territory that included the majority of the installation; in 2004 and 2006, the installation had one pack with two adults; in 2005 there was a single pack with four wolves. In 2008–09, there were seven wolves using the installation (Wilder 2009, pers. comm.). In 2010 a pack of three wolves occurred in the northern portions of the Fort, and a pack of two occurred on the south side (Wydeven *et al.* 2010, p. 42). Management and protection of wolves on the installation would not change significantly after Federal or State delisting. Den and rendezvous sites would continue to be protected, hunting seasons for other species (coyote) would be closed during the gun-deer season, and current surveys would 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.* 2005a, p. 25; 2006a, p. 25).

Minnesota National Guard's (MNG) Camp Ripley contains parts of two pack territories, which typically include 10 to 20 wolves. MNG 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 may 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 would further ensure the conservation of wolves in the three States after delisting. In addition, wolves that disperse to other units of the National Refuge System or the National Park System within the proposed WGL DPS will also receive the protection afforded by these Federal agencies.

Summary of Factor D

In summary, if this proposed delisting of the WGL DPS of gray wolves is made final, there would be varying State and Tribal classifications and protections provided to wolves. The wolf management plans currently in place for Minnesota, Wisconsin, and Michigan

will be more than sufficient to retain viable wolf populations in each State that are above the Federal recovery criteria for wolf metapopulation subunits, and even for three completely isolated wolf populations. These State plans provide a very high level of assurance that wolf populations in these three States will not decline to nonviable levels in the foreseeable future. Furthermore, the 2006 Update to the Wisconsin Wolf Management Plan (WI DNR 2006a, p. 3–4) demonstrates the State's commitment by retaining the previous management goal of 350 wolves, and it did not weaken any significant component of the original 1999 Plan. Similarly, the 2008 revised Michigan wolf plan continues to maintain the State's commitments to maintain viable wolf populations after Federal delisting. While these State plans recognize there may be a need to control or even reduce wolf populations at some future time, none of the plans include a public harvest of wolves, and all would maintain sufficient numbers of wolves to ensure their continued survival.

If Federally delisted, wolves in Minnesota, Wisconsin, and Michigan would continue to receive protection from general human persecution by State laws and regulations. Michigan met the criteria established in their management plan for State delisting and in April 2009 removed gray wolves from the State's threatened and endangered species list and amended the Wildlife Conservation Order to grant "protected animal" status to the gray wolf in the State (Roell 2009, pers. comm.). That status "prohibit[s] take, establish[es] penalties and restitution for violations of the Order, and detail[s] conditions under which lethal depredation control measures could be implemented" (Humphries in litt. 2004).

Since 2004 wolves have been listed as a "protected wild animal" by the WI DNR, allowing no lethal take unless special authorization is requested from the WI DNR (Wydeven *et al.* 2009c). Following the proposed Federal delisting, Wisconsin will fully implement that "protected wild animal" status for the species, including protections that provide for fines of $1,000 to $2,000 for unlawful hunting.

Minnesota DNR will consider population management measures, including public hunting and trapping, but this will not occur sooner than 5 years after Federal delisting, and MN DNR will maintain a wolf population of at least 1,600 animals (MN DNR 2001, p. 2). In the meantime, wolves may be taken legally in Zone A only when they pose an immediate threat to pets, domestic animals, or livestock or to protect human safety (MN DNR 2001, pp. 3–4). Since the wolf management plan was completed in 2001, MN DNR has fully staffed its conservation officer corps in the State's wolf range (Stark 2009a, pers. comm.).

Except for the very small portions of Indiana and Ohio, if delisted, wolves in the proposed WGL DPS are likely to remain protected by various State designations for the immediate future. States within the boundaries of the DPS either currently have mechanisms in place to kill depredating wolves (North Dakota and South Dakota) or can be expected to develop mechanisms following the proposed Federal delisting of the DPS, in order to deal with wolf-livestock conflicts in areas where wolf protection would no longer be required by the Act. Because these States (Illinois, Indiana, Iowa, Ohio, North Dakota, and South Dakota) constitute only about one-third of the land area within the DPS, and contain virtually no suitable habitat of sufficient size to host viable wolf populations, it is clear that even complete protection for wolves in these areas would neither provide significant benefits to wolf recovery in the DPS, nor to the long-term viability of the recovered populations that currently reside in the DPS. Therefore, although current and potential future regulatory mechanisms may allow the killing of wolves in these six States, these threats, and the area in which they will be, will not impact the recovered wolf populations in the DPS now or in the foreseeable future.

Finally, based on our review of the completed Tribal management plans and communications with Tribes and Tribal organizations, Federally delisted wolves are very likely to be adequately protected on Tribal lands. Furthermore, the numerical recovery criteria (and for Minnesota, the numerical planning goal) in the Recovery Plan would be achieved and 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 in Minnesota, Wisconsin, and Michigan, we expect National Forests, units of the National Park System, military bases, and National Wildlife Refuges will provide protections to wolves in the areas they manage if delisted that will match, and in some cases will exceed, the protections provided by State wolf management plans and State protective regulations.

Therefore, we conclude that the regulatory mechanisms that will be in place subsequent to Federal delisting are adequate to control threats to wolves in the proposed WGL DPS such that wolves in the proposed WGL DPS are not likely to become endangered in the foreseeable future in all or a significant portion of the range.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Taking of Wolves by Native Americans for Certain Purposes

As noted elsewhere in this proposed rule, the wolf has great significance to many Native Americans in the western Great Lakes area, especially to Wolf Clan members, and has a central role in their creation stories. The wolf, Ma"ingan, is viewed as a brother to the Anishinaabe people, and their fates are believed to be closely linked. Ma"ingan is a key element in many of their beliefs, traditions, and ceremonies, and wolf pack systems are used as a model for Anishinaabe families and communities. We are not aware of any takings of wolves in the Midwest for use in these traditions or ceremonies while the wolf has been listed as a threatened or endangered species. While wolves have been listed as threatened in Minnesota, we have instructed Wildlife Services to provide, upon request, wolf pelts and other parts from wolves killed during depredation control actions to Tribes in order to partially serve these traditional needs.

Some Tribal representatives, as well as the GLIFWC, have indicated that if wolves are delisted, there is likely to be interest in the taking of small numbers of wolves for traditional ceremonies (King in litt. 2003; White in litt. 2003). This take could occur on reservation lands where it could be closely regulated by a Tribe to ensure that it does not affect the viability of the reservation wolf population. Such takings might also occur on off-reservation treaty lands on which certain Tribes retained hunting, fishing, and gathering rights when the land was ceded to the Federal Government in the 19th Century. Native American taking of wolves from ceded lands would be limited to a specified portion of a harvestable surplus of wolves that is established in coordination with the Tribes, consistent with past Federal court rulings on treaty rights. Such taking would not occur until such time as a harvestable surplus has been documented based on biological data, and regulations and monitoring have been established by the States and Tribes to ensure a harvest can be carried out in a manner that ensures the continued viability of the wolf

population in that State. Previous court rulings have ensured that Native American treaty harvest of fish or wildlife species have not risked endangering the resource.

If requested by the Tribes, multitribal natural resource agencies, or the States, the Service or other appropriate Federal agencies will work with these parties to help determine if a harvestable surplus exists, and if so, to assist in devising reasonable and appropriate methods and levels of harvest for delisted wolves for traditional cultural purposes.

We conclude that the small number of wolves that may be taken by Native Americans would not be a threat sufficient to cause the wolves in the proposed WGL DPS to be in danger of extinction in the foreseeable future.

Public Attitudes Toward the Wolf

Human behavior has had a tremendous effect on wolf populations around the world. Theory and social science research have identified attitudes, and the beliefs on which they are based, as important drivers of behavior. Therefore, understanding public attitudes toward wolves is a key component of wolf management. The success of the United States wolf-eradication programs of the late-nineteenth and early twentieth centuries are often accepted as evidence of negative public attitudes that were based on perceptions and beliefs brought by European settlers that portrayed the wolf as an evil, menacing threat (Browne-Nunez and Taylor 2002, p. 1; Fogleman 1988; Kellert 1986; Schanning 2009, pp. 252–253) and were perpetuated by exaggerated accounts of marauding wolves preying on livestock (Schanning 2009, p. 253).

As the wolf arrived on the brink of extinction, there was a shift in management and a parallel shift in attitudes (Kellert *et al.* 1996; Schanning 2009, pp. 253–254; Williams *et al.* 2002, p. 581). In the Great Lakes region, bounty systems were repealed (Wisconsin in 1957, Michigan in 1960, and Minnesota in 1965) and, in 1972, the first of many attitudinal studies regarding wolves was carried out in Minnesota (Johnson 1974). In the last three decades, investigations of attitudes toward wolves and wolf management have burgeoned.

Minnesota

The first empirical examination of attitudes toward wolves was conducted using a convenience sample of 1,692 attendees of the Minnesota State Fair (Johnson 1974). It was based on the premise that children's stories, which typically cast the wolf as a villainous creature, shape attitudes from an early age. Although it found children to be more negative toward the wolf, a vast majority of adults held positive beliefs and attitudes. Most respondents felt that wolves were not a danger to humans, should not be exterminated, had value for Minnesota, and are good for the deer and moose populations.

Llewellyn (1978) reported the results of a content analysis of 1,083 public comment letters received by the Service regarding the proposed reclassification of the timber wolf in Minnesota from endangered to threatened. Of the 700 letters from Minnesota residents (the other letters were from out-of-state), 23 percent favored retention of endangered status, 7 percent supported reclassification, and 70 percent were in favor of delisting and return to State management. Of note were differences between urban and rural residents, with a large majority (78 percent) of urban residents and a minority (16 percent) of rural residents in favor of continued Federal protection of wolves. Support for delisting was largely based on concern for livestock and fear of wolves.

Kellert (1986) conducted a statewide phone survey of Minnesota residents' knowledge, attitudes, and behaviors toward the wolves. The study sample comprised the general public (Minneapolis-St. Paul residents and mostly rural, northern county residents), deer hunters, trappers, and livestock producers. Most respondents held favorable attitudes toward wolves (except farmers), supported protection of wolves and their habitat as long it did not interfere with human needs, and supported control of problem wolves. Urban residents expressed more protectionist attitudes, while rural residents' attitudes were more utilitarian in nature. There was "somewhat-limited" factual knowledge among the general public, but a higher knowledge level among trappers and, to a lesser degree, hunters and individuals with a higher income. Fear of wolves was expressed by some respondents, although most did not feel that wolves are a threat to people. Rather large percentages of farmers (12 percent) and trappers (17 percent) reported capturing or killing a wolf, and a majority of farmer, hunter, trapper, and northern county respondents reported knowing someone who captured or killed a wolf. Additionally, almost one-third of farmers, hunters, and trappers and a quarter of northern county respondents indicated that, given the opportunity, they might shoot a wolf while deer hunting.

In 1999, a second statewide phone survey of Minnesota residents was conducted, similar to the 1985 study, using a stratified random sample of northern residents, southern residents, farmers, hunters, and trappers (Kellert 1999). During this study period, Minnesota wolves were being considered for Federal delisting. Compared to the 1985 survey, this study found an overall increase in positive perceptions of the wolf. The general public expressed more affection and ethical concern for wolves than did farmers, although there was not a significant difference between groups in level of dislike of wolves. Over 70 percent of respondents believed wolves symbolize the beauty in nature and a large portion of the sample perceived other values of wolves, including ecological, scientific, and moral. Suburban and urban residents, the college educated, and younger respondents were more likely to have positive attitudes. Farmers were more knowledgeable about the wolf and more likely to support delisting. Of note was a substantial increase in the number of northern Minnesota residents who reported either killing a wolf themselves or knowing someone who did.

Chavez *et al.* (2005) assessed attitudes of residents of northwestern Minnesota. The sample of 600 rural residents was stratified by location: inside wolf range and outside but adjacent to wolf range. The study did not find large differences between geographic groups or farmers and non-farmers, with all groups indicating slightly unfavorable attitudes toward wolves. The authors suggest this could be attributable to shared rural cultural values and utilitarian attitudes. They also consider the possible influence of immigrant roots in Europe where folklore and early conflicts with wolves fostered negative attitudes. Both geographic groups agreed that wolves cause unacceptable levels of damage to northwest Minnesota's livestock industry, although predators were perceived as less of an agricultural threat than other threats (*e.g.,* livestock diseases, crop pests).

Using a random sample of 909 respondents (18 percent response rate), Schanning (2005) reported "pragmatic/utilitarian" beliefs regarding wolves among Minnesota residents. Most respondents supported compensation to livestock owners and having problem wolves shot by the DNR. Counter to Kellert's earlier findings, there was a significant level of fear of wolves among Schanning's sample, including fear for personal safety (31 percent), the safety of children (64 percent), and pets (70 percent).

Michigan

In Michigan, Hook and Robinson (1982, pp. 388–391) found that only a small percentage of respondents scored high on their anti-predator scale and most respondents were in favor of wolf restoration. Hunters were more positive toward predators than nonhunters. Fear of the wolf was the most important factor related to an anti-predator attitude, followed by negativistic attitudes toward all animals, and age, with older people holding more negative attitudes.

Kellert (1990) conducted a statewide mail survey of Michigan residents' knowledge, attitudes, and behaviors toward wolves. There were 639 respondents from the Upper (UP) and Lower (LP) peninsulas and members of three special interest groups: hunters, trappers, and livestock producers. Livestock producers were the most likely of the special interest groups to hold negative attitudes toward the wolf. LP residents were more likely than UP residents to express fear and dislike of wolves. A majority of respondents in each group, except livestock producers, supported restoration (64 percent of UP residents, 57 percent of LP residents, 76 percent of hunters, 66 percent of trappers, and 37 percent of livestock producers). Support was primarily motivated by the existence, ecological, and cultural values of the wolf.

A 2002 statewide survey of 557 Michigan residents' attitudes toward wolf recovery found that support for recovery by UP residents had declined since Kellert's 1990 study (Mertig 2004). At the time this study was conducted, the UP's wolf population had risen to about 250 animals (Hammill 2007), but in the LP, where wolves were not known to be present, there was increased support for wolf recovery in the UP. Other differences from Kellert's (1990) findings included increased support for wolf control and for hunting and trapping for pelts.

Based on a sample of 1,017 Michigan residents (20 percent response rate), Schanning (2004) found that a majority of respondents in his survey agreed with pro-wolf statements including "wolves are a part of our vanishing wilderness and should be protected" (51 percent). Similar to his 2005 study of Minnesota residents and his 2003 study of Wisconsin residents (reported below), Schanning found a substantial level of fear of wolves among the Michigan sample. Respondents reported fear for their personal safety (40 percent), the safety of children (70 percent), pets (7 percent), and livestock (66 percent).

Using a stratified random sample of respondents from five regions in Michigan, Beyer (2006) measured tolerance of wolves using a scale for social carrying capacity. The scale was based on Michigan wolves' perceived range, numbers, and the type and number of interactions with people. The study found that most people were at the most tolerant end of the scale, with smaller percentages classified as intolerant (7 percent) or least tolerant (20 percent).

Wisconsin

Knight (1985, reported in Schanning 2009, p. 257) surveyed hunter attitudes in two Wisconsin counties in wolf range where a minority (20 percent) of hunters reported negative attitudes toward wolves and most (69 percent) believed that wolves should not be eliminated.

In 1988, when there were only 20 wolves in Wisconsin, Nelson and Franson (1988) compared farmer' and non-farmers' attitudes toward wolves and wolf recovery in six Wisconsin counties. A series of agree-disagree belief statements was used to gauge attitudes toward wolves. Non-farmers were more positive than farmers, and a majority agreed that the wolf "symbolizes the beauty and wonder in nature" and "it would be wonderful to hear the wolf howl in the wild" (64 percent and 62 percent respectively). Almost half of farmers agreed with the same statements. Both groups disagreed that they would be afraid of an attack if they saw a wolf while walking in the woods. Farmers and non-farmers were divided about wolf restoration, with half of farmers and about one-third of non-famers opposed. Both groups favored trapping and removal of problem wolves.

Wilson (1999) examined knowledge, attitudes, and behaviors toward wolves in a 1997 survey of two random samples: all Wisconsin license plate owners and those who purchased an Endangered Resources (ER) license plate. Fifty percent of all license plate owners and almost 90 percent of ER license plate owners supported efforts to increase the State wolf population. There were slight differences between hunters (47 percent) and non-hunters (54 percent) who support wolf recovery.

Naughton *et al.* (2003) assessed tolerance of wolves among 535 rural Wisconsin residents using a mail-back questionnaire (82 percent response rate). They examined the influence of compensation for livestock losses to wolves and preferences for wolf management actions among different segments of the sample, including livestock producers, bear hunters, general residents, wolf damage complainants, recipients of compensation, and demographic segments. The strongest predictor of tolerance was social group. A large majority of bear hunters (73 percent) were in favor of reducing or eliminating the wolf population, compared to 45 percent of the livestock producers and 29 percent of general residents. Individuals who had lost a domestic animal to a predator were less tolerant of wolves than those who had not. Preferences for management actions depended on the conflict situation. Approval for lethal control was highest for depredation on livestock and pets. Bear hunters also were highly in favor of lethal control when hunting hounds are killed, but other groups did not muster a majority for this option. Compensation was not associated with higher tolerance when comparing recipients to nonrecipients among those who reported losing a domestic animal to wolves.

Similar to his studies in Minnesota and Michigan, Schanning (2003) surveyed 644 Wisconsin residents' (13 percent response rate) attitudes toward wolves. He found a majority of respondents held pro-wolf attitudes based on their agreement with three belief statements: "the wolf is a symbol of the beauty and wonder in nature," "wolves are part of our vanishing wilderness and should be protected," and "wolves are essential to maintaining the balance in nature" (72 percent, 56 percent, and 62 percent in agreement, respectively). There was substantial support for wolf hunting (41 percent), and a majority (60 percent) indicated they would shoot a wolf if it threatened their pet.

In a followup to Naughton *et al.* (2001), Treves *et al.* (2009) reported attitudes of 1,364 respondents (62 percent response rate) toward compensation after wolf recovery. They compared the attitudes of individuals who contributed to Wisconsin's voluntary compensation fund with those of noncontributors and found that attitudes of each group differed in several ways. Contributors favored nonlethal over lethal problem wolf management actions and supported all types of payments more strongly with the exception of payment for hunting dogs injured or killed by wolves on public land, but a majority of respondents of both groups supported compensation "even when wolves are no longer threatened or endangered." Noncontributors were more likely to believe that wolf damages were part of raising livestock and should not be compensated.

Treves *et al.* (in review) report the first longitudinal results for change in individual attitudes over time using findings from surveys conducted in 2001 (Naughton *et al.* 2003), 2004 (Treves *et al.* 2009), and 2009. During the data collection period, wolf numbers nearly tripled and greatly exceeded the State population goal, the level of wolf depredation on pets increased and became the third most frequent conflict after attacks on beef calves and bear-hunting dogs, and wolf management authority was granted to State governments and subsequently revoked several times after Federal court challenges. The 2009 survey found attitudes toward wolves had become less favorable, and fear of wolves, perceived competition for deer, and reported inclination to illegally kill wolves increased. In the 2009 survey, 18 percent of hunters indicated they would shoot a wolf if they saw one while hunting. Nearly half of respondents agreed their tolerance for wolves in Wisconsin would increase if people could hunt them.

Shelley *et al.* (in review) compared attitudes of Ojibwe Indians and nontribal residents of Wisconsin's wolf range. Tribal membership was the best predictor of attitudes. Ojibwe respondents had more positive attitudes toward wolves, were more supportive of wolf protection policy, and were less supportive of a public wolf harvest and lethal control of problem wolves. A considerable percentage (Ojibwe 33 percent, nontribal 44 percent) of each group indicated they would be afraid if wolves lived near their homes. Fewer Ojibwe (8 percent) than nontribal respondents (16 percent) indicated that they would shoot a wolf if they saw one while hunting. Nontribal respondents (57 percent) were more likely than Ojibwe respondents (26 percent) to believe that wolves threaten deer hunting opportunities. Shelley *et al.* (in review) point out the potential significance of treaty rights, which grant the Tribe half of any harvest, including wolves, within the territories ceded by them in nineteenth century Federal treaties upheld by Federal courts in the 1980s.

Treves and Martin (2011) examined the attitudes of 2,320 respondents, hunters and nonhunters, living within or adjacent to wolf range in surveys conducted in Wisconsin in 2001 and 2004 (reported above) and the northern Rocky Mountain (NRM) States of Idaho, Montana, and Wyoming. A majority of respondents supported regulated, public wolf hunting, although support was dependent on potential justifications for a hunting season.

In Wisconsin, bear hunters in 2001, followed by other hunters, were most likely to support an immediate hunt, whereas nonhunters in favor of wolf hunting were more likely to be supportive when managers estimate the wolf population could sustain harvests or when the majority of the public believe damages have become intolerable. There was a shift in 2004 when a majority of hunters indicated they would support wolf hunting when the population was deemed to be at a level that could sustain harvests. More nonhunters agreed with a hunt when the public felt damages had become intolerable. Inclination to kill a wolf illegally in Wisconsin in 2001 and 2004 was high among hunters, particularly among likely carnivore-hunters. These two groups favored a significant reduction (up to half) of the Wisconsin wolf population.

In addition to the studies summarized above, citizen input on the wolf management plans of Minnesota, Wisconsin, and Michigan has provided additional insight on public support for wolf recovery. Namely, it shows strong support for wolf recovery if the adverse impacts on recreational activities and livestock production can be minimized (MI DNR 1997, pp. 13–14, 50–56; MN DNR 1998, p. 2; WI DNR 1999, pp. 51–55; WI DNR 2006c, pp. 9–11).

Summary of Public Attitudes

While there is a lack of empirical data on early attitudes toward wolves, historical accounts describe an antagonist view of wolves during the 19th and early 20th centuries. Attitudinal research conducted throughout the lower 48 States in the last three decades has shown that a shift toward more positive attitudes took place during the 20th century (Browne-Nuñez and Taylor 2002, Kellert *et al.* 1996, Williams *et al.* 2002). Although the basis for this shift is not understood, suggested causes include changes in the portrayal of wolves in the media (Kellert *et al.* 1996) and a broader shift in societal values of wildlife (Manfredo *et al.* 2003).

Although direct comparisons cannot be made of each study summarized here, given different research methods and contextual circumstances, we can summarize some common findings and general conclusions. Similar to research conducted outside the Great Lakes region (summarized in Williams *et al.* 2002), many of the studies reviewed here demonstrate urban-rural differences in attitudes, with urban residents displaying more positive attitudes; farmers and livestock producers are more negative toward wolves; those with higher education levels have more positive attitudes; and compensation does not translate into increased tolerance.

In several studies, hunters were mostly positive toward wolves (Hook and Robinson 1982, Kellert 1990, Knight 1985), with the exception of Wisconsin bear hunters who were the most negative among special interest groups (Naughton *et al.* 2003). Cross-sectional studies suggest increasing support for control of problem wolves and public harvest of wolves (Kellert 1985, Mertig 2004, Naughton *et al.* 2003), and one recent study shows this support has increased among individuals re-sampled over time (Treves *et al.,* in review). Some respondents indicated they had or would kill a wolf illegally (Kellert 1985; Treves *et al.,* in review).

While most respondents were positive toward wolves, it is evident that there have long been competing attitudes toward wolves. While attitudes in other regions have been shown to be relatively stable (Williams *et al.* 2002, Wilson and Bruskotter 2009), a troubling finding for managers in the Great Lakes region is the most recent research showing declining support for wolves (Hammill 2007; Mertig 2004; Treves *et al.,* in review) and an increasing inclination to kill wolves illegally (Treves *et al.,* in review). Possible explanations for this decline include increasing wolf numbers, negative interactions with humans, and negative media coverage (Hammill 2007). It is unclear how delisting will affect attitudes and behavior toward wolves. Also in question is how public wolf harvest might affect attitudes and behaviors. While we do not believe the affects of public attitudes on wolves will be a significant threat to the species in the foreseeable future, as the status and management of the wolf evolves, there will be a need for continued collaboration between managers and researchers to monitor public attitudes toward wolves and their management.

Hybridization with Coyotes

Genetic data relevant to possible interbreeding between North American wolves and coyotes was first reported in a study of mtDNA restriction fragment length polymorphisms by Lehman *et al.* (1991). They found mtDNA haplotypes in wolf populations in the Great Lakes region that they interpreted as being derived from coyotes (Lehman *et al.,* p. 108). As wolf haplotypes were not found in coyotes, the apparent introgression occurred through matings of wolf males with coyote females. They determined that a minimum of six instances of coyote-wolf hybridization

could account for the diversity of "coyote-type" haplotypes observed in wolves (p. 112). Their general interpretation was that introgression primarily occurred as coyotes expanded their ranges into the Great Lakes region within historical time, although they allow that two coyote-type haplotypes commonly observed in Great Lakes wolves may have been the result of ancient hybridization. Their data also indicated (Lehman *et al.,* Figure 4) that coyote-type haplotypes were less common in the western part of the Great Lakes region than in the east.

Wilson *et al.* (2000, Figure 6, p. 2165) provided a different interpretation of wolf-coyote relationships in the region. They found coyote-like mtDNA sequences in eastern Canadian wolves from Algonquin Provincial Park, Ontario, southern Manitoba, and northeastern Minnesota that were intermediate in sequence divergence between coyotes and gray wolves. As these haplotypes were apparently absent in coyotes, they were thought not to result from hybridization with coyotes, but to represent an eastern wolf species, *Canis lycaon.* They suggest that these *Canis lycaon* haplotypes may have been previously reported as "coyote-type" in the study of Lehman *et al.* (1991).

It is now generally agreed that historical and most contemporary Great Lakes wolves have unique mtDNA haplotypes that are distinct from those of other wolves, and more related to but still distinct from those of coyotes. Haplotypes specific to the early 20th century wolf population of the western Great Lakes region were identified by Leonard and Wayne (2008, pp. 2–3), from a study of 17 historical specimens from Michigan, Wisconsin, Ontario, and Quebec. Of the 17 specimens that gave conclusive results, 14 were either the same or most similar to the haplotypes described by Wilson *et al.* (2000) as *C. lycaon.* Only one had a coyote haplotype. Wheeldon and White (2009) reported haplotypes from three additional historical specimens from the western Great Lakes region. Two individuals from Minnesota (collected 1899 and 1900) had the same coyote-like haplotypes (C13) found in a late 19th century specimen from Maine, 50 years before recorded coyote sightings in Maine (Wilson *et al.* 2003), as well as in contemporary western Great Lakes wolves from Minnesota to Quebec (Leonard and Wayne 2008, pp. 2–3). The third specimen, collected in the winter of 1907–08 in Wisconsin, had the common Great Lakes wolf haplotype C1. Microsatellite DNA analysis of these three specimens grouped them with wolves rather than coyotes.

Koblmüller *et al.* (2009) addressed the issue of coyote hybridization in the Great Lakes region from analyses of mtDNA sequence and both Y-chromosome and autosomal microsatellite DNA. They found evidence of repeated incidences of ancient introgression of coyotes into Great Lakes wolves, although they also suggested that introgression by coyotes is recent and ongoing, especially north of the Great Lakes.

Wheeldon and White (2009, p. 2) and Fain *et al.* (2010) concluded that the coyote-related haplotype C13 is actually a *C. lycaon* marker based on its presence mainly in *C. lycaon-C. lupus* hybrids in the western Great Lakes region, the absence of C13 in non-hybridizing coyotes, and its occurrence in historical eastern wolves. Assessments based on mtDNA, Y-chromosome, and autosomal microsatellite DNA data consistently found that the wolf population in the western Great Lakes region does not currently interbreed with coyotes (Fain *et al.* 2010, p. 14; Wheeldon *et al.* 2010). Previous reports of coyote-wolf hybridization in the WGL region were based on the misidentification of coyote-like haplotypes, which are now understood to be unique markers for *C. lycaon,* as discussed above.

Lehman *et al.*'s (1991, p. 114) interpretation of coyote introgression into Great Lakes wolves included an explanation that it occurred at a time when wolf population densities were low in the region, so that wolves would be less likely to find mates of the same species and mating with coyotes was more likely to take place. Conversely, Lehman *et al.* (1991) suggested that coyote introgression does not appear to occur when wolf densities are higher. If so, the increase in population size that has occurred over the last 30 years renders the western Great Lakes wolf population less vulnerable to whatever threat may have been presented by coyote introgression. The wolf population of the region has likely been exposed to this factor for centuries and has rebounded from near extirpation, yet retains essential genetic, behavioral, and other biological features of wolves without being displaced by coyotes. This fact suggests that the threat of coyote hybridization to a recovered wolf population is small.

Hybridization Between C. lupus and C. lycaon

Although it is clear that *C. lycaon* and *C. lupus* have hybridized in the western Great Lakes region, same-species combinations of paternal and maternal markers in male wolves are more common than expected by random mating (Wheeldon *et al.* 2010). This suggests that there is some constraint on complete hybridization between the two species and that complete blending of the two components of the population is not inevitable. The limited number of historical specimens from the western Great Lakes region that have been genetically characterized all have mtDNA indicative of *C. lycaon* (Leonard and Wayne 2008, pp. 2–3; Wheeldon and White 2009, p. 1), but four of these from the early 20th century also had *C. lupus* Y-chromosome haplotypes, which indicates that hybridization had occurred by that time. The opportunity for hybridization between *C. lycaon,* which belongs to a North American lineage, and *C. lupus,* which evolved in Eurasia, has existed since *C. lupus* entered North America about 500,000 years ago (Kurtén and Anderson 1980), yet a predominantly *C. lycaon* population of wolves still persists in the western Great Lakes region.

Hybrid indices based on the co-occurrence of species specific mtDNA and nuclear markers have been used to assess the depth and extent of hybrid zones in tiger salamanders, cutthroat trout, red deer, and wolves (Abernathy 1994; Riley *et al.* 2003; Wheeldon and White 2009). Wheeldon and White (2009) used the mtDNA haplotype of an individual wolf in combination with the program STRUCTURE assignment of its microsatellite genotype to identify *C. lupus—C. lycaon* hybrids in historical WGL wolves. Applying this index, half of WGL females with *C. lupus* mtDNA also exhibited high assignment to *C. lupus* and half of WGL females with *C. lycaon* mtDNA were similarly assigned to *C. lycaon.* Considering both lineage markers in males, 44 percent of males with *C. lupus* mtDNA and Y-chromosome haplotypes exhibited high assignment to *C. lupus,* but only 28 percent of males exhibiting *C. lycaon* mtDNA and Y-chromosome haplotypes also exhibited high assignment to *C. lycaon.* The 8–12 microsatellite loci typically used in studies of *C. lupus—C. lycaon* introgression (Grewal *et al.* 2004; Wilson *et al.* 2000, 2009; Fain *et al.* 2010; Rutledge *et al.* 2010; Wheeldon *et al.* 2010) can effectively estimate the amount of mixing at the population level, but not the individual level (Allendorf *et al.* 2010). Based on the information presented in these studies, there is no evidence showing that hybridization between *C. lupus* and *C. lycaon* is a threat to *C. lupus.*

Conclusion of the 5-Factor Analysis

As required by the Act, we considered the five potential threat factors to assess whether the wolves in the proposed

WGL DPS are threatened or endangered throughout all or a significant portion of their range. When considering the status of the species, the first step in the analysis is to determine whether the species is in danger of extinction or likely to become endangered in the foreseeable future throughout all of its range.

Human-caused mortality is the most significant issue to the long-term conservation status of the wolves in the proposed WGL DPS. Therefore, managing this source of mortality (*i.e.,* human predation) remains the primary challenge to maintaining a recovered wolf population into the foreseeable future. We have concluded that Minnesota, Wisconsin, and Michigan will maintain their share and distribution of the WGL wolf population above recovery levels for the foreseeable future, and that the threats have 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 this commitment is not expected to change.

Regulatory mechanisms in all three States are adequate to facilitate the maintenance of, and in no way threaten, the recovered status of the wolves in the WGL DPS. If Federally delisted, wolves in Minnesota, Wisconsin, and Michigan would continue to receive protection from general human persecution by State laws and regulations. Violation of regulations will be subject to prosecution.

As long as populations are maintained well above minimal recovery levels, wolf biology (namely the species' reproductive capacity) and the availability of large, secure blocks of suitable habitat will maintain strong populations capable of withstanding all other foreseeable threats. In terms of habitat, the amount and distribution of suitable habitat in public ownership provides, and will continue to provide, large core areas that contain high-quality habitat of sufficient size to anchor a recovered wolf population. Our analysis of land management shows these areas will maintain their suitability into the foreseeable future, if not indefinitely.

While disease and parasites can temporarily impact population stability, as long as populations are managed above recovery levels, these factors are not likely to threaten the wolf population at any point in the foreseeable future. Natural predation is also likely to remain an insignificant factor in population dynamics into the foreseeable future. Finally, we believe that other natural or manmade factors, such as potential hybridization with coyotes and public attitudes, are unlikely to threaten the wolves in the proposed WGL DPS in the foreseeable future in all portions of the range within the DPS.

We find that the threat of habitat destruction or degradation or a reduction in the range of the wolf; utilization by humans; disease, parasites, or predatory actions by other animals or humans; regulatory measures by State, Tribal, and Federal agencies; or other threats will not individually or in combination cause wolves in the proposed WGL DPS to likely become endangered within the foreseeable future throughout all of the species' range in the DPS. Ongoing effects of recovery efforts over the past decades, which resulted in a significant expansion of the occupied range of wolves in the proposed WGL DPS, in conjunction with future State, Tribal, and Federal agency wolf management across that occupied range, will be adequate to ensure the conservation of the proposed WGL DPS. 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 numerical recovery criteria established in the Revised Recovery Plan (USFWS 1992, pp. 25–28). Thus, the gray wolves in the proposed WGL DPS do not merit continued listing as threatened or endangered throughout all of their range.

Is the Species Threatened or Endangered in a Significant Portion of Its Range?

Having determined that wolves in the proposed WGL DPS do not meet the definition of endangered or threatened throughout their entire range, we must next consider whether they are in danger of extinction or are likely to become so in a significant portion of their range. The Act does not define the term "significant portion of its range." Therefore, we must give meaning to this phrase based on our experience and expertise. We interpret a portion of a species' range as being significant if it is part of the current range of the species (species used here is as defined in the Act, to include species, subspecies, or DPS) and if it is important to the conservation of the species because it contributes meaningfully to the representation, resiliency, or redundancy of the species. The contribution must be at a level such that its loss would result in a decrease in the ability to conserve the species.

Applying the definition described above for determining whether a species is endangered or threatened in a significant portion of its range, we first address whether any portions of the range of wolves in the WGL DPS warranted further consideration. We evaluated the WGL DPS in the context of whether any potential remaining threats are concentrated in one or more areas, such that if there were concentrated impacts, those wolves might be threatened, and further, whether any such area might constitute a significant portion of the species ranges.

Wolves are highly adaptable habitat generalists, and their primary biological need is an adequate natural prey base of large ungulates. The primary current and likely future threats to wolves are excessive human-caused mortality and increased mortality from diseases and parasites. Based on the biology of the gray wolf, threats to its continued existence, and conservation biology principles, the Recovery Plan specifies that two populations (or what equates to a single metapopulation) are needed to ensure long-term viability (see *Recovery Criteria,* above). The Revised Recovery Plan states the importance of a large wolf population throughout Minnesota Wolf Management Zones 1 through 4 (geographically identical to Zone A in the 2001 Minnesota Wolf Management Plan, see Figure 2 in this rule) and the need for a second viable wolf population occupying 10,000 sq mi or 5,000 sq mi elsewhere in the eastern United States (depending on its isolation from the Minnesota wolf population) (USFWS 1992, pp. 24–29).

The Recovery Plan also discusses the importance of low-road-density areas, the importance of minimizing wolf–human conflicts, and the maintenance of an adequate natural prey base in the areas hosting these two necessary wolf populations. These portions of Minnesota (Management Zones 1 through 4) and the portions of the proposed DPS that support the second viable wolf population (Wisconsin Zones 1 and 2 and the entire UP of Michigan) provide an adequate wild prey base, suitably low levels of human-caused mortality, and sufficient representation, resiliency, and redundancy to buffer the impacts of disease and parasite-induced mortality (See the discussion under *Recovery Criteria,* above*)* regarding how achieving the goals of the Recovery Plan for the Eastern Timber Wolf assures a viable wolf population in terms of representation, resiliency, and redundancy).

Post-delisting wolf protection, management, and population and health monitoring by the States, Tribes, and Federal land management agencies will ensure the continuation of viable wolf populations above the Federal recovery criteria for the foreseeable future. This is particularly true in Minnesota Zone A, Wisconsin Zones 1 and 2, and across the UP of Michigan, because the State management plans provide for greater protections for the species in that area (see the discussion of the three plans in *State Wolf Management Planning,* above).

Post-delisting threats to wolves in Zone B in Minnesota, Zones 3 and 4 in Wisconsin, and in the Lower Peninsula of Michigan will be more substantial, and may preclude the establishment of wolf packs in most or all of these areas in Wisconsin and Michigan. The Recovery Plan f specifically recommends against managing wolves in large areas of unsuitable habitat, stating that Minnesota Zone 5 (identical to Minnesota Wolf Management Zone B, Figure 2) should be managed with a goal of zero wolves there, because "Zone 5 is not suitable for wolves. Wolves found there should be eliminated by any legal means" (USFWS 1992, p 20). Therefore, the Recovery Plan views Zone 5, which is roughly 60 percent of the State, as not an important part of the range of the wolf. This portion of the State is predominantly agricultural land, with high road densities, and high potential for wolves to depredate on livestock. Although individual wolves and some wolf packs occupy parts of Zone 5, these wolves are using habitat islands or are existing in other situations where conditions generally are not conducive to their long-term persistence.

The northern LP of Michigan appears to have the only unoccupied potentially suitable wolf habitat in the Midwest that is of sufficient size to maintain wolf packs (Gehring and Potter 2005, p. 1239; Potvin 2003, pp. 44–45), although its small size and fragmented nature may mean that northern LP wolf population viability would be dependent upon continuing immigration from the UP. The only part of Michigan's LP that may contain suitable habitat are those areas of fragmented habitat studied by Potvin (2003, pp. 44–45) and Gehring and Potter (2005, p. 1239). However, these areas amount to less than half of the minimal area identified by the Recovery Plan for the Eastern Timber Wolf as needed for the establishment of viable populations. These LP areas therefore might have difficulty maintaining wolf populations even with the help of occasional immigration of wolves from the UP (see *Suitable Habitat Within the Proposed Western Great Lakes DPS,* above, for additional discussion). While the UP wolves may be significant to any LP wolf population (occasional UP to LP movements may provide important genetic and demographic augmentation crucial to a small population founded by only a few individuals), the reverse will not be true—LP wolves would not be important to the wolf population in the UP, as that population is already large enough in size and range to be self-sustaining.

The lack of sufficient areas of suitable habitat in those parts of North Dakota, South Dakota, Iowa, Illinois, Indiana, and Ohio that are within the proposed WGL DPS are expected to preclude the establishment of viable populations in these areas, although dispersing wolves and packs may temporarily occur in some of these areas. As a result, wolf numbers in these areas will have no impact on the continued viability of wolves in the proposed WGL DPS, and are not necessary to maintain adequate representation, resiliency, and redundancy for wolves in the proposed DPS.

In conclusion, Minnesota Zone A, Wisconsin Zones 1 and 2, and the UP of Michigan provide an adequate wild prey base, suitably low levels of human-caused mortality, and sufficient numbers and distribution of wolves to ensure adequate representation, resiliency, and redundancy to buffer the impacts of disease and parasite-induced mortality. Post-delisting wolf protection, management, and population and health monitoring by the States, Tribes, and Federal land management agencies will ensure the continuation of viable wolf populations in those areas above the recovery criteria established in the Recovery Plan for the foreseeable future.

In coming to this determination, we considered the quality, quantity, and distribution of the habitat relative to the biological needs of the species, the need to maintain the remaining genetic diversity, the importance of geographic distribution in coping with catastrophes such as disease, the ability of the habitat to provide adequate wild prey, and the need to otherwise meet the conservation needs of the species. Reasonably foreseeable threats to wolves in all parts of the proposed WGL DPS are not likely to threaten wolf population viability in the WGL DPS in the foreseeable future. Therefore, we find that wolves in the WGL DPS are not in danger of extinction and are not likely to become endangered in the foreseeable future throughout all or a significant portion of their range.

Proposed 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" and "endangered" contained in the Act and the reasons for delisting as specified in 50 CFR 424.11(d), we propose that revising the boundary of the 1978 Minnesota gray wolf listing and removing the WGL DPS of gray wolf (*Canis lupus*) from the List of Endangered and Threatened Wildlife (50 CFR 17.11) is appropriate. Wolves have recovered in the proposed WGL DPS as a result of the reduction of threats as described in the analysis of the five categories of threats and no longer are in danger of extinction, nor are likely to become so in the foreseeable future, throughout all or a significant portion of their range.

We recognize recent taxonomic information indicating that the gray wolf subspecies *Canis lupus lycaon* should be elevated to the full species *C. lycaon.* Additionally, we acknowledge evidence that *C. lycaon* intercrosses with *C. lupus* in the western Great Lakes region, resulting in a mixed population composed of *C. lupus, C. lycaon,* and their hybrids. As discussed under *Procedural Aspects of Proposal Applying to the Gray Wolf* above, the procedural aspects of this proposed rule refer to the gray wolf (*C. lupus*), because that is the named entity currently on the List of Endangered and Threatened Wildlife. Our proposed action here is to establish the existence of a WGL distinct population segment of *C. lupus* that is neither endangered nor threatened, despite its proximity to a closely related species, *C. lycaon*—a species whose status we will evaluate for possible protection under the Act in the near future.

Because *C. lycaon* was recently recognized as a unique species (rather than a subspecies of *C. lupus*), a complete status review of this species has never been conducted. Therefore, we are initiating a status review for *C. lycaon* throughout its range in the United States and Canada.

We also are proposing to revise the range of the gray wolf (the species *C. lupus*) by removing all or parts of 29 states (see Effects of the Rule, below) because this area is outside of the currently known historical range of the gray wolf (see *Taxonomy and Historical Ranges of Wolves in the United States*). These areas should not have been included in the original listing of the gray wolf because gray wolves did not historically occur there; they were either

red wolf (*C. rufus*) range or eastern wolf (*C. lycaon*) range.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in conservation actions by Federal, State, Tribal, and private agencies, groups, and individuals. The Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. This proposed rule, if made final, would remove these Federal conservation measures for gray wolves within the proposed WGL DPS.

Effects of the Rule

This proposal, if made final, would revise the pre-DPS policy Minnesota "species" listing and establish it as a WGL DPS of the gray wolf (*C. lupus*), expand the boundaries of that DPS, and remove the protections of the Act for that WGL DPS by removing the gray wolf wolves in that DPS from the List of Endangered and Threatened Wildlife.

This proposal, if made final, would remove the special regulations under section 4(d) of the Act for wolves in Minnesota. These regulations currently are found at 50 CFR 17.40(d).

Critical habitat was designated for the gray wolf in 1978 (43 FR 9607, March 9, 1978). That rule (codified at 50 CFR 17.95(a)) identifies Isle Royale National Park, Michigan, and Minnesota wolf management zones 1, 2, and 3, as delineated in 50 CFR 17.40(d)(1), as critical habitat. Wolf management zones 1, 2, and 3 comprise approximately 25,500 sq km (9,845 sq mi) in northeastern and north-central Minnesota. This proposal, if made final, would remove the designation of critical habitat for gray wolves in Minnesota and on Isle Royale, Michigan.

As described in the *Taxonomy and Historical Ranges of Wolves in the United States* section above, the species' historical range did not extend into many southern and eastern States. Therefore, our 1978 listing of the gray wolf throughout the 48 States and Mexico was partially in error. This proposed rule, if made final, would revise the geographic boundaries for the gray wolf as described in the 1978 listing by removing all or parts of 29 southern and eastern states (Maine, Massachusetts, Connecticut, New Hampshire, Rhode Island, Vermont, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida, Ohio (the part outside WGL DPS), West Virginia, Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Texas (east of Interstate Highway 35), Oklahoma (east of Interstate Highway 35 and southeast of Interstate Highway 44 north of Oklahoma City), Arkansas, Missouri (southeast of Interstate Highway 44 and southeast of Interstate Highway 70 east of St. Louis), Indiana (the part outside WGL DPS), and Illinois (the part outside WGL DPS)) because this area is outside of the currently known historical range of the gray wolf.

We also note that this proposed rule initiates a 5-year status review and request information for wolves in the western United States, which may inform future rulemakings to replace the remainder of the revised lower 48-State listing with more targeted regional units (as discussed above under National Wolf Strategy). This proposed rule does not apply to the separate listing and protection of the red wolf (*C. rufus*). Furthermore, the remaining protections of the gray wolf under the Act do not extend to gray wolf-dog hybrids.

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. We are to make prompt use of the emergency listing authorities 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, but 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 entities that are expected to assume responsibilities for the species' conservation, after delisting.

We developed a PDM plan for the wolves in the proposed WGL DPS with the assistance of the Eastern Wolf Recovery Team. That document is available on our Web site (see **FOR FURTHER INFORMATION CONTACT**).

The PDM program will rely on a continuation of State monitoring activities, similar to those which have been conducted by Minnesota, Wisconsin, and Michigan DNR's in recent years, and Tribal monitoring. Minnesota, Wisconsin, and Michigan comprise the core recovery areas within the DPS, and, therefore, the numerical recovery criteria in the Recovery Plan apply only to the area encompassed by these States' boundaries. These activities will include both population and health monitoring of individual wolves. During the PDM period, the Service and the Recovery Team 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, range expansion or contraction) to determine if the population of wolves within the DPS warrants expanded monitoring, additional research, consideration for relisting as threatened or endangered, or emergency listing.

Minnesota, Wisconsin, and Michigan DNRs have monitored wolves for several decades with significant assistance from numerous partners, including the U.S. Forest Service, National Park Service, USDA–APHIS–Wildlife Services, Tribal natural resource agencies, and the Service. To maximize comparability of future PDM data with data obtained before delisting, all three State DNRs 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.

In addition to monitoring wolf population numbers and trends, the PDM 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/or consider relisting the WGL DPS, if warranted.

This monitoring program will extend for 5 years beyond the effective delisting date of the DPS. At the end of the 5-year period, we and the Recovery Team will conduct another review and post the results on our Web site. In addition to the above considerations, the review will determine whether the PDM program should be terminated or extended.

Required Determinations

Clarity of the Rule

Executive Order 12866 requires agencies to write regulations that are easy to understand. We invite your comments on how to make this proposal easier to understand including answers to questions such as the following: (1) Is the discussion in the **SUPPLEMENTARY INFORMATION** section of the preamble helpful to your understanding of the proposal? (2) Does the proposal contain technical language or jargon that interferes with its clarity? (3) Does the format of the proposal (groupings and order of sections, use of headings, paragraphing, *etc.*) aid or reduce its clarity? What else could we do to make the proposal easier to understand? Send a copy of any comments on how we could make this rule easier to understand to: Office of Regulatory Affairs, Department of the Interior, Room 7229, 1849 C Street, NW., Washington, DC 20240. You may also e-mail the comments to this address: *Exsec@ios.doi.gov.*

National Environmental Policy Act

We have determined that an environmental assessment or an environmental impact statement, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared 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).

Paperwork Reduction Act

Office of Management and Budget (OMB) regulations at 5 CFR part 1320 implement provisions of the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*). The OMB regulations at 5 CFR 1320.3(c) define a collection of information as the obtaining of information by or for an agency by means of identical questions posed to, or identical reporting, recordkeeping, or disclosure requirements imposed on, 10 or more persons. Furthermore, 5 CFR 1320.3(c)(4) specifies that "ten or more persons" refers to the persons to whom a collection of information is addressed by the agency within any 12-month period. For purposes of this definition, employees of the Federal Government are not included. The Service may not conduct or sponsor, and you are not required to respond to, a collection of information unless it displays a currently valid OMB control number.

This proposal does not include any collections of information that require approval by OMB under the Paperwork Reduction Act. As proposed under the Post-delisting Monitoring above, wolf populations in the Western Great Lakes DPS will be monitored by the States of Michigan, Minnesota, and Wisconsin in accordance with their wolf State management plans. There may also be additional voluntary monitoring activities conducted by a small number of Tribes in these three States. We do not anticipate a need to request data or other information from 10 or more persons during any 12-month period to satisfy monitoring information needs. If it becomes necessary to collect standardized information from 10 or more non-Federal individuals, groups, or organizations per year, we will first obtain information collection approval from OMB.

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 have coordinated the proposed rule with the affected Tribes and, furthermore, throughout several years of development of earlier related rules and this 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 proposed changes, and (2) to understand their concerns with those changes. If requested, we will conduct additional consultations with Native American Tribes and multitribal organizations subsequent to any final rule in order to facilitate the transition to State and Tribal management of wolves within the proposed WGL DPS. We will fully consider all of the comments on the proposed rule that are submitted by Tribes and Tribal members during the public comment period and will attempt to address those concerns, new data, and new information where appropriate.

References Cited

A complete list of all references cited in this document is available upon request from the Ft. Snelling, Minnesota, Regional Office and is posted on our Web site (see **FOR FURTHER INFORMATION CONTACT**).

Data Quality Act

In developing this rule we did not conduct or use a study, experiment, or survey requiring peer review under the Data Quality Act (Pub. L. 106–554).

Authors

The primary authors of this proposed rule are the staff members of the Ft. Snelling, Minnesota, Regional Office (see **FOR FURTHER INFORMATION CONTACT**), with contributions from staff from Service Regions 2, 4, and 5. Staff from the Michigan DNR, Minnesota DNR, and Wisconsin DNR provided current information regarding wolves in their States. Staff from the Nelson Institute for Environmental Studies at the University of Wisconsin-Madison compiled the current data on public attitudes toward the wolf.

List of Subjects in 50 CFR Part 17

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

Proposed Regulation Promulgation

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

PART 17—[AMENDED]

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

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

§ 17.11 [Amended]

2. Amend § 17.11(h) by revising the entry for "Wolf, gray" under "MAMMALS" in the List of Endangered and Threatened Wildlife to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
MAMMALS							
*	*	*	*	*	*		*
Wolf, gray	*Canis lupus*	Holarctic	U.S.A.: All of CA, CO, KS, NE, NV, OR, UT, and WA; those portions of AZ, NM, TX, ID, MT, and WY not included in an experimental population as set forth below; and portions of IA, MO, ND, OK, SD, and TX as follows: (1) Southern IA, (that portion south of the centerline of Highway 80); (2) Northwestern MO (that portion northwest of the centerline of Interstate Highway 44 and northwest of the centerline of Interstate Highway 70 east of St. Louis);	E	1, 6, 13, 15, 35	N/A	N/A
			(3) Western ND (that portion south and west of the Missouri River upstream to Lake Sakakawea and west of the centerline of Highway 83 from Lake Sakakawea to the Canadian border);				
			(4) Western OK (that portion west of the centerline of Interstate Highway 35 and northwest of the centerline of Interstate Highway 44 north of Oklahoma City);				
			(5) Western SD (that portion south and west of the Missouri River); and				
			(6) Western TX (that portion west of the centerline of Interstate Highway 35). Mexico.				
Do	do	do	U.S.A. (portions of AZ, NM, and TX—see § 17.84(k)).	XN	631	N/A	17.84(k)

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
Do	do	do	U.S.A. (portions of ID, MT, and WY—see § 17.84(i)).	XN	561, 562	N/A	17.84(i), 17.84(n).
*	*	*	*	*	*		*

§ 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*)."

Dated: April 12, 2011.

Rowan W. Gould,

Acting Director, U.S. Fish and Wildlife Service.

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