

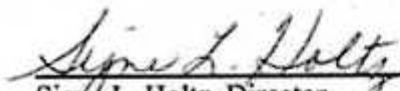
# Wisconsin Wolf Management Plan Addendum 2006 and 2007

Compiled by the Wisconsin Wolf Science Advisory Committee in cooperation  
with the Wisconsin Wolf Stakeholders Group


For The  
Bureau of Endangered Resources, Division of Land for the Wisconsin  
Department of Natural Resources

This addendum updates portions of the Wisconsin Wolf Management Plan, approved by the  
Natural Resources Board on October, 27, 1999. The addendum to the wolf plan was  
presented and approved by the Natural Resources Board at their meeting on June 28, 2006  
and updated on August 15, 2007.

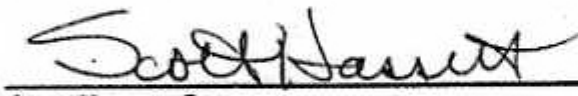
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August 15, 2007

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**Wisconsin Wolf Management Plan,  
Addendum 2006 & 2007  
Executive Summary  
By the Wisconsin Wolf Science Advisory Committee**

In 2004 and 2005, the Wisconsin Wolf Science Advisory Committee conducted a review of the 1999 Wisconsin Wolf Management Plan, in conjunction with the Wisconsin Wolf Stakeholders groups. Both groups advise and report to the Bureau of Endangered Resources on matters of wolf management and conservation in the Wisconsin. This report includes updates and modifications recommended to the 1999 Wisconsin Wolf Management Plan by the Wisconsin Wolf Science Committee.

The review of the wolf plan included several meetings with the Wolf Science Committee in 2004 and 2005, four meetings with the Wisconsin Wolf Stakeholders, and a public review of the 1999 Wolf Plan by interested citizens in between August 13 and September 13, 2004 through email, mail, and contacts at DNR offices (Appendix K). In the following discussion the Wolf Science Advisory Committee will be referred to as “the Committee”.

Wolf population management goals were reviewed and were generally agreed to continue to be reasonable by the Committee. Carrying capacity assessments continued to suggest a potential biological capacity for about 500 wolves. The committee agreed to continue to maintain a state delisting goal of 250 wolves outside of Indian reservations in a late winter count, and a state management goal of 350 wolves outside of Indian reservations in a late winter count. Social surveys indicate that there continues to be strong public support for wolf conservation in the state, although it varies considerably among various groups. In late winter 2007, 540 to 577 wolves were counted statewide, and 528 to 560 were counted outside of Indian reservations. Thus in recent surveys the wolf population seems to be above the state management goal. Federal delisting was completed on March 12, 2007, allowing the state to begin to apply controls on the wolf population.

Concerns and procedure of wolf health monitoring were updated and modified to reflect greater involvement by the Wisconsin DNR in examination and necropsies on dead wolves, which were initially conducted by the National Wildlife Health Center in Madison.

Information on habitat management was updated. New assessments of potential habitat were being conducted, but had not been completed at the time of the review. In general most wolves did continue to occur in heavily forested lands and in areas with low road

densities. The committee in general agreed that access management on public lands and protection of den sites continued to be important conservation practice for wolves. Special protection for wolf rendezvous sites no longer seemed necessary with the higher wolf population and ephemeral nature of these sites. The committee agreed that wilderness areas were not necessary for maintaining healthy wolf populations as long as scientifically sound management and access control were conducted on public and industrial forest lands.

The language for wolf depredation management was updated to include new depredation payments rules adopted in 2005, and clarification of procedures and practices. A solid professional program for providing timely and effective responses to wolf depredations management is outlined. The committee agreed to extend areas of depredation control trapping to 1.0 mile from depredation sites in zones 1 and 2, from 0.5 mile of the 1999 plan, when wolves are delisted or federal regulations allow greater flexibility. Authorizations for control of wolves attacking domestic animals on private land have been updated and will go into effect once federal delisting is completed.

List of potential wolf research projects was updated to reflect expanded knowledge of wolves in the state, new disease concerns such as ehrlichiosis and neosporosis, need for assessing potential changes in human attitudes, and continuing to examine wolf impacts on ecosystems in the state.

Wolf specimen handling information was updated as DNR and USDA-WS have started to handle larger numbers of dead wolves. Modifications are being made with necropsies no longer just conducted by the National Wildlife Health Center in Madison, as had been the case through the early 2000s. Changes in guidelines for wolf specimen handling was also necessary to reflect reorganization changes that have occurred in the WDNR personnel.

Budget information on the wolf plan was updated to reflect annual state wolf management costs of \$250,000 to \$310,000, and annual depredation payment costs of \$60,000 to \$80,000. More secure federal funding has been found to allow USDA-Wildlife Services to be more effective in dealing with wolf depredation management, but additional sources for funding state wolf management and state depredation payments may be needed in the future.

Two appendices to the wolf plan were supplemented and a new appendix was added by the committee. Appendix F on Wolf Health Monitoring and Mortality Factors was supplemented to add additional mortality data through summer 2005. Appendix H on Public Opinions on Wolf Management incorporated new data and surveys conducted between 2001 and 2005. Appendix K was added to include all the results from the DNR questionnaire on wolf management that was conducted in 2004.

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## **Wisconsin Wolf Management Plan, Addendum 2006 & 2007.**

### **Review of Management Goals**

The Wisconsin DNR wolf management plan (1999) contains goals for management and goals for legal status (endangered, threatened, delisted) thereby linking population levels to discrete levels of protective management. In determining various population goals associated with management and legal classification the Wisconsin Wolf Advisory Committee evaluated the following 4 factors.

- The goal needed to meet or exceed federal recovery criteria.
- The goal must represent a population level that can be supported by the available habitat.
- The goal needed to be compatible with existing information on gray wolf population viability analysis.
- The population goal needed to be socially tolerated to avoid development of strong negative attitudes toward wolves.

The outcome of this process was a management goal of 350 wolves outside of Native American Reservations. At this level “proactive depredation control can be authorized”. A late winter count of 250 (outside of Native American Reservations) was the threshold for de-listing or removal from state “threatened” status. Eighty individuals was the threshold for classification as a state “endangered” species (Wisconsin DNR 1999, Wolf Management Plan).

Review of population goals will be made in light of the 4 factors considered above.

#### The goal needed to meet or exceed federal recovery criteria.

The U.S. Fish and Wildlife Service Recovery Plan for Wolves in the Eastern U.S. (1992) recommended maintaining a minimum of 100 wolves in Wisconsin and Michigan. This number apparently depends on an assumption that wolves will continue to emigrate from Minnesota. The assumption of emigration is reasonable given recent long-distance movement of wolves outside on the northern Great Lakes region. Since the federal goals have not changed the Wisconsin goal of 350 continues to exceed the federal goal of 100.

#### The goal must represent a population level that can be supported by the available habitat.

A detailed assessment of the available habitat and the number of wolves that could be supported by the available habitat was done by Mladenoff et al. (1995, 1997). This effort was based on an logistic regression modeling of the occupancy of a small number of pioneering wolf packs, with covariates reflecting their assumed tolerance for human disturbance and their assumed relationship to deer density. Later colonization and local growth in the wolf population provided additional data and an opportunity for validation of the earlier habitat modeling. This later analysis indicated that the habitat relationships developed by Mladenoff et al. (1995, 1997) were robust, correctly classifying the habitat used by 18 of 23 new wolf packs as favorable (Mladenoff et al. 1999). Mladenoff et al.

predicted that 300 to 500 wolves could occupy the most favorable habitat at saturation. With additional occupancy of marginal or secondary habitat Mladenoff et al (1995, 1997) predicted an equilibrium population size of 500 to 800 wolves. Further analysis suggested that the earlier projections were likely conservative – failing, for example, to identify the currently occupied wolf range of Wisconsin’s central forest region (Mladenoff 1999).

An independent analysis of the growth of Wisconsin’s wolf populations largely corroborated with the equilibrium Mladenoff et al. (1995, 1997, and 1999) predicted based on habitat. Van Deelen (unpublished) fit simple growth models to a XX year time series of wolf population estimates. Models fit were the discrete logistic model (CITATION) and the discrete Ricker model (1975) of the general form  $N_{t+1} = f(N_t)$  where  $N$  = population size. Model fitting was based on a least squares algorithm and jackknife procedures were used to generate variance estimates because of the inherent temporal autocorrelation (Dennis and Taper 1994). The best fit logistic model estimated an equilibrium (or carrying capacity) of 505 (95% C.I. = 501 - 518,  $P < 0.0001$ ,  $R^2 = 0.99$ ) whereas the best fit Ricker model estimated an equilibrium of 522 (95% C.I. = 295 - 635,  $P < 0.0001$ ,  $R^2 = 0.99$ ). Model selection criteria (Burnham and Anderson 1998) suggested that these 2 models were nearly equivalent given the data. Nonetheless, a Ricker model is probably more useful because of less restrictive assumptions about the shape of the growth curve.

Despite wide use to characterize the growth in a time series of population growth estimates (Lotts et al. 2004) this model fitting approach has recently been criticized in favor of a risk analysis (Population Viability Analysis) that can be generated from the same data (Lotts et al. 2004). Still this exercise demonstrates that the original estimates of 300-800 wolves (depending on the extent to which marginal habitat was used) were reasonable and probably quite accurate.

#### The goal needs to be compatible with existing information on gray wolf population viability analysis

The wolf advisory committee assessed the viability of the Wisconsin wolf population by reviewing current literature on wolf population viability (Soule 1980, Fritts and Carbyn 1995, Haight et al. 1998) and by conducting an independent analysis tailored to the population biology of Wisconsin wolves (Appendix B, Wisconsin DNR 1999, Wolf Management Plan).

The independent analysis was based on computer simulation of wolf population dynamics using the program VORTEX. VORTEX is a mechanistic individual-based model incorporating stage-specific birth and death rates and stochasticity. Conclusions of this analysis were that a population of 300-500 wolves would have a high probability of persisting for 100 years under most scenarios but that population persistence was susceptible to environmental variation and demographic catastrophes (a severe mange outbreak for example). Simulations for a 300-500 wolf population suggested that under moderate environmental variability and a 5% probability of demographic catastrophe 10-

40% of simulations declined below 80 wolves (threshold for classification as endangered).

The independent analysis in Appendix B is an important and instructive piece of supporting analysis for the wolf management plan. However it was conducted in 1998 when the estimated population size was 178-184 wolves. Additional information on the actual growth of the Wisconsin wolf population (425 in 2005) and the telemetry monitoring since 1998 might be useful for refining or validating the input survival and reproductive parameters used.

That said, highly mechanistic population models like those simulated with the VORTEX suffer from imprecision in their projections and may in fact be biased because of their complexity (Lotts et al. 2004). For instance the description in Appendix M (1999 Wisconsin Wolf Management Plan) suggests that there were at least 14 discrete assumptions made about the values or statistical properties of the input parameters and model structure dictates an additional assumption about how the model inputs relate to one another. Appendix M correctly points out that its population viability analysis should be viewed as a component in an adaptive management process and that correction and updating of predictions should occur as population monitoring provides additional information on the population dynamics of Wisconsin wolves. This point warrants emphasis. Additionally, the lengthening time series of high quality wolf population estimates for Wisconsin will likely support additional modeling approaches (e.g. Lotts et al. 2004) that would serve to validate or identify weaknesses in population viability analysis using a mechanistic approach.

Previous discussion notwithstanding, the population viability analysis done for the Wisconsin Wolf Management Plan (1999) appears to remain valid in the light of the continued growth of the wolf population (see above). And survival analysis of radio collared wolves through 2003 indicated that the input parameters on stage-specific wolf mortality used in Appendix M are reasonable (Van Deelen unpublished).

The population goal needs to be socially tolerated to avoid the development of strong negative attitudes toward wolves.

Determining social carrying capacity is more difficult, because it is hard to put into exact numerical terms. Some recent research and surveys have provided some general suggestions of social carrying capacity or tolerance. In late summer 2004, the Wisconsin DNR, conducted a survey of the state wolf plan to which 1367 people responded (1322 residents of the state, and 45 non-residents). Table 1 lists attitudes toward the state delisting and management goals. Overall, 41 % of the respondents felt the delisting goal was too low, 19% that it was correct, and 40% felt it was too high. Similarly, 39% of respondents felt the management goals was too low, 16% that it was correct, and 45% that it was too high. Among hunters, 57% felt the delisting goals were too high, 64% felt the management goals were too high. On the other hand, among non-hunters, 78% felt the delisting goal was too low, and 74% felt the management goal was too low. When asked about specific numbers for a goal, state residents seemed to prefer 400 or more



wolves, but hunters preferred about 100, and farmers about 150. But among all groups there was a broad range from 0 to 5000 wolves that were considered desirable for the state.

Naughton-Treves et al. (2003) conducted surveys of livestock producers, bear hunters, and northern Wisconsin residents in 2002, when 327 wolves were counted in the state. Bear hunters were the most negative toward wolf numbers in the state and nearly 1/3 felt wolves should be eliminated from the state (Table 2). Livestock producers were more positive, and 55% felt the current population should be maintained or increased. Northern Wisconsin residents who were neither bear hunters nor livestock owners were most positive and 73 % indicated that the current population should be maintained or increased. Most bear hunters wanted the wolf population held to less than 100 wolves, but among farmers, 63% wanted more than 100 wolves. Among the other northern Wisconsin residents, 44% wanted over 250 wolves, and 28 % wanted no cap.

In some more recent research by Naughton-Treves et al. (unpublished report), a survey was done on attitudes of wolves by urban people outside range, rural people outside wolf range, urban people in wolf range, and rural people in wolf range. In general, rural people in wolf range wanted the lowest wolf numbers, while urban people outside wolf range wanted the highest numbers (Table 3). But the average value for rural people in wolf range indicated that most would still accept between 350 and 500 wolves. People outside of wolf range mostly wanted over 500 wolves in the state.

In 2003, Kevin Schanning, Sigurd Olson Environmental Institute of Northland College conducted a study to assess the attitudes, opinions, and concerns of Wisconsin residents regarding the state's wolf population. The study design utilized a random sampling methodology, which included some degree of over-sampling of residents who lived in counties known to be inhabited by wolves. Overall, 647 respondents returned the surveys, yielding a margin of error of plus or minus 4%.

One section of the survey asks respondents about their degree of participation in a wide variety of outdoor activities from berry picking, to ATV riding, to hunting; 16 activities in all. Respondents were asked the degree to which the presence of wolves would affect their participation in such activities. The vast majority of respondents indicated that the presence of wolves would not affect their level of participation in these activities. For example, 88% of the respondents who deer hunted indicated that their level of participation would not change with the presence of wolves. Overall, the percentage of respondents indicating that their activities would not change ranged from a high of 90% for canoeing to a low of 77% for running. Additionally, for each activity listed approximately 3 % of respondents reported that their level of participation in that activity would increase if they knew wolves were present in the area in which they were participating in that activity. These findings suggest that social tolerance of wolves in Wisconsin is high.

Respondents were also asked to respond to the question of whether they thought Wisconsin currently had too few wolves, too many wolves, or the correct amount of

wolves. Findings from this question are: 51% indicated that there are currently the right amount of wolves, 31% indicate that there are not enough wolves, and only 18% stated that there are too many wolves in the state. In 2003 the DNR estimated the wolf population to be between 335-353 animals. Consequently, it would seem that vast majority of respondents felt that the current population of wolves was acceptable.

No attitude surveys on wolves have been conducted with Native Americans in Wisconsin. Future surveys should attempt to determine attitudes toward wolf management by Ojibwa, Menominee, Pottawatomie, Ho-Chunk, Stockbridge, and Oneida people in Wisconsin.

The sampling for these surveys were done somewhat differently. The surveys by Naughton-Treves and Schanning were stratified random samplings, while the DNR survey was available for anyone interested in wolf management in the state. But the 4 surveys do yield some similar results. In general it does appear that goals set in the plan seem to fall about mid-way within the range of population goals expressed by people; although at least one member of the DNR Wolf Science committee felt social surveys did not provide justification to keep the wolf population below the potential biological carrying capacity. Hunters, farmers, and rural landowners in wolf range, were mostly interested in lower wolf numbers. Bear hunters were least tolerant of wolves, and will be a difficult group to satisfy as to wolf population management. For most other groups, the DNR wolf population goals seem fairly reasonable.

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Table 1. Population Goals from Wisconsin Wolf Management Questionnaire

<u>Question/group</u>	<u>Much too low</u>	<u>Somewhat low</u>	<u>About right</u>	<u>Somewhat high</u>	<u>Too high</u>
Delisting at 250					
Hunters	8%	13%	22%	18%	39%
Non-hunters	43%	35%	12%	4%	6%
All	20%	21%	19%	13%	27%
Manage at 350					
Hunters	7%	13%	16%	17%	47%
Non-hunters	39%	35%	16%	3%	7%
All	18%	21%	16%	12%	33%
<u>Recommended Goal</u>	<u>Mean</u>	<u>Median</u>	<u>Range</u>		
State Resident	483 wolves	400 wolves	0 -5000 wolves		
Non Resident	455 wolves	400 wolves	300-1000 wolves		
Hunter (Resident)	185 wolves	100 wolves	0 -3500 wolves		
Farmer (Resident)	252 wolves	150 wolves	0 -3500 wolves		

Table 2 . Wolf Population Goals from Naughton-Treves et al. 2003.

Question	Bear Hunter	Livestock Producer	N. Wis. Gen. Resident	All
Wolf population Should be.....?				
Eliminated	32%	12%	6%	16%
Reduced	48%	31%	20%	32%
Maintained at current level	16%	43%	50%	37%
Increased	4%	14%	23%	14%
Wolf population should be under				
<100	72%	37%	28%	45%
<250	16%	36%	28%	25%
<350	4%	6%	9%	6%
<500	3%	7%	7%	6%
no cap	6%	14%	28%	10%

Table 3. Wolf Population Goals, Naughton-Treves and Treves (unpubl. Data)

Groups\ Wolf Number	1 <250 wolves	2 <350 wolves	3 <500 wolves	4 <1000 wolves	5 No cap
Urban, No Wolf (n=431)			3.47		
Rural, No Wolf (n=216)			3.27		
Urban, Wolf Area (n=206)		2.87			
Rural, Wolf Area (n=493)		2.27			

### **C. Wolf Health Monitoring**

Health monitoring is necessary to assess impact of diseases and parasites on the wolf population. Additionally, comparisons of the health and diseases of culled depredators and investigation of the role of wolves in the ecology of diseases of zoonotic or livestock importance will assist in management of the growing wolf population. Health monitoring includes collection and analysis of biological samples from live-captured wolves, analysis of wolf scats, and necropsies of dead wolves found in the field. While federally listed as endangered/threatened, biological samples of live captured wolves and analysis of scats will be conducted by WDNR, and wolf necropsies will be conducted by the USGS-National Wildlife Health Center and the WDNR. When federal delisting occurs, all health monitoring will be the responsibility of WDNR.

Intensive health monitoring will continue while wolves are listed as a state endangered or threatened species. Live-captured wolves will be tested 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. Wolf scats will be collected to monitor for infectious diseases and parasites. Dead wolves will be necropsied to determine cause of death, physical condition and disease status. Additionally, tissues will be archived for future disease and genetic investigations.

Following state delisting, live-trapping will continue, but the percentage of the population captured each year will decline. WDNR will continue to examine dead wolves. Special research studies may occasionally be conducted on wolves and these should include health monitoring. Wolf health monitoring should continue to be part of the capture protocol of studies of wild wolves in Wisconsin, and should be coordinated with WDNR Wildlife Health Team.

### **D. Habitat Management**

#### **1. Potential and Suitable Habitat.**

In the 1999 Wisconsin Wolf Plan, it was estimated that about 5812 mi.<sup>2</sup> of favorable wolf habitat existed in Wisconsin based on research by Mladenoff et al. 1995 and 1997. Favorable habitat was considered areas with road densities of 0.7 mi./ mi.<sup>2</sup> or less, and also were mostly forest, had low density of humans, lacked urban areas, and included little or no farm land. Areas with road densities of 0.7 -1.0 mi./ mi.<sup>2</sup> were considered secondary wolf habitat and covered 5015 mi./mi.<sup>2</sup>. Mladenoff et al. (1999), and Wydeven et al. (2001), indicated that road density continued to be a useful indicator of preferred wolf habitat. Mladenoff et al. (2005) examined distribution of Wisconsin wolf packs through 2003, and found that in recent years packs have begun to occupy areas in higher road densities than seemed unsuitable during earlier portions of the colonization.

In 2005, areas occupied by territorial wolves covered 6373 mi.<sup>2</sup>, or about 10% higher than the original predicted favorable habitat. Occupied areas included 5557 mi<sup>2</sup> in Zone 1, 346 mi<sup>2</sup> in Zone 2, and 250 mi<sup>2</sup> in Zone 3. Wolves in northwest and north-central Wisconsin in 2005 appeared to occupy all the areas of primary (favorable) and secondary habitat, and appeared to be spreading into areas previously considered unsuitable habitat. Wolf packs did continue to occur mainly in areas of extensive forest cover or other wildlands (barrens, marsh, bog, forest openings, wild grasslands and brushlands). In northeast Wisconsin wolves had not completely occupied primary and secondary habitat, packs continued to be rather scattered, and only one pack (Dunbar in Marinette and Florence Counties) had any substantial pup survival. Wolf packs in the Central Forest (Zone 2) seemed to occupy all the areas of primary and secondary habitat. A few areas of Zone 3 were also occupied by territorial wolves and included Fort McCoy, Burnett/Polk/Barron Counties, south-central Rusk County, Mead Wildlife Area, Dewey Marsh Wildlife Area, west Shawano County, west Oconto County, and southeast Marinette County. Zone 3 contained 6 packs but they consisted only of 2 to 4 wolves. In Zone 3, half the packs were involved in depredation on livestock, compared to <10% annually of packs from the rest of the state (Wydeven et al. 2004). As wolves move into areas considered more marginal habitat, level of depredation on livestock is likely to increase (Treves et al. 2002, Treves et al. 2004).

## **2. Access Management**

With recent growth and expansion of the wolf population, access management seems to be less of an issue in wolf management. Although there probably is little justification to reduce road densities on public forest lands for wolves, it would be prudent to maintain areas of low road density for wolves and other wildlife sensitive to human disturbance. These areas of low road density were the first places settled by wolves and probably serve as core habitat for source populations. With future fluctuations in wolf population these core areas may be important for maintaining viable populations, and population persistence. Development, especially rural housing continue to increase and expand

across northern Wisconsin, causing further fragmentation and reduction of forest habitat (Radeloff et al. 2005). Also with eventual federal delisting, greater pressure will be placed on wolves in marginal areas, causing these core areas of low road densities to become that much more important in maintaining viable wolf numbers.

In recent years use of All Terrain Vehicles (ATVs) has drastically expanded across much of Wisconsin. This increase has occurred at the same time the wolf population has also expanded, suggesting that current levels of ATV use have had little impact on wolf populations. But changes in attitudes toward wolves, reduction of large blocks of forests, increase human populations and recreational activities, may change these dynamics. Impact of ATV use on forest wildlife, especially low density, sensitive species such as wolves and bobcats, as well as impact on forest ecosystems, should continue to be an important aspect of forest management. Access management and off-road management should occur on all major areas of public forest lands.

### 3. Vegetation Management

In recent years wolves have had little problem finding adequate prey of deer and beaver across northern and central Wisconsin. It appears that current composition of early succession, mature, and older forest seem to adequately provide prey for wolves. In the future, early succession types such as aspen and jack pine will continue to decline. Although minor declines in these habitats are not likely to greatly affect wolves, major declines would reduce abundance of wolves and may reduce or eliminate some areas as wolf habitat. The new plan for the Chequamegon-Nicolet National Forest (2004) seems to maintain reasonable areas of early succession forest to maintain wolf numbers. The national forest provide some of the best potential for maintaining large blocks of mature forests, and it should serve this role, but adequate areas of young forest also need to be maintained. County Forests are developing 10 - 15 years comprehensive management plans in 2005, and maintaining areas of early succession will be part of most county forest plans. Through state forest master plans it is expected early successional forests will be a continued important component of these properties.

### 4. Habitat Linkage and Corridors.

It continues to be unclear how wolves disperse across large landscape areas. It is generally assumed wolves use forested parcels, forested riverways, and areas of low road densities, but detailed assessment of habitat used by dispersing wolves have not been made. Research on Highway 53 in northwest Wisconsin did not indicate any major impact of highway development on wolf population expansion or mortality (Kohn et al.2000). Impact of highway development was minimized because highway alignments mostly followed existing roadways, and mitigation measures were used along the highway (Kohn et al.2000). Although some dispersing wolves have done extensive crossings of roads and highways (Merrill and Mech 2000), vehicle collisions continue to be a major mortality factor for wolves in central and southern Wisconsin. Wolves have been killed on many of the major interstate and four-lane highways in the state including I39/U.S. 51, I94, U.S. 53, and State 29.

In Wisconsin wolves have been killed on roadways in Zone 4 counties including Brown, Columbia, Dane, Jefferson, Outagamie, Sauk, and Waukesha Counties. Additionally a yearling male from Jackson County, Wisconsin was found dead in eastern Indiana, 420 miles away, and a 2-year old male from Gogebic County, Michigan/ Iron County, Wisconsin was killed in north-central Missouri about 460 miles away. These extensive movements suggest that some form of dispersal habitat exist along the way. Unfortunately, most were killed by vehicles, suggesting that roadways may still limit movements of dispersers. Several were found near riverways as well, suggesting that these may be important components of dispersal habitat. Maintaining forest cover throughout the state, especially along riverways, seems to still be of value to enable wolves and other long-distant dispersing mammals to travel between habitat patches in Wisconsin and the Midwest.

Kerry Martin with University of Wisconsin- Madison, is researching habitat of dispersing wolves in Wisconsin, and hopefully will be able to give updated guidelines for conservation of wolf corridor or dispersal habitat.

### **5. Den and Rendezvous Site Management**

Within areas of suitable wolf habitat in Zones 1 and 2, protection of den sites continues to be a useful strategy for conserving wolf habitat. Den sites generally occur in the most remote portions of wolf territories (Unger et al. 2005). Although at times wolves can tolerate some disturbance at den sites (Thiel et al 1998), but it may just be in very special circumstances where disturbance will be tolerated at dens. It is not clear as to how such disturbance will affect long term viability of packs. Plus the long-term affects of additional developments in forest areas may reduce potential areas of suitable den site. Therefore protections listed in the 1999 wolf plan should be continued.

It is less clear whether protection of rendezvous sites are still necessary across much of northern Wisconsin. In northwest, north-central, and Central Forest portions of Wisconsin protection of rendezvous sites are probably not necessary. In northeast Wisconsin where few packs are able to successfully raise pups, protection of rendezvous sites may continue to have benefits. Once wolf packs are well established within an area, as long as road densities are maintained at low levels, and sound ecological management is conducted on the forests, rendezvous site protection may not be necessary. In suitable areas where colonization is just beginning or wolf pup survival is extremely poor, protection of rendezvous sites may be appropriate.

### **6. The Role of Wilderness**

As with the 1999 wolf management plan, wilderness areas are not necessary to manage for wolves in Wisconsin. Wilderness area are used by wolves, but as long as sound ecological management is used on forests, wilderness areas are not necessary to maintain a viable population of wolves in the state.

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## **E. Wolf Depredation Management**

**{ Details of impact of wolf depredation in Wisconsin are discussed in the “Final Environmental Assessment for management of wolf conflict and depredation of wolves in Wisconsin” (USDA-APHIS 2006). Information on effects of wolves and other predators on farms, beyond verified depredations, are found in the review by Lehmkuhler et al. (2007). }**

[\http://www.fws.gov/midwest/wolf/depredation/WiPermitEA.htm\](http://www.fws.gov/midwest/wolf/depredation/WiPermitEA.htm)

Wolf depredation management is one of the most sensitive segments of this Wolf Management Plan. WDNR is charged with protecting and maintaining a viable population of wolves in the state, but also must protect the interests of people who suffer losses due to wolf depredation.

Wolves occasionally kill livestock, poultry, and pets. Although wolf depredation is not anticipated to impact a significant portion of the livestock growers, poultry producers, and pet owners, it can bring hardship to individuals. Minnesota currently has about 3,000 wolves but fewer than 1% of the farms in wolf range experience wolf depredation problems.

WDNR paid \$469,430.88 in wolf damage compensation claims for 270 calves, 13 cows killed and 4 cows injured, 74 sheep, 6 horses, 44 deer (Game Farm), 148 turkeys, 114 chickens and 95 dogs killed and 32 dogs injured between 1985 through 2005. (See [Appendix A1.](#)) Depredation on dogs represented 39 % of reimbursement payments and deer represented 18% of reimbursements provided by WDNR. In the 1990s an average of 2.8 farms suffered wolf depredation annually (range 0 -8), but from 2000 -2005 an average of 14.0 farms annually suffered depredations, and grew to 25 farms with depredations in 2005.

Reclassifying wolves from federally and state endangered to threatened status will provide an option to euthanizing depredating wolves. Under threatened status only government agents would euthanize wolves. Once wolves are delisted, permits may be issued by WDNR to enable private landowners to take depredating wolves. Public comments in autumn 1996 revealed concerns about killing wolves, particularly through public harvests. Other comments strongly supported public harvest. Most who supported euthanizing depredating wolves felt this should only be done by government professionals. Many urged educational programs and preventive efforts by livestock producers to minimize depredation losses. There was strong support for continued damage compensation programs.

### **1. Depredation Management Plan.**

The objectives of the wolf depredation management program are to address wolf depredation problems by investigating reported wolf complaints, accurately verifying wolf depredations, providing damage compensation in accordance with administrative code, and conducting depredation management actions to abate or prevent damage. Depending on circumstances management actions may include providing non-lethal

abatement measures and recommendations, and lethal removal of wolves by WDNR or its agents.

## **2. Verification Procedures**

Verification of reported wolf depredations is a critical step in the process of managing depredation problems. A reported wolf complaint must be verified as a confirmed or a probable wolf depredation before any damage abatement or compensation can be provided. Previous experience has shown that many reported wolf complaints turn out to be non-wolf problems upon investigation. Also, many reported complaints cannot be verified due to lack of evidence. Prompt response by government personnel trained in depredation investigation techniques is important in order to determine the validity of a reported complaint.

Wolf depredation investigations will be conducted by USDA-APHIS-Wildlife Services (WS) personnel under a cooperative agreement between WDNR and WS. Wildlife Services will maintain toll-free telephone lines to facilitate the reporting of wolf complaints. The public will be encouraged to report complaints directly to WS by use of the toll-free line. Upon receipt by WDNR of a reported wolf depredation complaint, WDNR personnel will refer the complainant to WS and provide the appropriate WS toll-free telephone number.

Upon receiving a wolf complaint, WS will contact the complainant by phone within 24 hours. If after a telephone consultation WS determines that a field investigation is warranted, WS will make an onsite inspection within 48 hours of the telephone consultation. An investigation into a reported wolf complaint may include the onsite inspection, as well other components such as interviews with complainant and adjacent landowners, veterinarians, and wolf pack location data.

After the investigation is completed, USDA-WS will classify the complaint under one of the following categories:

2.1. Confirmed Depredation. Clear evidence that wolves were responsible for the depredation, which may include, but is not limited to, evidence from a carcass, such as tooth punctures and associated hemorrhaging, broken bones, wolf-like feeding patterns, as well as wolf tracks in the immediate vicinity or other wolf sign.

2.2. Probable Depredation. Carcass missing or inconclusive but presence of good evidence which may include, but is not limited to; a characteristic kill site, blood trails, wolf tracks and scat in the immediate vicinity, as well as known presence of wolves, and/or a history of wolf depredations in the area.

2.3. Confirmed Non-Wolf Depredation. Clear evidence that the depredation was caused by another species, such as coyotes, black bear, bobcat, domestic dogs or wolf-dog hybrids. Wolf-dog hybrids and wolves that appear to have been raised in captivity will be treated as domestic animals.

2.4. Unconfirmed Loss. Any depredation or livestock loss that does not meet the above criteria.

The first two categories, "Confirmed" and "Probable" are the only ones that will warrant further action under this plan. If a reported complaint is determined by USDA-WS to be "Confirmed Non-Wolf Depredation" or "Unconfirmed Depredation", no further action will be taken except that the incident will be recorded and, if the depredation is determined to be caused by wild animals other than wolves, USDA-WS will provide the appropriate assistance. Appropriate assistance depends on the species involved and may include providing technical or operational assistance, or referral of the complaint to WDNR.

### 3. Control Response Options

Five control response options are available to resolve confirmed or probable depredations. (Table 3a and 3b) The depredation management program will use a combination of these options in an integrated approach to wolf depredation management as appropriate depending upon the individual situation. These include:

1. Technical assistance to help prevent/minimize problems.
2. Compensation for losses by wolves in accordance with administrative rules.
3. Live-trapping and translocation of wolves causing problems.
4. Trapping and euthanizing, or shooting of problem wolves by government agents.
5. Landowners /occupants will not be allowed to kill depredating wolves in accordance with ESA 4(d) rules while Federally threatened or endangered, but may do so by WDNR permit after Federal delisting has occurred. They would also be allowed to shoot wolves attacking pets or livestock on their land.

Possible Depredation Control Activity	Zone 1	Zone 2	Zone 3	Zone 4
Technical Assistance and Compensation	allowed	allowed	allowed	allowed
Translocation of Wolves	allowed	allowed	allowed	not allowed
Euthanize Wolves (Government Agents Only)	Allowed within 1 mi.	Allowed within 1 mi.	Allowed within 1 mi.	Allowed within 1 mi.
Private Landowner Control <sup>1</sup>	Not allowed	Not allowed	Not allowed	Not allowed

Possible Depredation Control Activity	Zone 1	Zone 2	Zone 3	Zone 4
Technical Assistance and Compensation	allowed	allowed	allowed	allowed
Translocation of Wolves	allowed	allowed	allowed	not allowed
Euthanize Wolves (Government Agents Only)	Allowed within 1 mi.	Allowed within 1 mi.	Allowed within 5 mi.	Allowed no distance limit
Private Landowner Control	allowed	allowed	allowed	allowed
Intensive Control Management Zones	To be determined	To be determined	To be determined	To be determined
Public Harvest	To be determined	To be determined	To be determined	To be determined

#### 4. Implementation of Options

**TECHNICAL ASSISTANCE:** Technical assistance will be provided in all Wolf Zones. This may include advice and recommendations on methods or activities that may reduce the likelihood of conflicts with wolves, such as removing carcass dumps. Technical assistance may also include the loaning or sale to a landowner abatement materials such as flashing lights, sirens, temporary fencing, and fladry. These methods are generally short term measures, and their effectiveness varies widely. The use of aversive conditioning or other experimental non-lethal methods will be in accordance with “Guidelines for Conducting Depredation Control” (Appendix L).

**COMPENSATION:** Compensation will be provided in all Wolf Zones for verified and probable losses of domestic animals to wolves (Wisconsin Administrative Code, subchapter III). Additionally, farmers can be eligible for compensation of missing calves according to the criteria established in NR 12.54, depredation reimbursement procedures (2)(c). The present compensation program is funded through Endangered Resources revenues, and will continue to fund wolf depredations until wolves are designated as game or furbearer species. The WDNR is seeking additional sources for funding the compensation program after delisting. USDA-WS will provide a reimbursement form and instructions to complainants who have suffered a confirmed or probable losses caused by wolves. The Mammalian Ecologist will verify the validity and accuracy of the reimbursement claim based on the USDA-WS investigation, and forward to the Madison Office of the WDNR for approval. The Madison Office will respond to a claimant within

14 days either affirming the claim, and initiating processing or seeking additional justification for the claim. Farmers must follow any technical assistance recommendations to remain eligible for compensation payments.

**TRANSLOCATION:** Depredating wolves may be translocated from Zones 1, 2 and 3. The trapping and translocation of wolves as a depredation management tool will generally be limited as few suitable release sites exist. Local relocations may be used when wolves are captured next to Indian reservations or large blocks of public forest land, if affective aversions can be used to keep wolves off sites where depredations have occurred. Translocation may be effective in some limited situations, but success will vary depending on the trapping history of a problem wolf, and long-distant translocations would generally not be used if the wolf population is above its goal (> 350 wolves outside of Indian reservations). Translocations will be conducted in accordance with “Guidelines for Conducting Depredation Control”.

**LETHAL REMOVAL:** When appropriate wolves may be lethally removed in order to manage depredation incidents. Wolves may be trapped by USDA-WS and euthanized, or shot. While wolves are listed as federally endangered or threatened, lethal controls would be restricted to ½ mile or 1 mile from depredation sites, depending on 4d rule designation or authority issued through special permits from the US Fish and Wildlife Service. Once wolves are delisted by the federal government, lethal controls by USDA-WS or DNR will be authorized up to 1 mile from depredation sites in Zones 1 and 2, to 5 miles in Zone 3, and no distance restrictions in Zone 4. Any lethal removal of wolves will be in accordance with the latest version of the “Guidelines for Conducting Depredation Control”.

**PRIVATE LANDOWNER CONTROL:** Will not be allowed while wolves are federally listed as threatened or endangered. Once wolves are delisted by the federal government, landowners and lessees of land would be allowed to kill a wolf, “in the act of killing, wounding, or biting a domestic animal” with requirements that a conservation warden be contacted within 24 hours (Wisconsin Administrative Rule, NR 10.02 (1) (b)). Landowners/lessees would also be allowed to obtain permits from DNR to control a limited number of wolves during specific time periods on land they owned or leased if they had suffered from wolf depredation.

**INTENSIVE CONTROL MANAGEMENT SUB-ZONES:** To be determined.

**PUBLIC HARVEST:** To be determined.

**Literature Cited:**

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#### **K. Wolf Research Needs:**

Additional research needs that have been identified since the 1999 plan include the following:

- Continued health monitoring to document significant disease events that may impact the wolf population and to identify new diseases in the population (Modify from, "Continued health monitoring to identify factors causing low pup mortality.....").
- Investigation of the role of sarcoptic mange in wolf population dynamics, including spatial and temporal differences and trends in this disease.
- Comparison of health parameters between wolves involved in livestock depredation and other wolf packs to determine whether disease plays a role in depredation behaviors.
- Investigation of the role wolves play in the ecology of important zoonotic and livestock diseases, such as human ehrlichiosis and bovine neosporosis.
- Conduct social survey of in northeast Wisconsin to determine attitudes and possible factors hindering public acceptance and poor establishment of wolves.
- Conduct a survey similar to Nelson & Franson 1988 on attitudes of landowners and farmers in northern Wisconsin toward wolves.
- Examine impact of ATVs and other recreation activities on wolves.
- Conduct economical analysis of the costs and benefits of a wolf population in northern and central Wisconsin.
- Update habitat analysis of wolf habitat in Wisconsin (Mladenoff et al. 1995, 1997, 1999), and project future declines in wolf habitat due to housing and road development across north and central Wisconsin.
- Examine canid spacing in relationship to depredation management by wolves, bears, coyotes, and domestic dogs.
- Examine the degree and impact of dog gene introgression into the Wisconsin wolf population.
- Continue to examine impact of wolves on elk, and on elk movements and dispersion on the landscape.
- Examine ecosystem impacts of wolves on the landscape by effects on abundance, distribution on habitat use of deer, beaver, and mesocarnivores.
- Update examination of wolf population viability with updated population information.
- Assess changes in mortality and survival of adult wolves with changes in status and application of new control programs.
- Determine productivity, mortality factors, and survival rates of pups, and examine factors that contribute to greater productivity and survival.

- Examine non-predation impacts of wolves and other predators on farms including negative and potential positive impact, economical and social. (Lehmkuhler et al. 2007).

Literature cited:

Lehmkuhler, J., G. Palmquist, D. Ruid, B. Willging, and A. Wydeven. 2007. Effects of wolves and other predators on farms in Wisconsin: beyond verified losses. Wisconsin Wolf Science Committee, Wisconsin Department of Natural Resources, Madison, Wisconsin 15 pp.  
[http://dnr.wi.gov/org/land/er/publications/pdfs/wolf\\_impact.pdf](http://dnr.wi.gov/org/land/er/publications/pdfs/wolf_impact.pdf)

## **M. Wolf Specimen Management**

To date wolf carcasses found in the wild have had necropsy evaluations to determine cause of death and health status. While wolves were listed as endangered, the DNR policy was to have all wolf carcasses studied by the National Wildlife Health Center in Madison, Wisconsin. Eventually they became specimens at research institutions, with most wolf specimens deposited at the University of Wisconsin - Zoology Museum in Madison. With reclassification and eventual delisting, the management of wolf specimens will be modified. The Wisconsin Wolf Advisory Committee developed guidelines for managing wolf specimens under threatened and delisted classification.

### **1. Wolf Specimen Management – Threatened**

With reclassification to threatened, research, population monitoring and health evaluations of dead wolves found in the wild will remain the top priority. Additional wolf carcasses will be made available as euthanasia of depredating wolves become possible, and accidental mortality caused by vehicle collisions increases. Carcasses of collared wolves from the DNR Wolf Monitoring Program will be necropsied by the National Wildlife Health Center, and specimens will be turned over to interested researchers, when there is an identified need for such specimens. If specimens remain available after research needs have been met, the second priority for use of wolf carcasses would be for education purposes and Native American cultural and religious purposes. Such carcasses can be made available to tribal governments, nature centers, state parks, wolf education organizations, WDNR and other agency offices. Carcasses would not be available for private ownership.

Wolves found dead in the field should be collected by wildlife biologists, wildlife technicians or conservation wardens and placed in WDNR freezers until arrangements can be made to ship the carcasses to Madison. Any wolves euthanized by USDA-Wildlife Service will also be turned over to WDNR. All carcasses should be tagged, and labeled with all pertinent information kept with each carcass. The WDNR wolf program manager should be notified of all wolf carcasses found. The wolf program manager will coordinate shipment, necropsies, and eventual designation of specimens. The wolf program manager will keep lists of organizations interested in receiving carcasses, and



will coordinate distribution of carcasses. Any wolf suspected of being killed illegally will be held for conservation wardens until legal investigation and prosecution are completed.

## **2. Wolf Specimen Management - Delisted**

When wolves are no longer listed as threatened or endangered in Wisconsin, management of wolf carcasses can be broadened. Wolf carcasses would be available from depredation control activities, natural mortality, illegal kills, and accidents.

Research will continue to be an important priority, but will require a research proposal identifying needs and anticipated results, and such proposals would need WDNR and/or tribal approval. A portion of carcasses collected each year may be requested by WDNR-Wildlife Health Team to evaluate health status. Following research and health monitoring, wolf education and Native American cultural use would be the next priority for ownership of wolf carcasses. Skins and skulls would be made available for Native American tribal governments, schools, nature centers, state parks, WDNR and other agency offices, tribal centers, and wolf education organizations. Wolf specimens could be turned over to private individuals if specimens are not needed for above purposes. No carcasses should be provided to landowners conducting control on their land, or to persons involved in accidental killing of wolves. Dead canids suspected of being wolf-dog hybrids, but which appear to be mostly wolf, should be treated as wolves for the purpose of wolf specimen management.

Eventually regional wildlife supervisors will coordinate wolf specimen management in each WDNR region. The wildlife supervisors will maintain lists of organizations and individuals interested in receiving specimens, and will determine disposition of carcasses. Annual reports will be submitted to WDNR Endangered Resources or Wildlife Management on carcasses collected and handled in each region, including biological information and final disposition of carcasses. Currently while wolves continue to be listed as federally endangered or threatened, wolf specimen designations will be coordinated through Endangered Resources central office, in Madison.

## **VI. WOLF MANAGEMENT BUDGET**

The budget costs of the wolf program have grown extensively since the start of the recovery/management program in 1979-1980, and grew at higher rates than anticipated in

the 1999 wolf plan (Table 4). In the period 2000-2005, annual costs for wolf management ranged between \$218,000 to \$309,000. The 1999 plan had expected management cost to grow from \$130,000 in FY 99-00 to \$209,000 in FY 04-05. The actual costs were about 50% higher. Some of the cost increase reflect major increase in airplane flights raising costs to fly and locate all collared wolves across the state from about \$300 to about \$1000. Additional costs were also incurred by more DNR personnel spending time on wolf related issues, and the growth and spread of wolf population.

The source of funds for the wolf management program had been from 77% federal funds and 23% state funds in the 1990s, but in recent years the proportions of state funds have increased. Federal funds had included grants from U.S. Endangered Species Act, Pittman-Robertson Wildlife Restoration Act, and U.S Forest Service funds. State funds were mainly from the Endangered Resources Tax Check-Off, and Endangered Resources License Plate. Private funding came from Timber Wolf Alliance, Defenders of Wildlife, National Wildlife Federation, Milwaukee Zoo, Timber Wolf Information Network, and donations from private citizens. U.S. Endangered Species grant money declined in the 2000s. Recently additional Pittman-Robertson funds were found to cover more of wolf management costs. The wolf program was not successful in obtaining any funding through the new State Wildlife Grants program. It is expect that wolf management costs in the near future will continue to be in the range of \$250,000 to \$300,000, and efforts will continue to try to find additional funding for the program and depredation payments.

Cost of depredation reimbursement was higher than anticipated. The 1999 plan had assumed annual depredation reimbursements cost of \$20,000 to \$40,000, but in recent years costs have ranged from \$23,000 to \$77,000. Higher costs have occurred in part due to higher rates of depredation due to lack controls because federal delisting had not occurred as had been expected. Also DNR had started paying for some missing livestock, that were previously not considered for reimbursement payments. Cattle prices also improved in recent years which in turn increased reimbursements provided for wolf losses. Funding for depredation reimbursement when 3 % of Endangered Resources License plates funds were added to the 3 % of Endangered Resources Tax Check-Off, which doubled the wolf/endangered resources depredation payments account to about \$34,000 annually. During years when this amount had been exceeded, other portions of the Endangered Resources funds (Check-Off & License plate) were made available for wolf payments at the cost of other Endangered Resources programs. Donations to these funds have declined in recent years, thus the impact on other Endangered Resources has been magnified. Availability of the new federal State Wildlife Grants program have offset some of these losses to other Endangered Resources. One area where WDNR cost have declined was the funding for USDA-Wildlife Service, which at the time of the plan was funded mainly by WDNR at cost of up to \$30,000 annually. Since the early 2000s, USDA-WS has been able to secure separate federal appropriations from the Department of Agriculture, so that DNR no longer needed to fund out of state money

Table 4. Wisconsin Gray Wolf Program Expenditures by WDNR Fiscal Year (FY)

Year	State or Donated	Federal	Total Management Expenditures	Depredation Payment
1979-80	5,000	15,000	20,000.00	—
1980-81	5,425	16,275	21,700.00	—
1981-82	7,734	35,000	42,734.00	—
1982-83	13,013.44	35,200	48,213.44	—
1983-84	27,905.18	51,440	79,345.18	—
1984-85	11,804.38	28,125	39,929.38	200.00
1985-86	23,625.24	60,600	84,225.24	0.00
1986-87	44,128.80	56,305	100,433.80	2,500.00
1987-88	14,864.00	62,592	77,456.00	0.00
1988-89	23,887.60	18,069	41,956.60	400.00
1989-90	20,410.94	48,319.47	68,730.41	2,500.00
1990-91	15,508.40	95,198.40	110,706.80	187.55
1991-92	25,768.83	67,442.88	93,211.71	1,535.00
1992-93	38,650.75	58,893.00	97,543.75	1,600.00
1993-94	19,005.61	68,893.00	87,898.61	6,125.00
1994-95	19,404.31	91,264.75	110,669.06	1,800.00
1995-96	30,818.99	112,118.50	142,937.49	4,163.12
1996-97	29,908.92	120,450.21	150,359.13	7,465.45
1997-98	31,283.68	98,038.62	129,322.30	16,081.97
1998-99	40,358.72	160,506.58	200,865.30	19,787.19
1999-00	48,423.15	210,251.08	258,674.23	71,450.47
2000-01	43,059.61	209,117.83	252,177.44	22,808.20
2001-02	54,637.44	219,124.67	273,762.11	60,940.20
2002-03	46,888.69	170,997.18	217,885.87	54,585.37
2003-04	172,861.62	136,213.19	309,074.81	67,715.43
2004-05	195,746.86	153,224.97	348,971.83	76,867.32

## APPENDIX A-2

### Wolf Depredation in Wisconsin through 2005.

By Adrian P. Wydeven, Robert C. Willging, David Ruid and Randle L. Jurewicz

Although wolf depredations on domestic animals were relatively rare events in Wisconsin prior to the mid 1990s, by the late 1990s depredations had become a fairly regular activity (Treves et al. 2002). Rates of depredation on livestock in Wisconsin by the early 2000s were similar to the rates in Minnesota in the early 1980s (Fritts et al. 1992).

Between 1985 and 2005, the Wisconsin DNR paid \$469,430.88 for 270 calves, 13 cows, 74 sheep, 44 deer (deer farm), 6 horses (5 foals), 114 chickens, 148 turkeys, 83 hunting hounds, 12 pet dogs, 4 injured cows and 32 injured dogs. These reimbursements included \$184,226.42 for dogs, \$197,181.56 for livestock, \$82,850.00 for deer, and \$5172.90 for poultry. Most of these payments were for verified depredations (confirmed or probable), but some payments were also made for missing livestock when wolves were believed responsible for some of the losses.

Table A-3 summarizes wolf depredations losses and wolf controls in Wisconsin between 1976 through 2005. Total verified wolf depredations included 5 horses killed, 1 horse injured, 50 sheep killed, 184 cattle killed, 7 cattle injured, 38 deer killed, 264 poultry killed, 99 dogs killed and 30 dogs injured. A fairly strong relationship was found between wolf population level and number of cattle killed ( $r^2 = 0.66$ ,  $P < 0.01$ ), dog kills ( $r^2 = 0.59$ ,  $P < 0.01$ ), and farms with depredation ( $r^2 = 0.75$ ,  $P < 0.01$ ) between 1989 and 2003 (Wydeven et al. 2004a). Numbers of farms with depredations on domestic animals averaged 2.8 farms annually in the 1990s, but increased to mean of 14.0 farms annually between 2000 and 2005. By 2005, the number of farms with depredation had grown to 25, and between 2001 and 2005, 54 farms had at least 1 verified livestock depredation

Prior to 2005, all depredations on livestock and poultry occurred in northern Wisconsin (Zone 1 and northern portions of Zone 3). In 2005 a farm in the Central Forest (Zone 2) lost two calves, the first livestock depredation for that region. Total farms for 16 counties with wolf packs (2002) in northern Wisconsin was 6445 farms (USDA, NASS, 2002 Census of Agriculture Profile), thus the 53 farms with wolf depredation represent about 0.8 % of farms in the region. Although this would suggest that total farms with wolf depredation are relatively low, not all the farms had livestock available, and most farms were outside of wolf range. Thus a small number of farms received most of the wolf depredation losses.

Between 1991 through 2005, 118 wolves were trapped or shot at depredation sites by USDA Wildlife Services or WDNR, and 74 were euthanized. Prior to 2003 only one wolf was euthanized by special permit. From 1991-2002 a total of 32 wolves were translocated long distances (52 to 277 km) away, 3 were released locally (<10 km), 2 died in captivity and 1 was euthanized. Since 2003 federal authority has allowed taking of depredating wolves (threatened status 4d rule in 2003 & 2004, and special permit in 2005), and most captured wolves were euthanized (70 wolves, 90% of captures). Pups

captured prior to August 1 were released near capture sites. At least 3 of the wolves translocated at long distances, depredated on livestock in new locations, and a female wolf that had attacked farm deer, attacked dogs at a new location.

Generally only a few packs were found to depredate on domestic animals. Through 2000, 68% of packs detected in the state caused no depredation to domestic animal (Treves et al. 2002). Between 1995 and 2002, annually 7% of packs depredated on livestock, 10% depredated on dogs, and only about 2 % of packs attacked both dogs and livestock (Wydeven et al. 2004). Generally packs attacking livestock occurred near the edge of the northern forest near agricultural land. Packs in the core of wolf range in large blocks of public forest land, rarely were involved in livestock depredation. Thus control actions of trapping and euthanizing depredating wolves is not likely to affect most of the wolf population. If wolves in the future were able to colonize areas outside the large forest blocks in northern and central Wisconsin, wolf depredation levels would likely increase (Treves et al. 2004). Control trapping will need to continue to address depredation problems and reduce colonization of wolves into agricultural areas.

Packs depredating on dogs are more difficult to predict. Dog depredations are generally scattered across wolf range. Generally packs that attack dogs are the larger packs on the landscape, and there apparently is learning involved because 2/3 of packs killing dogs will likely do so again the following year (Wydeven et al. 2004b). Control trapping has not been used on packs killing hunting dogs on public land, and will not likely be used in the future unless such packs also attack livestock on farms or pets near residential areas.

Factors that caused increases in wolf depredation in Minnesota were recently examined (Harper et al. 2005). Major factors included range expansion, colonization of new areas in wolf range, and learning behavior. Range expansion by the Minnesota wolf populations apparently stopped in 1998, and depredation levels have declined since that time (W. J. Paul unpublished reports). Range expansion by Wisconsin wolves, especially recent colonization of more agricultural areas has probably increased numbers of farms with depredation in the state. Future management will need to address stabilization of range expansion to minimize depredations to livestock.

Work has also been done and will continue to explore better methods of nonlethal wolf control in the state. Testing was done with fladry (special flagging material) and movement activated guard devices (use strobe light and loud sounds) to deter predators (Shivik et al. 2003). Both systems have potentials in certain situations to reduce depredation by wolves, but wolves can probably learn to adapt to them, and such systems are generally less successful when actual killing of livestock by wolves has begun. Testing was also conducted on the use of dog shock collars on wolves to deter them from specific areas (Hawley 2005, Schultz et al. 2005). Shock collars may have use in specialized situation where it is desirable to keep wolves in the general area, but keep them off pastures with livestock or other focal points.

Future wolf depredation management is likely to be most successful if an integrated approach is used (USDA-APHIS-Wildlife Services 2006). Such an approach will use a

combination of technical advice, animal husbandry, nonlethal and lethal controls. The approach will also be an adaptive management procedure that builds on new knowledge and adjusts management as new things are learned. Attempts will be made to also document non-predatory effects of wolves to farms (Lehmkuhler et al. 2007). Careful monitoring and research will be an essential part of future depredation management.

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Table A3. Summary of verified wolf depredations on domestic animals in Wisconsin from 1976 -2005, and total number of wolves removed in control actions.

Resources/ years	≤89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	Total
<b>Farms Affected</b>	2	0	2	2	3	0	4	1	2	8	6	8	5	10	14	22	25	--
<b>Total Losses*</b>	6	2	116	11	28	2	11	8	16	40	74	19	104	66	55	56	64	<b>678</b>
<b>Horses killed</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	2	<b>5</b>
<b>Horses injured</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	<b>1</b>
<b>Sheep killed</b>	2	0	1	8	0	0	0	0	0	0	0	0	0	7	24	5	3	<b>50</b>
<b>Sheep injured</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	<b>0</b>
<b>Cattle killed</b>	2	0	0	1	0	0	11	1	10	20	7	6	11	37	20	27	31	<b>184</b>
<b>Cattle Injured</b>	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	4	<b>7</b>
<b>Farm Deer</b>	0	0	0	0	0	0	0	0	0	4	19	3	0	5	1	6	0	<b>38</b>
<b>Poultry Losses</b>	0	0	115	0	27	0	0	0	0	0	44	4	74	0	0	0	0	<b>264</b>
<b>Dogs killed</b>	2	0	0	2	0	2	0	5	5	11	2	5	17	10	6	15	17	<b>99</b>
<b>Dogs injured</b>	0	2	0	0	0	0	0	2	1	5	2	0	1	4	4	3	6	<b>30</b>
<b>Wolves captured</b>	0	0	1	0	0	0	0	0	2	4	2	2	8	18	17	27	37	<b>118</b>
<b>Wolves euthanized</b>	0	0	0	0	0	0	0	0	0	0	1	0	0	0	17	24	32	<b>74</b>

\* total of animals killed & injured



**APPENDIX F2****Wolf Health Monitoring and Mortality Factors****by USGS-National Wildlife Health Center (NWHC) and WDNR-Wildlife Health Team**

The Wisconsin wolf health monitoring program has included necropsy evaluation of all free-ranging wolves found dead or euthanized in Wisconsin, including monitored radio-collared wolves. Table F2 presents a summary of mortality factors identified from necropsies of 269 Wisconsin wolves between 1979-2005. A high percentage of wolf mortality was associated with human causes (70.6%), with vehicle collisions (31.2%) and shooting (18.2%) being particularly important. Since 2003, euthanasia of wolves to control livestock depredation has also added significantly to human-associated wolf mortality (14.9%). Natural mortality factors contribute 23.4% of total mortality, with Sarcoptic mange-related deaths a majority of the 14.5% mortality from disease. Wolves listed in Table F3 included both collared and noncollared wolves, but only those subjected to necropsies by the USGS-National Wildlife Health Center and Wisconsin DNR Wildlife Health Team.

Table F3 lists only radio collared wolves found dead in the field from October 1979 through June 2005, but does include some animals that were not necropsied because carcasses were too decomposed. Human caused mortality accounted for 55% of known mortalities, and 51% of all mortalities. The most important human mortalities were shooting (29%), and vehicle collisions (14% of known mortalities), but unlike total necropsy sample in Table F2, only 1% included wolves euthanized at depredations. Natural mortality included 45% of known mortality and 41% of all mortalities. The most common natural mortalities were disease (27%) and other wolves (13%).

The overall necropsy samples had lower percentages than the collared sample of wolves dying from illegal shooting, other wolves, and disease, in part because these mortalities were rarely detected unless wolves were collared. The overall necropsy sample had higher percentages of wolves killed by vehicle collisions and euthanized depredators, because these represent dead wolves that most likely will be reported to or collected by WDNR without the help of radio telemetry. Although the collared sample probably more closely matches the overall mortality rates within the population, it is important that all forms of wolf mortality are carefully examined. Collared wolves may not be as representative of wolves living in marginal habitat, where it appears that vehicle collisions and depredation controls, may be important limiting factors on the wolf population.

<b>Table F2</b>		
<b>Mortality Summary of wolves from Wisconsin and adjacent areas of Minnesota necropsied Oct. 1979-Sept. 2005 by NWHC and WDNR</b>		
<b>Cause of Death:</b>	<b>Number</b>	<b>Percent Total Mortality</b>
<b>Human Causes:</b>		
Euthanasia/Accident	1	0.4
Euthanasia/Depredation	40	14.9
Capture-Related	9	3.3
Shooting	49	18.2
Accidental Trapping	6	2.2
Vehicle Collision	84	31.2
Poisoning	1	0.4
Unknown Human Cause	0	0
<b>Total Human Caused:</b>	<b>190</b>	<b>70.6</b>
<b>Natural Causes:</b>		
Birthing Complications	1	0.4
Disease <sup>a</sup>	39	14.5
Killed by Other Wolves	16	5.9
Other Natural Cause <sup>b</sup>	8	3.0
Unknown Natural Cause	0	0
<b>Total Natural Caused:</b>	<b>63</b>	<b>23.4</b>
<b>Unknown Causes<sup>c</sup>:</b>	<b>16</b>	<b>5.9</b>
<b>Total Known Mortality:</b>	<b>253</b>	<b>94.1</b>
<b>Total Unknown Mortality:</b>	<b>16</b>	<b>5.9</b>
<b>Total All Mortality:</b>	<b>269</b>	<b>100</b>

<sup>a</sup>includes mange-related deaths

<sup>b</sup>includes blunt trauma of unknown cause (could be prey or vehicle) and debilitated, heavily parasitized animals

<sup>c</sup>animals with no lesions and all tests negative, as well as badly decomposed carcasses with no recognizable cause of death

**Table F3.** *Mortality summary of radio-collared wolves in Wisconsin and adjacent areas of Minnesota from October 1979 – June 2005.*

	<b>Cause of Death</b>	<b>Number</b>	<b>% Known Mortality</b>
<b>Human Causes</b>	Capture Related	6	4%
	Shot Wound*	41	29%
	Trapped	4	3%
	Vehicle Collision	19	14%
	Euthanized (depredation)	2	1%
	<u>Unknown Human Causes</u>	<u>5</u>	<u>4%</u>
	<i>Total Human Causes</i>	<i>77</i>	<i>55%</i>
<b>Natural Causes</b>	Accident	1	1%
	Birthing Complications	1	1%
	Disease	37	27%
	Killed by Other Wolves	18	13%
	Malnutrition/Starvation	2	1%
	<u>Unknown Natural Causes</u>	<u>3</u>	<u>2%</u>
	<i>Total Natural Causes</i>	<i>62</i>	<i>45%</i>
<b>Totals</b>	<i>Known Mortality</i>	<i>139</i>	<i>100%</i>
	<u>Unknown Mortality</u>	<u>13</u>	
	<b>Total Mortality</b>	<b>152</b>	

\* 2 wolves were shot by bow and arrow, and 39 by firearms

## APPENDIX H2

### Public Opinion of Wolf Management in Wisconsin, 2001-2005

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#### INTRODUCTION

Wolves stir people's emotions and attract public attention far out of proportion to their numbers. Although many U.S. citizens support carnivore conservation and enjoy the environmental, aesthetic, and economic benefits of restoring wolves, the direct costs of conserving these animals fall on a minority of individuals in rural areas who lose livestock or pets to carnivores. Wildlife managers must therefore steward recovering wolf populations in a way acceptable both to the general public and rural communities living with wolves.

In the past, voters and special interest groups have removed authority and flexibility from carnivore managers when unpopular interventions were undertaken or when managers catered to one interest group in particular (Harbo & Dean 1983, Torres et al. 1996). This potential threat to adaptive management suggests a need for rigorous assessment of public opinion about wolf management. Public opinion surveys enable managers to float alternative scenarios for management actions and judge the popularity of options across stakeholder groups. This approach also supports democratic, transparent decision-making about management and policy.

Because management of large carnivores triggers widespread interest in many groups, managers need diverse methods and added resources for sampling the opinions of the varied stakeholders. Partnerships with university and non-profit groups can extend the outreach and sampling effort of state wildlife agencies. The Wisconsin Department of Natural Resources (WDNR) has been proactive and energetic in surveying public opinions and supporting partners' efforts to understand public opinion of wolf management in Wisconsin.

Here we describe the results of three surveys of public opinion regarding wolf control, compensation, harvest and monitoring. We focus on these components of management because they are in use or being considered in Wisconsin. We devote special attention to the opinions of key stakeholder groups, including livestock producers,

hunters and voluntary contributors to the Endangered Resources Fund of the WDNR (ER fund hereafter), which is the major source of revenue for wolf management in the state at present. This appendix updates information from Appendix H, in the 1999 wolf management plan (pp. 66-70), and addresses K2 under research strategies “Re-measurement of public attitudes toward wolves and recovery in the state to define reasonable population goals and acceptable wolf habitat.”

## METHODS

In 2001 and again in 2004, L. Naughton, A. Treves and R. Grossberg, conducted surveys of state residents using stratified random sampling. The 2001 survey (Naughton-Treves et al. 2003). was aimed at residents of townships in which verified wolf depredations had occurred. The survey was sent to all people who had complained to the WDNR of wolf depredation on domestic animals and residents of the same townships selected randomly from commercially available lists of taxpayers. Overall, the response rate was 81.6% (n=535 respondents).

The 2004-2005 survey<sup>1</sup> was aimed at residents of six zip codes chosen to span the range of support for wildlife, judged by their relative contributions to the ER fund. Within zip codes, respondents were selected randomly as above. Overall, the response rate was 61.7% (n=1364 respondents), with relatively even response rates across the six zip codes (range 202-272, n=6). A more complete description of findings, sampling bias, and sample population can be found at [www.geography.wisc.edu/livingwithwolves/public\\_reports.htm](http://www.geography.wisc.edu/livingwithwolves/public_reports.htm).

In 2003, K. Schanning randomly selected 5000 Wisconsin residents to mail a questionnaire, using all public telephone listings with name and address as the sampling frame. Of these 5000 surveys, 644 were returned, yielding a response rate of 13%. The length of the survey may help account for this low response rate.

In late summer 2004, the Wisconsin DNR, conducted a survey to which 1367 people responded (1322 residents of the state, and 45 non-residents). Notice of the survey was listed in news papers and other media sources throughout the state. The DNR sent copies of the questionnaire-based survey to all people who requested it, and made the survey available on the web. We believe this approach sampled a group of people very interested in wolves, both from a negative and positive standpoint. The sample was composed of 66% hunters (compared with 57% in the Naughton/Treves 2003-2004 survey), 16% farmers (compared to 34% who had some experience raising livestock or 15% who raised livestock for commercial purposes in the Naughton/Treves survey), and 66% who identified themselves as environmentalists, 83% who identified themselves as conservationists, and 36% who identified themselves as animal preservationists.

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<sup>1</sup> for details see [www.geography.wisc.edu/livingwithwolves/public\\_reports.htm](http://www.geography.wisc.edu/livingwithwolves/public_reports.htm)

Analyses for all three studies are presented without weighting for under-represented respondents (e.g., women). As a result, the findings should be considered preliminary pending such weighting and peer review of findings. Across the following results and figures and analyses, sample sizes vary as not all respondents answered all of our questions.

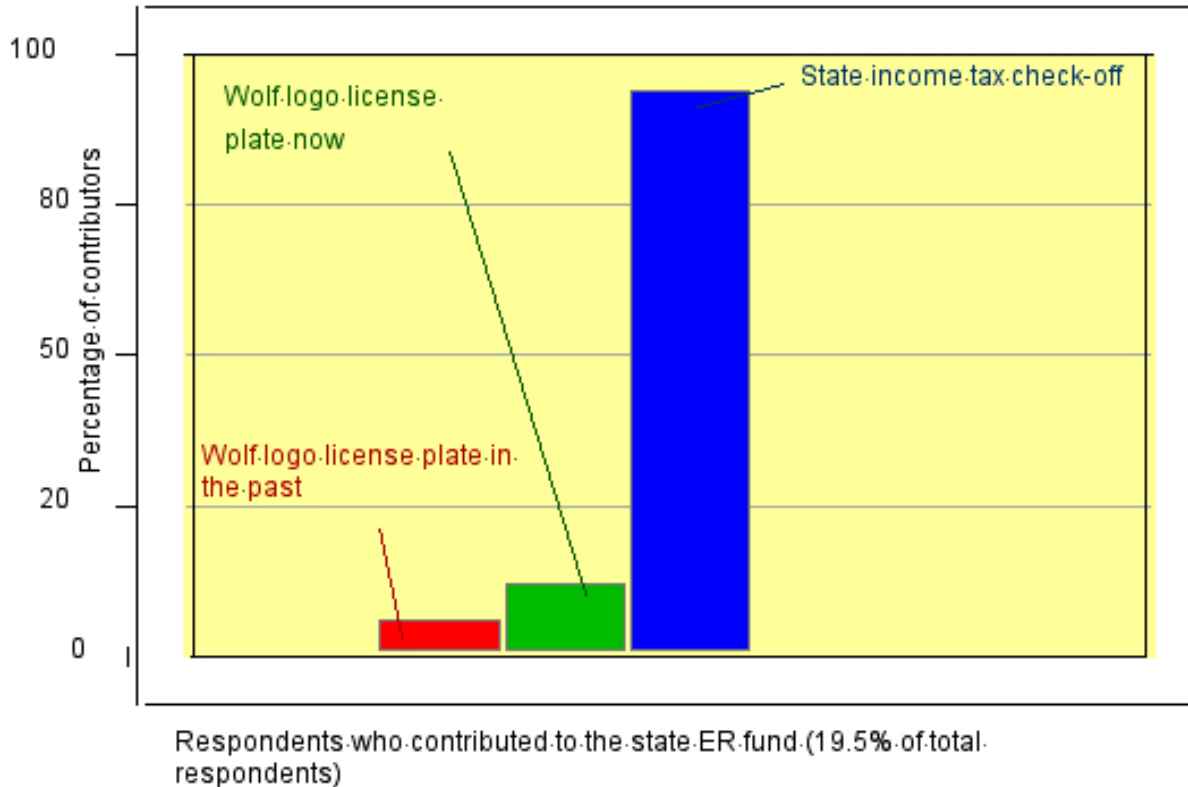
## RESULTS

The 2001 survey of wolf county residents by Naughton/Treves offered three conclusions: 1) most respondents favored the presence of wolves in the state provided the population was limited; 2) the existing compensation program for wolf depredations was very popular, but individuals who received compensation payments for reported depredations were no more tolerant of wolves than were individuals claiming losses but who were not paid, and 3) lethal control of wolves was the preferred management response to wolf predation on livestock and pets. The survey also revealed, on average, bear hunters had the most negative attitudes toward wolves and were most critical of current management strategies, while livestock producers were less negative, and other rural residents were the most positive toward wolves and current management practices.

In the second survey (2004/2005), Naughton and Treves found again that the majority of respondents supported wolf recovery in the state, but there were significant differences among citizens regarding preferred management strategies. Here we highlight results for two groups selected randomly from the population: voluntary contributors to the ER fund for wolf management and non-contributors. Such a comparison is significant because the WDNR depends heavily on voluntary contributions for wolf management.

Respondents who had contributed to the ER fund (contributors) represented 19.5% of the sample; most often gave via the state income tax check-off (Figure 1).

**Figure 1.**  
**Method of contribution to the ER Fund**



To assess individual tolerance for wolves, respondents were asked a series of questions about values and attitudes toward wolves. We present one because all were highly intercorrelated. Respondents were asked if they agreed or disagreed with the following statement: "If I were out hunting and saw a wolf, I might shoot it"; 90% of respondents disagreed strongly or were neutral. In this survey (2004-2005) and the previous one (2001), respondents agreeing or strongly agreeing with this statement were just under 11% of the entire sample.

When asked "If a wolf kills livestock..." or "If a wolf kills a family pet...", a majority of respondents preferred "capture and relocate the wolf to a wilderness area" (43-57% of all respondents) followed by "kill the wolf" (35-39% of non-contributors) or "take no immediate action toward the wolf but monitor the situation" (21-23% of contributors). By contrast, when asked "if a wolf kills a hunting dog on public land...", the most popular response was "take no immediate action toward the wolf but monitor the situation" (35% and 64% among non-contributors and contributors respectively) followed by "capture and relocate the wolf to a wilderness area" (31% for either group). Note that wilderness areas in Wisconsin are too small to support whole wolf packs and most were already occupied by wolves, thus the term was subject to respondents' interpretations. The action "Try to frighten away the wolf or deter it from approaching..."

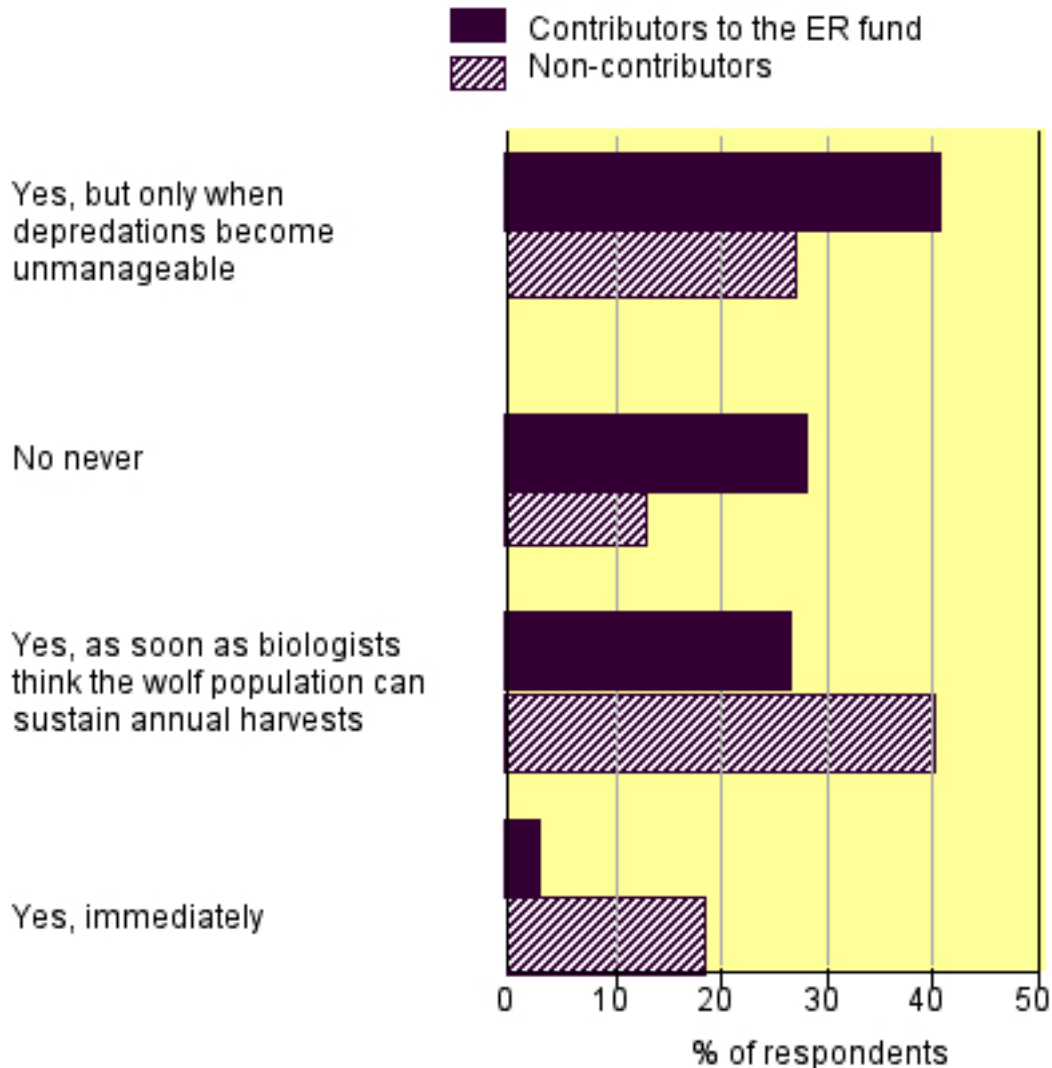
was least popular in all situations. Hence the general population of Wisconsin is less likely to favor lethal control than Northwoods residents (Naughton et al. 2003).

When asked, “If there must be lethal control of wolves, who should be allowed to kill wolves?”, most respondents (76% of contributors and 55% of non-contributors) approved of “government agents”. Non-contributors also approved of “private landowners who provide evidence of wolf predation on livestock” (56%); this choice received support from almost half the contributors (48%). No other personnel achieved >49% approval for conducting wolf control.

Wolf harvest (not initiated in Wisconsin at the time of writing) received more positive than negative responses among both contributors and non-contributors (Figure 2). However among those respondents approving of a wolf harvest (68% of our sample), few wanted the immediate initiation of a wolf season (2% of contributors and 18% of non-contributors). The preferred timing was “only when depredations become unmanageable” (41% of contributors) or “as soon as biologists think the wolf population can sustain annual harvests” (41% of non-contributors).



**Figure 2.**  
***Do you believe there should be a public hunting/trapping season on wolves?***



Contributors vs. Non-contributors, Pearson  $\chi^2=71.1$ ,  $df=3$ ,  $n=1131$ ,  $p<0.0001$

To assess if support for lethal control depended on the accuracy of removing the individual wolves implicated in depredations, we asked if errors in lethal control affected approval. Seventy-seven percent of contributors and 54% of non-contributors wanted either “no lethal control” or error rates <10%. By contrast 23% of contributors and 48% of non-contributors accepted error rates  $\geq 10\%$ . There are currently no data on Wisconsin wolf removal accuracy nor effective techniques for assessing past or future likelihood of causing depredations.

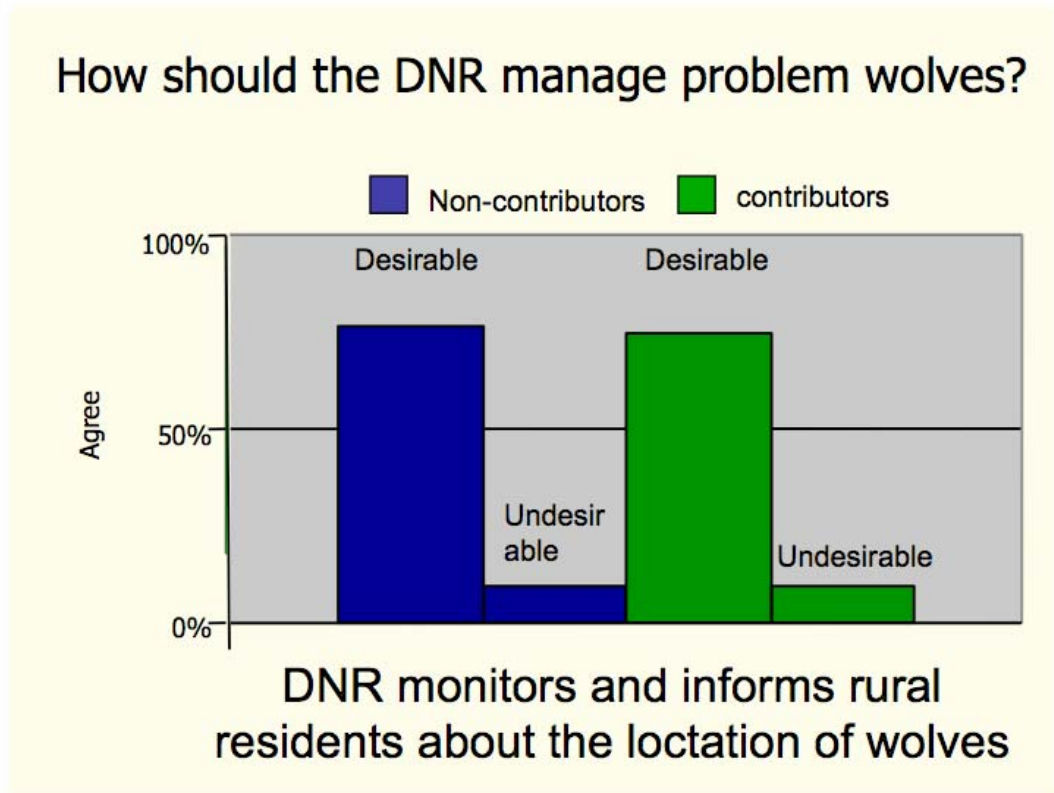
Far and away, the most popular source of funding for compensation was the existing state ER fund (70% and 78% approval among non-contributors and contributors respectively) although “hunting fees” also appealed to a majority of contributors.

There was overwhelming approval among both contributors (80%) and non-contributors (69%) for farmer compensation contingent upon “best livestock management practices”. Similar majorities favored compensation “only if government agents find evidence of wolf involvement” (88% and 79% respectively). Compensation for hunters who lose a hunting dog on public land was far less popular, with 51% of contributors favoring no compensation and 52% of non-contributors favoring the following recipe: “He/she should be compensated for loss only if government agents find evidence of a wolf”.

We described an incentive scheme as follows: “Some managers propose that landowners living near wolf packs be given a monetary incentive to protect the wolves. The incentive would help offset the risks they face, and compensate for any domestic animal losses. This incentive might also prevent people from illegally killing wolves.” and asked “Assuming you live on or near land suitable for wolves, would you consider participating in such an incentive program?”. This was far more popular among contributors (81% would participate) than among non-contributors (34% would participate).

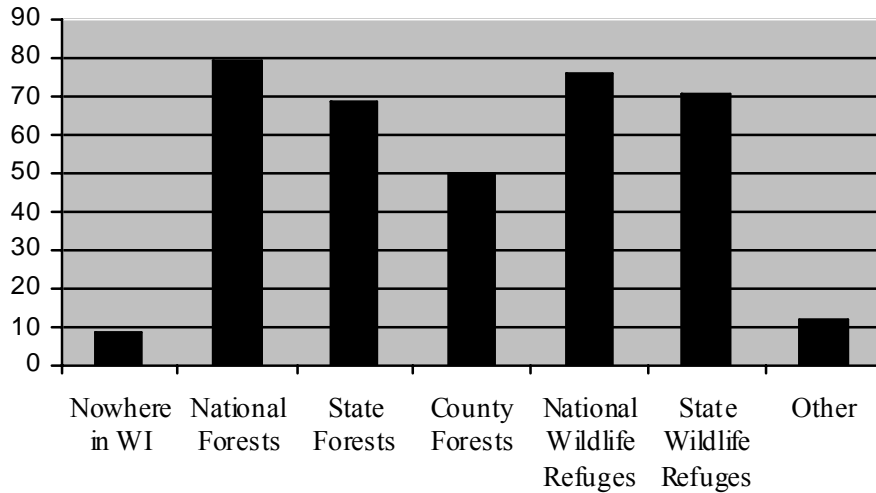
Monitoring and informing rural residents about the locations of wolves was highly popular among both contributors and non-contributors (Figure 3).

Figure 3.



Results from the Northland College Survey

Respondents showed an acceptance of wolves on the landscape, and favored wolves living in National Forests and Wildlife Refuges, while also showing strong support for wolves inhabiting State Forests (Figure 4).

**Figure 4. Public wolf acceptance on various landscapes in Wisconsin.**

When asked if a public harvest should be used to manage the wolf population, respondents were split about hunting, but, opposed to a public trapping season. However, no other methods of management were found to be more popular than a public harvest. Having the DNR trap wolves was the next most preferred technique, even though only 33% of all respondents supported this method.

Relating to methods of managing problem wolves that have caused damage, support was shown for the relocation of problem wolves. Respondents were equally supportive of allowing both the landowner and the DNR to shoot a wolf that had caused harm. However, much more support was shown for allowing farmers to shoot problem wolves in general. Respondents overwhelmingly opposed the hypothetical poisoning of problem wolves by farmers or the DNR.

Respondents showed more support for the compensation of livestock loss to wolves than for losses of farmed deer or bear dogs. When given the dollar figure of how much was paid out in compensation to livestock farmers in one fiscal year, 81% of respondents wanted to continue compensation for livestock, while 10% wanted it reduced. Asked the same question about deer farmers, 42% of respondents wanted to continue compensation for deer at current levels, and 25% wanted it reduced. Even less support was shown for the compensation of bear dogs killed by wolves, with 52% of respondents indicating compensation for bear dogs should stop, and 25% wanting it reduced. Most respondents wanted to compensate livestock owners only if they had taken some protective measures against wolves or were using Best Management Practices. However, 40% wanted to continue compensating all livestock owners for depredations, and only 5% wanted to stop compensation altogether.

## Results from the Wisconsin DNR survey

After being told “Currently an intense system of population monitoring is being used including radio tracking, winter track surveys by DNR and volunteers, summer howl surveys, and collection of reports of public observations of wolves.”, respondents were asked “What is your impression of the current level of wolf monitoring?” 43% thought it was about right, 28% thought it was too intense, and 29% thought it was not adequate. Of the wolf population survey methods listed below, respondents were asked whether efforts should increase, decrease or remain about the same:

- Live-trapping and radio-tracking: increase 32%, remain the same 38%, decrease 31%
- Snow track surveys by DNR: increase 35%, remain the same 46%, decrease 19%
- Snow track surveys by volunteers: increase 47%, remain the same 40%, decrease 13%
- Computer models estimations: increase 20%, remain the same 49%, decrease 31%
- Collect reports from the public: increase 52%, remain the same 37%, decrease 11%

The results again supported the conclusion that current monitoring should remain the same, except for the participation of volunteers, which most respondents wanted to increase. Overall, increases in effort outnumbered decreases in effort:

The DNR asked about the wolf management zones and provided a map of these zones with definitions of appropriate management in each. When respondents were asked “Do you support the concept of zone management for wolves?”, 33% opposed it, 51% supported it, and the remainder were neutral. When asked “Do you feel the current zone system provides appropriate protection for wolves?”, 44% thought it was too protective, while 29% thought it not protective enough, with many (27%) neutral on the subject.

The DNR asked how desirable the following control action would be: “Public harvest if the population goal for the state is exceeded”. 55.5% found it desirable, while 38% found it undesirable. This result is higher than that found by Naughton/Treves (above) who found fewer respondents (40% for contributors, 26% for non-contributors) wanted a wolf harvest “as soon as biologists think the wolf population can sustain annual harvests”. The difference may reflect that Naughton/Treves offered an alternative “only when depredations become unmanageable” that was attractive to many respondents (see above).

The DNR asked respondents how desirable the following control activities were:

- “USDA-Wildlife Services should continue to provide technical assistance including non-lethal methods to persons who have problems with wolf depredations” 66% desirable, 25% undesirable.
- “USDA-Wildlife Services should trap and euthanize wolves that cause depredation on domestic animals on private land.” 60% desirable, 30% undesirable.
- “Control trapping should be avoided on public lands (currently trapping is only allowed on private land or public lands immediately adjacent to private lands where depredations have occurred).” 45% desirable, 43% undesirable.

These findings match the Naughton/Treves results but there is higher support for lethal control, perhaps because translocation was not offered as an alternative control strategy or because the DNR sampled more hunters and more people with an interest in wolves (see methods).

When respondents were asked whether the state should allow trapping of wolves up to 1.0 mile from depredation sites in Zones 1 and 2 to be consistent with 2003 federal regulations, a majority of respondents agreed (58%) with only 27% disagreeing.

“Once delisted by both the state and federal government, permits can be issued to landowners or occupants to control a limited number of wolves on land they own or lease, if they have had recent wolf depredations.” Respondents agreed with this procedure in 60% of cases and disagreed in 36% of cases.

## CONCLUSIONS

Examining public opinion broadly, one finds three surveys with similar general findings, namely that a majority of the public approves of current wolf management strategies and policies as implemented by the Wisconsin DNR. This conclusion is robust judging from the very different sampling approaches used by the three surveys that yielded this same general conclusion. However, the details of our results suggest some changes may be needed.

A majority of the public approves of changes to the ongoing policies of compensation and control, and wishes to guide any potential future harvest in various ways. Briefly, the compensation program in place with requirements of evidence before compensation is popular, but recently enacted programs to pay for missing livestock with less evidence do not seem to be strongly supported. Although livestock specialists disagree on best management practices for reducing depredations in all situations, if reasonable practices can be found, most of the public seems to support requiring implementation of such practices as part of determining payments. Payments for hunting dogs killed on public land received limited support and many want to see such payments eliminated. The current practice of lethal control of depredating wolves is popular but approval will decline if lethal control is implemented on public lands, or if other than government agents conduct controls. Non-lethal control remains popular and can in some scenarios exceed the popularity of lethal control, but the public is often unaware of limitations of non-lethal methods. Finally, pertaining to a potential, future wolf harvest, there is support among a majority of state residents, contingent upon either biologists' assessments of the sustainability of a hunt or contingent upon excessive depredations by wolves. It appears that broad acceptance of a public harvest would not likely occur unless such harvest is strongly tied to reduction or elimination of wolf depredation on livestock and pets.

A somewhat surprising result, was that almost 11% of hunters would consider shooting wolves while hunting for deer (results from two surveys of different populations). With over 650,000 deer hunters in the state, 72,000 might consider shooting a wolf, although

other research in the Great Lakes generally shows support for wolf conservation among about 70% of hunters. Thus, there remains a sizeable subset of hunters that could severely negatively impact the wolf population. Illegal killing of wolves may be one of the factors that will restrict wolves from colonizing open, developed landscapes. Habitat management will need to continue to provide adequate refuge habitat by maintaining forested areas of low road density. While legal restrictions will provide some protection for wolves, we also see the need for additional policies and management supported by a vast majority of the public, including those who might consider killing wolves.

These results and others pertaining to public opinion may help the Wisconsin DNR to refine its policies and fine-tune its management actions on the ground. Such alterations of current practices should not be done in pursuit of popularity as an end in itself, but rather because sound management designed with public opinion in mind can help to avoid illicit actions, grassroots political resistance, and high-level political interference in science-based management.

Surveys of public opinion should be conducted every few years to gauge continued acceptance of management programs, or determine shifts in public attitudes toward wolves. Additional surveys should also be conducted if there are plans for major changes in wolf management, such as public harvests or changes in population goals.

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**APPENDIX K.****Wisconsin Wolf Management Questionnaire 2004**

By Wisconsin Wolf Science Committee.

The questionnaire was available by mail, email or at DNR offices from August 13 through September 13, 2004. A Wisconsin DNR news release went out to media sources throughout the state to let people know about the questionnaire. A total of 1367 completed questionnaires were received, with over 90% being from state residents. The questionnaire and total responses to each question are listed below.

The Wisconsin DNR would like your opinion on the 1999 Wisconsin Wolf Management Plan. We wish to assess how well the plan is working and to determine if portions of the plan need to be modified or new items need to be included. Along with asking questions on specific portions of the plan, there will be opportunity at the end of this questionnaire, to include additional items you feel are needed in the plan.

Detailed information on each question are found in the 1999 Wolf Management Plan (<http://www.dnr.state.wi.us/org/land/er/publications/wolfplan/toc.htm>)

**We value you input, and to assure that all are legitimate citizen comments, we will only consider comments when you include your name and address at the end of the questionnaire.**

A. Population Goals.

1. Delisting / Re-listing Goal. The state delisting goal (the level at which wolves could be removed from the state endangered and threatened species list) was a population of 250 wolves outside of Indian reservations for one year. . The goal was achieved in 2002 and state delisting was completed in 2004. Wolves would be state re-listed as threatened if the population dropped below 250 for 3 years, and re-listed as endangered if it dropped below 80 for one year.

In your opinion, the delisting/re-listing goal of 250 wolves is:

- Much too low      **273**
- Somewhat low      **284**
- About right      **256**
- Somewhat high      **177**
- Much too high      **361**

Recommended alternate goal? (**Avg. = 160, stdev =331**).

2. Management Goal. The state management goal is to maintain a population of 350 wolves outside of Indian reservations. If the wolf population exceeds this level, proactive control by government trappers or public harvest may be used to reduce the population back to this level.



In your opinion, the management goal of 350 wolves is:

- Much too low **240**
- Somewhat low **283**
- About right **219**
- Somewhat high **167**
- Much too high **440**

#### B. Wolf Management Zones.

The state wolf management plan identified four wolf management zones to provide different levels of wolf protection and management.

Zone 1 (northern Wisconsin) and Zone 2 (central Wisconsin forest):

Zones where wolf presence is most acceptable and given the highest level of protection. Habitat management for wolves would focus mainly on these zones. Control efforts would be allowed on private land to reduce wolf depredation on domestic animals. In 2003-2004, there was a minimum of 306 wolves that occurred in at least 88 packs in Zone 1, and 49 wolves in at least 15 packs in Zone 2.

Zone 3 (central and southwest Wisconsin):

A buffer area and important dispersing habitat for wolves between Zones 1 and 2, but contains only limited habitat for wolf packs and has high potential conflict with agriculture. Habitat management would focus mainly on maintaining dispersal habitat and corridors. Agriculture is fairly extensive and control on depredating wolves would be fairly aggressive. In 2003-2004, at least 17 wolves occurred within this zone.

Zone 4 (eastern and southern Wisconsin):

Zone of intense agriculture and large urban areas that is considered unsuitable as wolf habitat. Control on problem wolves would be aggressive. A small number of dispersing loners probably exist in the zone. Three wolves were killed in the zone in winter 2003-2004 from vehicle collisions (2) and illegal kill (1).

Do you support the concept of zone management for wolves?

- Very Opposed **252**
- Moderately Opposed **193**
- Neutral **212**
- Moderately Supportive **354**
- Very Supportive **334**

Do you feel the current zone system provides appropriate protection for wolves.

- It is far too protective **421**
- It is moderately too protective **166**
- Protection is about right **364**
- It is not protective enough **289**
- It is not nearly protective enough **104**

### C. Population Monitoring and Management.

1. The level of monitoring necessary to assess the wolf population varies with population status and intensity of management. At low population levels, monitoring needs to be intense to prevent disappearance of wolves from the state. At higher population levels monitoring can be less intense. Currently an intense system of population monitoring is being used including radio tracking, winter track surveys by DNR and volunteers, summer howl surveys, and collection of reports of public observations of wolves. Intense monitoring will also need to continue for 5 years after federal delisting (which could occur in 2005). Intense monitoring will also be necessary if regular harvests are begun, to make sure that over-harvest does not occur.

a. What is your impression of the current level of wolf monitoring?

- Far too intense           **217**
- Somewhat too intense   **162**
- About right               **573**
- Somewhat inadequate   **250**
- Very inadequate         **138**

b. Of the survey methods listed below, please indicate whether you feel the efforts should increase, decrease or remain about the same.

	Increase	Remain the same	Decrease
Livetrapping and radio-tracking	<b>420</b>	<b>500</b>	<b>410</b>
Snow track surveys by DNR	<b>460</b>	<b>615</b>	<b>250</b>
Snow track surveys by volunteers	<b>618</b>	<b>534</b>	<b>178</b>
Computer models estimations	<b>259</b>	<b>640</b>	<b>410</b>
Collect reports from the public	<b>694</b>	<b>496</b>	<b>144</b>

2. The Wisconsin Wolf Management Plan recommends different control measures based on wolf population status. When wolves were listed as a State Threatened Species (80 to 250 wolves outside Indian reservations), lethal controls were restricted to government trappers on verified depredators, or government agents on wolves that posed threats to human safety. As a delisted, state protected wild animal, below the population goal (250 –350 wolves outside Indian reservations), landowners would have authority to kill wolves attacking domestic animals on private land, and could also be issued permits to kill problem wolves (as long as federal de-listing had also occurred). Above the population goal (> 350 wolves outside of Indian reservations), proactive control by government trappers could be used to reduce the population by

eliminating wolves from unsuitable area. Public harvest could also be considered (as long as federal de-listing had occurred).

*Please circle the response that best describes how you feel about the desirability of each of the following wolf management strategies:*

	Highly Desirable	Desirable	Neutral	Undesirable	Highly Undesirable
Control by government trappers on wolves verified as depredators on domestic animals	480	332	191	154	185
Control by government agents on wolves that pose threats on human safety	551	347	188	117	135
Landowner authority to kill wolves in the act of attacking domestic animals on private land	669	183	120	170	210
Landowner permits to kill a limited number of wolves during specific time period on private land with history of wolf depredation	562	142	93	177	375
Proactive control by government trappers on wolves in areas considered unsuitable because of high risk of human conflict if the state population goal is exceeded	424	326	205	189	199
Public harvest if the population goal for the state is exceeded	635	114	90	89	421

#### D. Habitat Management.

The Wolf Management Plan recognized about 5812 square miles of favorable wolf habitat. By 2003 most areas of favorable wolf habitat in northwest, north central, and central forest were occupied by wolf packs. In portions of northwest and central Wisconsin, wolves have started to occupy less suitable habitat, but in northeast Wisconsin areas of favorable habitat are still not fully occupied. The Wolf Management Plan recommends various levels of habitat management that would be emphasized in Zones 1 and 2. The Wisconsin DNR is interested in your thoughts on these various management tools.

What is your opinion on the following aspects of the Wolf Management Plan?

*Please circle the response that best describes your level of agreement with each of the following statements.*

	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
The plan encourages maintaining low road densities in Zones 1 and 2 on public lands where wolves occurred, and encourages keeping road densities at or below current levels.	<b>520</b>	<b>229</b>	<b>201</b>	<b>106</b>	<b>268</b>
The plan encourages managing public forest land in Zones 1 and 2 in diverse forest cover including some areas of early successional forest that maintain reasonable levels of prey populations.	<b>483</b>	<b>333</b>	<b>246</b>	<b>88</b>	<b>171</b>

#### E. Wolf Depredation Management.

The Wolf Management Plan discusses five control responses to reduce the impact of wolf depredation on domestic animals. These include: 1. technical assistance including non-lethal methods, 2. compensation for losses, 3. livetrapping and translocating wolves by government trappers, 4. trapping and euthanizing wolves by government trappers, and 5. landowner controls on problem wolves. Wildlife specialists from Wisconsin DNR and USDA-Wildlife Service conduct investigations of possible wolf depredations. These specialists also provide technical assistance, help producers apply nonlethal controls, and if necessary attempt to trap problem wolves. Reimbursements for losses due to wolves come from the state Endangered Resources Fund (from individual voluntary contributions on tax returns) and the sale of special wolf license plates.

Please indicate the extent to which you agree with each of the following policies related to wolf depredation management.

	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
USDA-Wildlife Services should continue to provide technical assistance including non-lethal methods to persons who have problems with wolf depredations.	<b>625</b>	<b>266</b>	<b>110</b>	<b>125</b>	<b>216</b>
USDA-Wildlife Services should trap and euthanize wolves that cause depredation on domestic animals on private land.	<b>543</b>	<b>263</b>	<b>133</b>	<b>186</b>	<b>218</b>
Control trapping should be avoided on public lands (currently trapping is only allowed on private land or public lands immediately adjacent to private lands where depredations have occurred).	<b>383</b>	<b>220</b>	<b>156</b>	<b>184</b>	<b>399</b>

1. In your opinion, should the Wisconsin DNR continue to reimburse owners for depredation on the following groups of animals if killed or injured by wolves?

Please indicate the extent to which you agree with each of the following policies related to wolf depredation management.

	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
livestock and poultry on private land	<b>780</b>	<b>398</b>	<b>73</b>	<b>44</b>	<b>58</b>
pets on private land	<b>686</b>	<b>347</b>	<b>132</b>	<b>85</b>	<b>101</b>
pets on public land	<b>510</b>	<b>164</b>	<b>148</b>	<b>222</b>	<b>304</b>
pets on industrial forest	<b>493</b>	<b>146</b>	<b>155</b>	<b>233</b>	<b>318</b>
Hunting dogs legally used on public or industrial forest land	<b>539</b>	<b>163</b>	<b>102</b>	<b>183</b>	<b>364</b>

2. The 1999 Wolf Management Plan allows control trapping to occur up to 0.5 miles from depredation sites in Zones 1 and 2, up to 5 miles away in Zone 3, and any distance from depredation sites in Zone 4. Do you agree with these restrictions?

- strongly agree      **178**
- somewhat agree      **383**
- no opinion      **253**
- somewhat disagree      **273**
- strongly disagree      **258**

The 2003 federal reclassification of wolves includes regulations that allow the state of Wisconsin to trap problem wolves up to 1 mile from depredation sites while listed as federal threatened. Should the plan allow trapping up to 1.0 mile from depredation sites in Zones 1 and 2 to be consistent with federal regulations?

- strongly agree      **378**
- somewhat agree      **394**
- no opinion      **207**
- somewhat disagree      **175**
- strongly disagree      **187**

3. Wolves have been delisted by the State of Wisconsin, and may be removed from the federal threatened species list in 2005. Once the federal action is completed, the Wisconsin plan may allow private landowners to shoot wolves in some situations.

- a. Private landowners or occupants on private land would be able to shoot wolves in the act of attacking pets or livestock on private land. The owner or occupant would be required to contact a conservation warden within 48 hours. Do you agree with this procedure?

- strongly agree      **634**
- somewhat agree      **274**
- no opinion      **33**
- somewhat disagree      **184**
- strongly disagree      **226**

b. On public land, owners of domestic animals being attacked by wolves would be allowed to harass and scare wolves, but would not be allowed to use lethal force. Do you agree?

- strongly agree           **365**
- somewhat agree           **245**
- no opinion                   **32**
- somewhat disagree       **142**
- strongly disagree       **561**

c. Once delisted by both the state and federal government, permits can be issued to landowners or occupants to control a limited number of wolves on land they own or lease, if they have had recent wolf depredations. Do you agree with this procedure?

- strongly agree           **547**
- somewhat agree           **263**
- no opinion                   **51**
- somewhat disagree       **193**
- strongly disagree       **287**

#### F. Wolf Education Programs.

Wolf Education Programs continue to be an important part of wolf management in Wisconsin. These include annual wolf awareness week, a pamphlet on wolves in farm country, updated wolf information on the DNR web site, a pamphlet on wolves and dogs, periodic news releases, working with wolf education organizations, and providing wolf talks.

1. In your opinion, the amount of effort DNR spends to educate the public about wolves is:

- Far too much effort           **240**
- Somewhat too much effort   **111**
- About right                   **387**
- Somewhat too little effort   **368**
- Much too little effort       **236**

### G. Interagency Cooperation.

Interagency cooperation has been critical to successful wolf management in Wisconsin, especially with federal agencies, tribes, and state DNRs in Michigan and Minnesota. When wolves are delisted by the federal government, the role of federal agencies will decline. However, some level of involvement will continue by the U.S. Fish and Wildlife Service for 5 years after delisting, and Forest Service involvement in wolf conservation will continue indefinitely on National Forest lands containing wolves.

1. Do the efforts of interagency management of wolves in Wisconsin seem adequate?
 

<input type="radio"/> strongly agree	<b>144</b>
<input type="radio"/> somewhat agree	<b>412</b>
<input type="radio"/> no opinion	<b>454</b>
<input type="radio"/> somewhat disagree	<b>192</b>
<input type="radio"/> strongly disagree	<b>141</b>

### H. Volunteer Efforts.

The DNR makes extensive use of volunteers in education and survey work on wolves. Each year about 100 people are trained to assist in track surveys. Volunteers from Timber Wolf Alliance, Timber Wolf Information Network, and other organizations provide talks and training to thousands of people each year on wolves.

1. Should DNR continue to support these volunteer efforts in wolf management in Wisconsin?
 

<input type="radio"/> strongly agree	<b>726</b>
<input type="radio"/> somewhat agree	<b>236</b>
<input type="radio"/> no opinion	<b>134</b>
<input type="radio"/> somewhat disagree	<b>80</b>
<input type="radio"/> strongly disagree	<b>170</b>



Of the following wolf management issues, please indicate three that are most important to you (rank 1=most important, 2=2<sup>nd</sup> most important, 3=3<sup>rd</sup> most important).

	<b>1</b>	<b>2</b>	<b>3</b>
___ Population monitoring .....	152	147	123
___ Population management and control.....	287	196	164
___ Education.....	143	164	153
___ Habitat protection and management.....	338	156	111
___ Controlling depredation on domestic animals.....	195	181	169
___ Depredation compensation.....	85	171	156
___ Training of volunteers.....	27	38	62
___ Wolf research.....	56	105	115
___ Public Involvement and agency cooperation.....	46	53	126
___ Law enforcement and legal protection.....	70	97	114
___ Diseases Monitoring and Management.....	32	48	62
___ Public Harvest.....	233	96	189

Thank you for your comments, The Wisconsin Wolf Science Committee. Please fill out the following:

Name:

Address:

Phone:

Email Address if available

Additional Background Information (Optional):

Have you read the 1999 Wisconsin Wolf Management Plan? Yes (**673**) No (**298**).

Are you a male (**915**) or female (**72**)?

Do you hunt? Yes (**848**) No (**444**)

If yes, which animals do you hunt?

<input type="checkbox"/> Deer ( <b>798</b> )	<input type="checkbox"/> Upland Game Birds ( <b>662</b> )
<input type="checkbox"/> Bear ( <b>375</b> )	<input type="checkbox"/> Rabbits & Squirrels ( <b>492</b> )
<input type="checkbox"/> Waterfowl ( <b>375</b> )	<input type="checkbox"/> Predators & Furbearers ( <b>326</b> )

Do you trap furbearers? Yes (**165**) No (**1094**).

Do you hunt with dogs? Yes (**516**) No (**737**).

If yes, which kind of dogs and hunting?

<input type="checkbox"/> Hounds for bears and other predators.	<b>224</b>
<input type="checkbox"/> Beagles & other dogs for small game.	<b>177</b>
<input type="checkbox"/> Dogs for upland gamebirds.	<b>367</b>
<input type="checkbox"/> Dogs for waterfowl	<b>230</b>

Do you farm? Yes (**205**) No (**1069**).

If yes, what kind of farming?

<input type="checkbox"/> Row crop	<b>75</b>
<input type="checkbox"/> Orchard or Fruit	<b>26</b>
<input type="checkbox"/> Vegetable	<b>45</b>
<input type="checkbox"/> Beef Cattle	<b>62</b>
<input type="checkbox"/> Dairy Cattle	<b>23</b>
<input type="checkbox"/> Sheep	<b>13</b>
<input type="checkbox"/> Hogs	<b>19</b>
<input type="checkbox"/> Poultry	<b>38</b>
<input type="checkbox"/> Deer or Elk	<b>5</b>
<input type="checkbox"/> Other	<b>67</b>

Do you consider yourself an environmentalist? Yes (**855**) No (**389**).

List any environmental organizations to which you belong.

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Do you consider yourself a conservationist? Yes (**1066**) No (**172**).

List any conservation organizations to which you belong.

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Do you consider yourself an animal protectionist? Yes (**471**) No (**745**).

List any animal protection or animal welfare organizations to which you belong.

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