

# **Post-delisting Monitoring Plan for the Western Great Lakes Distinct Population Segment of the Gray Wolf**



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## Acknowledgements

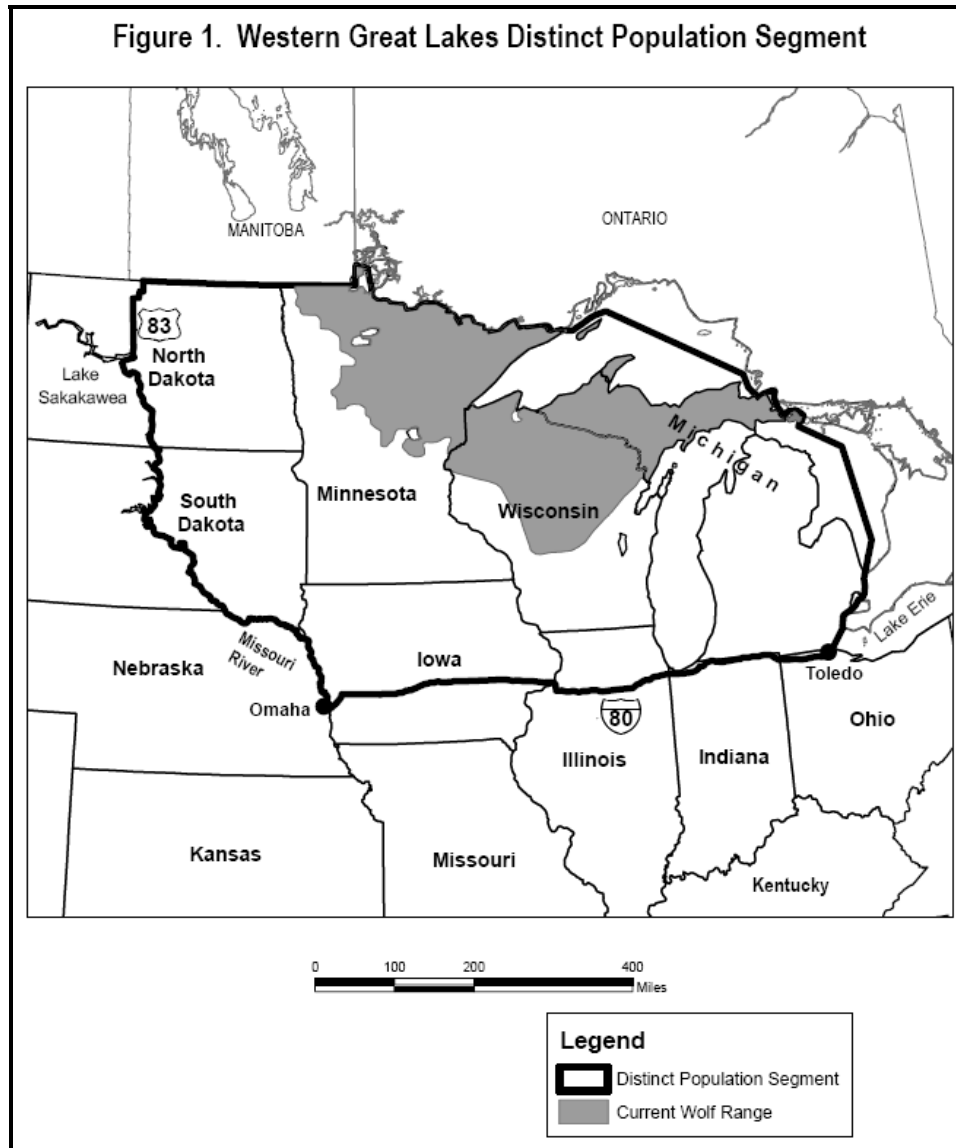
This plan was originally drafted by Ron Refsnider, U.S. Fish and Wildlife Service (Service), Midwest Region, with input from members of the Service's recovery team. It was then finalized after the completion of the public comment period by Phil Delphey, with assistance from Joel Trick and Christie Deloria-Sheffield all of U.S. Fish and Wildlife Service.

## Background

Section 4(g) of the Endangered Species Act (Act) requires the Service to monitor, for a minimum of five years, any species that is delisted due to its recovery. The intent of this monitoring is to determine whether the species should be proposed for relisting under the normal listing procedures, relisted under the emergency listing authority of the Act, or kept off of the list because it remains neither threatened nor endangered. For the Western Great Lakes Distinct Population Segment of the Gray Wolf [WGLDPS, 71 Federal Register 15266; (March 27, 2006); Figure 1], the post-delisting monitoring (PDM) plan should focus on reviewing and evaluating (1) population characteristics of the distinct population segment (DPS), (2) threats to the DPS, and (3) implementation of legal and management commitments that are important in reducing threats to the DPS or maintaining threats at sufficiently low levels as these have a bearing on the five factors set forth in the Act.

For the delisted WGLDPS, focusing PDM on these three aspects is necessary and sufficient to ensure that the DPS does not decrease to the point of again meeting the definition of threatened or endangered without an appropriate and timely response from the Service. Winter and late-winter estimates of wolf populations in Minnesota, Wisconsin, and Michigan have demonstrated that wolves in the WGLDPS have surpassed their numerical recovery criteria for a sufficient period due to a reduction in threats over the last 25 years [U.S. Fish and Wildlife Service (USFWS) 1992]. The protection and management of wolves by states will be critical in conserving the WGLDPS. In addition, management of wolf habitat by tribes and federal land management agencies will continue to be important in conserving the WGLDPS. Since delisting, state and tribal laws and regulations have become the primary mechanism to protect wolves from their primary former threat – excessive human-caused mortality.

PDM for the WGLDPS will be focused within the borders of Minnesota, Wisconsin, and the Upper Peninsula (UP) of Michigan, where wolf populations have attained the numerical recovery criteria specified in the Recovery Plan for the Eastern Timber Wolf (USFWS 1992). The delisting of the WGLDPS of the Gray Wolf is based on wolf recovery in those three states. Therefore, it is not necessary to conduct intensive monitoring in other parts of the DPS. The Service is interested, however, in reviewing any data regarding the existence of individual wolves or wolf populations outside of the core recovery areas (Fig. 1), especially in the Northern Lower Peninsula (NLP) of Michigan. Additionally, the Service is interested in obtaining disease and parasite data from wolves found in other portions of the DPS that may suggest a new or increasing threat that may impact wolves in the core recovery areas.



## Public Review and Comment

On June 4, 2007, the Service announced the availability of its draft plan to monitor the WGLDPS of the Gray Wolf for public review and comment. After the comment period closed on July 5, 2007, the Service reviewed each comment received and prepared comments in response to any substantive comments (see Appendix).

## Monitoring by the States

The States of Minnesota, Wisconsin, and Michigan have carried out wolf monitoring for several decades, with significant assistance from numerous partners, including the U.S. Forest Service, National Park Service, U.S. Department of Agriculture (USDA)-Wildlife Services, tribal natural

resource agencies, and the Service. In Minnesota, for example, these agencies provide data directly to the Minnesota Department of Natural Resources to support its development of statewide population estimates (Erb and Benson 2004). The methods used in this monitoring are summarized below, and are described in detail by Erb and Benson (2004), Wydeven *et al.* (2006), and Potvin *et al.* (2005).

All three states intend to implement monitoring methodologies that would allow for comparison to data obtained before delisting. As specified in the Recovery Plan for the Eastern Timber Wolf (USFWS 1992), population monitoring will be conducted during the late winter months when wolf populations are at the low point of their annual cycle and when snow cover and lack of foliage on deciduous trees facilitates tracking and aerial counting.

**Table 1. Gray wolf winter populations in Minnesota, Wisconsin, and Michigan (excluding Isle Royale) from 1976 through 2006.**

| <b>Year</b> | <b>Minnesota</b> | <b>Wisconsin (WI)</b> | <b>Michigan (MI)</b> | <b>WI &amp; MI Total</b> |
|-------------|------------------|-----------------------|----------------------|--------------------------|
| 1976        | 1,000–1,200      | ?                     |                      |                          |
| 1978–79     | 1,235            | ?                     |                      |                          |
| 1988–89     | 1,500 & 1,750    | 31                    | 3                    | 34                       |
| 1989–90     |                  | 34                    | 10                   | 44                       |
| 1990–91     |                  | 39                    | 17                   | 57                       |
| 1991–92     |                  | 45                    | 21                   | 66                       |
| 1992–93     |                  | 40                    | 30                   | 70                       |
| 1993–94     |                  | 54                    | 57                   | 114                      |
| 1994–95     |                  | 83                    | 80                   | 163                      |
| 1995–96     |                  | 99                    | 116                  | 215                      |
| 1996–97     |                  | 148                   | 113                  | 261                      |
| 1997–98     | 2,445            | 178                   | 139                  | 319                      |
| 1998–99     |                  | 204                   | 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     |                  | 540                   | 509                  | 1,049                    |

## Minnesota

Minnesota Department of Natural Resources (DNR) will continue to use a rangewide survey/local intensive study approach, which is suitable for a wolf population of thousands of animals ranging across more than 34,100 square miles (88,325 square kilometer). The most

recent survey was conducted during the winter of 2003-2004 and provided a population estimate used in making the Service's delisting decision. The Minnesota Wolf Management Plan (Minnesota DNR 2001) specifies that the survey frequency will be increased from the previous 9-10-year interval. Statewide wolf population and distribution estimates will be conducted during the first and fifth years after delisting and subsequently at 5-year intervals.

During the years between statewide population estimates, the DNR will collect and analyze data from its predator scent post survey, furbearer winter track survey, and recorded wolf depredations of domestic animals. Each of these will furnish independent annual indices of wolf population trends and occupied range but will not provide population estimates. In the "Forest Zone", which comprises the main portion of the wolf range in Minnesota, there were 173 scent station routes completed in 2006 (Erb 2006). Each route is 2.7 miles long and contains ten scent stations. Data from these indices must be interpreted with caution and may not by themselves be reliable indicators of population declines. Since 1994, however, trends in these indices point to a stable or slowly growing wolf population in Minnesota, consistent with the results of the statewide population estimates [72 Federal Register 6054 (8 February 2007)].

To estimate statewide wolf abundance, Minnesota uses estimates of winter pack territory and pack size that are based on radio telemetry studies in different portions of Minnesota wolf range. The extent of occupied wolf range is determined based on an extensive survey of hundreds of tribal, federal, state and other natural resource managers, wildlife biologists, conservation officers, and other knowledgeable field personnel, and also by using human density and road density criteria (Erb and Benson 2004). Wolf density data from the localized radio telemetry studies are applied to the estimated wolf range to derive an estimate of the numbers of wolves in packs in Minnesota. This number is adjusted upward to account for non-pack wolves and a 90 percent confidence interval for the resulting point estimate is calculated (Erb and Benson 2004). Using those methods for the winter of 2003/2004, Minnesota DNR estimated 3,020 wolves in the state with a 90 percent confidence interval ranging from 2,301-3,708 (Erb and Benson 2004).

In addition to reviewing each statewide wolf population estimate and wolf population indices, the Service will request from Minnesota DNR an annual summary of recorded wolf mortality incidents. In the years between statewide population estimates, these mortality data will provide an additional index to the wolf population in the state and may help to assess the relative importance of various mortality factors.

## Wisconsin

Wisconsin DNR will continue its intensive radio-tracking and annual winter track and sign surveys to provide data directly comparable to those available for recent years. Wisconsin's methods are based on weekly aerial radio-tracking of about 40 percent of Wisconsin wolf packs from mid- through late-winter, supplemented by multiple winter track and sign surveys conducted in all areas suspected of containing wolf packs. Those complementary methods identify the locations and approximate territories of nearly all packs and have a high likelihood of detecting most or all members of each pack. Detection probability is less than 100 percent. Therefore, the method probably underestimates the number of wolves in packs.



In several years, packs have subsequently been documented where no packs were suspected. When this occurs, WI DNR retroactively adjusts the previous year's population estimate to account for the missed wolves. Although there currently are no data available to derive confidence limits, the DNR's survey methods probably underestimate packs and pack wolf numbers by less than 10 percent. Because some of the underestimate is removed by adjustment in the subsequent year, the ultimate underestimate probably averages 5 to 10 percent or less for pack wolves. Winters with less snow cover produce poorer conditions for track surveys and reduced contrast for aerial sightings, likely resulting in larger underestimates in those years.

A second cause of underestimation is the number of lone wolves that are not included in the final estimate. Lone wolves are generally believed to constitute about 10-15 percent of a wolf population in winter (Fuller *et al.* 1992, 2003). WI DNR recorded 2 to 13 percent of the wolf population as loners from 1991-2000, but among radio-collared wolves an average of 8 percent spent the whole winter as loners (range 0 to 15 percent, Wydeven *et al.* 2000). The 2006-2007 population estimate included 17 (3%) lone wolves. Wolf reports were received from numerous Wisconsin counties beyond the area surveyed by the DNR. Although many of these are likely misidentifications by the public, some of these reports likely are of dispersing lone wolves not included in the annual count. Thus, missing lone wolves may further underestimate the statewide wolf population in Wisconsin.

Due to the minimal likelihood of double-counting pack wolves and the conservative approach used to estimate numbers of lone wolves, Wisconsin's methods are unlikely to overestimate the number of late-winter wolves in the state. During the PDM period Wisconsin DNR might test other methods, but does not plan to replace its traditional radio tracking/snow tracking surveys (Wydeven *in litt.* 2006).

## Michigan

Michigan DNR also plans to continue its intensive ground tracking, aerial observation, and radio telemetry-based methods during the PDM period. Michigan's methods are very similar to those used by Wisconsin, including weekly monitoring of radio-collared wolves in about 40 percent of the packs, although Michigan does not use volunteers to assist with ground tracking. With the assistance of USDA-Wildlife Services, Michigan DNR annually spends over 2,000 person hours conducting the ground tracking portion of the survey. This effort involves searching over 8,000 miles of roads and trails at least once for wolf sign, with many miles searched multiple times.

Due to the increases in wolf numbers and the corresponding increase in effort required to count wolves, Michigan DNR is planning to implement a sampling approach to more efficiently determine wolf abundance (Potvin *et al.* 2005). Under this approach, Michigan DNR would stratify the UP into three sampling areas and intensively survey about 40-50 percent of the wolf habitat area annually. This stratified sampling approach would produce unbiased and precise estimates of the total wolf population that may be compared statistically to estimates derived before delisting (Beyer *in litt.* 2006, Lederle *in litt.* 2006).



## Summary of Monitoring in Wisconsin and Michigan

The late winter surveys by the Wisconsin and Michigan DNRs produce estimates of their wolf populations at the low points in their annual cycle. By late winter, mortality factors such as starvation and hypothermia, perhaps exacerbated by mange and other diseases, have largely exerted their effects and the annual production of pups has not yet begun. In early spring after pups are born it is likely that the wolf population approximately doubles the late-winter population. Therefore, the late-winter population estimates must always be accompanied with this understanding when used to evaluate recovery progress and post-delisting viability – they are minimum estimates of the wolf population made at its annual low point.

### Monitoring of Threats

The most important part of this monitoring plan is to determine, with sufficient confidence, that population levels exceed the objectives described in the recovery plan, as summarized above. Where feasible, however, the Service should also review mortality records, diseases, prey abundance, and other information to determine whether or not significant problems for wolf populations may be developing during the post-delisting monitoring period. Post-delisting threats are all the threats that may affect the species after the protections of the Act are removed.

These include ongoing threats whose magnitude has been reduced by conservation actions, continuing threats that have not been mitigated since listing, or new threats that are first recognized subsequent to delisting. For purposes of this monitoring plan, we believe the most important threats to monitor are those that have been sufficiently reduced and contained, but not permanently eliminated, during the recovery process. For gray wolves in the WGLDPS, those threats are primarily the various forms of human-caused mortality that were reduced by conservation actions before the DPS was delisted. Additionally, a variety of known wolf diseases and parasites are of concern and new diseases represent a threat that requires vigilance. All of these anticipated post-delisting threats are described in detail in **Summary of Factors Affecting the Species** in the preamble of the 2006 proposed delisting rule [75 Federal Register 15277-15302 (8 February 2007)].

Minnesota, Wisconsin, and Michigan DNRs will continue to compile summaries of human-caused and natural mortality and to provide this information to us annually. This reporting will include information on: wolves killed legally and intentionally for depredation control, conservation actions taken to reduce threats, conduct research, or for other reasons, accidental mortality (e.g., vehicle collisions and incidental trapping mortalities), natural mortality (e.g., disease and intraspecific conflict), illegally killed wolves, and mortalities from unknown factors.

Although starvation may be the major cause of pup mortality, disease may also be important during some years and may also infrequently play a significant role in adult mortality. Significant levels of mortality due to disease would be reflected in population surveys conducted by each state. Nevertheless, each state plans to also implement some level of disease monitoring.

The wolf management plans for Minnesota and Wisconsin commit the respective DNRs to conduct necropsies on dead wolves, carry out disease screening on live-trapped wolves, and

analyze wolf scat for pathogenic microorganisms and parasites. The Michigan DNR states that wolf health and disease monitoring will receive a high priority for a minimum of five years after Federal delisting. The Service will request this information annually for review (see below).

Native American Indian tribes are responsible for wolf management within their reservations. In addition, many tribes have rights and interests in wolves in a number of treaty ceded territories.

Consistent with our responsibilities to tribes and our goal to have the most comprehensive data available for our annual review, we will annually contact tribes and their designated intertribal natural resource agencies within the DPS 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 WGLDPS that may have significant wolf data to provide during the post-delisting period include Bois Forte, Bad River, Fond du Lac, Grand Portage, Lac Courte Oreilles, Lac du Flambeau, Leech Lake, Menominee, Oneida, Red Lake, and White Earth. 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 to request wolf data as described below.

We will also annually contact the federal land management agencies with significant wolf populations on their units in Minnesota, Wisconsin, and Michigan to obtain any additional data they may have regarding wolf management/protection, numbers, mortality, injuries, or disease.

### **Implementation of Legal and Management Commitments**

The recovered WGLDPS is dependent upon wolves receiving sufficient protection in Minnesota, Wisconsin, and Michigan to ensure that a viable wolf population will remain in Minnesota and a second viable population will exist in Wisconsin-Michigan for the foreseeable future. When the Act's protection ended at the time of delisting, the focus of wolf protection shifted to state and tribal governments and to federal land management agencies. Protections by the states as identified more fully in the Final Rule [72 Federal Register 6052 (8 February 2007)], may be most important because they affect the greatest number of wolves in the DPS.

The Service has concluded that the wolf management plans of Minnesota, Wisconsin, and Michigan and the protection of gray wolves by the tribes and federal land management agencies are sufficient to conserve viable wolf populations within the DPS. Therefore, the Service will annually evaluate the implementation and outcomes of these wolf management plans, protections, and related guidelines and procedures.

### **Monitoring Duration and Methods**

The Service will implement this PDM plan for five years after the delisting of the Gray Wolf WGLDPS. Therefore, we plan to complete this monitoring in 2012 – for example, population data obtained during the winter of 2011-2012 will represent the final year of monitoring. This will allow for five complete Wisconsin-Michigan population estimates after delisting has occurred and non-federal wolf management plans and protections become operational. Minnesota DNR will develop statewide estimates for the winters of 2007-2008 and 2011-2012.

The WGLDPS population currently is estimated to be several times greater than the numerical delisting criteria stated in the 1992 Recovery Plan (USFWS 1992 and Table 1) and we currently envision no threat or combination of threats that are reasonably likely to drive wolf numbers rapidly downward. Therefore, we believe 5 years of PDM is sufficient. Under the circumstances described below we will consider extending the PDM period and/or taking action to restore federal protections under the Act.

We will gather available data annually from Minnesota, Wisconsin, and Michigan DNR's and from the Native American natural resource agencies and federal land management agencies with large land bases within occupied wolf range in these three states. We will also contact the wildlife management agencies of the other states in the DPS to obtain any relevant data acquired during the previous year.

The Service will contact state and tribal wildlife resource conservation agencies and federal land management and research agencies to establish points of contact to obtain the relevant data annually. Within the Service, the Endangered Species Coordinator at the Service's Twin Cities, Minnesota, Ecological Services Field Office will be the focal point for the data gathering, evaluation, and coordination with former members of the Eastern Gray Wolf Recovery Team and other experts, as appropriate.

Our data gathering will include the following, with the primary data shown in bold type:

- Wolf **population estimates, pack numbers, and estimated occupied area** from Minnesota, Wisconsin, and Michigan DNRs and from reservations within the wolf-occupied portions of these three states;
- Wolf **mortality data** from the three states and the reservations within occupied range in the WGLDPS;
- Data on the **occurrence of diseases and parasites** in wolves throughout the WGLDPS;
- Information on changes made within the previous year, or changes likely within the next year, to state **regulatory mechanisms that change the previously-provided protections** for gray wolves, gray wolf prey, or gray wolf habitat within the DPS;
- Summary data for all **law enforcement investigations** relating to wolves by the three states;
- Summary reports of **wolf depredation incidents** and the resolution of those incidents in the WGLDPS;
- Reports or publications on public attitudes toward WGLDPS wolves;
- Reports of wild gray wolves in other states within the WGLDPS;
- Wolf research reports or publications dealing with WGLDPS wolves or factors adversely affecting them;
- Educational materials, press releases, and other wolf-related public information/education documents distributed by the state, tribal, and federal agencies within the WGLDPS, and similar materials distributed within the WGLDPS by non-governmental agencies.

The Service will annually contact the following four categories of agencies, requesting the listed types of data.

1) Minnesota, Wisconsin, and Michigan Departments of Natural Resources:

- population estimates, pack numbers, occupied area
- mortality data
- disease/parasite occurrence in wolves
- verified or probable depredation incidents and follow-up actions
- changes to regulatory mechanisms affecting the protection or management of the species, its prey, and its habitat
- law enforcement investigations of wolf mortality
- other relevant information including any recent population estimates or indices for primary wolf prey, white-tailed deer (*Odocoileus virginianus*) and moose (*Alces alces*).

2) Tribal Natural Resource Agencies in the DPS:

- population estimates and pack numbers
- mortality data
- changes to management
- other relevant information including any recent population estimates or indices for primary wolf prey, white-tailed deer (*Odocoileus virginianus*) and moose (*Alces alces*).

3) Other States within the WGLDPS – North Dakota, South Dakota, Iowa, Illinois, Indiana, and Ohio:

- verified or probable wolf reports & disposition of any verified or probable wolves
- disease/parasite occurrence in documented wolves
- other relevant information

4) Federal Land Management Agencies with large land bases within occupied wolf range – Chippewa National Forest (NF), Superior NF, Chequamegon-Nicolet NF, Hiawatha NF, Ottawa NF, Voyageurs National Park; and national wildlife refuges with sufficient land base or known wolf presence:

- population estimates and pack numbers
- mortality data
- law enforcement investigations of wolf mortality
- regulatory mechanism changes
- other relevant information including any recent population estimates or indices for primary wolf prey, white-tailed deer (*Odocoileus virginianus*) and moose (*Alces alces*).

Wisconsin and Michigan DNRs currently finalize their annual population between April and June. Therefore, we expect to gather this information annually during that timeframe and to complete our evaluation of the information later in the year. The data and the Service's evaluations thereof may be provided in entirety or in summary form to the former members of the Eastern Gray Wolf Recovery Team for their independent review. The Service may request additional reviews from other wolf experts and independent specialists, as appropriate. We will attempt to focus these annual reviews on any indications of (1) increasing or new threats to wolf population viability, (2) a decline in wolf population or decrease in occupied range, (3) a change in state, tribal, or federal management and protection that might have adverse effects on wolf conservation. We will also evaluate other factors that might indicate or cause a decline in wolf population viability in the WGLDPS and how these might affect the status of the species in terms of the Act's five listing factors. Although the Service's review will focus on population trends, mortality data, and protection and enforcement activities, other data will be reviewed as appropriate. We will post the results of these reviews in summary form on our Web site in a timely manner to allow interested parties to annually review our PDM and our evaluation of the data.

### **Events & Factors Indicating a Potential Need for Action by the Service**

Although it may seem desirable to specify in advance a list of explicit quantitative triggers that would require specific actions by the Service (e.g., extension of the PDM period, initiating a formal status review, or publication of a relisting proposal), such actions should only be taken based on a more comprehensive review. Thus, we are instead identifying three quantitative events and describing several examples of qualitative factors that would lead to our *consideration* of the actions (a) through (d) described below, but which *would not necessarily trigger* these actions. Consultation with the former members of the Eastern Gray Wolf Recovery Team, other wolf experts, and endangered species biologists within the Service will help to identify the appropriate response.

### **Events that Might Cause Consideration of Relisting or Emergency Relisting**

Any of the events described below might be evidence of a serious problem, but by themselves may not trigger Federal regulatory action. The occurrence of any of the following could cause the Service to investigate the underlying cause, the likely duration of the decline, and other data relevant to wolf population viability in the WGLDPS to decide if a proposal to relist, an emergency relisting, or other action is warranted.

- A decline that reduces the combined Wisconsin-Michigan (excluding Isle Royale and the Lower Peninsula) late winter wolf population estimate to 200 or fewer wolves.<sup>1</sup>

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<sup>1</sup> To calculate the total number of wolves in Michigan and Wisconsin, the Service will assume that the number of wolves in either state is equal to the lower end of the 90% confidence interval or, in the absence of any confidence intervals, the minimum value of the reported range. As of this plan's completion, Michigan plans to annually compute confidence intervals for its statewide population estimate, whereas Wisconsin provides a range with minimum and maximum values.

- A decline that brings either the Wisconsin or the Michigan (excluding Isle Royale and the Lower Peninsula) wolf estimate to 100 or fewer wolves.
- A decline that brings the Minnesota winter wolf population point estimate or lower end of the 90% confidence interval to 1500 or fewer wolves.

The numeric recovery goals were 1251-1400 for Minnesota (USFWS 1992:28) and 100 for the Wisconsin-Michigan population (USFWS 1992:25).

### **Others Factors Indicating a Potential Cause for Concern**

The Service may evaluate the potential impact of any of the following events on the conservation of the WGLDPS, but would not necessarily take additional actions.

- A rapid and large decline (for example, 25 percent or more from the previous year) in the late winter wolf population estimate for Wisconsin or Michigan.
- Any wolf population decline in Wisconsin Zones 1 and 2 or the Upper Peninsula of Michigan of three years or more in duration.
- A substantial and widespread increase in mortality from known or unknown causes.
- Evidence of a new wolf disease or substantial increase in virulence of a previously known wolf disease, even in the absence of noticeable demographic impacts on the wolf population.
- A substantial decline in the wolf prey base across a large portion of the occupied wolf range in the DPS.
- A significant adverse change in wolf, wolf prey, or wolf habitat management practices or protection across a substantial portion of the occupied wolf range in the WGLDPS.

If declines in wolf abundance in the WGLDPS (as described above under ‘Events’ and ‘Other factors’) are evident following an annual PDM review, the Service may take any or all of the following actions:

- a) extend the PDM period;
- b) add new components to the PDM;
- c) initiate a comprehensive status review of the species within the DPS;
- d) investigate or remedy the cause(s) of the decline.

In addition, the Service may determine that none of these four actions is appropriate. For example, no action may be necessary if the decline is relatively minor, is likely to be temporary or readily resolved, or is not statistically significant.

As part of each annual evaluation the Service will also consider changes to the PDM

methodology and data review process. If such changes are necessary to meet the Service's responsibilities under Section 4(g) of the Act, they will be promptly implemented, subject to available funding needed for their implementation.

During the monitoring period, if the Service detects a change in wolf populations or a significant increase in threats, it can evaluate and change monitoring methods or consider relisting. At the end of the PDM period the Service will conduct a final internal review and may request reviews by the former members of the Eastern Gray Wolf Recovery Team and other independent specialists, as appropriate. Based on those reviews, which will be posted on the Service's Internet site, the Service will decide whether to relist, continue monitoring, or end monitoring.



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## **Appendix: Responses to Public Comments**

**on the**

## **Post-Delisting Monitoring Plan for the Western Great Lakes Distinct Population Segment of the Gray Wolf**

November 2007

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## **Introduction**

On June 4, 2007, U.S. Fish and Wildlife Service (Service) announced the availability of its draft plan to monitor the Western Great Lakes Distinct Population Segment (WGL DPS) of the Gray Wolf for public review and comment. The comment period closed on July 5, 2007. The plan is intended to fulfill the Service's responsibility under the Endangered Species Act of 1973, as amended, to monitor the status of the WGL DPS for five years after its removal from the Federal List of Threatened and Endangered Wildlife and Plants. The Service announced the delisting of the WGL DPS on February 8, 2007 and the delisting became effective on March 12, 2007.

After the comment period closed, the Service reviewed each comment received and prepared comments in response to any substantive comments. Those comments and the Service's responses are grouped and summarized below.

## **Accuracy, Precision, and Sensitivity of the Proposed Monitoring Plan**

Comment – The precision of the 'rangewide survey/local intensive study approach' to monitoring that is used by Minnesota Department of Natural Resources (MN DNR) may not be sufficient to readily detect rapid population declines, which may result from increased lethal control of wolves.

Response: The Service will review mortality data annually for each state and will also evaluate 'annual index' data collected by MN DNR (e.g., autumn scent station surveys; MN DNR 2001:19). Although MN DNR plans to conduct statewide population estimates during only the first and fifth years after delisting, our review of mortality data and other indices of wolf population abundance would likely result in the detection of any sharp population decline between years.

Comment – The Service should consider the relative precision of each state's population estimate, especially for Minnesota.

Response – The 2003/2004 survey and subsequent analysis by MN DNR resulted in an estimate of 3020 wolves in Minnesota with a 90% confidence interval ranging from 2301 to 3708. In other words, MN DNR may be 90% confident that the actual number of wolves in Minnesota during the winter of 2003/2004 was between 2301 and 3708. On the other hand, there may only be a 10% chance that the number of wolves in Minnesota was less than 2301 or greater than 3708. The Service agrees that it should consider the precision of statewide population estimates. Therefore, under the heading, "Events that might cause Consideration of Relisting or Emergency Relisting", the Service will evaluate a decline that brings the Minnesota winter wolf population point estimate or 90% confidence interval to 1500 or fewer wolves.

Wisconsin DNR's (WI DNR) methods do not allow it to quantitatively describe the precision of its population estimate, although its methods likely produce a highly accurate and precise estimate. Wisconsin typically reports its population estimate as a range and the Service will use the low end of the range when evaluating the state's wolf population estimate against the review triggers.

As stated in the draft post-delisting monitoring plan, Michigan DNR (MI DNR) has recently modified its monitoring plans to allow for the calculation of confidence intervals. Thus, to calculate the total number of wolves in Michigan and Wisconsin, the Service will assume that the number of wolves in either state is equal to the lower end of the 90% confidence interval or the minimum of the reported range.

Comment – The population levels that would cause the Service to consider relisting gray wolves in the Western Great Lakes Distinct Population Segment are too low for Minnesota.

Response – In the draft post-delisting monitoring (PDM) plan, a decline that brought the Minnesota winter wolf population estimate to 1500 or fewer wolves would trigger the Service to consider relisting the gray wolf in the Western Great Lakes Distinct Population Segment. As stated above, the Service will modify this 'trigger' to state that the Service will consider relisting if the lower end of the 90% confidence interval

is less than 1500. The Service's recovery plan established a planning goal of 1,250–1,400 animals for the Minnesota wolf population (USFWS 1992:28), concluding that a population of this size would be necessary to ensure resilience against potentially harmful demographic and environmental events. In 1997, when wolf numbers in the Midwest appeared to be approaching the recovery criteria specified in the 1992 Plan, the Service reconvened its Recovery Team to reevaluate these criteria, which stated that the recovery criteria were "sufficient" (Peterson in litt. 1997, in litt. 1998). Furthermore, a separate group of peer reviewers supported the Service's conclusion that the Western Great Lakes Distinct Population Segment of the Gray Wolf (WGL DPS) was recovered. No one among this group expressed concern with the 1992 recovery criteria. Therefore, we think that the plan to consider relisting if and when the 90% confidence interval falls below 1500 would be sufficiently sensitive to ensure a timely response to a situation in which the Minnesota population was at or approaching minimum recovery levels.

Comment – The monitoring methods used in the three states are inconsistent with one another. For example, they vary in accuracy and precision and the methods used in Minnesota would have overestimated the number of wolves in Wisconsin in 2004.

Response – There is no clear reason for the monitoring methods to be entirely consistent among the three states as long as each is sufficient to describe the status of wolves in its respective state. Thus far, each state has developed methods that have been sufficient for describing the numbers and distribution of gray wolves within its boundaries. The cost and delay that would result from each state attempting to modify its monitoring methods to align with a single methodology would be significant and may hinder comparisons to pre-delisting abundance and distribution within the WGL DPS. Nevertheless, each state may improve its monitoring methods as biologists find ways to improve the accuracy, precision, and efficiency of their methods.

Based on an analysis conducted by Wisconsin DNR (Wiedenhoeft 2005), the methods used in Minnesota to estimate wolf abundance and distribution there would not have been well suited for use in Wisconsin in 2004. This may be due, in part, to the fact that the wolf population in Wisconsin is still expanding and the Minnesota methods assume that all suitable habitat is occupied by wolves. That assumption may be valid for Minnesota, where all suitable habitat may already be occupied (Erb & Benson 2004), but would have overestimated wolf abundance in Wisconsin in 2004 where wolves were yet to inhabit all suitable habitat and where wolf habitat is more patchy (Wiedenhoeft 2005:12).

The Minnesota methods were also found to overestimate the area occupied by wolves in Michigan (D. Beyer, Michigan DNR, pers. comm. 8/10/06). In the Upper Peninsula, deer are sparse in some areas during winter. The habitat suitability model used in Minnesota is based on road and human density and does not consider winter deer density. Therefore, some areas where human and road densities are sufficiently low in Michigan have insufficient prey densities to support resident packs. The assumption that these areas were occupied by wolves resulted in an overestimate of wolf numbers in Michigan (D. Beyer, pers. comm. 7/27/07). These underlying ecological differences among the states provide further support for not attempting to force a uniform monitoring methodology.

Comment – The Minnesota monitoring methods may make it difficult to measure rapid population declines.

Response – This comment focused on the methods used to calculate statewide population estimates in Minnesota. The Service will not rely entirely on these statewide population estimates to assess trends in wolf abundance in Minnesota, but would also review wolf mortality data, law enforcement investigations of wolf mortality, verified or probable depredation incidents and associated follow-up actions, and wolf pack numbers on national forests, national parks, and national wildlife refuges. These additional sources of information, in conjunction with review of the periodic statewide population estimates, are likely to allow for timely detection of any significant population declines in Minnesota.

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Comment – The Service should require the states to annually present confidence limits on these estimates.

Response – Wisconsin intensively monitors its wolf population using aerial radio tracking, intense snow track surveys, and collection of public reports of wolf observations and will continue to do so during the five-year federal monitoring period (Wydeven et al. 2007:13). Therefore, it likely provides a highly precise and conservative estimate of the statewide population. It is conservative because it is taken in late winter before pups are born and it underestimates lone wolves. Moreover, the Service would use the minimum value in the range to represent the size of the state population. Confidence intervals are more important when only a subset of the population is intensively monitored, as in Minnesota and Michigan.

Comment - The "Events that might cause Consideration of Relisting or Emergency Relisting" should be made more stringent. The scenarios presented appear to be based solely on baseline recovery population levels and do not consider the rate of decline or other factors. Steep rates of decline should also be considered a quantitative event which might cause consideration of relisting. This concept is considered under item 1 of the "Other factors indicated a potential cause for concern" section, but this should be elevated and incorporated into the "event" conditions.

Response – We will keep this concern where it was in the draft plan, but may take the following actions in response to a steep decline:

- a) extend the PDM period;
- b) add new components to the PDM plan;
- c) initiate a comprehensive status review of the species within the DPS;
- d) investigate and/or remedy any causes of the decline.

Comment – An "event" condition should also be developed based upon marked declines in the population indices that the MN DNR uses to monitor wolf population trends between state-wide surveys.

Response – The annual indices that MN DNR proposes to use to monitor wolf populations between statewide surveys include wolf depredation complaints, autumn scent station surveys, winter furbearer track surveys, and other observations of field personnel from all natural resources agencies (Minnesota Department of Natural Resources 2001:19). In general, these indices must be interpreted with caution and may not by themselves be reliable indicators of significant population declines. Nevertheless, the Service will review these data sources annually and may take the types of actions described in the immediately preceding comment, if appropriate.

Comment – The draft PDM plan stated that MN DNR's statewide population estimate "can only provide trend information and is not a population count."

Response – This comment in the draft PDM plan referred to the annual indices of wolf numbers and distribution (number of depredation complaints, scent post surveys, etc.) and did not refer to the five-year statewide population estimate.

### **Funding**

Comment - Funding sources that will support the population monitoring activities proposed by the states are not identified. The Service must guarantee adequate funds are in place to support these plans. The Service's plan must identify the resources that each state will use to support population monitoring activities.

Response – In 2000, MN DNR sent its recommendations for appropriations to implement its wolf management plan to the state legislature. These described funds necessary for population monitoring and to hire a wolf specialist, which it hired in 2007. The Service cannot guarantee that adequate funds are in place for the next five years of monitoring in each state. Nevertheless, each state has acted in good faith thus far in monitoring its wolf populations and has also demonstrated that it can acquire funds necessary to fully

implement the monitoring components of its state plan. The states have a variety of sources from which to fund wolf population monitoring, including Endangered Species Act Section 6 Conservation Grants. The Service does not anticipate any of the states being unable or unwilling to implement the monitoring committed to in their state management plans. Nevertheless, if any of the three states substantially reduce the robustness of their monitoring program (e.g., relative to the description of its monitoring in the Service's plan) the Service will consider revising the post-delisting monitoring plan.

Comment - Section 4(g) of the Endangered Species Act (ESA) mandates postdelisting monitoring (PDM) for a minimum of five years after a species is delisted. Because PDM is a federal requirement, federal funding should be provided to the states of Minnesota, Wisconsin, and Michigan to fulfill it. Furthermore, the level of federal funding provided should be commensurate with the standards and monitoring intensity required by the final PDM plan.

Response – The states are obviously critical in implementing the post-delisting monitoring described in the PDM plan. Nevertheless, there is a variety of federal assistance funds that could be used by states to support their efforts. These include Federal Aid in Wildlife Restoration, the State Wildlife Grant Program, and the Cooperative Endangered Species Conservation Fund.

### **Disease Monitoring**

Comment - The sampling protocol for necropsies and disease screening should be specifically stated to ensure that sampling is adequate to provide statistically significant results.

Response – Although starvation may be the major cause of pup mortality, disease may also be important during some years and may also infrequently play a significant role in adult mortality. Significant levels of mortality due to disease would be reflected in population surveys conducted by each state. Nevertheless, each state plans to implement some level of disease monitoring. Although we understand the commenter's interest in a statistically robust disease monitoring program and the potential need for such monitoring in some cases, the continued population monitoring to be conducted by each state and the level of disease monitoring proposed by each state is sufficient for post-delisting monitoring of the Western Great Lakes DPS.

Below we summarize the disease monitoring proposed in each state's wolf management plan (Michigan Department of Natural Resources 2007; Minnesota Department of Natural Resources 2001; Wisconsin Department Natural Resources 2006):

#### **Michigan**

In its draft revised wolf management plan, MI DNR proposes to take the following actions to ensure diseases and parasites do not threaten the viability of wolves in Michigan:

- As necessary, update and refine protocols for collecting, submitting, and storing information on carcasses and biological samples.
- Train field staff on collection and submission protocols.
- Conduct necropsies and analyses of dead wolves and biological samples, respectively.
- Work with management partners to develop and conduct studies of wolf diseases and parasites.
- Continue to evaluate the feasibility and need for vaccinations of captured and free-ranging wolves.

#### **Minnesota**

- Will collaborate with other investigators and continue monitoring disease incidence, where necessary, by examination of wolf carcasses obtained through depredation control programs and through blood/tissue physiology work conducted by MN DNR and the U.S. Geological Survey.
- Will keep records of documented and suspected incidence of sarcoptic mange.



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- May initiate regular collection of tissue and conduct “periodic assessments of wolf health” “when circumstances indicate that diseases or parasites may be adversely affecting portions of the wolf population.”

### Wisconsin

- Will test live-captured wolves for diseases, physiological condition and parasites. Ideally about 10% of a population of 100 wolves should be examined, but as the population continues to increase, the percentage of the population live-captured will decline. In recent years 20 to 40 wolves were captured annually.
- Will collect wolf scats to monitor for infectious diseases and parasites.
- Will necropsy dead wolves to determine cause of death, physical condition and disease status.
- Will archive tissues for future disease and genetic investigations.
- May occasionally conduct special studies on wolves – these should include health monitoring.
- Should continue wolf health monitoring as part of the capture protocol of studies of wild wolves in Wisconsin and should coordinate this monitoring with WDNR Wildlife Health Team.

### **Cooperation with Native American Tribal Governments**

Comment – The paragraph on page 6 which discusses tribal management has a generally negative tone.

Response – The commenter also provided replacement language for this paragraph, which we have largely adopted in the final version of the plan.

Comment – Expand the list of information that the Service will request from tribal natural resource agencies (i.e., include “changes to management” and “other relevant information”) and request this information from tribal natural resource agencies within the range of wolf within the DPS, in general.

Response – The final version of the plan includes this slightly expanded list of information to be requested from tribal natural resource agencies and does not explicitly limit the information request to specific tribes.

### **Recommended Actions at End of Five-Year Monitoring Period**

Comment – The Service indicates at the end of the 5 year period, it “may” request reviews by the Recovery Team; this should be a required action.

Response – The Service, in developing and implementing recovery plans, may procure the services of appropriate public and private agencies and institutions and other qualified persons in the form of recovery teams. Now that the gray wolf within the WGL DPS is delisted, the Service plans to disband the Eastern Gray Wolf Recovery Team. Therefore, we will change any reference to the recovery team to “former members of the recovery team” in the final plan. Nevertheless, the Service recognizes the substantial technical expertise of these persons and will likely seek their individual reviews of our findings, at least at the end of the five-year monitoring period.

Comment – The Service indicates that, except under fairly extreme circumstances, it believes a 5 year monitoring period will be adequate; the Service should retain an oversight role and program even after the five-year post-delisting period has ended.

Response – Now that the WGL DPS of gray wolves is no longer on the list of endangered and threatened species, the Service has no authority under the Endangered Species Act for formal oversight of wolf management. If data are sufficient to indicate that the gray wolf in the DPS will be effectively conserved without protection of the Endangered Species Act, then the Service should focus its limited resources on species that remain on the list of endangered and threatened species or that may warrant addition to the list (i.e., “candidate” and ‘at risk’ species).

Comment - A public attitude survey should be conducted near the end of the monitoring period to gain insight into the trends in public acceptance of wolves. Public attitudes may be the most significant factor in determining the long-term fate of the species in this DPS and it would be difficult to adequately determine if additional monitoring is necessary without an understanding of public attitudes and how they may be trending.

Response – The Service will annually review any reports or publications on public attitudes toward WGL DPS wolves and any educational materials, press releases, and other wolf-related public information/education materials produced by the states, tribes, or others. In addition, we will directly evaluate the impacts of the public on wolves in the DPS by reviewing wolf population estimates and trends, the numbers of wolves killed legally and illegally, summary data for all law enforcement investigations, and reports of wolf depredation incidents. Although the Service does not plan to commission any survey of public attitudes, it plans to review the results of any studies conducted by others (e.g., universities).

### **Status of Wolves in Lower Michigan**

Comment – A population survey should be conducted in the northern lower portion of Michigan in the final year of the 5-year post-delisting monitoring period.

Response – There is no clear need for wolves to occur in this area to ensure that the species no longer meets the definition of endangered or threatened under the Endangered Species Act. Therefore, the Service's PDM plan will not refer specifically to wolves in this particular area.

### **Other Comments Specific to Monitoring in Minnesota**

Comment – MN DNR should conduct aerial wolf surveys and should not just gather “opinions” and data incidental to studies on other species. We would like to see a list of participants and break down of their field positions in order to assess their qualifications for making these wolf observations.

Response – The statewide survey is based on much more robust methods than that suggested by the commenter. MN DNR collects data from a variety of sources to prepare its five-year statewide population estimate. It relies, in part, on data collected from regular monitoring that is not focused solely on gray wolf, including scent post surveys and winter furbearer track surveys. There is nothing inherently wrong in using these types of data to ensure that all data revealing of wolf abundance and distribution contribute to the MN DNR's understanding of wolf trends in the state. MN DNR also uses the best available information regarding the relationships between wolf densities and human population and road densities to describe occupied wolf range in the state. In addition, ongoing radio telemetry studies help DNR to refine estimates of pack territory sizes. We expect MN DNR to continue to investigate the most efficient methods to estimate its statewide wolf population as accurately and precisely as is feasible. In its 2003-2004 report on its most recent statewide estimate, for example, MN DNR stated that aerial sampling methods show promise, but “may be logistically challenging when applied to broad expanses of dense forest” (Erb and Benson 2004). Due to the logistical and other factors that each state must consider when designing its methods to monitor the widespread and dynamic wolf populations, it would not be appropriate for the Service to prescribe specific methodologies.

Comment – A significant portion of Minnesota's wolf range does not have any scent post sites and two of the largest counties in prime wolf range (Itasca and Koochiching) have only one station each.

Response – MN DNR actually conducts annual surveys along 24 2.7-mile routes (ten scent stations each - 240 scent stations total) in Itasca County and an additional ten routes (100 scent stations total) in Koochiching County (J. Erb, Minnesota Department of Natural Resources, Grand Rapids, MN, pers. comm. 8/24/07). In the “Forest Zone”, which comprises the main portion of the wolf range in Minnesota, there were 173 scent station routes completed in 2006 (Erb 2006).

Comment – The draft monitoring plan mentioned that MN DNR would furnish independent annual indices

and changes in occupied range of wolf in the state but they will not provide population estimates annually. Delisting and monitoring depend on population data. Using limited trend data is an arbitrary way to “monitor” a species just removed from the list of threatened species.

Response – It is uncommon for populations of any species to be counted in their entirety. Therefore, conservation agencies commonly use indices and population sampling to monitor population trends. Of the three states inhabited by gray wolf packs in the WGL DPS, only Wisconsin may continue to conduct what may approach a complete count or census of its late winter wolf population. Minnesota, however, may contain approximately six times the number of wolves as Wisconsin, distributed over a larger geographic area. The combined use of annual population indices and a five-year statewide population estimate is adequate for monitoring the post-delisting status of gray wolves in the state.

### **Scope of Plan**

Comment – The post-delisting threats remain significant. The draft plan does not adequately acknowledge those threats nor does it provide an adequate process for addressing those threats.

Response – The Service determined that the current threats to the species no longer warranted its listing as endangered or threatened under the ESA. A reduction in threats to the species is the primary cause of the dramatic wolf population increase over the last 25 years and attainment of the numerical recovery criteria. The intent of the post-delisting monitoring plan is to determine whether or not threats to gray wolves in the WGL DPS are adequately addressed by states, tribes, and others (e.g., federal land management agencies) to preclude the need to list the species under the ESA during the five years following its delisting. For gray wolf WGL PDM purposes, we believe the most important threats to monitor are those that have been sufficiently reduced and contained, but not permanently eliminated, during the recovery process. For gray wolves in the WGL DPS, those threats are primarily the various forms of human-caused mortality that have been reduced by the provisions of the Act. Additionally, a variety of known wolf diseases and parasites are of concern. Furthermore, the possibility of new diseases represents a threat that requires vigilance. All these anticipated post-delisting threats are described in detail in “Summary of Factors Affecting the Species” in the preamble of the 2006 proposed delisting rule (75 FR 15277-15302) and are addressed by each state in their respective state management plans.

### **Monitoring Effort**

Comment – The same monitoring techniques should not be required both pre-and post delisting, particularly for populations that significantly exceed numerical delisting criteria outlined in recovery plans. In reality, states should only be required, through the PDM plan, to reliably demonstrate that there is at least the minimum number required by recovery plans for delisting purposes.

Response – The Service agrees that the most important purpose of population monitoring per the ESA’s PDM requirement is to determine, with sufficient confidence, that population levels exceed the objectives described in the recovery plan. Where feasible, however, the Service should also review trends in population estimates, indices of abundance (e.g., scent post surveys), mortality records, diseases, and prey abundance to determine whether or not significant problems for wolf populations may be developing during the PDM period.

Comment - The final PDM plan should include language that allows the states to investigate and adopt alternative methods and protocols so as long as the data are scientifically comparable to data obtained prior to delisting. States should have flexibility to refine and change monitoring protocols through time as new techniques are investigated and validated. This flexibility is especially important given the potential for limited and declining availability of funding as wolf distribution expands.

Response – In the final PDM plan the Service will attempt to accurately describe each state’s monitoring plans for the five years following delisting. There is nothing in the Service’s plan that would preclude changes by the states. The Service would review any changes, however, to ensure that the revised methods

are likely to provide sufficiently accurate and precise information to effectively monitor the status of the species. In fact, Michigan has been in the process of revising its methods and the nature of those revisions is briefly described in the PDM plan.

### **Typographical, Clarification, and other Minor Errors in Draft**

Comment - The PDM draft indicates actions (a) through (f) as potential actions USFWS might take after an annual review, but actions (e) and (f) are missing from the list on page 10 of the 04/23/07 draft.

Response – The draft plan should have said that the Service may take actions “(a) through (d)” listed below. There were no potential response actions that were missing from the draft plan.

Comment - The difference and the nature of the relationships between "quantitative events" with "qualitative factors" are not clear.

Response – The response to the ‘quantitative’ triggers would be a focus on the potential need to relist the species, whereas the response to the ‘qualitative’ factors would not necessarily focus on the potential need to relist the species. Situations that trigger one of the “qualitative events” will prompt the Service to evaluate the situation in detail and its underlying causes, but will not necessarily prompt an assessment of the potential need to relist the species. We will attempt to make that more clear in the final PDM plan.

### **Potential Response of the Service to Monitoring Results**

Comment - We agree with the general USFWS approach, to consider a variety of data sets, events, and factors that influence wolf population trajectory, in addition to their interactions. We agree that USFWS should not specify a set of strict triggers and automatic agency actions a priori. Instead, USFWS should consider the collective body of information and data, consult with independent experts if appropriate, and proceed accordingly.

Response – We agree that it would not be appropriate to state in the PDM plan that the Service would relist the species, for example, if certain events transpired. It is more appropriate to state, as clearly as is appropriate, what situations will prompt an evaluation by the Service to determine its appropriate response.

Comment – The PDM draft plan states that "in the event that WGL DPS declines are evident following an annual review, the Service may take any or all of the following actions." Previous paragraphs suggest that this is the list (a) through (f) of potential USFWS actions. But the list (a) through (d) published in the draft does not include the option of taking no action for a year. The final PDM plan should not absolutely require the USFWS to take any action after only a single year's decline. Wildlife populations are inherently variable and there is also variance associated with monitoring protocols, sampling, and population estimation procedures. For example, monitoring protocols in the Great Lakes states rely heavily on snow tracking surveys, but low snow pack and poor tracking conditions can result in poor quality data and an apparent population decline when the population may have actually increased.

Response – We agree that evidence of a population decline in some years may not warrant that the Service implement one of the four actions described in the draft plan. We will modify the plan to include ‘no action’ as a potential response, as appropriate.

Comment – As written, the Service could be required to take action after any single's year data shows "a decline", but the draft is not clear with respect to whether the decline was in one of the quantitative measures or the qualitative measures. This should be clarified in the final DPM plan.

Response – We will attempt to clarify this in the final plan to indicate that the Service may act in response to annual declines in any of the ‘quantitative’ or ‘qualitative’ events or factors.

Comment – We encourage the Service to consider a combination of metrics (e.g., moving averages) and not

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a single metric of total number of wolves. Furthermore, more than a single year's decline (or whatever combination of metrics is in the final PDM) in a state's wolf population should be required before extending the PDM period, initiating a status review, or an emergency relisting.

Response – The Service is likely to maintain a focus on total number of wolves or estimates thereof as described in the draft plan. We agree that such a focus will result in a high degree of sensitivity to population fluctuations, but we will strive to ensure that our response to any declines is appropriate and based on factors such as the magnitude of the decline and our ability to identify the cause and duration of the decline.

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