Minnesota Wolf Management Plan

February, 2001

Prepared by the

Minnesota Department of Natural Resources
Division of Wildlife

in consultation with the Minnesota Department of Agriculture

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Approved:

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Executive Summary

The goal of this management plan is to ensure the long-term survival of wolves in Minnesota while addressing wolf-human conflicts that inevitably result when wolves and people live in the same vicinity. This plan was developed by holding 12 public information meetings throughout the state in January 1998, convening a wolf management roundtable (Roundtable) that held 8 days of meetings to develop consensus recommendations, and utilizing the wealth of biological, sociological, cultural, and economic data, reports, and experience available to the Minnesota Department of Natural Resources (DNR). Additional guidance and authority were provided by the Minnesota Legislature and Governor (Laws of 2000, Chapter 463).

The ecology of wolves and their relationships to humans have been more studied in Minnesota than anywhere else in the world. We know much about their distribution, numbers, prey relationships, social organization, reproduction, and survival. In general, wolf numbers are highest where prey is abundant and human-caused mortality is low. We also know that humans hold a wide range of values related to wolves. During the past 30 years, legal protection of wolves and management for a healthy prey base have contributed to a threefold increase in wolf numbers in Minnesota. Wolves have been protected under Federal endangered species laws since 1974, and primary management authority since that time has resided with the United States Fish and Wildlife Service (USFWS). With wolf numbers quickly increasing in Wisconsin and Michigan in recent years, the wolf in the western Great Lakes region now meets established criteria for removal from the federal listing of threatened and endangered species.

When management authority reverts to the states, DNR, in cooperation with the Minnesota Department of Agriculture (MNDA) and the United States Department of Agriculture (USDA) Wildlife Services, proposes to keep in place some current wolf management activities, and to enhance or add others.

DNR will conduct or facilitate the following management activities and programs:

<u>Population Monitoring</u>

- employ and enhance the currently used methodologies to assess wolf population numbers, distribution and demography
- encourage and conduct telemetry monitoring of wolves in selected areas
- monitor aspects of wolf health and diseases

<u>Population Management</u>

- wolf populations in Minnesota will be allowed to continue to expand, with a minimum population goal of 1,600
- no general public taking of wolves will be proposed for the first 5 years following federal delisting

Public Safety

- harassment of wolves to discourage contact with humans will be allowed
- killing of wolves in defense of human life will continue to be allowed

Wolf Damage Management

An integrated wildlife damage management program that combines animal husbandry considerations, cost-effective nonlethal deterrents, lethal wolf removal, and compensation payments to owners of livestock and dogs will be developed, and include the following activities:

- the current USDA Wildlife Services wolf damage control program will be continued, under a new cooperative agreement
- State certified predator controllers will provide additional wolf damage control
- two wolf depredation management zones (Zone A and Zone B) are created, with different depredation control procedures
- Zone A comprises approximately 30,000 square miles in northeastern Minnesota; Zone B is the remainder of the state

- in Zone A (Northeastern Minnesota)
    - state administered wolf control by certified predator controllers will be limited to cases of verified losses, conducted within a one-mile radius of the depredation site, and limited to 60 days in duration
    - owners of livestock, guard animals, or domestic animals, and the owner's agents, may shoot or destroy wolves that pose an immediate threat to their animals, under certain conditions
    - owners of domestic pets may shoot or destroy wolves that pose an immediate threat to their animals, under certain conditions

- in Zone B (remainder of Minnesota)
    - state administered wolf control by certified predator controllers will be limited to cases of verified losses within the previous five years, and conducted within a one-mile radius of the depredation site
    - owners of livestock, domestic animals, or pets may shoot wolves to protect their animals, on land owned or leased by the owner, under certain conditions. Additionally, owners of livestock, domestic animals, or pets may employ a State certified predator controller to trap wolves to protect their animals on and within one mile of land owned or leased by the owner

- a handbook for wolf depredation will be produced; investigating agents and predator controllers will be trained and certified
- a central public telephone contact for wolf depredation assistance will be created
- a database of all reported depredation losses will be created
- the use of Best Management Practices (BMPs) by livestock owners will be encouraged
- the harassment of wolves will be allowed under certain conditions, to discourage interaction between wolves and humans, livestock, or pets

- compensation for livestock losses will be increased to full market value, effective July 1, 2001

Habitat management

- Wolf habitat components, including wolf prey (deer and moose) and the vegetation and other environmental variables they depend upon will be monitored and managed
- human-caused wolf mortality and connectivity of wolf populations will be monitored

Enforcement

- illegal wolf taking is a gross misdemeanor, punishable by fines up to $3,000 and imprisonment in the county jail for up to one year
- the restitution value for illegally taken wolves is $2,000
- the release of captive wolves (except by permit) or wolf-dog hybrids is prohibited
- activities necessary to enforce wolf laws and regulations will be initiated and increased

Information and education

- timely and accurate information about wolves and wolf management will be available to the public in written, visual, and electronic formats
- wolf education programs and activities conducted by private organizations will be supported and facilitated
- timely news releases about wolves and wolf management will be prepared
- responsible wolf ecotourism will be supported as an important form of public education
- periodic knowledge and attitude surveys (5 years) of Minnesota citizens living both inside and outside wolf range may be conducted, because public attitudes directly impact wolf management

Research

- wolf research will be encouraged, coordinated, supported, and initiated when necessary
- primary research topics will include wolf population assessment, wolf-livestock interactions, and wolf-prey interactions

Staffing

- a wolf specialist position will be created, to provide overall coordination of wolf management activities
- a wolf research biologist position will be created, to coordinate and conduct wolf research and population monitoring
- three conservation officer positions will be created, to ensure that wolf laws and regulations are enforced, and depredation responsibilities are handled in a timely manner

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INTRODUCTION

Since the eastern subspecies of the timber wolf, *Canis lupus*, (now referred to as the gray wolf, and in this plan, simply "wolf") was given full protection in 1974 by the Endangered Species Act of 1973 (ESA), the federal government and states in the western Great Lakes region have managed wolves with the primary objectives of enhancing populations in Minnesota and re-establishing viable populations in Wisconsin and Michigan. The ultimate goal of such management was to exceed the population guidelines set forth in the 1992 federal Recovery Plan for the Eastern Timber Wolf, and have the subspecies removed from the federal list of endangered and threatened species because of its successful recovery.

Plan goal

In 1998, the Minnesota Department of Natural Resources (DNR) adopted the following position statement on wolf management goals in Minnesota:

> ***The Minnesota Department of Natural Resources is committed to ensuring the long-term survival of the wolf in Minnesota, and also to resolving conflicts between wolves and humans.***

For delisting (the removal of wolves from the federal list) to occur, each state not only needs to demonstrate that the biological requirements of wolf recovery have been met, but also must demonstrate future management plans for wolves that assure their continuing survival. After delisting, most legal responsibility for management will reside with state and tribal authorities.

Plan development

DNR conducted an extensive public involvement process, funded in large part by an appropriation approved by the Legislative Commission on Minnesota Resources (LCMR).

Public information meetings -- DNR held 12 public information meetings throughout the state in January 1998 to present an overview of the wolf management planning process, to answer questions about wolves and wolf management, and to seek public comments on management issues. Attendees were provided with two informational handouts and encouraged to complete a public comment sheet. An estimated 3,275 people attended the meetings, and about half (1,572) submitted comment sheets at the meetings. Comments were tabulated by meeting place and in aggregate for future use.

Wolf Management Roundtable -- DNR convened a Minnesota wolf management roundtable (Roundtable) composed of representatives of environmental, agricultural, hunting, trapping, and wolf advocate organizations; government agencies; and private citizens who had specific interest in wolf management issues in Minnesota. The purpose of the Roundtable was to provide guidance to DNR in developing a wolf management plan for Minnesota by deriving consensus recommendations on wolf management plan options, with particular emphasis on the controversial aspects of wolf management. At the first meeting of the Roundtable in April 1998, Commissioner Rod Sando committed DNR to endorsing all Roundtable consensus recommendations, as long as the survival of the wolf in Minnesota would be assured and the recommendations were biologically sound. Seven meetings were held, and the consensus-based decision-making process was facilitated by Roger Williams, Director of the Office of Dispute Resolution of the Minnesota Bureau of Mediation Services. On 28 August 1998, the Roundtable completed deliberations and came to consensus on a wide range of wolf management issues (Appendix V.).

Legislation -- In 1999, DNR drafted a wolf management bill, consistent with the Roundtable recommendations. The 1999 Minnesota Legislature considered significant amendments to the bill, but ultimately did not pass any wolf management legislation. In 2000, DNR drafted a revised bill, still incorporating many Roundtable recommendations, but modified to reflect issues raised by legislators the previous year. The 2000 Minnesota Legislature passed a wolf management bill, which was signed into law by Jesse Ventura, Governor of Minnesota (see Appendix I, Chapter 463, Laws of 2000).

Wolf Management Plan -- As authorized by Section 16, Chapter 463, Laws of 2000, DNR prepared this plan, in consultation with the Minnesota Department of Agriculture (MNDA), consistent with all provisions of state law, and incorporating many Roundtable consensus recommendations. DNR professional staff and advisors fully considered various biological, sociological, and economic data, reports, and experience in preparing this plan.

BIOLOGY AND HISTORY OF WOLVES IN MINNESOTA

General knowledge and research

Worldwide, wolves have been scientifically studied more than any other carnivore species, resulting in a comprehensive understanding of their ecology and relationship to

humans. Minnesota's wolves have been the subject of more scientific investigations than any other regional group of wolves, worldwide. The first scientific study of wolves carried out in Minnesota was reported on 60 years ago by Sigurd Olson, and researchers still actively study wolves in a variety of areas of the state today. The result of these efforts has been a voluminous literature that comprises much that we know about wolves and their relationships with the environment and with humans. There are many papers and books that could be individually cited in a review of wolf biology and history in Minnesota, but for clarity and brevity, the following summary has been excerpted from compilations in a few pertinent publications, including a review and estimate of wolf distribution and numbers in Minnesota by Dr. Todd K. Fuller et. al. in 1992, the federal Eastern Timber Wolf Recovery Plan published in 1978 and revised in 1992, and a set of guidelines for wolf management in the Great Lakes region by Dr. Todd K. Fuller in 1997.

Biology

Distribution and relations with other wolves and carnivores -- Before settlement by Europeans, wolves inhabited all of Minnesota, from the southern prairies to the northern forests. The Minnesota subspecies was formerly known as the eastern timber wolf (*C. l. lycaon*) but is now considered to be the buffalo wolf (*C. l. nubilus*). To the human inhabitants of the region, all wolves looked and behaved rather similarly, and at present all wolves in Minnesota are considered a single subspecies by scientists. There is genetic evidence that a few wolves bred with coyotes (*Canis latrans*) during the past century when wolf numbers were low and coyotes expanded their range into and through Minnesota, but the biological consequences of such interbreeding cannot be detected. In general, wolves displace coyotes, but are tolerant of red fox.

Prey relationships -- Historically, wolves preyed on large hoofed mammals (ungulates) in Minnesota, such as white-tailed deer (*Odocoileus virginianus*), elk (*Cervus elaphus*), woodland caribou (*Rangifer tarandus*), moose (*Alces alces*), and bison (*Bison bison*) wherever they occurred. Wolves are not habitat specialists; they can live anywhere prey is sufficiently abundant because they can kill the largest of ungulates and supplement their diet with a variety of smaller animals, such as snowshoe hares (*Lepus americanus*) and beavers (*Castor canadensis*). Wolves most often kill very young ungulates and very old ungulates because they are the most inexperienced and debilitated, respectively, in the

population, and thus the easiest to capture. Under unusual circumstances, such as extremely deep snow late in the winter, wolves may kill many more ungulates than they can eat, but usually wolves must constantly hunt to sustain themselves.

Social organization -- As in other areas of the northern hemisphere where they occur, most wolves in Minnesota live in family groups called packs. These packs are composed of a breeding pair and their offspring of one or more years, and sometimes one or more nonrelated wolves. A pair of wolves can be considered a pack, and some packs number 15 or more. The average pack in Minnesota consists of 5-6 wolves. Throughout their lifetimes, wolves may also live on their own for some time, especially when they disperse from their natal pack and look for their own area in which to settle. At any one time, the proportion of the wolf population consisting of lone wolves averages 10-15 percent, varying with the time of year and other factors.

Territoriality -- Wolf packs in Minnesota and elsewhere live in territories that are home ranges defended constantly against intrusion by other packs. On a rangewide basis, territories comprise a mosaic of wolf packs with few uninhabited areas in between. Territories may be as small as 25 square miles or as large as 200 square miles, depending on pack size and the density of ungulates (i.e., amount of food available). Boundaries of territories sometimes are obvious topographical features such as lakes or rivers, but most often they are indiscernible to humans. Boundaries usually are quite stable from year to year, except when pack composition changes substantially.

Dispersal and reproduction -- Wolves usually leave their packs when they are yearlings to seek a mate and establish their own territory and pack. This dispersal often occurs during autumn and, if successful in pairing, results in breeding in February and pups born in April. In most packs, only one female gives birth and litter sizes usually range from 4 to 7 pups. All pack members contribute to raising pups during the summer, whether the pups are at dens or at resting areas called “rendezvous sites.” By autumn, pups have grown to nearly adult size and begin traveling with other pack members.

Survival -- Unless food is very abundant, up to one-half of wolf pups die before they reach 6 months of age. Starvation is thought to be the major cause of death of pups, but diseases that particularly affect pups also are important. Mortality of adults also is relatively high. In a wolf population that remains at the same level from one year to the

next, about 35 percent of adult wolves die each year. The most common natural causes of mortality to both pups and adults are starvation and intraspecific strife (i.e., wolves killing other wolves). This happens when food is scarce and when wolves must "trespass" into adjacent wolves' territories to hunt. Resident wolves defend their territory and food supply, and often the result is the death of one or more members of both packs. Infrequently, disease may also be an important adult wolf mortality factor. Wolf survival in Minnesota is not affected by competition with black bears (*Ursus americanus*) or coyotes. Infrequently, motor vehicles or trains accidentally hit and kill wolves. Wolves are also deliberately (illegally) killed by humans, but the frequency of these illegal actions is unknown. In addition, about 150 wolves are killed each year by Federal depredation control activities.

Density -- A review of many wolf studies in North America indicates that wolf abundance is directly related to prey abundance. When prey is relatively abundant, litter sizes are larger and pup survival is greater. Under the best circumstances, wolf populations can increase 30-40 percent per year. Conversely, when prey is scarce, litters are smaller and pup survival is lower. The result is a sort of shifting balance between wolves and their food supply. However, the density of wolves is also influenced by mortality. High mortality rates, such as from disease or killing by humans, might reduce wolf numbers even though prey is relatively abundant. Also, wolf numbers might be relatively low in areas of high prey abundance that wolves are just beginning to colonize, or relatively high in areas where ungulate density is declining due to some other factor, such as severe winter weather. These differences in actual versus expected density are the result of "time lags," or the time needed for wolf populations to adjust to the food supply. In any one year, the ratio of wolves to ungulates may vary, but over a period of years with relatively stable ungulate populations there is the strong likelihood of a predictable ratio between wolf and prey abundance, albeit with wide variance.

Interactions with humans

Values -- Wolves have always played a prominent role in Native American culture and spirituality. In general, wolves were revered by American Indians, who made no efforts to control wolf populations or eliminate them from the landscape. However, American Indians did kill some wolves, usually for fur and cultural reasons. Similarly,

early European fur traders seemed indifferent to wolves because they neither posed a threat to their livelihood nor were considered valuable furbearers. Conversely, European settlers definitely did not value wolves and already had a long history of persecuting them in their homelands. In Minnesota, the bounty system for wolves started in 1849 and continued through 1965. Settlers not only had a mostly unfounded fear of wolves, but knew that wolves killed livestock and competed with humans for wild ungulates. Culturally, wolves had little or no value to European settlers and were viewed as a species to be eliminated. Over time, some economic value of wolf pelts accrued, but there was no widely accepted protection or conservation of wolves in Minnesota prior to the 1960s.

Attitudes -- Public attitudes began to change significantly with the "environmental revolution" in the 1960s, and by 1966 the first federal Endangered Species Act was passed. Subsequently, wolf research and protection efforts increased substantially, as did educational efforts on behalf of the wolf. Wolves remained a species to be eliminated in the eyes of some, but gradually more people became concerned about wolves and their long-term survival in Minnesota.

Legal and conservation status

Federal -- The federal Endangered Species Preservation Act of 1966 provided wolves limited protection, but only on federal lands. In 1970 the Superior National Forest was closed by supervisory decree to the taking of wolves. In 1974 the federal Endangered Species Act of 1973 legally protected all wolves in the lower 48 states as an endangered species. Beginning in 1975, wolves depredating on livestock were captured and relocated elsewhere in extreme northern Minnesota by United States Fish and Wildlife Service (USFWS) trappers. In 1978 an Eastern Timber Wolf Recovery Plan was published that called for wolf management zones, the re-establishment of wolves elsewhere, and reclassification of wolves in Minnesota. Wolves in Minnesota were federally reclassified as threatened in 1978, thus allowing government trappers to kill depredating wolves under a set of strict guidelines. In 1986 authority for federal wolf control efforts passed from USFWS to USDA Animal Damage Control (now Wildlife Services). Under federal law, disposal of gray wolf parts and hides is by federal permit.

State -- Wolves were unprotected in Minnesota prior to the federal ESA and could be taken by public hunting and trapping. In addition to the state bounty, Minnesota had for

a number of years an ongoing government wolf control program, including aerial shooting, which ended in 1956. The last bounties on wolves were paid in 1965. From 1965 through 1973, some wolves were killed for fur, while depredating wolves were killed from 1969 through1973 under a state directed predator control program. Under State endangered species laws, wolves were listed by Minnesota as a threatened species in 1984, and were removed from the state list in 1996 because their populations had met recovery criteria. In 1978, Minnesota created a compensation program administered by the Minnesota Department of Agriculture (MNDA) to pay livestock owners for wolf caused losses.

Tribal -- American Indian tribes in Minnesota are sovereign governments that by various treaties retain certain rights to regulate natural resources used by their members on tribal and public lands on reservations, and in some cases, on public lands in ceded territories. Tribal governments also have the authority to dispose of gray wolf parts and hides taken under their authorities as they see fit, including use for religious and ceremonial purposes.

Recovery criteria -- In 1992 a revised federal recovery plan (1992 Recovery Plan) identified specific criteria for delisting wolves in Minnesota and adjacent states. These included a Minnesota wolf population goal of 1,251-1,400 by the year 2000, a combined Wisconsin-Michigan population of greater than 100 for 5 consecutive years, and management programs in each state that would ensure the continued survival of wolves in the future.

Density and Distribution

Through the 1970s -- Wolf distribution and abundance have changed significantly in Minnesota over the past 150 years, as a consequence of changes in the human population composition, public attitudes, and legal status afforded wolves. Wolves once occurred throughout the state, but by 1900 wolves were rare in southern and western Minnesota. Wolf range continued to decrease, and by the 1940s the highest densities remained in remote areas of the northern third of the state, adjacent to and contiguous with the much larger wolf population in Canada. During the early 1950s, wolves still occurred almost exclusively in 12,000 square miles of the northern and northeastern part of the state and numbered 450-700. By the mid-1960s wolves might have numbered 350-700, and by 1970 numbers were estimated at 750 and their range probably covered almost 15,000 square

miles. As a result of federal and state protection and increasing deer numbers, wolves numbered 1,000-1,250 by the late 1970s, and had increased at an average annual rate of about 5 percent per year.

1988-89 -- During the winter of 1988-89, the state conducted a comprehensive assessment of wolf distribution and abundance. Federal, state, and county natural resources professionals, all familiar with wolves and wolf sign, were asked to record winter wolf observations. This information (1,244 observations) was combined with other distribution data, such as location of wolf depredation activities and radioed research packs, to estimate total occupied wolf range in the state (20,500 square miles), which indicated a range expanding south and west. The resulting population estimate of 1,500-1,750 wolves was well above the federal recovery plan goal. Overall, wolf numbers had continued to increase at a rate of about 3 percent per year, and wolf range had also increased.

1990s -- During the 1990s, sightings, reports, DNR annual scent station surveys, and federal depredation trapping activities all indicated that wolves were continuing to expand their distribution and thus their abundance. Given these observations and assuming that the continuing rate of wolf population increase was similar to that observed during the 1970s and 1980s, DNR estimated that there could have been 2,000-2,200 wolves in Minnesota in 1994. During winter 1997-98, an effort similar to but expanded from the 1988-89 survey was made to document wolf distribution and estimate total numbers. From more than 3,300 observations, DNR estimated that in winter 1997-98, 2,450 wolves ranged over approximately 33,970 square miles in Minnesota.

Wisconsin and Michigan -- In Wisconsin and the Upper Peninsula of Michigan the wolf population has also expanded, but at an even faster rate because of abundant prey and few wolves. In the early 1970s, there were no more than six wolves in Michigan, and one pack in Wisconsin. By 1994 wolves numbered 57 in each state, and by 1997 Wisconsin had 148 wolves (37% increase/year) and the Upper Peninsula of Michigan had 112 (25% increase/year). By 1999-2000, Wisconsin had about 250 wolves and Michigan had 216. By 1999, both states had prepared wolf management plans.

Management activities

Monitoring -- Comprehensive monitoring of wolf numbers and distribution in Minnesota has been carried out by DNR at approximately 10-year intervals, and other

population surveys and depredation trapping have provided indications of annual population trends. In addition, state and federally funded research projects that estimate wolf population trends and dynamics on specific study areas have been conducted for 2-30 year periods for the past 30 years. These studies, all of which include monitoring of numerous radio collared individuals, have occurred in all portions of wolf range in Minnesota, and some continue today. DNR also carries out annual evaluations of deer and moose populations. Ungulates are managed on a regional basis to ensure sustainable harvests for hunters, sufficient numbers for aesthetic and nonconsumptive use, and to minimize damage to natural communities and conflicts with humans such as depredation of agricultural crops.

Depredation control -- Since 1986, control of depredating wolves has been the responsibility of the USDA Wildlife Services wolf depredation program headquartered in Grand Rapids. During 1993-1999, that program was responsible for investigating 159-249 complaints annually, and killing an average of 153 depredating wolves each year, many of which were utilized for scientific and educational purposes. The annual budget for the federal depredation program is approximately $250,000 per year.

Compensation payments -- Assessment of livestock losses and eligibility for payment of compensation are a cooperative effort between USDA Wildlife Services, DNR Division of Enforcement, MNDA, and county extension agents. Compensation payments made by the MNDA ranged from $31,000 to $67,000 each year during 1993-1998.

Enforcement -- Because wolves are protected under federal, state, and tribal laws, enforcement of statutes prohibiting the illegal killing or harassment of wolves is the responsibility of the enforcement staff of USFWS, DNR, and tribal natural resource departments.

FUTURE WOLF MANAGEMENT IN MINNESOTA

The goal of this management plan is to ensure the long-term survival of wolves in Minnesota while also adequately addressing the wolf-human conflicts that inevitably result when wolves and people live in the same vicinity. To achieve this goal DNR, in cooperation with MNDA and USDA Wildlife Services, proposes to keep in place some current wolf management activities, and to enhance or add others. In particular, the plan

addresses wolf conservation concerns in the areas of population monitoring and management, depredation management, habitat management, law enforcement, public information and education, research, and program administration.

Authority

Federal and State -- Many aspects of this plan are superseded by federal laws, until the wolf is delisted from the ESA. When delisting occurs, all federally superseded state laws existing at that time will be immediately effective, and all federal wolf regulations eliminated. However, after delisting USFWS will continue to monitor the status of wolves in Minnesota for a period of 5 years to ensure that recovery goals are maintained. Should Minnesota or any state manage wolves in a manner that results in population declines below the 1992 Recovery Plan goals, USFWS has authority to immediately re-list the species. The 1992 Recovery Plan also requires USFWS to determine that the survival of the wolf in Minnesota is assured, before making a delisting decision. For these reasons, it is desirable for Minnesota to have a wolf management plan with legislatively authorized implementation provisions prior to federal delisting.

DNR authority to manage wolves is governed by the Minnesota Legislature through statutes. The 2000 Minnesota Legislature passed a wolf management bill, which was signed into law by the Governor (Laws of 2000, Chapter 463; see Appendix I.). These new laws, in conjunction with existing Minnesota Game and Fish Laws, authorize and constrain wolf management activities, and this management plan is consistent with those statutes.

Tribal management -- Various tribal authorities autonomously manage their wildlife and other resources on tribal lands in Minnesota. Current wolf range in Minnesota encompasses the Mille Lacs, Leech Lake, White Earth, Red Lake, Fond du Lac, Bois Forte, and Grand Portage Indian reservations. On reservation lands, tribal conservation codes may supersede state laws, and other provisions of this state wolf management plan. In addition, tribal conservation codes in force in both the 1837 and 1854 Ceded Territories may differ from state regulations. There are other tribes outside of the area that the State manages for wolves that may also be affected by this management plan. DNR will consult with individual tribes on a government-to-government basis through their designated agencies, including tribal governments, the Great Lakes Indian Fish and Wildlife

Commission, and the 1854 Authority, regarding wolf management, through agreed upon processes including those stipulated to and approved by the Courts.

Other government and private land management -- Authorizations of individuals to kill wolves under state law are, of course, subject to other laws and regulations, including trespass on private property; local firearm discharge ordinances; state, federal, and local park regulations; etc.

Population monitoring

Assessment of wolf numbers and distribution -- DNR will continue and enhance current methodologies to periodically assess wolf population abundance and distribution (see Appendix VI.). In the past, these statewide population assessments have been conducted approximately every 10 years (1978-79, 1988-89, 1997-98). The next comprehensive statewide estimates of wolf distribution and numbers will be scheduled and completed in the first and the fifth years following federal delisting. Subsequently, statewide estimates of wolf distribution and numbers will be scheduled at 5 year intervals.

Annual indices -- Annual changes in wolf distribution and abundance will be monitored by means of currently used indicators such as wolf depredation complaints, autumn scent station surveys, winter furbearer track surveys, and other observations of field personnel from all natural resources agencies. Such trend indicators likely will not identify small population changes or changes in specific areas, but an accumulation of evidence from multiple sources and/or multiple years should provide indications of overall wolf population trends between statewide population assessments.

Radio-telemetry -- Continuing area-specific telemetry monitoring of wolves will be encouraged. Emphasis will be placed on areas of wolf population concern, such as newly colonized regions and areas where conflicts with humans are likely. Such monitoring might be carried out directly by DNR, but also by other agencies or university scientists. The use of technological advancements such as satellite telemetry will be encouraged. Permits to conduct such research are authorized by DNR and as such have specific reporting criteria to ensure that the monitoring is helping to fulfill wolf management and conservation objectives.

Population modeling -- DNR will investigate and develop the use of computer modeling to predict wolf population trends. Modeling may be a useful tool in predicting

impacts of management prescriptions on long-term wolf distribution and numbers in Minnesota.

Health -- Monitoring the health of wolves necessarily includes consideration of the effects of infectious diseases and parasites. Examples of health monitoring include collection and analysis of biological samples from live-captured wolves, analysis of wolf scats, and necropsies of dead wolves. Regular collection of pertinent tissues of live-captured or dead wolves will be initiated, and periodic assessments of wolf health will be carried out under authorization of DNR, when circumstances indicate that diseases or parasites may be adversely affecting portions of the wolf population.

Population management

Population goal -- Wolves in Minnesota will continue to be allowed to naturally expand their range in the state. To assure the continued survival of the wolf in Minnesota, the minimum statewide winter population goal is 1,600 wolves. There is no maximum goal. If the population falls under this minimum, DNR will take appropriate management actions to address the cause of the reduction and assure recovery to the minimum level in the shortest possible time. The 1992 Recovery Plan identified specific wolf management zones with differing population goals within Minnesota. Although this state plan identifies two zones, with different depredation management approaches (see **Depredation management** below), it does not prescribe population sub-goals for each zone. Zone A is identical to the 1992 Recovery Plan zones 1-4, which had an aggregate recovery population goal of 1,251-1,400 wolves. Zone B is identical to the 1992 Recovery Plan zone 5, which had a recovery population goal of zero wolves. Consequently, the state's ongoing wolf population goal of 1,600 minimum, statewide, substantially exceeds the 1992 Recovery Plan population goals in aggregate, and will likely exceed those goals in all 5 individual federal zones.

Distribution -- No general public taking of wolves is authorized by this plan within the first 5 years of implementation (see **Population management activities** below). The killing of depredating wolves will continue to be allowed at depredation sites, and in Zone B potentially depredating wolves may also be killed (see **Depredation management** below). Thus, wolves will continue to be protected on all public lands, but can be removed from private land (and in some cases, small areas of immediately adjacent public land).

Because of the way in which public and private lands are distributed in Minnesota, a natural system of "zones" will continue to develop, as it has in the past. Where wolves are not in conflict with humans, they will be left alone; where they are in conflict with humans, problem wolves will be removed. The effects of depredation-related mortality are not expected to change the current distribution of wolves in Minnesota.

Population management activities -- Population management measures, including public taking (i.e., hunting and trapping seasons) or other options, will be considered by DNR in the future but not sooner than 5 years after Federal delisting by USFWS. If, in the future, public taking is proposed by DNR, there will be opportunity for full public comment. Decisions on public taking will be based on sound biological data, including comprehensive population surveys.

Public Safety

No documented cases of wolves attacking and injuring people have occurred in Minnesota. Nevertheless, many people are sincerely concerned about the threat of wolves to human safety, citing recent documented attacks of wolves on people in Ontario, Canada, and in India, and observations in Minnesota of bolder behavior of wolves around human habitations since full protection was provided by ESA. In consideration of these safety concerns, private citizens are authorized to take a wolf in defense of the person's own life or the life of another. A person who takes a wolf in defense of human life must protect all evidence, and report the taking to a DNR Conservation Officer within 48 hours (see Appendix I.).

Depredation management

Administration -- DNR will assume administrative responsibility for an integrated wolf depredation management program, in consultation and cooperation with the MNDA and USDA Wildlife Services. DNR's Wolf Specialist will assume primary responsibility for developing and coordinating wolf depredation management activities. In addition, 3 DNR Conservation Officers, stationed within wolf range, will coordinate and conduct the depredation responsibilities of the DNR Division of Enforcement. DNR may delegate some administrative responsibilities to USDA Wildlife Services, subject to terms of a future cooperative agreement. DNR will establish a central public telephone contact for wolf depredation assistance.

Approach -- DNR will use an integrated wildlife damage management approach to reduce animal losses to wolves, similar to that currently used by the USDA Wildlife Services wolf depredation program. Because USDA Wildlife Services has extensive experience, success, and credibility in managing wolf depredation in Minnesota, DNR will develop a cooperative agreement with USDA Wildlife Services to continue and expand on that basic approach. Goals of the agreement will include continuation of current wolf depredation management programs, development and integration of new State wolf depredation control procedures, creation of a wolf depredation handbook, training of predator controllers and investigating agents, coordination with MNDA to provide information and education to livestock owners, and transfer of some recordkeeping and administrative tasks to USDA Wildlife Services.

Zones -- For purposes of wolf protection and effective depredation management, two wolf management zones are created in Minnesota. In Zone A (Northeastern Minnesota), the killing of depredating wolves is limited to situations of immediate threat, and immediately following verified losses of livestock, domestic animals, or pets. Zone A is identical to Federal wolf recovery zones 1-4, and includes the current primary wolf range in Minnesota. Because livestock, domestic animals and pets are present in this zone, depredation procedures are needed. However, they are limited to circumstances of immediate threat and verified losses. These constraints will likely result in no significant increase of depredating wolves killed, as they provide a level of wolf protection similar to previous ESA depredation management.

In Zone B, the killing of depredating wolves is allowed for the purpose of protecting livestock, domestic animals, or pets. Documentation of immediate threat or a verified loss is not required, but the killing of wolves is limited to land owned, leased or managed by the domestic animal owner or, by employing the services of a State certified predator controller, to a one-mile radius from that land. Zone B is identical to Federal recovery zone 5, in which elimination of wolves was recommended in the 1992 Recovery Plan. Because livestock, domestic animals, and pets are present in this zone in larger numbers and distribution than in Zone A, and because Zone B is not essential to wolf recovery in Minnesota, preventive depredation procedures will encourage greater private landowner tolerance of the general presence of wolves, without jeopardizing the long-term

survival of wolves in the state. Although these depredation procedures will likely result in a larger number of wolves killed, as compared to previous ESA management, they will not result in the elimination of wolves from Zone B.

State wolf depredation control activities -- In Zone A, if DNR verifies that livestock, domestic animals, or pets were destroyed by a wolf, and the owner requests wolf control, a predator control area will be opened for up to 60 days. The control area may not exceed a one-mile radius surrounding the damage site. Trained and certified predator controllers, with permission of the owner and other landowners within the control area, may take wolves subject to the provisions of MN Statutes 97B.671, related Rules, and other restrictions DNR may impose (see Appendix VII). Controllers must dispose of unsalvageable wolf remains as directed by DNR, and surrender any salvageable wolf remains to DNR. Trained and certified predator controllers will be paid $150 for each wolf killed. With the exception of payment, any wolf control conducted by USDA Wildlife Services personnel will be subject to these same regulations and restrictions. In Zone B, wolf control is subject to the same conditions and restrictions, with two exceptions. Under current Rule, a control zone may be opened for 30 days to 214 days, depending upon the time of year. Also, a control zone may be opened anytime within 5 years of a verified depredation loss. The effect of these different restrictions for Zone B is to allow preventive and repetitive wolf depredation control, but only on sites with a verified damage history.

Private wolf depredation control activities -- Statewide, all persons are authorized to harass wolves that are within 500 yards of people, buildings, dogs, livestock, or other domestic pets or animals, to discourage wolves from contact or association with people and their animals. Harassment methods are not restricted, but cannot result in physical injury to a wolf. Additionally, owners (and the owners' agents) of livestock, guard animals, or domestic animals may shoot or destroy wolves when they pose an immediate threat to such animals, on lands owned, leased or occupied by the owners of such animals. Immediate threat is defined as the observed behavior of a wolf in the act of stalking, attacking, or killing livestock, a guard animal, or a domestic pet under the supervision of the owner. If a wolf is not observed stalking or attacking, the presence of a wolf feeding on an already dead animal whose death was not caused by wolves is not an immediate threat. A person who destroys a wolf under these circumstances must protect all evidence and report the

taking to a conservation officer as soon as practicable, but no later than 48 hours after the wolf is destroyed. Similarly, an owner of a domestic pet may shoot or destroy a wolf that poses an immediate threat to a domestic pet under the supervision of the owner. The owner is not restricted to lands owned or leased by the owner, but other restrictions apply (trespass, local ordinances, etc.) The owner must protect all evidence, and report the taking to a conservation officer as soon as practicable but no later than 48 hours after the wolf is destroyed.

In Zone A, DNR will respond to all such reported takings by investigating and documenting the taking, confiscating any salvageable wolf remains, disposing of wolf remains by sale or donation for educational purposes, and compiling monthly reports. In cases involving livestock and guard animals, DNR will notify the county extension agent, who may recommend to the owner cost-conscious measures to reduce depredation risks. These recommendations must be consistent with the best management practices developed by MNDA.

The condition of immediate threat does not apply in Zone B. A person may shoot a wolf on land owned, leased, or managed by the person at any time to protect the person's livestock, domestic animals, or pets. Additionally, in Zone B a person may employ a State certified predator controller to trap a gray wolf on land owned, leased, or managed by the person or on land within one mile of the land owned, leased, or managed by the person to protect the person's livestock, domestic animals, or pets. A person must report a wolf shot or trapped under these circumstances to a conservation officer as soon as practicable but no later than 48 hours after the wolf was shot or trapped. DNR will determine the disposition of the wolf.

Best Management Practices -- Best Management Practices (BMPs) are agricultural management practices that may result in the reduction and prevention of livestock depredation by wolves and other predators. MNDA has developed a guide to BMPs (see Appendix VIII.), and will continue to develop, update, and distribute this information to Minnesota livestock producers.

Compensation -- Compensation for livestock killed by wolves is provided under a program administered by MNDA (see Appendix IX.). When wolf depredation is verified by an investigating agent, compensation is authorized. Effective July 1, 2001, the amount

of compensation will be the fair market value for livestock lost, as determined by the commissioner of MNDA.

When livestock owners experience losses and apply for compensation, the following conditions apply:

1. A livestock owner will report the depredation claim to a Conservation Officer or county extension agent within 24 hours of discovery, and protect all associated evidence.
2. The investigating agent will determine if the loss was caused by gray wolves, taking into account factors in addition to a visual identification of a carcass, and make a recommendation to the commissioner of MNDA. The investigating agent will record deficiencies, if any, in the owner's adoption of BMPs developed by MNDA.
3. The MNDA Commissioner shall evaluate the claim and investigating agent's report to determine if compensation is warranted. MNDA will review the report for conformance with BMPs, and provide the owner with a list of any BMP deficiencies.

Habitat management

Good wolf habitat includes areas where ungulate prey is abundant, where human-related sources of mortality are low, and that are sufficiently large and connected to maintain existing populations and ensure the continued exchange of dispersing unrelated wolves. Vegetation cover is significant only as it relates to these other factors because wolves are habitat generalists. DNR will continue to identify and manage currently occupied and potential wolf habitat areas to benefit wolves and their prey on public and private land, in cooperation with landowners and other management agencies.

Prey -- In Minnesota, white-tailed deer are the primary prey for most wolves, though in some areas with few deer (e.g., the far northeastern part of the state), moose are the main prey. Population and habitat management of deer and moose is primarily the responsibility of the DNR Division of Wildlife. DNR will continue to maintain healthy populations of these species by regulating deer and moose harvest by hunters, estimating population numbers and reproductive success, monitoring and improving deer and moose habitat, and enforcing laws. Deer and moose populations will continue to be managed in hunting management units that are based on habitat and environmental factors, land

ownership and use, and human attitudes. Deer and moose population goals are designed to balance a variety of factors, including compatibility with habitats and ecosystems, sustainable harvests for hunters, deer observation and watching opportunities (aesthetics), and conflicts with humans such as vehicle accidents and crop depredation. Populations that provide sustainable harvests for hunters must be large enough to withstand natural mortality sources and still provide a harvestable surplus. Because wolf predation is one of several forms of natural mortality, any population capable of sustaining a hunting harvest will, by definition, also provide a healthy prey base for wolves. Area-specific ungulate populations are assessed through models that incorporate all known factors influencing population dynamics. Ungulate populations are managed by regulating hunting harvests and managing habitats.

Experience in Minnesota strongly suggests that, at the population level, wolves do not suppress deer numbers. Recently, after the severe winters of 1995-96 and 1996-97, deer numbers in Minnesota's wolf range were reduced by 45-50 percent. However, deer harvest management changes resulted in a quick recovery to former deer population levels, despite high wolf numbers. Considering these recent events, it appears unlikely that wolves in Minnesota will suppress deer populations, unless an unprecedented combination of other factors were to cause a catastrophic deer population reduction. For more than 20 years, Minnesota has successfully managed deer populations at levels that have provided increasing hunter harvests and ample prey for wolf recovery and persistence, despite variable winter conditions, highway collision losses, other predation, and other mortality factors. DNR expects that continuation of current deer management prescriptions will fully accomplish the goal of managing the ecological impacts of wolves on Minnesota's deer population.

Potential disturbance at den and rendezvous sites -- Both the Wisconsin and Michigan wolf management plans recommend seasonally protecting, from timber harvesting and road or trail construction, a zone within 110-880 yards for wolf dens and rendezvous sites, depending on the regularity of use of the den and the wolf management zone in which it occurs. The Superior and Chippewa national forests in Minnesota have similar recommendations. In Wisconsin and Michigan, such protection is deemed warranted because of the small size (compared to Minnesota) and recovering nature of the

wolf populations in those two states, and because of the unknown but potential effects of human disturbance on pup survival. However, Minnesota's much larger wolf population is not vulnerable to the minor losses these disturbances might cause. In addition, wolves with pups in Minnesota and Wisconsin have been tolerant of nearby logging operations, moss harvesting work, military maneuvers, and road construction work. Given these facts and the documented population growth and range expansion of wolves in Minnesota, no additional restrictions regarding rendezvous or den sites are planned.

Subpopulation connectivity -- Areas need to be of sufficient size to support a minimum of one to several wolf packs if they are to be identified as viable wolf habitat. However, for wolves to persist in these small areas for any length of time, they must be able to periodically "exchange" wolves with other subpopulations. In Minnesota, most of the occupied wolf range is contiguous; that is, most packs occur adjacent to or very near other packs. In addition, all wolves in Minnesota are connected with the much larger population inhabiting southern Canada. However, wolf habitat in Wisconsin is more fragmented, and somewhat isolated from the contiguous source population in Minnesota. The original source of Wisconsin's wolves was undoubtedly Minnesota, and continued exchange of wolves between the two states is desirable. Currently, no barriers to wolf dispersal exist between Minnesota and Wisconsin. Recently, wolf dispersals have been documented south of the existing Federal Wolf Zone 4, including dispersals into extreme southern Minnesota. The dispersal corridor within Zone 4 contains large land areas in public ownership (the Nemadji and St. Croix State Forests) that are contiguous with large areas of county forest land in Douglas County, Wisconsin. The area immediately south of Zone 4 includes the Chengwatana State Forest and St. Croix State Park. Because of the substantial habitat security of the public land base between the Twin Cities and Duluth, there are no current nor anticipated needs to further protect wolf dispersal corridors between Minnesota and Wisconsin. However, in cooperation with the Wisconsin Department of Natural Resources, DNR assessments of the effects of future development will be incorporated into long-term viability analyses of wolf populations and dispersal in the interstate area.

Human-caused mortality

Wolf mortality due to human causes can be a major factor in either reducing wolf numbers or limiting population growth. Some of this mortality is accidental, such as collisions with vehicles or trains. Other human-caused mortality is purposeful, either legal (wolf depredation trapping) or illegal (intentional shooting or trapping).

Accidental mortality -- Accidental mortality is not expected to significantly affect wolf population dynamics in Minnesota. Other than continued monitoring, efforts to reduce accidental mortality are unnecessary.

Illegal mortality -- Illegal wolf mortality results from a combination of opportunity and intent to violate the law. As evidenced by substantial wolf range expansion and population increases, illegal human-caused mortality has not constrained Minnesota wolves at the population level. However, illegal wolf mortality has the potential to impact local wolf numbers, especially where wolves are living in areas of high road density and human populations, where there is more potential for frequent human contact with wolves. A combination of education efforts, regulations, and enforcement will be used to reduce illegal wolf mortality. First, animosity toward wolves will be reduced by continuing to educate citizens about the effects of wolves on livestock, ungulates, and human activities. Education programs and information distribution will be encouraged and supported by DNR. Second, an effective wolf depredation management program that, with restrictions, empowers people to protect livestock and pets should improve tolerance for the presence of wolves and reduce motivation for illegal killing. Third, the opportunity to illegally kill wolves may be affected by the extent of road and trail access to state forests and other lands. Motorized access into wolf habitat, and the level of human use of such access, has been shown to be a key factor in establishing and maintaining wolf populations. In the recent past, wolf packs rarely lived in territories where road densities were greater than about one mile of road per square mile of land. At such densities, it appeared that illegal killing of wolves exceeded a level at which wolf populations could sustain themselves. During winter 1988-89, it appeared that most wolf packs in Minnesota were located in areas with road densities less than1.1 miles of roads per square mile of land, and human population densities less than 10 people per square mile; and in areas with road densities less than 0.8 miles of road per square mile of land, and human population densities less

than 21 people per square mile of land. The most recent analysis (the 1997-98 state wolf distribution survey) indicates that most wolves still live in such areas, but also that many more wolves are living in areas with much higher road and human densities. As more tolerant attitudes toward wolves increase and depredations by wolves are controlled, wolves can be expected to continue to expand their range into areas with more roads and humans. Given the current status of wolves, reducing current levels of road access is not necessary to increase either wolf density or distribution. However, in areas of sufficient size to sustain one or more wolf packs, land managers should be cautious about adding new road access that could exceed a density of one mile of road per square mile of land, without considering the potential effect on wolves. Finally, increases in DNR enforcement time and activities related to wolves will enhance the enforcement of regulations protecting wolves and decrease illegal human-caused wolf mortality.

Legal mortality -- USDA Wildlife Services has killed about 150 wolves annually, in recent years, in verified depredation situations. The number of wolves killed annually by depredation control is likely to increase, as wolves continue to expand their range into transitional forest-agriculture landscapes. However, the number of wolves legally killed in depredation situations has not prevented wolf range expansion and population increases, because this mortality has been less than 10 percent of the wolf population. Wolves have tremendous reproductive potential, and can withstand human caused mortality rates of 28-53 percent annually, and still maintain growing populations. The removal of depredating wolves will not be limited by population management objectives, unless the total number of wolves killed annually rises to a level that causes a statewide population decline.

Law enforcement

Administration and funding -- Legal protection has been a key to increasing wolf numbers and distribution in Minnesota. Due to a continuing increase in the workload of DNR Conservation Officers, and their assumption of primary responsibility for wolf regulations enforcement after delisting, increases in staff and resources needed to fully implement this plan were presented in a report to the Minnesota Legislature (see Appendix II.). Additional tribal conservation officers should be cross-deputized to increase law enforcement capabilities concerning wolves. Cooperation with federal law enforcement officials will continue.

Penalties -- Enforcement and penalties for the illegal taking (pursuing, shooting, killing, capturing, trapping, snaring, including attempting to take, and assisting another person in taking) of wolves are comparable to those for other game and nongame species. Restitution value is established at $2,000 per wolf. Illegal taking of wolves is a gross misdemeanor, with maximum penalties of a $3,000 fine and one year in the county jail.

Captive wolves and wolf-dog hybrids -- Wolves may be kept in captivity, provided they are legally obtained from licensed game farms or other authorized sources. In other situations where DNR permits are required, no permits will be issued for the purpose of keeping wolves as pets. The release of wolf-dog hybrids is prohibited, and the release of captive gray wolves requires a special permit from DNR.

Public education and attitudes

The dissemination of factual information about wolves, their interactions with their environment, and their interactions with humans is a key component of successful wolf conservation. Such education efforts have been undertaken in Minnesota by a variety of private organizations and individuals, as well as state and federal agencies. The degree to which this information is useful and worthwhile depends on its presentation, accuracy, and relevancy.

Program and material development -- The major goal of DNR wolf education efforts will be to assure that timely and accurate information about wolves and wolf management is available to the public. Current information on the history of the wolf and its management in Minnesota, wolf behavior and biology, the wolf as part of the ecosystem, wolf status, human-wolf coexistence, and strategies for dealing with problem wolves will be available to all Minnesotans, in multiple formats.

Collaboration with other organizations -- Many private, nonprofit organizations currently provide educational programs and materials about wolves. Foremost is the International Wolf Center, at Ely, MN (IWC), which is focused exclusively on wolf education. Rather than "reinventing the wheel," DNR will collaborate and cooperate with IWC and other organizations to achieve its wolf education goals. Collaboration will include providing data, reports, news releases, and other information for distribution by other organizations, and/or incorporation into their educational programming. Collaboration may also include financial and other resource sharing and partnerships.

Public and media relations -- DNR staff will provide access to and information about wolf management by meeting with the public, compiling reports, collecting data, issuing news releases, and preparing information packages for the public and the media.

Ecotourism – Ecotourism is a recent and expanding additional use of natural resources in Minnesota. Its intent is to derive (for the private sector) financial benefits as the public enjoys and learns about large, healthy natural ecosystems with diverse wildlife populations. Wolves in Minnesota are a keystone ecotourism species, drawing tourists from around the world who come to view wolf tracks, scats, and kill sites, and to hear wild wolves howl. There is little information or research data that increasing human-wolf interactions associated with ecotourism is detrimental to wolves. Consequently, responsible wolf ecotourism will be encouraged.

Assessment of public attitudes -- Statewide surveys of public knowledge of and attitudes toward wolves and wolf recovery are extremely useful to wolf recovery and conservation. Understanding changes in public attitudes toward wolves is important for continued wolf existence, and periodic surveys (every 5 years) to assess shifts in public attitude and knowledge will be encouraged. Accurate information on public attitudes will help to ensure that wolf management adequately addresses citizens' needs, in addition to wolf conservation needs.

Research

Wolf research is expensive, and DNR-funded wolf research efforts should be focused on the topics most pertinent to achieving the goals of this management plan. Despite the abundance of wolf research in Minnesota and elsewhere, there are still several important areas of research that should be addressed.

Population assessment -- Because population assessment is the foundation for monitoring the status of wolves and the effectiveness of management programs, it is one of the most important aspects of a wolf management and conservation program. Population assessment methods must continue to be based on the best science and data available. The comprehensive statewide assessment of wolf distribution and density in Minnesota conducted in 1997-98 was state of the art. DNR intends to use the same methods in future statewide surveys, but they may be modified if alternative methods are developed that either increase statistical or biological precision, or reduce costs. In addition to the

comprehensive surveys, annual wolf population assessments based on annual population trend surveys will be conducted to detect any large changes in wolf distribution and numbers that could occur in the intervals between comprehensive surveys. Additional annual indices and population modeling will be investigated, to improve the accuracy of annual wolf population trend assessments.

Livestock interactions -- Continued research is desirable to enhance BMPs that will result in reduced wolf depredation to livestock, livestock guard animals, and dogs. Foremost is research on cost-effective nonlethal means of wolf behavioral control to abate wolf depredation, including identification of the behaviors of depredating wolves and improvements in our ability to predict and avoid depredation losses. DNR will coordinate with MNDA and USDA Wildlife Services regarding wolf depredation research.

Prey interactions -- More information is needed on the effects of wolf predation and severe weather on deer numbers. Although there has been significant research on this topic in Minnesota, predicting the long-term effects of winter weather and wolf predation on deer populations is difficult. Long-term monitoring of deer and wolf populations in various portions of Minnesota will be a DNR research priority, especially as it relates to the role that wolves may play in regulating deer at relatively low population densities.

Disease monitoring -- Standardized and comprehensive disease testing has not been part of Minnesota wolf management activities, although significant disease research has occurred in Minnesota and incidental records are maintained by DNR. Wolves in Minnesota have greatly increased their distribution and numbers in Minnesota during the past 20 years, despite numerous documentations of various diseases. Nevertheless, disease is a potentially important mortality factor affecting wolf populations. DNR does not intend to initiate wolf disease studies, but will collaborate with other investigators and continue monitoring disease incidence, where necessary, by examination of wolf carcasses obtained through depredation control programs, and also through blood/tissue physiology work conducted by DNR and the U.S. Geological Survey. DNR will also keep records of documented and suspected incidence of sarcoptic mange.

Program administration

Personnel -- The wolf management program in Minnesota will be under the immediate direction of a Wolf Specialist. DNR will create this new position at the level of

senior Natural Resource Specialist in the Division of Wildlife, with duties focused exclusively on wolf management. This person will be responsible for administering all aspects of wolf management, including coordinating depredation management and monitoring efforts within DNR; serving as liaison with USFWS, USDA Wildlife Services, MNDA, County Extension, and tribal authorities; coordinating data collection and information dissemination; and recommending research efforts that pertain to wolf conservation in Minnesota. In addition, DNR proposes that once federal delisting is accomplished and full implementation of this plan occurs, a Wolf Research Biologist position should be created. This position will directly conduct wolf population assessments, propose and conduct wolf research, and provide DNR with the necessary professional expertise to implement the wolf management plan. Finally, DNR proposes the addition of three Conservation Officers, to ensure that enforcement of various provisions of the wolf plan is adequate, and to respond to depredation complaints.

Funding -- The costs for wolf research and management have been substantial in the past, and will continue to be substantial in the future. DNR estimates the total annual cost to the state of Minnesota for full implementation of this plan, including depredation activities but not including MNDA staff costs, to be about $848,000 (See Appendix II.).

Interagency cooperation -- Cooperation between governmental agencies is of the utmost importance for ensuring the continued survival and competent management of wolves in Minnesota. Various state, federal, county, and tribal landowners and authorities have been participating in wolf management activities, and this will continue in the future through partnerships. A variety of agencies and organizations have participated in wolf management, and cooperation will continue to be invited by DNR.

Volunteers -- In order to enhance management efforts, participation of volunteers and volunteer organizations will be sought to help produce and present general wolf education programs and provide matching funds for research and development of wolf conservation strategies. Thus, private individuals, schools and colleges, conservation organizations, and other partners will help achieve wolf management goals in Minnesota.

Plan monitoring and review

In addition to regularly reported assessments of wolf management progress, DNR will periodically convene an advisory group of agency natural resource and agricultural

managers and wolf biologists to review and comment on wolf management plan implementation and progress. The advisory group will be asked to assess the degree to which each part of the plan has been successfully implemented, the effects of implementation on changes in wolf population levels and distribution, and changes in wolf interactions with humans. Invited participants in the advisory group will include, but not be limited to, MNDA, USDA Wildlife Services, US Fish and Wildlife Service, US Forest Service, Wisconsin DNR, Michigan DNR, 1854 Authority, Great Lakes Indian Fish and Wildlife Commission, and wolf research scientists.

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APPENDIX I.

WOLF MANAGEMENT LEGISLATION:

CHAPTER 463, LAWS OF 2000

(Go to http://www.revisor.leg.state.mn.us/slaws/2000/c463.html)

APPENDIX II.

WOLF MANAGEMENT PLAN BUDGET:

OCTOBER 2000 REPORT TO THE LEGISLATURE

Minnesota Department of Natural Resources
OFFICE OF THE COMMISSIONER
500 Lafayette Road
St. Paul, Minnesota 55155-4037

October 1, 2000

The Honorable Bob Lessard, Chair
Senate Environment and Natural Resources Committee
111 Capitol
St. Paul, MN 55155
and
The Honorable Jane Krentz, Chair
Senate Environment and Agriculture Budget Division
235 Capitol
St. Paul, MN 55155
and
The Honorable Dennis Ozment, Chair
House Environment and Natural Resources Policy Committee
479 State Office Building
St. Paul, MN 55155
and
The Honorable Mark Holsten, Chair
House Environment and Natural Resources Finance Committee
381 State Office Building
St. Paul, MN 55155

Dear Senators Lessard and Krentz, and Representatives Ozment and Holsten,

Enclosed for your consideration is a report recommending appropriations needed to accomplish the gray wolf management plan in Minnesota, as required by Section 21, Chapter 463, Laws of 2000. These recommended appropriations are needed to implement the policy provisions of Laws of 2000, Chapter 463 relating to gray wolf management.

Section 16, Chapter 463, Laws of 2000 requires the commissioner, in consultation with the commissioner of agriculture, to adopt a gray wolf management man. This gray wolf management plan is currently in draft, and is expected to be completed before January, 2001. The recommended appropriations in this report are our best estimates pending final completion of the plan.

Sincerely,

Allen Garber
Commissioner

enc.
c: Keith Bogut, Department of Finance

DNR INFORMATION: 651-296-6157, 1-888-646-6367 (TTY: 651-296-5484, 1-800-657-3929) FAX: 651-296-4799

Report to the Minnesota Legislature (Section 21, Chapter 463, Laws of 2000) recommending appropriation needs for gray wolf management

Prepared by the Minnesota Department of Natural Resources

October 1, 2000

Wolf Management Plan Budget Summary:

Program/Activity	FY 02	FY 03	FY 04 (Ongoing Base)
Professional Staff (2.5 FTE):			
Wolf Specialist (1 FTE)	$70,000	$70,000	$70,000
Wolf Research Biologist (1 FTE)	-	$70,000	$70,000
Support staff (0.5 FTE)	-	$20,000	$20,000
Population Monitoring and Research:	-	$100,000	$100,000
Depredation: Wildlife Services Cooperative Wolf Damage Management and State Directed Predator Control	-	$200,000	$200,000
Enforcement (3 FTE):	-	$300,000	$210,000
Education/Public Participation:	$25,000	$25,000	$25,000
DNR Totals (all new appropriations)**:**	**$95,000**	**$785,000**	**$695,000**
Note: The MN Dept. of Agriculture may be recommending additional appropriations for the wolf depredation compensation program under their administration; this reflects their current base:	$158,000	$158,000	$158,000

Wolf management plan budget narrative:

Wolf Specialist (1FTE). This position is needed in FY02, to allow preparation and lead time for implementation of the gray wolf management plan, immediately following Federal delisting of the gray wolf in Minnesota from the Endangered Species Act of 1973 (estimated to be in FY03). The Wolf Specialist will coordinate all aspects of implementation of the gray wolf management plan, including coordination with the U.S. Fish and Wildlife Service in the delisting process, developing programs and procedures for depredation management, and public information duties.

Wolf Research Biologist (1FTE). This position is needed in FY03, when the gray wolf management plan is implemented. A primary responsibility of the Wolf Research Biologist will be developing and implementing wolf population monitoring programs. It is essential that Minnesota maintain state of the art wolf population monitoring, so that wolf numbers can be monitored and evaluated after the State of Minnesota assumes management responsibility. In addition, the Wolf Research Biologist will coordinate wolf research activities of other agencies, and administer or facilitate the development of DNR and other research projects pertaining to livestock depredation, effects of wolves on prey, and wolf dispersal/range expansion.

Population Monitoring and Research. This funding would provide necessary project funding for programs of the Wolf Research Biologist, including radio-telemetry work to support population monitoring, and research projects on livestock depredation, wolf dispersal, or other topics with direct management applications.

Depredation. Since 1978, federal agencies (US Fish and Wildlife Service, USDA) have provided essential wolf depredation control in Minnesota. Because USDA/Wildlife Services has a very effective program and experience personnel, DNR intends to continue the USDA/Wildlife Services program, with modifications to include State certified predator controllers. Wildlife Services depredation programs typically require a 50/50 cost share agreement with state agencies. Because the gray wolf has been under Federal control, Minnesota has, to date, successfully argued for full Federal funding of this program. However, when gray wolf management becomes a state responsibility, continuation of the Wildlife Services program will require cost-sharing by the State. DNR estimates that the State portion of a cost-shared Cooperative Wildlife Services wolf damage management program will be $125-150,000 annually. The additional funding is needed to provide payments to State certified predator controllers and to conduct training programs.

Enforcement (3FTE). Conservation Officers will be required to investigate gray wolf depredation complaints, verify wolf-caused losses, designate control areas, notify predator controllers, salvage wolf remains, and otherwise monitor and coordinate wolf control activities. In addition, Conservation Officers will be required to investigate all reports of public takings of gray wolves, and undertake other activities related to enforcement of Minnesota's wolf laws. To ensure adequate responses to depredation complaints and enforcement of wolf laws, three new Conservation Officers are needed, strategically located within current gray wolf range in Minnesota. These officers will assume primary responsibility for implementing the enforcement aspects of the gray wolf management plan, and will coordinate the efforts of other Conservation

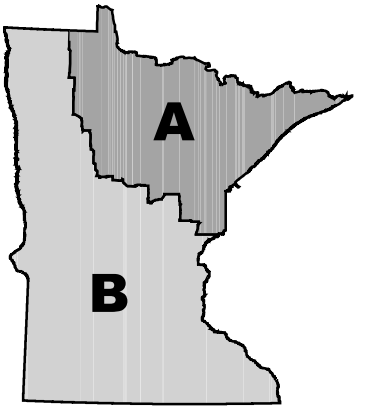
Officers where necessary. They will likely perform other enforcement duties, but implementation of the gray wolf management plan will be their priority.

Education/Public Participation. Because gray wolf management continues to be controversial, and Minnesotans remain polarized on many wolf management issues, continuing education, public access to information, and public participation in gray wolf management is essential. Funding is needed to produce and distribute publications and electronic information, attend public and professional meetings, and conduct public meetings about the gray wolf management plan implementation, progress, and results.

APPENDIX III.

WOLF MANAGEMENT ZONES MAP

Minnesota Wolf Management Zones



Roseau
310
89
89
Grygla
54
27
Gully
2
92
Clearbrook
92
2
Bagley
2
2
71
71
Park Rapids
87
64
87
Backus
371
1
1
6
Aitkin
210
169
210
McGregor
65
Pine River
Crosby
Deerwood
65
18
18
McGrath
23
48
Hinckley

Legend

Wolf Management Zones

- Wolf Management Zone A
- Wolf Management Zone B
- Cities/Towns Dividing Wolf Zones A & B
- County Boundaries

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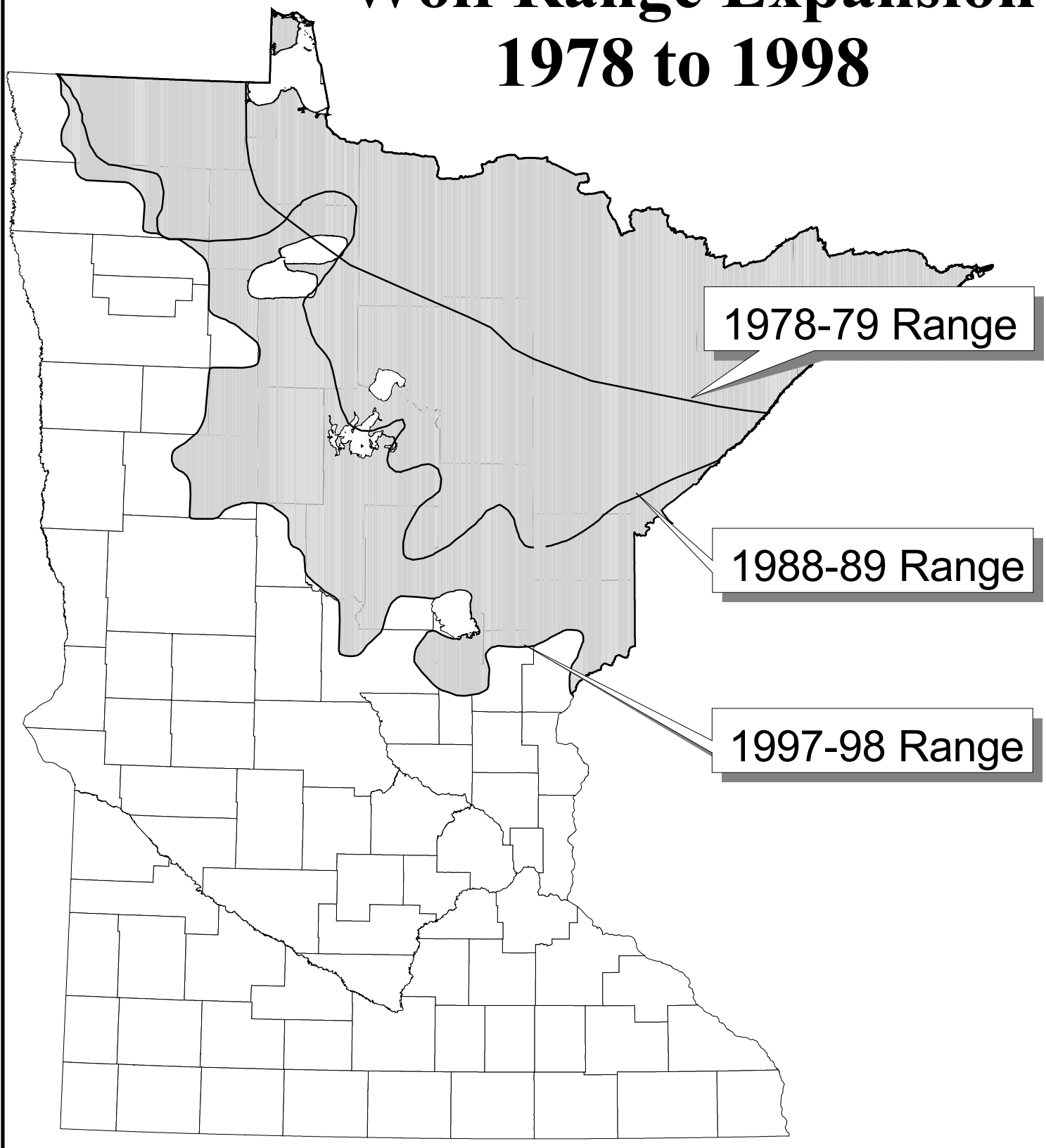
APPENDIX IV.

WOLF RANGE EXPANSION 1978 TO 1998

Wolf Range Expansion
1978 to 1998



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APPENDIX V.

1998 WOLF MANAGEMENT ROUNDTABLE RECOMMENDATIONS

On August 28, 1998, the Minnesota wolf management roundtable reached consensus on the following package of wolf management recommendations:

Wolf Population Management

Wolves in Minnesota will be allowed to expand statewide. Population management measures, including public taking or other options, will be considered in the future but not sooner than the 5-year post-delisting monitoring period of the US Fish and Wildlife Service. If public taking is authorized by the legislature, the Department of Natural Resources will prepare and publish a rule, with opportunity for full public comment. Decisions on public taking will be based on sound data, including but not limited to the "5-year census" and the results of non-lethal control research.

To assure continued survival of the wolf in Minnesota, the roundtable recommends a minimum statewide population of 1,600 animals. This number is not a maximum population goal. If the population falls under the recommended minimum, appropriate management actions will be taken to address the cause of the reduction and assure recovery to the minimum level in the shortest possible time.

Wolf Population Monitoring

The roundtable accepts the current methodologies that the Minnesota DNR is using to indicate wolf population abundance and distribution, with the understanding that any results are estimates which may be higher or lower than the actual population. The roundtable recommends that for future wolf management decisions, the methodologies should move as close as possible toward an actual census. The roundtable understands that this movement toward a census for now will include:

a. standardized training of the data collectors and objective verification of their data
b. more continuous tracking and verification of information from more radio-collared control groups.

Wolf Depredation Management

Issue 1: Animals/damages Covered by the Depredation Program

The roundtable supports the continuation of a compensation program for wolf depredation to livestock.

The roundtable recommends a compensation program for wolf depredation to dogs under the supervised control of the owner, and livestock guard animals including llamas, donkeys and, dogs.

The roundtable recommends that veterinary costs incurred as a result of wolf depredation be included as a compensated loss.

Issue 2: Eligibility and Verification for Compensation and Lethal Control

The roundtable endorses the language in MN Rule 1515.3500 for determining eligibility for compensation, with the following additional recommendations:

a. In addition to Conservation Officers and county extension agents, other agents (State, Federal, Tribal) certified by the State should be included.

b. A handbook for wolf depredation investigations should be produced and all certified agents trained.

c. A uniform evidence-reporting form should be developed including photographs of the kill site for the file.

d. A central public contact (1-800 number) should be established.

e. A database of all reported losses, not just verified losses, should be developed. the database should include information on all predator losses.

f. The statutory requirement for a carcass to be present should be eliminated.

g. MN Rule 1515.3500 should be amended to be specific to wolves, and not endangered species.

If there are physical remains of a wolf-killed animal, lethal control may be carried out by a government agency.

Note: Consensus was not reached on the level of verification required to initiate government agency control actions if physical remains are not present.

Issue 3: Best Management Practices

The roundtable supports current legislative efforts to encourage the use of Best Management Practices (BMP's). The roundtable believes that the use of BMP's is critical to the long-term survival of the wolf in Minnesota, and urges the Minnesota Legislature to appropriate $500,000 on a matching basis with any non-public funding source for ongoing research, development, and dissemination of BMP's and non-lethal means of wolf control to abate wolf depredation to livestock. The roundtable suggests that farms experiencing livestock depredation be used as research sites.

Issue 4: Preventative Depredation Measures

Owners of livestock, livestock guard animals and dogs and/or their permitted agents may take action to destroy wolves that pose an "immediate threat" to human life, livestock, guard animals, or dogs. This action is permitted only on the livestock

owner's property. In the case of dogs, this action is permitted only for dogs under the controlled supervision of the owner. "Immediate threat" is defined as follows: the wolf is observed in the act of pursuing or attacking. The mere presence of a wolf or a wolf feeding on an already dead animal does not constitute an immediate threat.

At any time, a farmer or dog owner may first "harass" any wolf within 500 yards of people, buildings, dogs, livestock or other domestic animals in a non-injurious, opportunistic manner. Wolves may not be purposely attracted, tracked, searched-out or chased and then harassed. Wolves showing abnormal behavior will be reported to an authorized agent for action.

The following conditions apply when taking action to destroy a wolf:

a. A farmer or dog owner will report the action to an authorized agent within 24 hours and protect all evidence.

b. The agent will investigate all reported taking of wolves and will:

    1. keep written and photographic documentation of the kill site and any instances of poor husbandry that contributed to the attack occurring;

    2. with farmers but not dog owners, evaluate what, if any, best management practices and non-lethal controls are needed to prevent future attacks and develop a reasonable written and signed plan with the farmer for implementation;

    3. confiscate the wolf carcass(es).

c. State agents will report any evidence of abuse of this rule.

d. Failure to comply with the elements of this program, including failure to implement in a reasonable length of time the best management practices and non-lethal control plan developed with the authorized agent, or abuse of the program will result in loss of a farmer or dog owner's eligibility for future wolf damage compensation for a period of one year or until they implement the best management practices/non-lethal control plan.

e. Pelts will remain in the control of the state or tribal authorities and may be disposed of only by donation or sale for educational purposes.

f. This program will be reviewed at the annual gathering of roundtable participants who will make recommendations regarding the continuation, modification or termination of this program.

g. Monthly reports of this program will be made available to the public.

Issue 5: Removal of Verified Depredating Wolves

The roundtable recommends that the Department of Natural Resources assume administrative responsibility for an integrated wolf depredation program funded from the general fund. The roundtable recommends that DNR contract for assistance with the USDA/Wildlife Services program. Investigation of a kill-site and verification of a wolf kill will be conducted by a state agent (as defined in Issue 2, a). Trapping may be accomplished by state certified contract trappers. Wolf pelts will be retained by the state and disposition will be only for educational purposes.

Issue 6: Amount of Compensation

The roundtable recommends that the legislature consider compensation closer to fair market value than the $750 cap currently in law for verified wolf kills of livestock.

The roundtable recommends that compensation for the loss of guard animals (animals specifically bred, trained and used to protect livestock from wolf depredation) be the same as for livestock.

The roundtable recommends that compensation for dogs not qualifying as guard animals, under the supervised control of the owner, be at fair market value not to exceed $500.

Habitat Management

DNR will identify currently occupied and potential wolf habitat areas with the objective of managing habitat to benefit wolves and their prey on public land and in cooperation with private, corporate and tribal landowners. Elements of wolf habitat that need to be considered include but are not limited to:

a. human access
b. disturbance at den and rendezvous sites
c. corridors and linkages

Enforcement

Enforcement and penalties for the illegal taking (killing, injuring, beating, harassing, stalking, baiting/poisoning and other activities having the likelihood of injury or attempt to do the same) of wolves should be consistent with present statutes on the illegal taking of game. Fine levels should reflect the unique nature of the wolf. The roundtable further recommends that the restitution value of the wolf be established at $2,000. Injury to wolves caused by guard dogs used in the traditional manner is not considered illegal taking.

Due to the increased workload of conservation officers, the roundtable recognizes the need to substantially increase the number of conservation officers as well as the resources available to them. The roundtable urges the legislature to provide the general fund resources necessary for proper enforcement. The roundtable urges cross-deputization of additional tribal conservation officers and continued cooperation with federal law enforcement officials.

Education

The management plan should include an education component, providing information about:

a. the history of the wolf in Minnesota
b. wolf management in Minnesota
c. wolf behavior and biology
d. the wolf as part of the ecosystem
e. wolf status
f. human/wolf coexistence
g. contacts for additional information about the wolf
h. strategies for dealing with wolves

Eco-tourism

The roundtable recommends that DNR address eco-tourism in the management plan.

Wolf-dog Hybrids/Captive Wolves

a. The release of wolf hybrids and captive wolves into the wild should be banned.
b. The legislature should consider appropriate regulatory measures, based on public safety concerns.

Management Plan Monitoring

The Dept. of Natural Resources will convene a group, including all groups participating in the existing roundtable, on an annual basis to review and comment on management plan implementation.

Funding for Plan Implementation

State funding for implementing the management plan should come from sources other than the game and fish fund.

APPENDIX VI.

WOLF POPULATION SURVEY 1997-98

UPDATED WOLF POPULATION ESTIMATE FOR MINNESOTA, 1997-1998

William Berg and Steve Benson

During this century, there have been several estimates by natural resources scientists of wolf *(Canis lupus)* numbers and distribution in Minnesota that have been both range-wide and study area-specific in scope. The early estimates, especially those derived from bounty records and heresay, were of necessity subjective and crude. As wolf studies commenced in Minnesota during the mid-1930's (Olson 1938) and late 1940's (Stenlund 1955), data reliability improved, and since the advent of radio telemetry, there has been a minimum of 11 wolf studies in the state, each of which has provided area-specific data on wolf density.

Estimates of wolf density and distribution over larger areas such as a state or province require considerable coordination and effort. Since state or province-wide total counts (i.e., census) are impossible (even if all packs are radio-collared), techniques involving sampling, extrapolations, large observer base, telemetry studies, and track surveys must be utilized (Fuller 1995).

Fuller et al. (1992) extrapolated range-wide wolf population and distribution estimates from various studies dating back to Olson (1938), and reported on the comprehensive Minnesota Department of Natural Resources (MN DNR) wolf surveys in 1978-79 (Berg and Kuehn 1982) and 1988-89. The latter survey combined observations of wolves and wolf sign by field personnel with telemetry, U.S. Department of Agriculture (USDA) depredations trapping, and other databases to derive a wolf population estimate of 1,500 - 1,750 within a 60,178 km^2 contiguous range, the greatest area since wolf studies began in Minnesota.

With the fulfillment of wolf population goals in Minnesota and the establishment of a second population in Wisconsin and Michigan as required in the 1992 Eastern Timber Wolf Recovery Plan (U.S. Fish and Wildlife Service 1992), delisting from the Endangered Species Act could have occurred as early as 1999. As a part of the delisting process and as a critical component of the MN DNR Wolf Management Plan, a comprehensive wolf population and distribution survey similar to those in 1978-79 and 1988-89 was conducted in 1997-98. This report summarizes the results of that survey.

METHODS

The methodologies for conducting and analyzing the 1997-98 wolf population and distribution survey (Berg 1997) followed as closely as possible those used in 1988-89 (Fuller et al. 1992) and to a lesser extent, those used in 1978-79 (Berg and Kuehn 1982) (Table 1).

Instructions, forms, and maps were mailed in late October, 1997 to the field stations of several natural resources agencies statewide. Included were 1) all MN DNR disciplines, 2) U.S. Forest Service, 3) U.S. Fish and Wildlife Service, 4) USDA, 5) U.S. Geological Survey, 6) Wisconsin Department of Natural Resources, 7) Camp Ripley, 8) Voyageurs National Park, and 9) all county land departments, wood products industries, Indian Reservations, and Treaty Authorities located in the northern two-thirds of Minnesota.

Like the previous efforts (Table 1), the 1997-98 survey mailing consisted of two parts; 1) mapping of all location and group size observations of wolves and wolf tracks, and locations of scats, and 2) subjective ratings of wolf abundance and population trends in the last 5 years. The mapping effort was by far the most important and objective aspect of the survey, and other databases used to supplement the map locations were 1) 1997 scent station survey, 2) 1997 winter fisher *(Martes pennanti)* and marten *(M. americana)* track survey, 3) 5 wolf telemetry studies ongoing in 1997-98, and 4) USDA depredations trapping data for 1997-98. This combined database is abbreviated "WISUR '98" in the following text.

As maps and survey forms were received during spring 1998, data were digitally entered using ArcView GIS software and other data entry systems. Data entry continued until late summer, allowing some preliminary analyses to begin in August.

As in the 1988-89 survey, the township (Í 93 km^2) was used as the basis for analyzing wolf pack ($ 2 wolves) and single wolf occurrences, primarily because the most current GIS databases on human densities, roads, cover type, and land use were also categorized by township. The method for defining wolf range was to 1) digitally transfer points from all databases to maps, 2) code all townships to road and human density criteria used in Fuller et al. 1992 (roads <0.70 km/km^2 and humans <4/km^2 or roads <0.50 km/km^2 and humans <8/km^2; hereafter termed the 1988-89 road-human density model), and 3) include all townships fitting the 1988-89 road-human density model, plus all other townships with wolf packs, as wolf range. Townships with road and human densities higher than the 1988-89 road-human density model that had observations of single wolves were excluded from wolf range calculations, even though many townships in this class had several observations of lone wolves. Total wolf range was delineated on the west and south boundaries of these townships, and occupied wolf range was calculated by subtracting the areas of the excluded townships and large lakes from the total wolf range. Townships south and west of the total wolf range boundary, even though they had either observations of wolf packs or they conformed to the 1988-89 road-human density model, were not included in the wolf population or range calculations.

The WISUR '98 database was analyzed similarly to the wolf observation analyses in 1988-89 (Fuller et al. 1992) (Table 1). This consisted of 1) calculating the mean pack area (n=36) from the 1997-98 telemetry studies, 2) increasing the mean pack area by 37% to compensate for interstices between pack territories (Fuller et al. 1992:51), 3) dividing the occupied wolf range area by the increased mean pack area to obtain the number of wolf packs, 4) calculating the mean pack size (n=36) from the 1997-98 telemetry studies, and multiplying by the number of packs to obtain the number of wolves living in packs, and 5) dividing the number of pack wolves by 0.85 (to compensate for 15% single wolves in the population; Fuller et al. 1992:46) to calculate the total

number of wolves in the population. There were 90% statistical confidence intervals (90% CI's) on the final wolf population estimate.

RESULTS

WISUR '98 data were received from 179 field stations (compared to 154 in 1998-99, a 16% increase) representing the input of a minimum of 464 persons (compared to a minimum of 362 persons in 1998-99, a 28% increase) (Table 2). The total number of WISUR '98 observations of wolves or wolf sign was 3,451, nearly three times higher than in 1988-89 (1,244). WISUR '98 observations consisted of 73% tracks, 12% visuals, 6% scats, and 9% other (Table 2); in 1988-89 these respective proportions were 72%, 17%, 4%, and 7%. Observations of single wolves and wolf packs (≥ 2 wolves) (packs derived from WISUR '98 visual and track observations only) comprised 41% and 59%, respectively, of total observations, compared to 44% and 56% in 1988-89. Wolves in packs (total of 6,377) derived from all observations of ≥ 2 wolves comprised 82% of all wolves tallied in both 1988-89 and 1997-98.

The telemetry database consisted of 36 radioed packs during 1997-98 in five studies: Superior National Forest (n=21 packs), MN DNR (n=7), Agassiz Refuge (n=2), Camp Ripley (n=2), and Wisconsin Border (n=4). These packs, containing 195 total wolves and having a combined area approximating 8% of the total wolf range, were distributed over a wide array of habitats, prey densities, land use and ownership patterns, and road and human densities (Fig. 1). The proportions of land use and covertype such as forest, brush, and pasture as determined from both the WISUR '98 and telemetry databases were nearly identical, indicating that the five telemetry study areas were representative of the entire wolf range (Fig. 1). For the 22 packs that also had pack observations from the 1997-98 winter survey, 67% of 1997-98 survey pack sizes ($\bar{0}$ = 5.0 wolves) were less than telemetry pack sizes ($\bar{0}$ = 5.4), suggesting that the WISUR '98 observations underestimated pack size. The USDA database derived from depredations trapping consisted of 94 records in a minimum of 88 townships during 1997 - 1998.

Distribution

The area occupied by wolves as indicated by the number of townships with wolf packs increased dramatically from 1988-89 to 1997-98, both statewide and within the 60,178 km^2 contiguous pack range identified in 1988-89 (Fuller et al. 1992:48) (Fig. 1). Statewide, 693 townships (Í 64,450 km^2) were known to contain wolf packs in 1997-98, compared to 314 townships (Í 29,400 km^2) in 1988-89, a 121% increase (Fig. 2).

The 1988-89 contiguous pack range (Fuller et al. 1992:48) had 293 townships (27,250 km^2) with known wolf packs in 1988-89, whereas in 1997-98 this same area had 418 townships (Í 38,870 km^2) with pack observations. South and west of the 1988-89 contiguous pack range, 21 townships (Í 1,950 km^2) had pack observations in 1988-89, compared to 175 townships (Í 16,270 km^2) with packs, and another 69 townships with single wolves only, in 1997-98 (Fig. 2). Part of the wolf range expansion since 1988-89 can be attributed to wolves residing in townships with road and human densities higher than those in the 1988-89 road-human density model (see Methods). In 1997-98, 17% of the townships known to contain packs did not conform

to the 1988-89 road-human density model, (i.e., they had higher road and human densities) (Table 2), compared to 11% in 1988-89 (Fuller et al. 1992:48). This enabled large areas identified in the 1988-89 survey (Fuller et al. 1992:49) as having no potential to be occupied by wolves to be occupied by packs in 1997-98 (Fig. 2).

A new total wolf range was delineated from the WISUR '98 database that included 99% of all townships known to contain wolf packs in 1997-98 and excluded large (>200 km^2) lakes; this total wolf range encompassed 88,325 km^2 (Fig. 2). Within the total wolf range, the 1997-98 occupied range of 73,920 km^2 consisted of 1) 666 townships (61,943 km^2) known to contain packs, and 2) 107 townships (11,977 km^2) (14% of the total wolf range) that were presumed to contain packs because of low road and human densities.

Wolf numbers

The 1997-98 population estimate using the WISUR '98 database and the 73,920 km^2 of occupied range is 385 packs and 2,450 wolves (90% CI=1,995-2,905), and was calculated according to Fuller et al. 1992:46 (73,920 km^2 ÷ 192 km^2 per pack x 5.4 wolves per pack ÷ 0.85 pack wolves = 2,450) (Fig. 3).

Questionnaire Survey

The questionnaire part of the survey made no attempt to estimate the population, but rather, served as a subjective way to look at wolf distribution and population trends. By far the minor part of the survey, the 1997-98 questionnaire survey was identical to that in 1978-79 and 1988-89, and asked for a subjective rating of wolf density (high, medium, low) and population trend (increasing, stable, decreasing). There were responses from 150 work stations in 1997-98; most in the northern part of the wolf range reported a stable population in their work area, and those in the west and south portions generally reported increasing numbers (Fig. 4). There is strong agreement between the wolf ranges as estimated from the questionnaire and WISUR '98 databases (Figs. 2 and 4). It is noteworthy that none of the 129 respondents with wolves present in their work areas in 1997-98 reported declining numbers, and that 71% reported increasing numbers over the last 5 years.

DISCUSSION

The distribution and population estimates derived from the 1997-98 survey were derived from extremely conservative criteria, for several reasons. The vast majority of survey cooperators worked for public land management agencies, and consequently, data were obtained from relatively few privately owned tracts. Outlying townships south and west of the total wolf range that had observations of packs were not included in the 1997-98 wolf population estimate, as they were inthe1988-89 estimate. Townships with one to several observations of single wolves and that may have been adjacent to townships with packs, but that had high road and human densities (roads >0.5 km/km^2 and humans >8/km^2 or roads >0.7 km/km^2 and humans >4/km^2), were excluded from all range and population calculations. The pack size for the population estimate calculation (0=5.4) was
much less than the mean of 5.8 for 388 previously studied packs in Minnesota, and the territory area for the population estimate (192 km^2) was much greater than the mean of 154 km^2 for 131 previously studied packs for which territory area data were available (W. Berg, unpub. data).

The area within the 1997-98 total range that conformed to the 1988-89 road-human density model but in which no packs were observed (and thus was included in the range area estimate) was much less in 1997-98 than in 1988-89. In 1988-89, 23,700 km (39% of the contiguous range) fell into this category, whereas it totaled 11,977 km^2 (14% of the total wolf range) in 1997-98.

Despite these conservative analyses, the wolf population increased 50% from1988-89 to 2,450 (90% CI=1,995-2,905) (Fig. 3). The calculated annual finite rate of population increase since 1988-89 was 1.045, nearly identical to the 1.04 calculated by Fuller et al. (1992:51) for the period 1970-1989.

The contiguous pack range in 1988-89 of 60,178 km^2 increased 48% by 1997-98 to 88,325 km^2, and the occupied area within those ranges increased 45% from 50,950 km^2 in 1988-89 to 73,920 km^2 in 1997-98.

In 1988-89, the lower wolf population estimate of 1,500 was derived from winter survey data similar to that in 1978-79 and 1997-98, and the upper estimate of 1,750 was derived from the relationship between wolf density and ungulate biomass (Fuller 1989:21). Only the winter survey data were used to derive the population estimate in 1997-98 in an effort to maintain relatively uniform survey methodologies for the three surveys since 1978-79, and because of recent questions concerning the reliability of using ungulate biomass to estimate wolf numbers in any one year (Mech et al. 1998, Mech pers. commun.).

As more wolf distribution surveys have been conducted, areas occupied by packs have continued to expand both within existing range and south and west into previously unoccupied areas. A study in 1983 by Mech et al. (1988:86) identified 59,900 km^2 of occupied primary, peripheral, and disjunct range, and 40,676 km^2 of unoccupied range, some of which contained only single wolves. In 1988-89, Fuller et al. (1992) found wolf packs in the peripheral, disjunct, and unoccupied ranges identified just 5 years earlier, and identified 60,178 km^2 of contiguous pack range and 11,500 km^2 of potential range south and west of the contiguous range. Additional areas

previously devoid of wolves contained packs in 1997-98. Approximately 128 townships (60 northeast and 68 southwest of the 1988 contiguous pack boundary) that the road and human density model identified in 1988-89 as having no potential to have wolves were known to contain packs in 1997-98, and 56 of these had human densities >8/km^2.

The road and human density analyses from the 1997-98 survey, combined with GIS land ownership, land use, and cover type databases, identified some possible areas of future wolf range expansion. Most occur just inside or south and west of the 1997-98 total pack range boundary, and include Clay, Benton, Sherburne, and central Marshall Counties (all of which contain single or pack wolves now) (Fig. 2), and blocks of 200-800 km^2 in southeastern Minnesota where single wolves have been reported. It is unknown how many additional wolves these areas will support, but the total will likely be small compared to the wolf population present in the late 1990's.

ACKNOWLEDGMENTS

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Table 1. Comparison of 1978-79, 1988-89, and 1997-98 wolf survey and population estimation methodologies.

	WINTER 1978-79	WINTER 1988-89	WINTER 1997-98
1.	Field personnel submitted maps with wolf/sign observations and numbers of wolves in approximately delineated pack areas. Personnel also rated wolf population trends in last 5 years and wolf abundance.	Field personnel from additional agencies submitted maps with wolf/sign observations and numbers of wolves. Personnel also rated wolf population trends in last 5 years and wolf abundance.	Field personnel from still more agencies over northern two-thirds of the state submitted maps with wolf/sign observations and numbers of wolves. Personnel also rated wolf population trends in last 5 years and wolf abundance.
2.	Field observations consisting primarily of responses from personnel totaled 480.	Field observations were supplemented by data from USDA and scent station surveys and totaled 1,244.	Field observations were supplemented by data from scent station and winter track surveys, and USDA, and totaled 3,659.
3.	Field observations were combined with telemetry data from four studies.	Field observations were combined with telemetry data from at least four studies.	Field observations were combined with telemetry data from five studies.
4.	Two wolf range lines were calculated. The "primary" range of 36,500 km^2 included all pack range as determined from field observations and telemetry. A "peripheral" range of 55,600 km^2 included the area occupied by disjunct packs and single wolves.	A contiguous pack line was calculated that included 93% of townships with packs as determined from all databases, and encompassed 60,178 km^2 of northern Minnesota. Remote or untraversed townships with <0.7 km/km^2 roads and <4 humans/km^2 or <0.5 km/km^2/roads and <8 humans/km^2 but without known wolf packs were added to the total wolf range. Non-wolf range (8,000 km^2) was subtracted from total area.	A contiguous pack line was calculated that included 99% of townships with packs as determined from all databases, and encompassed 88,325 km^2 of northern Minnesota. Remote or untraversed townships with <0.7 km/km^2 roads and <4 humans/km^2 or <0.5 km/km^2 roads and <8 humans/km^2 but without known wolf packs were added to the total wolf range. Non-wolf range (14,405 km^2) was subtracted from the total area to derive total occupied wolf range (73,920 km^2).
5.	Number of wolves calculated from telemetry studies and areas known to contain wolves = 988.	Mean wolf territory size (166 km^2) derived from previous and current telemetry studies was divided into total range (after increasing pack territory size by 37% for interstitial pack area) to estimate number of packs (233).	Mean territory size (140 km^2) derived from current telemetry studies was divided into total range (after increasing pack territory size by 37% for interstitial pack area) to estimate number of packs (385).
6.	Areas without observations but having low road and human densities were extrapolated from wolf densities in known wolf areas; this amounted to an additional 148 wolves (988 + 148) to get the total number of pack wolves (1,136).	The mean winter pack size (5.55) derived from previous and current telemetry studies was multiplied by the number of packs (233 x 5.55) to get total number of pack wolves (1,293.).	The mean winter pack size (5.4) derived from current telemetry studies was multiplied by the number of packs (385 x 5.4) to get the total number of pack wolves (2,079).
7.	An additional but very conservative 10% was added to account for lone wolves, providing a total of 1,235 wolves. This was a single point estimate without confidence intervals.	The total number of pack wolves was increased to compensate for 15% single wolves in the population (1,293 ÷ 0.85) = 1,52l total wolves. This was a point estimate with 90% confidence intervals. The upper range of the population estimate (1,750) was calculated from a regression of wolf/ungulate biomass ratios.	The total number of pack wolves was increased to compensate for 15% single wolves in the population (2,079 ÷ 0.85) = 2,450 total wolves. This was a point estimate with 90% confidence limits. The wolf to ungulate biomass ratios were not used in 1997-98.

Table 2. Observations of wolves and wolf tracks, scats, and other wolf sign in Minnesota as reported by 464 natural resources personnel from 179 work stations during 1997-1998. An additional 83 persons from 62 additional work stations (most in non-wolf range) responded to the questionnaire only and did not contribute wolf observations.

	Observers		Number of observations				Total observations	
Affiliation	**n**	**%**	**Tracks**	**Wolves**	**Scats**	**Other[a]**	**n**	**%**
Minnesota DNR	78	17	728	114	64	166	1072	31
Wildlife	124	27	625	59	45	3	732	21
Parks	28	6	85	13	13	1	112	3
Trails	10	2	77	22	4		103	3
Other	33	7	272	43	20	1	336	10
Subtotal	273	59	1787	251	146	171	2355	68
U.S. Forest Serv.	57	12	134	37	10	3	184	5
U.S. F & W Serv.	33	7	13	5	11	5	34	1
U.S. Geol. Surv.	3	–				21	21	1
U.S. Dep. Agric.	7	2				94	94	3
U.S. Park Serv.	12	3	73	21	1	4	99	3
Subtotal	112	24	220	63	22	127	432	13
County Land Dept.	33	7	399	53	8		460	13
Indian Reservations	17	4	29	24	2	1	56	2
Wood Prod. Ind.	21	4	88	35	8		131	4
Other[b]	8	2	8	1	1	7	17	--
Subtotal	79	17	524	113	19	8	664	19
Grand total	464	100	2531	427	187	306	3451	100

[a] Includes winter track survey (n = 86), scent station (n = 66), USDA (n = 94), telemetry studies (n = 1 per pack), and miscellaneous wolf kill sites and howling (n = 24).

[b] Includes private natural resources consultants and Wisconsin DNR.

Table 3 . Number of observations (total = 2,000) of wolf packs (≥ 2 wolves) in townships with varying road and human densities during winter, 1997 - 1998.

km^2 roads/km^2	Human density/km^2				
	<1	1-<2	2-<4	4-<8	≥8
<0.50	956	225	62	53	5
0.51-0.60	72	58	58	7	0
0.61-0.70	114	17	57	32	6
0.71-0.80	18	29	53	26	4
0.81-0.90	3	11	41	6	1
>0.90	0	6	6	34	46

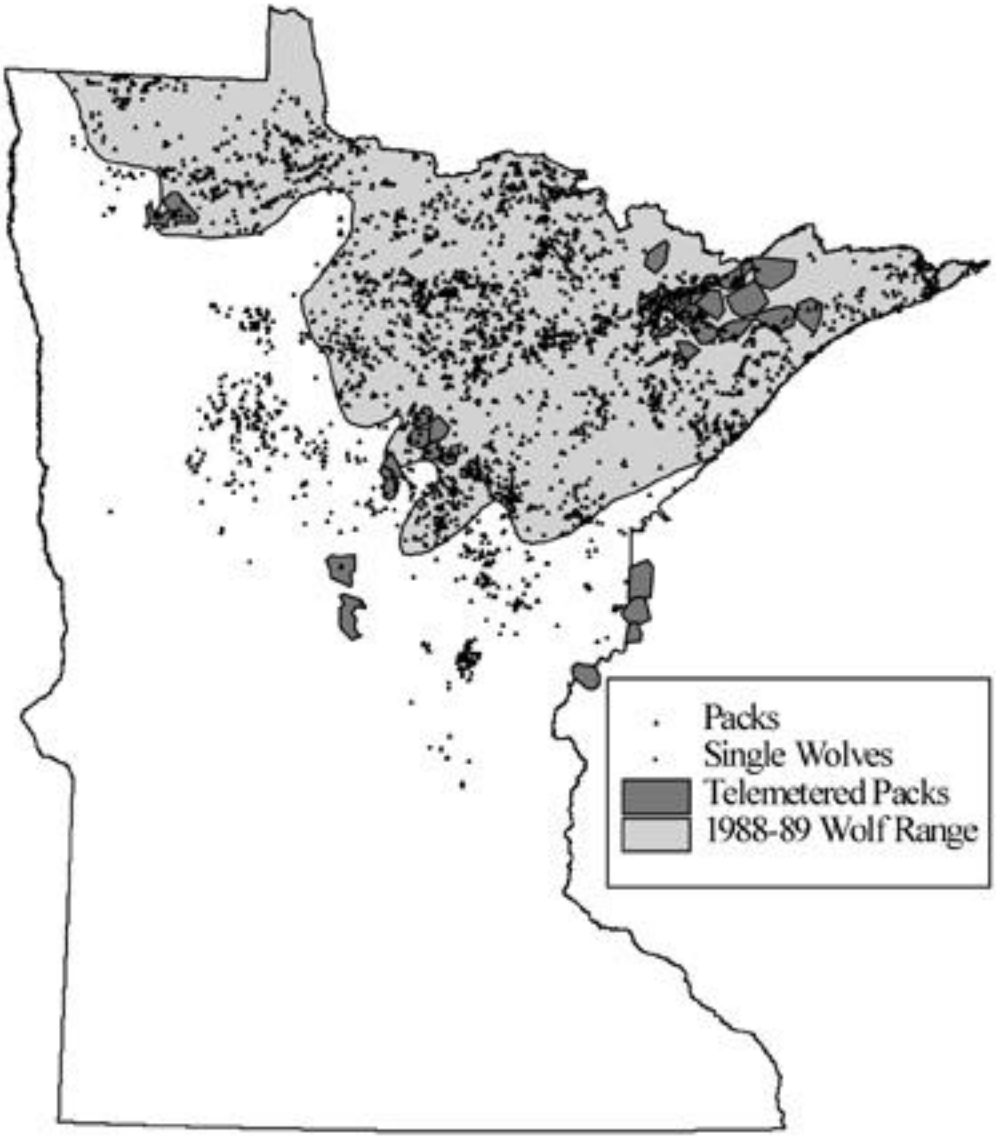

Figure 1. Observations of wolves, wolf tracks, wolf scats and other wolf sign (total n=3,451) in Minnesota, 1997-98 (see Table 1). Polygons represent wolf pack territories from five studies, and shaded area is the total wolf range (61,629 SqKm) in 1988-89.

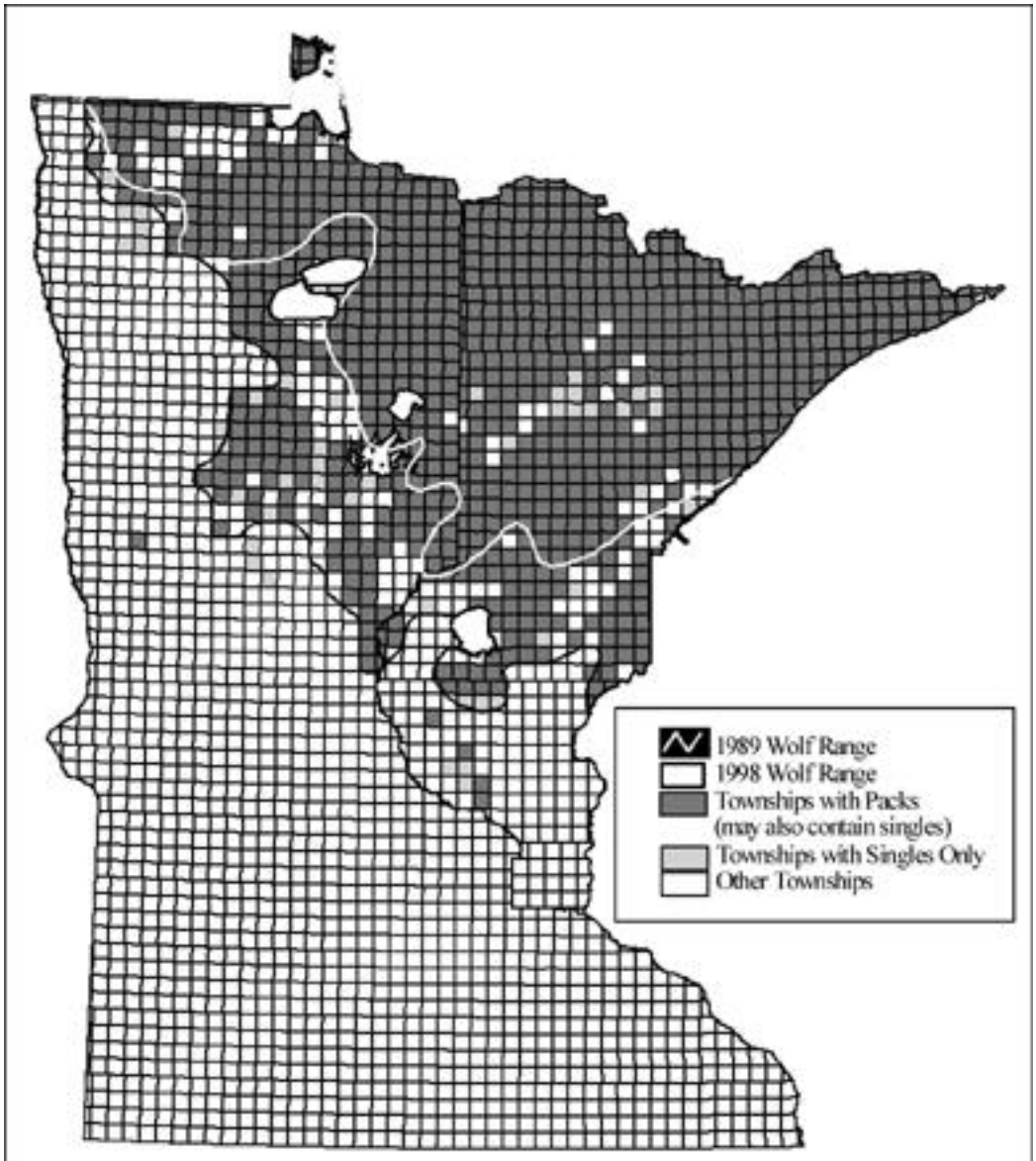

Figure 2. Total wolf range as identified from the 1997-98 wolf distribution survey (88,325 SqKm). Dark shading represents townships with packs (many contained single wolves also) or townships that fit the 1989 wolf model. Light shading represents townships with single wolves only. No shading represents townships with no wolves.

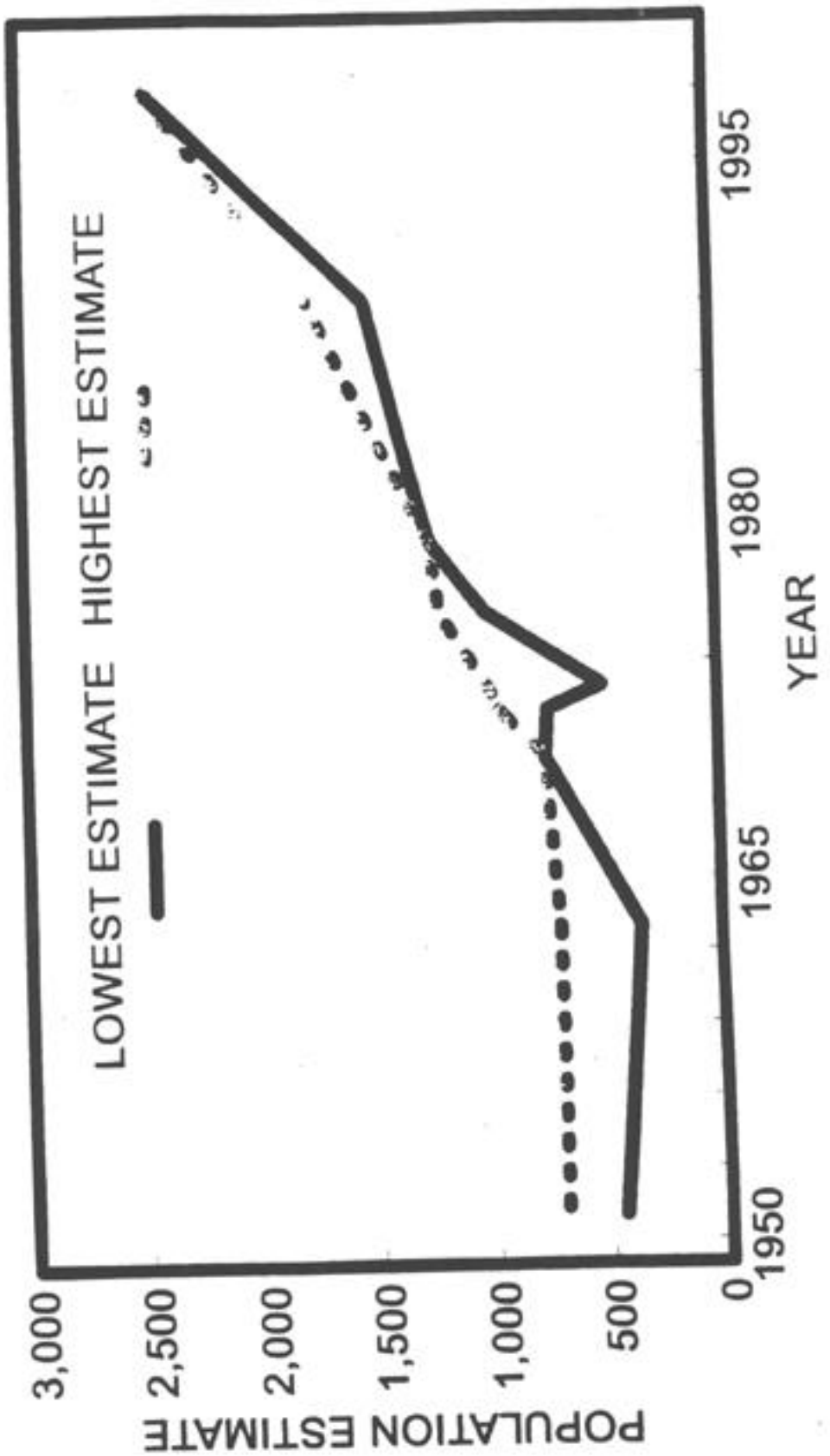

Figure 3. Wolf population estimates for Minnesota, 1952 to 1998. The 1998 population estimate of 2,450 has a 90% confidence interval of 1,995-2,905.

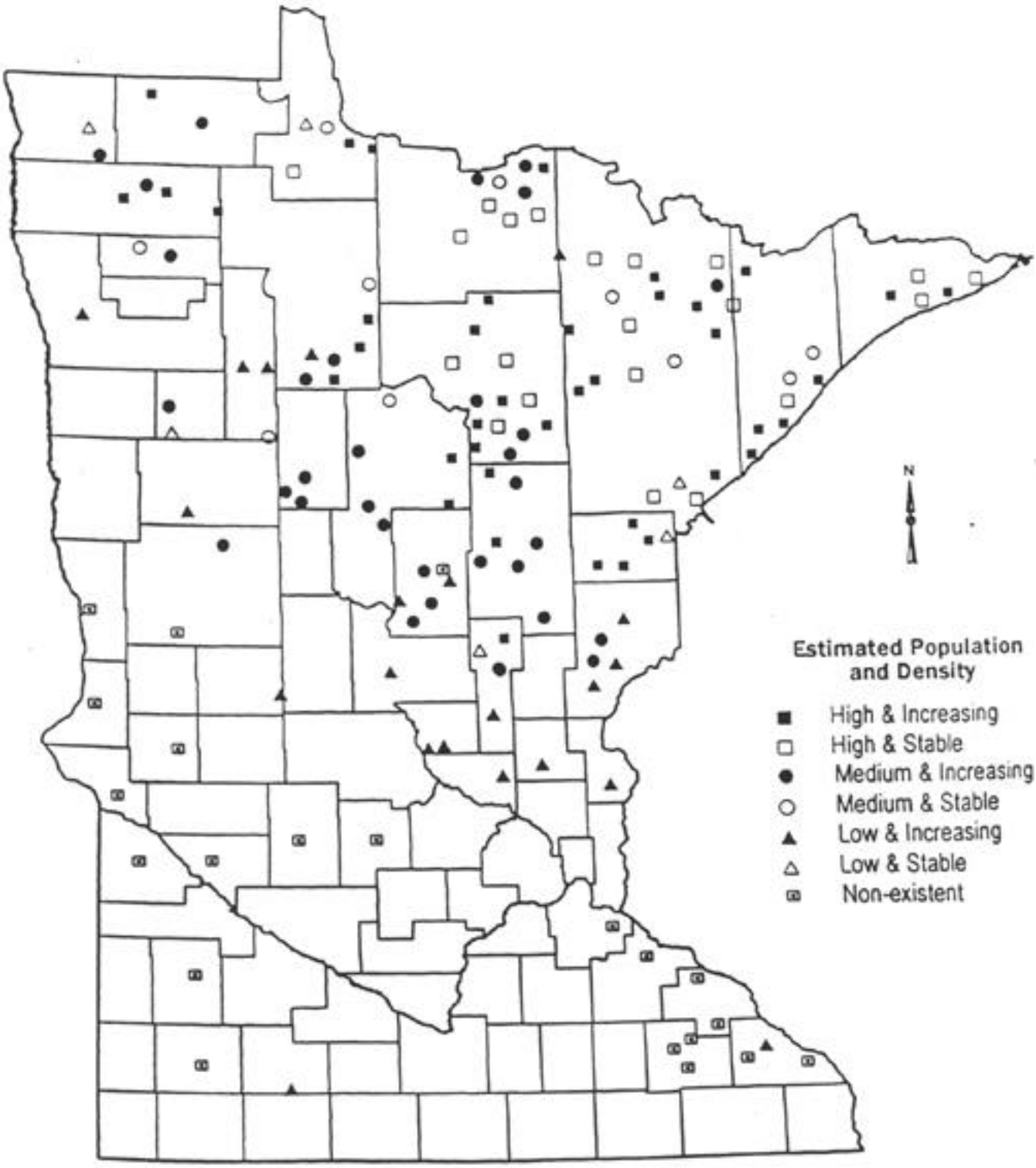

Figure 4. Winter 1997-98 wolf questionnaire presence and population trend summary, based on responses from 150 field stations. No Stations reported a declining wolf population.

APPENDIX VII.

PREDATOR CONTROL STATUTES AND RULES

97B.671 Predator control program.

Subdivision 1. **Authorization to take predators.** If the commissioner determines that predators are damaging domestic or wild animals and further damage can be prevented, the commissioner shall authorize the taking of the predators by predator controllers. The commissioner shall define the area where the predators may be taken, the objectives to be achieved, procedures for notifying predator controllers, payments to be made, the methods to be used, and when the predator control shall cease.

Subd. 2. **Certification of predator controllers.** (a) The commissioner shall certify a person as a predator controller if the person has not violated a provision of this section and meets qualifications of experience, ability, and reliability. The commissioner shall establish application procedures, prescribe forms, and maintain a list of predator controllers. The application procedures must include reports from conservation officers and other department field personnel as to the ability and reliability of the applicants.

(b) The commissioner may revoke a certification if the predator controller violates a provision of sections 97B.601 to 97B.671 or 97B.901 to 97B.945 or a rule of the commissioner relating to fur-bearing animals.

Subd. 3. **Predator control payments.** The commissioner shall pay a predator controller the amount the commissioner prescribes for each predator taken. The commissioner shall pay at least $25 but not more than $60 for each coyote taken. The commissioner may require the predator controller to submit proof of the taking and a signed statement concerning the predators taken.

Subd. 4. **Gray wolf control.** (a) The commissioner shall provide a gray wolf control training program for certified predator controllers participating in gray wolf control.

(b) After the gray wolf is delisted under the federal Endangered Species Act of 1973, in zone B, as defined under section 97B.645, subdivision 12, if the commissioner, after considering recommendations from an extension agent or conservation officer, has verified that livestock, domestic animals, or pets were destroyed by a gray wolf within the previous five years, and if the livestock, domestic animal, or pet owner requests gray wolf control, the commissioner shall open a predator control area for gray wolves.

(c) After the gray wolf is delisted under the federal Endangered Species Act of 1973, in zone A, as defined under paragraph (g), if the commissioner, after considering recommendations from an extension agent or conservation officer, verifies that livestock, domestic animals, or pets were destroyed by a gray wolf, and if the livestock, domestic animal, or pet owner requests gray wolf control, the commissioner shall open a predator control area for gray wolves for up to 60 days.

(d) A predator control area opened for gray wolves may not exceed a one-mile radius surrounding the damage site.

(e) The commissioner shall pay a certified gray wolf predator controller $150 for each wolf taken. The certified gray wolf predator controller must dispose of unsalvageable remains as

directed by the commissioner. All salvageable gray wolf remains must be surrendered to the commissioner.

(f) The commissioner may, in consultation with the commissioner of agriculture, develop a cooperative agreement for gray wolf control activities with the United States Department of Agriculture. The cooperative agreement activities may include, but not be limited to, gray wolf control, training for state predator controllers, and control monitoring and recordkeeping.

(g) For the purposes of this subdivision, "zone A" means that portion of the state lying outside of zone B, as defined under section 97B.645, subdivision 12.

HIST: 1986 c 386 art 2 s 56; 1993 c 231 s 39,40; 2000 c 463 s 17,18

6234.3000 CERTIFICATION FOR PREDATOR CONTROL.

Subpart 1. **Certification required.** A person may not participate in the predator control program unless the person is certified.

Subp. 2. **Application process.** Application for certification as a predator controller may be made on forms provided by the commissioner to a conservation officer in the applicant's county of residence on forms provided by the commissioner. The application shall include a summary of the applicant's experience and skill as a trapper or hunter.

Subp. 3. **Predator controller qualification requirements.** A person will not be certified unless the person completes all information requested on the application and meets the following qualifications:

A. for three years prior to the date of application, the person must not have been convicted of a violation of Minnesota Statutes, sections 97B.601 to 97B.671 or 97B.901 to 97B.951, or a rule of the commissioner relating to furbearing animals; and

B. the person must either demonstrate or attest to the person's skill in hunting or trapping, including the ability to distinguish signs, tracks, and trails of predators.

Subp. 4. **Revocation of certification.** A certificate may be revoked if the controller is inactive in the program for 24 consecutive months.

Subp. 5. **Inactivity in predator control program.** A certificate may be revoked if the controller is inactive in the program for two consecutive years.

STAT AUTH: MS s 97B.671; and others at 19 SR 6

HIST: 19 SR 484; 19 SR 2222

Current as of 11/02/00

6234.3200 USE OF SNARES FOR PREDATOR CONTROL.

Certified predator controllers may use snares statewide at any time when participating in the predator control program.

STAT AUTH: MS s 97B.671; and others at 19 SR 6

HIST: 19 SR 484

Current as of 11/02/00

6234.3400 COMPENSATION FOR PREDATOR CONTROL.

Subpart 1. **Presentation of carcass.** A predator controller must, within 48 hours, present the entire unskinned carcass of each predator to the conservation officer in the county where taken. The conservation officer must remove the front feet and the ears from the unskinned carcass. The remaining carcass is the property of the predator controller and must be immediately removed.

Subp. 2. **Identification of sites and methods.** Controllers must, upon request, specifically identify the method used to take the predator and the site where each predator for which payment is claimed was taken.

Subp. 3. **Payment schedule.** The payments in items A and B will be made for predators taken according to this part.

A. For predators taken from March 1 through September 30:

(1) coyote (Brush Wolf), $45; and

(2) fox, $15.

B. For predators taken from October 1 through the last day in February:

(1) coyote (brush wolf), $30; and

(2) fox, $10.

STAT AUTH: MS s 97B.671; and others at 19 SR 6

HIST: 19 SR 484; 19 SR 2222

Current as of 11/02/00

APPENDIX VIII.

LIVESTOCK BEST MANAGEMENT PRACTICES

The Costs of Prevention

These preventive practices have implementation costs and have not been shown to work in all cases. The use of guard dogs, for example, is often a first response to predation. Unfortunately, this deterrent does not work as well for wolves due to their size and cooperative hunting habits. Increased costs must be balanced by a reduction in losses to be cost effective.

Raising animals in close proximity significantly increases disease risk. Again, this increased risk of loss must be weighed against the benefits of reduced predation.

Warning Signs of Wolf Depredation

Farmers have reported some common signs that could indicate wolves have moved into your area. Signs may include:

- animals tightly bunched together instead of being spread across the pasture;
- the entire herd or flock is disturbed;
- sheep become panicked in the presence of herding dogs;
- increase of wolf signs on the farm;
- animals refuse to enter certain areas;
- cattle breaking through otherwise sound pasture fences;
- drastic changes in herd temperament.

CONTACTS

For information about wolf depredation in Minnesota or the MDA reimbursement program:
Blane White
Minnesota Department of Agriculture
90 West Plato Blvd.
St. Paul, MN 55107
651-296-0591.

For information on the use of guard dogs:
Livestock Guard Dog Association
111 East Chestnut Hill Road
Montague, MA 01351

For trapping services:
USDA/APHIS/Wildlife Services
34912 US Hwy 2
Grand Rapids, MN 55744
218-327-3350, Fax 218-326-7039

For information on carcass disposal:
State Board of Animal Health
90 West Plato Blvd
St Paul, MN 55107
651-296-2942

To contact farmers and ranchers who have experienced wolf problems:
Minnesota Lamb and Wool Producers
Route 2, Box 63
Hinckley, MN 55037
320-384-7262

Minnesota State Cattlemen's Association
3311 Highway 65
Mora, MN 55051
320-679-5755 or 218-927-2495

Coyote track
(track size up to 2.5 inches long)

Wolf track
(track size up to 5 inches long)

Track graphics courtesy of
the International Wolf Center
http://www.wolf.org

Wolves in Farm Country

A guide for Minnesota farmers and ranchers living in wolf territory

For many years, the only place one could find gray wolves (also called timber wolves) in the continental United States was the deep forest of northern Minnesota. Today, wolves are making a strong comeback in Minnesota and Wisconsin, and they are spreading throughout the state. While the rebounding wolf population is an ecological success story, it creates challenges for farmers and ranchers who must find a way to protect livestock from these adaptable predators.

Where is the wolf found today?

Most reports of wolf depredation on livestock still come from the northern half of the state where wolf numbers are highest. However, every year the wolf's range stretches deeper into central and southern Minnesota. In addition, the roaming tendency of wolves means they can cause livestock losses anywhere in the state.

Bears, dogs and coyotes also occasionally attack livestock, so you must look for evidence to help determine what caused the loss.

What should I do if I suspect wolves have killed my livestock?

Recognizing the economic harm wolf depredation can have on domestic livestock, the 1977 Minnesota Legislature authorized the Minnesota Department of Agriculture to reimburse livestock owners for losses caused by wolves. USDA/Wildlife Services provides wolf trapping for cases of verified wolf attacks on domestic animals. To receive trapping services and to be eligible for state reimbursement, farmers and ranchers need to follow specific reporting procedures.

Step 1: Carefully examine the kill site and dead livestock. Be cautious not to trample over animal tracks or disturb the site. A USDA trapper or DNR conservation officer may be able to read subtle clues that you may not recognize. If the examination suggests a wild animal killed your livestock, protect your remaining animals by temporarily moving them to a more secure location, if possible.

CAUTION : Wolves are protected under federal law. It is illegal to harm or kill a wolf, except in defense of human life. Any attempt to frighten away wolves returning to kill other animals or to feed on dead livestock must be done without harming the wolf.

Step 2: Preserve the evidence of the suspected wolf kill as much as possible (see box) and then report the kill. To be eligible for state compensation, you must report a suspected wolf kill within 24 hours of discovery to a DNR conservation officer or county extension educator. Make a note of who took your report and the day and time of your report for future reference.

Step 3: After reporting the incident, a DNR conservation officer or county extension educator will investigate and verify the wolf kill for compensation. You will be asked to complete an application for state compensation. The report will then be sent to the county extension office for a determination of the market value of the livestock lost. The request will then be sent to the MDA for payment.

What can I do to prevent wolf depredation?

The University of Minnesota conducted a study in early 1999 to determine if any livestock management practices could prevent wolf depredation. The study could find no management practices certain to prevent wolf depredation. The only method proven to prevent wolf depredation was removing the depredating wolves from the farm. However, farmers and ranchers have reported a few practices that may help in some cases. These include:

- **Maintaining healthy, well-fed animals.** Wolves typically select the weakest and easiest prey. Healthy animals are more difficult to take. Move lame or sick animals to a safe area when possible.
- **Using guard animals.** Although not always effective, the presence of guard dogs can be a deterrent. When using guard dogs against wolves it is important to use several dogs, as wolves may kill a single animal. Moving and consolidating sheep, as is done in rotational grazing, can help guard dogs be more effective. Keep in mind, however, that rotational grazing is less suitable during lambing as it may disrupt the bond between mother and offspring.
- **Moving calving or lambing activities closer to the barnyard.** Newborns are easy prey. Some farmers move calving or lambing closer to the barnyard because it allows for more frequent monitoring.

Recent research was unable to find a link between improper carcass disposal and wolf depredation. Regardless of research findings, Board of Animal Health regulations on proper carcass disposal must be followed.

Preserving evidence of a wolf kill

- Secure the area from the entry of livestock. Curious animals or upset mothers can destroy evidence quickly.
- Look for tracks or scat (droppings) that will show a wolf's presence. Cover with plywood or weighted cans.
- Cover livestock carcass or remains with a tarp and weight securely to keep other predators from destroying teeth marks or other evidence.
- Photograph or video tape the evidence. It is helpful to put some common object next to the evidence to document size.
- Do not disturb evidence until the federal trapper or conservation officer can investigate the site.
- Remember that under Board of Animal Health regulations you must properly dispose of carcasses within 48 to 72 hours. You may need to inform the Conservation Officer of this.

APPENDIX IX.

LIVESTOCK COMPENSATION STATUTES

3.737 Livestock owners; compensation for destroyed or crippled animals.

Subdivision 1. Compensation required. (a) Notwithstanding section 3.736, subdivision 3, paragraph (e), or any other law, a livestock owner shall be compensated by the commissioner of agriculture for livestock that is destroyed by a gray wolf or is so crippled by a gray wolf that it must be destroyed. The owner is entitled to the fair market value of the destroyed livestock as determined by the commissioner, upon recommendation of a university extension agent or a conservation officer.

(b) Either the agent or the conservation officer must make a personal inspection of the site. The agent or the conservation officer must take into account factors in addition to a visual identification of a carcass when making a recommendation to the commissioner. The commissioner, upon recommendation of the agent or conservation officer, shall determine whether the livestock was destroyed by a gray wolf and any deficiencies in the owner's adoption of the best management practices developed in subdivision 5. The commissioner may authorize payment of claims only if the agent or the conservation officer has recommended payment. The owner shall file a claim on forms provided by the commissioner and available at the university extension agent's office.

Subd. 2. Deduction from payment. Payments made under this section shall be reduced by amounts received by the owner as proceeds from an insurance policy covering livestock losses, or from any other source for the same purpose including, but not limited to, a federal program.

Subd. 3. Rules. The commissioner shall adopt and may amend rules to carry out this section which shall include: methods of valuation of livestock destroyed; criteria for determination of the cause for livestock loss; notice requirements by the owner of destroyed livestock; and other matters determined necessary by the commissioner to carry out this section.

Subd. 4. Payment, denial of compensation. (a) If the commissioner finds that the livestock owner has shown that the loss of the livestock was likely caused by a gray wolf, the commissioner shall pay compensation as provided in this section and in the rules of the department.

(b) For a gray wolf depredation claim submitted by a livestock owner after September 1, 1999, the commissioner shall, based on the report from the university extension agent and conservation officer, evaluate the claim for conformance with the best management practices developed by the commissioner in subdivision 5. The commissioner must provide to the livestock owner an itemized list of any deficiencies in the livestock owner's adoption of best management practices that were noted in the university extension agent's or conservation officer's report.

(c) If the commissioner denies compensation claimed by an owner under this section, the commissioner shall issue a written decision based upon the available evidence. It shall include specification of the facts upon which the decision is based and the conclusions on the material issues of the claim. A copy of the decision shall be mailed to the owner.

(d) A decision to deny compensation claimed under this section is not subject to the contested case review procedures of chapter 14, but may be reviewed upon a trial de novo in a court in the county where the loss occurred. The decision of the court may be appealed as in other civil cases. Review in court may be obtained by filing a petition for review with the administrator of the court within 60 days following receipt of a decision under this section. Upon the filing of a petition, the administrator shall mail a copy to the commissioner and set a time for hearing within 90 days of the filing.

Subd. 5. Gray wolf best management practices. By September 1, 1999, the commissioner must develop best management practices to prevent gray wolf depredation on livestock farms. The commissioner shall periodically update the best management practices when new practices are found by the commissioner to prevent gray wolf depredation on livestock farms. The commissioner must provide an updated copy of the best management practices for gray wolf depredation to all livestock owners who are still engaged in livestock farming and have previously submitted livestock claims under this section.

HIST: 1977 c 450 s 4; 1982 c 424 s 130; 1982 c 629 s 1; 1983 c 247 s 2; 1986 c 444; 1Sp1986 c 3 art 1 s 82; 1988 c 469 art 1 s 1; 1998 c 401 s 11-13; 2000 c 463 s 1,22

* NOTE: The amendment to subdivision 1 by Laws 2000, chapter *463, section 1, is effective July 1, 2001. Laws 2000, chapter *463, section 24.