

Michigan Gray Wolf Recovery and Management Plan

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Prepared by the Michigan Gray Wolf Recovery Team

for the

Michigan Department of Natural Resources

Lansing, Michigan

Approved:

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Michigan Gray Wolf Recovery and Management Plan

MICHIGAN GRAY WOLF RECOVERY TEAM

Gray wolves have increased in number in the Upper Peninsula in recent years through natural immigration and reproduction. Several agencies and groups have mandates and interests in wolf management and protection. The need for a unified and coordinated wolf recovery and management effort was recognized. To this end, former Department of Natural Resources Director Roland Harmes appointed an interagency recovery team with the assignment to develop a gray wolf recovery and management plan through public and agency involvement.

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SUMMARY

Gray wolves have increased in the Upper Peninsula of Michigan due to natural immigration from Wisconsin, Ontario, and Minnesota and through production of pups in Michigan. The 1996-97 winter population was estimated at 112 wolves in at least 20 packs distributed across the Upper Peninsula, and 24 wolves in three packs on Isle Royale.

The main factors affecting long-term survival and management of wolves in Michigan are the abundance and distribution of wild prey species, the level of human-caused wolf mortality, and the ability of wolves to move between areas of suitable wolf habitat.

The plan is designed to involve natural resource management agencies and Michigan residents in restoring and managing wolves through a cooperative approach. Fifteen public forums held by the Recovery Team found that over 90 percent of the attendees supported wolf restoration in Michigan.

The Plan summarizes wolf biology, history, status and distribution. It includes sections on public attitudes, goals, education, monitoring, wolf habitat, prey relationships, diseases, protection, depredation, and research.

Wolf Population Goals

The wolf restoration goals are presented at three levels. No wolf introductions are recommended or needed.

The **federal recovery plan goal** will be achieved when there is a combined population of 100 wolves in Michigan and Wisconsin for a period of five consecutive years. At this level the wolf will be recommended for removal from endangered status on the Federal Endangered and Threatened Species List and changed from endangered to threatened status on the Michigan Endangered Species List. When wolves are downlisted from endangered states, lethal wolf control may be allowed in some localized areas in special circumstances, such as repeated livestock depredations. When a **minimum sustainable population** is achieved in the Upper Peninsula for a period of five consecutive years, the wolf can then be removed from the Michigan Endangered Species List.

Fully occupied range cannot be quantified now but is defined as the upper limit of wolf numbers that is compatible with human land use practices and human tolerance. Wolf numbers and human attitudes need to be closely monitored as the wolf population increases to determine this cultural carrying capacity. When this level is determined and attained, it may be necessary to stabilize the wolf population.

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Recovery and management strategy

1. Public support is vital for the long-term survival of wolves in Michigan. Information and education efforts designed to exchange information with Michigan residents are essential and need to receive a high priority.
2. Wolf population monitoring is needed to measure progress toward restoration, to determine limiting factors, and to direct management at all wolf population levels.
3. Adequate wolf habitat now exists in the Upper Peninsula to meet the population goals. However, the survival of wolves and other species with large home ranges is best assured by maintaining some large tracts of land with relatively low human densities and accessibility. Future land management will require careful planning at the landscape level to maintain sufficient quantity and proper distribution of suitable wolf habitat.
4. Large area closures or extensive road closures solely for wolf protection are not needed. Some restrictions on land use are recommended around wolf home sites (dens and pup rendezvous sites) to protect pups. Year-around protection is recommended within a 5 chain (100 m) radius of home sites. Seasonal protection is recommended within a 5-40 chain (100-800 m) radius of home sites from March 1 to July 31.
5. Wolves are expected to have a negligible effect on prey species. Some reduction in deer numbers is possible in local areas where declining deer habitat is coupled with severe winters. Existing deer management programs and commercial timber cutting will provide adequate populations of prey species for wolves and still provide adequate deer numbers for hunters and viewers.
6. Wolf protection will be achieved through coordinated law enforcement and by working cooperatively with tribal leaders, landowners, hunters, trappers, and livestock farmers to ensure wolf protection.
7. Wolf depredation on livestock will be minimized by providing assistance in developing preventive measures and ameliorated by seeking to provide compensation through private funding sources for livestock losses caused by wolves. Wolves that are likely to cause repeated depredations will be trapped and relocated, or lethally controlled when *the federal recovery plan goal* has been attained.
8. Research on Michigan wolves should be directed toward coordinated Great Lakes regional efforts and problems of concern in Michigan.
9. A wolf steering committee should be appointed by the DNR to direct the annual and long-term aspects of the Plan.
10. The Plan should be reviewed in five years, or at the time federal reclassification is proposed.

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1. INTRODUCTION

1.1 PURPOSE

The purpose of this Plan is to provide a course of action that will ensure the long-term survival of a self-sustaining wild wolf population in Michigan. It is written to encourage cooperation among agencies, communities, private and corporate landowners, special interest groups, and all Michigan residents. The Plan conforms to the provisions of the federal Eastern Timber Wolf Recovery Plan, which includes Michigan (U. S. Fish and Wildlife Service 1992).

Federal recovery criteria have no specific requirement for the long-term viability of a Michigan wolf population. The federal delisting is expected to occur as a result of a secure population in Minnesota and the presumed long-term viability of a joint Michigan-Wisconsin wolf population. The federal endangered species act requires that the Fish and Wildlife Service, as a part of the delisting process, be able to ensure that the species is not likely to return to the list. The implementation of this management plan demonstrates Michigan's intent, to the extent of its authority, to protect the wolf from adverse effects that could lead to a need for its relisting as a threatened or endangered species.

The Michigan Department of Natural Resources (DNR) led the development of this plan because of its primary responsibility and statutory authority for the management of resident wildlife species in the state. Cooperating federal and tribal agencies have additional legal mandates and responsibilities for wolf management and protection. The support of Michigan residents is essential to the long-term survival of wolves in the state.

1.2 LEGAL STATUS

The gray wolf is listed as endangered under Michigan Law (Part 365, Endangered Species Protection, of the Natural Resource and Environmental Protection Act, 1994 PA 451) and the federal Endangered Species Act (Public Law 93-205). The DNR is

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responsible for administering the state act and the U. S. Fish and Wildlife Service (USFWS) is responsible for administering the federal act.

The wolf is afforded full protection under both acts by prohibiting the "taking" of wolves. *Take* means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct.

A violation of the state act constitutes a misdemeanor with fines up to \$1,000, imprisonment up to 90 days, or both. A person convicted of illegally killing, possessing, buying, or selling a gray wolf must also reimburse the state for the \$1,500 assessed value of the animal (Part 401, Wildlife Conservation, of the Natural Resource and Environmental Protection Act, 1994 PA 451).

Maximum penalties under the federal act are \$100,000 per individual or \$250,000 for corporations or organizations, with imprisonment of up to one year. The federal act also requires that agencies of the federal government avoid actions that are likely to jeopardize the continued existence of or adversely modify designated critical habitat of an endangered species. Federal agencies must consult with the U. S. Fish and Wildlife Service to assure that their actions are not likely to jeopardize the continued existence of any endangered or threatened species, including wolves.

2. WOLF BIOLOGY AND ECOLOGY

2.1 DESCRIPTION

The gray wolf (*Canis lupus*) is Michigan's largest member of the Canidae, or dog family. Other native Michigan canids are the coyote (*Canis latrans*), red fox (*Vulpes vulpes*), and gray fox (*Urocyon cinereoargenteus*). Michigan's gray wolf is also known as the eastern timber wolf, or simply timber wolf. Previously Michigan's wolves were included with the eastern timber wolf subspecies *Canis lupus lycaon* (Young and Goldman 1944), but recent taxonomic studies have resulted in their reclassification as the Great Plains subspecies *Canis lupus nubilus* (Nowak 1995).

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Wolves are large in comparison to coyotes, with body dimensions exceeding those of a fully grown German shepherd or Alaskan malamute. Male wolves are slightly larger than females. Weights of adult gray wolves range from 60-115 pounds (27-52 kg) and average about 75 pounds (34 kg). Wolves are about six feet (1.8 m) long from nose to the end of the tail. Adults stand 30-34 inches (75-85 cm) tall at the shoulder. The feet of wolves are large, with tracks measuring 3½-4 inches (9-10 cm) wide and 4½-5 inches (11-13 cm) long. Wolves have cheek tufts that make their faces appear wide and their heads large. Their tails are bushy and straight, not curled like most dogs.

Wolves are adapted for their role as the primary large mammal predator in cold and temperate climates. The dense underfur in their winter coats is protected by guard hairs that may be up to six inches (15 cm) long over the shoulder.

Wolves' skeletal and muscular structures make them well adapted to travel. They have tremendous stamina and often spend eight to ten hours a day on the move, primarily during early morning and evening. Even wolves on Isle Royale traveled an average of 31 miles (50 km) per day during the winter (Mech 1966).

2.2 SOCIAL STRUCTURE AND BEHAVIOR

Wolves are social animals and live in packs. The pack (two or more wolves traveling together, with evidence of breeding behavior) is the functional unit of wolf society. It is typically comprised of two lead or "alpha" animals, the current year's pups, siblings from previous litters, and occasionally other wolves that may or may not be related to the alpha pair. The alpha male and female normally are the only animals that breed, even though other pack members may be physiologically capable of reproduction. The alpha animals are thought to lead in decisions such as when and where to hunt and when it is time to move, rest, or find seclusion. The alpha female is believed to select the denning site. Pack size can range from two to 13 wolves but usually ranges from four to six (Mech and Frenzel 1971). Pack members may separate for short periods.

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Much of the time that the pack spends together is used to reinforce the intricate dominance hierarchy within the pack through structured greetings and body posturings.

In addition to sight, wolves communicate extensively through the senses of smell and hearing. Scent marking is used to relay information among pack members and between packs. Wolves place scent marks on objects in their territories and are able to discriminate olfactory cues among individual wolves. Wolves howl together as a pack, to separated pack members, and to other packs. Depending environmental conditions, wolves apparently can hear other wolves howling four to six miles (6-10 km) away (Asa and Mech 1995). Wolves howl in long, low tones without yapping. Howling between packs and scent marking along territory edges are principle means of spacing in wild wolf populations.

As a result of spacing mechanisms, packs live in territories that are actively marked and defended. Territory size depends upon the density of wolves and on the density and distribution of prey. Sizes of individual wolf pack territories reported from the Great Lakes area ranged from 30 to 260 square miles (80-670 km²) (Mech 1970, Mech and Hertel 1983) but generally range from 42 to 100 square miles (109-259 km²) in Wisconsin and Minnesota (Wydeven et al. 1995, Fuller 1995). One pack of five animals monitored in the Upper Peninsula in 1992-93 used an area of 310 square miles (800 km²).

Some young wolves leave the pack and move into new areas when they begin to mature at one to four years of age. New packs form when subordinate pack members disperse from the pack territory, find an animal of the opposite sex, claim and defend a territory, and eventually mate and produce offspring themselves. Wolves are capable of dispersing several hundred miles from home territories. One wolf moved over 500 miles (800 km) from Minnesota to Saskatchewan between January and October 1981 (Fritts 1983). A male wolf captured as a pup near Ely, Minnesota in August 1991 was recaptured in Iron County, Michigan, in June 1994 (Mech et al. 1995).

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Wolves occur in rather low densities wherever they are found. One wolf per 10 square miles (1 wolf/26 km²) is considered a high wolf density.

2.3 REPRODUCTION AND MORTALITY

Mating takes place in February, dens are dug in March, and pups are born in mid- to late April (Peterson 1977, Fuller 1989). Litter sizes can range from one to nine pups, but usually number four to six. Wolves are among the best examples in the animal world of population self-regulation. Packs in the Great Lakes region limit production of pups by allowing only the alpha pair to breed; packs may not breed during years when prey numbers are low. Pups are weaned at about nine weeks and moved to a rendezvous site (Section 6.32). As the pups grow, they are fed partially digested food brought to the den or rendezvous site and regurgitated from the stomachs of returning adults. All pack members feed and care for the pups. This activity strengthens the social bonds of dependence among pack members.

Up to 60 percent mortality may occur from disease and malnutrition during the period from birth to the time pups are able to travel with the rest of the pack at six to seven months of age. Mortality rates approximate 45 percent from six months to one year, and 20 percent between years one and two (Pimlott et al. 1969, Mech 1970, Mech and Frenzel 1971, Van Ballenberghe et al. 1975, Fritts and Mech 1981). Annual adult wolf mortality in Wisconsin averaged 39 percent during a period of decline, and 19 percent during a period of increase (Wydeven et al. 1995). Adults may live up to 13 years, although most die much sooner (Mech, pers. comm. 1996).

No animal habitually preys on the wolf, though pups may occasionally be taken by a bear or other predator. Both moose and deer have injured or killed wolves (Nelson and Mech 1985, Mech and Nelson 1989). Other natural mortality factors include accidents, malnutrition, starvation, parasites, diseases, and fatal encounters during territorial disputes between packs.

Between 1960 and 1987, 16 wolf specimens were recovered from the Upper Peninsula. Ten (63 percent) of the animals died as a direct result of human actions

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(six shot, one trapped, and three struck by vehicles). The cause of death in six animals could not be determined (Thiel and Hammill 1988). Of 18 wolves recovered since 1989, six were struck by vehicles, three were trapped, seven died from mange, and two were shot. Known Michigan wolf mortality is summarized in Table 1.

Table 1. Michigan Wolf Mortality From Wolves Recovered Between 1960-1997.

Cause of Death	Number of Wolves¹
Vehicles	9
Illegally Shot	8
Accidentally Trapped	4
Disease	7
Undetermined	6
Total	34
¹ Isle Royale not included	

2.4 WOLF FOOD HABITS

White-tailed deer (*Odocoileus virginianus*), beaver (*Castor canadensis*), and small mammals are the primary prey species for gray wolves in Michigan. Mandernack (1983) analyzed scats of Wisconsin wolves to determine the relative abundance of prey species in their diet. Deer comprised 55 percent of the diet, beaver 16 percent, snowshoe hare (*Lepus americanus*) 10 percent, and other small mammals and miscellaneous items 20 percent. He reported that beaver provide as much as 30 percent of a Wisconsin wolf's spring diet. Previous studies in the Upper Peninsula found that wolves ate shrews, snowshoe hares, red squirrels, mice, one ruffed grouse, crayfish, and grass in addition to white-tailed deer (Stebler 1944, 1951).

3. WOLVES IN MICHIGAN

3.1 HISTORY AND CURRENT DISTRIBUTION

The gray wolf has been part of Great Lakes fauna since the melting of the last glacier and as such is native to the land area we know as Michigan. Wolf history in Michigan is similar to that observed in the rest of the continental United States.

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The aboriginal people of present-day Michigan have always been spiritually connected to the wolf. According to the Anishinabe or Ojibwa creation story, original man and his brother ma'iingun, the wolf, traveled together to name and visit all the plants, animals, and places on earth. Later they were instructed by the Creator to walk their separate paths and that they both would be feared, respected, and misunderstood by the people that would join them on earth (Benton-Banai 1988).

Wolves occupied all of what is now Michigan at the time of European settlement. Settlers brought their wolf prejudices with them (Lopez 1978). European werewolf mythology, fairy tales, and religious beliefs, along with views that wolves were incompatible with civilization, resulted in the persecution of wolves in Michigan.

Assisting the pattern of exploitation, the United States Congress passed a wolf bounty in 1817 in the Northwest Territories, which included what is now Michigan. A wolf bounty was the ninth law passed by the First Michigan Legislature in 1838. A wolf bounty continued until the period between 1922 and 1935, when a state trapper system was in effect. The bounty was reinstated in 1935 and repealed in 1960, only after wolves were nearly eliminated from the state. Michigan wolves were given complete legal protection in 1965.

By the time bounties were imposed in the 1800s, wolves were nearly gone from the southern Lower Peninsula and were absent from the entire Lower Peninsula by about 1935 (Stebler 1944). In the more sparsely settled Upper Peninsula, the decline was less precipitous. In 1956, the population was estimated at 100 individuals in seven major areas in the Upper Peninsula (Arnold and Schofield 1956). The Michigan wolf population was estimated at six animals in the Upper Peninsula in 1973; sporadic breeding and occasional immigration of wolves from more secure populations in Ontario and Minnesota were postulated as the factors that maintained a small population of wolves in the Upper Peninsula (Hendrickson et al. 1975). It is likely that a few animals persisted in remote areas of the Upper Peninsula and that wolves were never extirpated from the state.

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Beginning about 1973, the wolf population in Minnesota began to expand southward from its northern range in the state. In 1975, a pack of wolves occupied a territory in both Pine County, Minnesota, and Douglas County, Wisconsin (Thiel 1993). This signified the beginning of re-occupation of their former range in Wisconsin. Since 1975, the wolf population in Wisconsin has grown to over 100 animals occupying suitable habitat in the northern counties. Wolves occupying the west and central Upper Peninsula are likely descendants of immigrants from Wisconsin (Thiel 1988) and Minnesota (Mech et al. 1995). Those now found in the eastern Upper Peninsula are likely a result of wolves crossing the ice from Ontario at Whitefish Bay, along the St. Mary's River, and near northern Lake Huron islands (Jensen et al. 1986).

Only one wolf introduction has been attempted in Michigan. All four of a pack of Minnesota wolves released in Marquette County in March 1974 died as a result of direct human activities between July and November 1974. These wolves did not reproduce and did not contribute to the current wolf population (Weise et al. 1975).

Wolf numbers have increased in Michigan in recent years (Table 2). The wolf population in Michigan during the winter of 1995-97 was estimated at 112 animals in at least 20 packs across the Upper Peninsula, plus 24 wolves in three packs on Isle Royale (Figure 1).

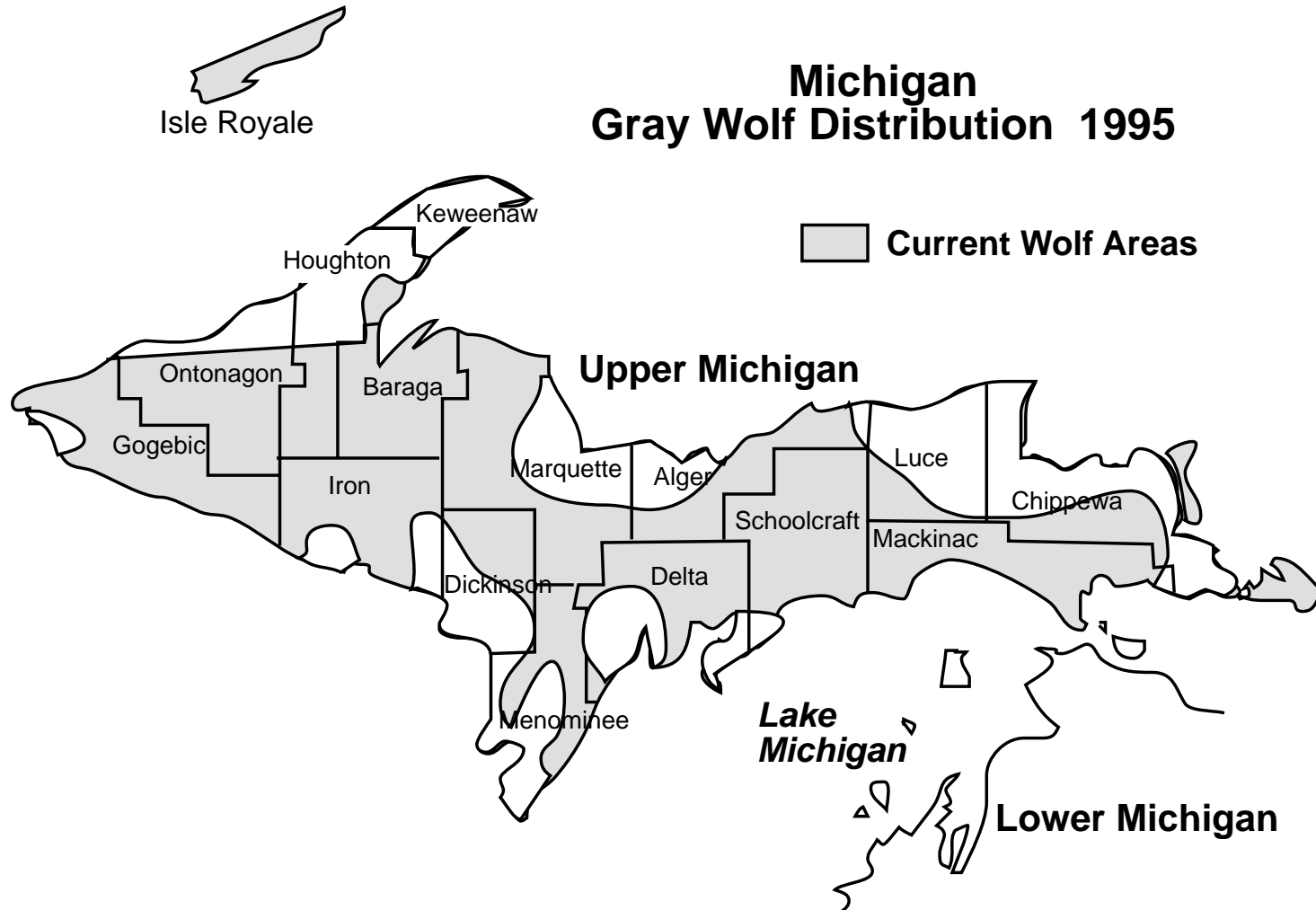
Table 2. Confirmed Late Winter Wolf Numbers in the Upper Peninsula 1991-96.

Year	Number of Wolves¹	Number of Packs¹
1991	17	1
1992	21	1
1993	30	4
1994	57	8
1995	80	12
1996	116	12-20
1997	112	20+

¹Isle Royale wolves not included

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Figure 1. Michigan Wolf Distribution, 1994-95.



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3.2 ISLE ROYALE

3.21 History

Isle Royale was established as a national park in 1931. Protection of the native flora and fauna became the primary management goal. Prior to the arrival of wolves and moose (*Alces alces*) on Isle Royale, the primary large mammals were the woodland caribou (*Rangifer tarandus*), lynx (*Lynx canadensis*), and coyotes. Wolves first appeared on Isle Royale in the late 1940s, when a pair, or two lone wolves crossed the ice from either Minnesota or Ontario. There is no archeological evidence of wolves on the Island prior to this period, although research is limited. Wolves arrived on the Island to find a substantial moose population, which became their primary food source. A formal monitoring program of the moose and wolves began in 1958.

Wolf numbers have varied between 12 and 50; moose numbers ranged from 500 to 2,500. The wolf and moose populations on the Island followed a pattern of dynamic fluctuations, wherein high moose numbers—particularly older moose—were followed by higher wolf numbers. Wolves influenced moose numbers predominantly through the direct killing of calves and have remained the only consistent source of moose mortality on the Island. The moose-wolf population patterns held until a dramatic crash occurred in the wolf population in the early 1980s, in which wolf numbers dropped from 50 to 14. Wolf reproduction progressively declined during 1985-92; numbers dropped to their lowest level—a dozen animals. As the moose population grew throughout the 1980s and 1990s, the wolf population failed to correspondingly increase. Although a possible outcome is a complete die-off of the Isle Royale wolf population, the present population seems to be thriving and increased to 24 animals in 1997. The Isle Royale moose population declined from 2,400 in 1995 to 500 in 1997 adding another dimension to the Isle Royale wolf-moose relationship.

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3.22 Future Management And Direction

Management of the Isle Royale wolf population is guided by National Park Service (NPS) policy, the federal wolf recovery plan, and ongoing research. Concern over the decline of the wolf population in the late 1980s prompted the convening of a group of scientists representing NPS management, wolf ecologists, disease and genetics experts, and conservation biology specialists to discuss the wolf decline. They agreed over the short-term that the wolf population in the Park should be allowed to proceed without intervention (including no introduction of new animals) while undertaking more intensive research directed at understanding the cause of the wolf decline. Intensive research, initiated in 1988, focused on three possible causes for the wolf decline: food shortage, disease, and genetic factors. Uncertainty remains over the causes of the wolf decline. Results from this research suggest that canine parvovirus played an important role in the population crash, which was clearly caused by high wolf mortality rather than emigration. High mortality in 1981-88 would have accelerated genetic decay in the wolf population above the background rate arising from isolation. Wayne et al. (1991) estimated that there has been a 50 percent loss of genetic variability in Isle Royale wolves. However, there remains uncertainty surrounding the reasons for the wolf decline, particularly the role of genetics. It is essential to closely follow the next generation of wolves in the mid- to late 1990s to better understand the population decline.

The results of ongoing research, especially attempts to define the causes of the population decline, will play a major role in determining future management options for the Isle Royale wolf population. The NPS will continue to encourage and support this research.

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4. ATTITUDES OF MICHIGAN RESIDENTS TOWARD WOLVES

4.1 1990 PUBLIC ATTITUDE SURVEY

A 1990 survey (Kellert 1990) conducted to determine the attitudes and opinions of Michigan residents found considerable interest and support for the wolf and its recovery in the Upper Peninsula (Table 3). This study was contracted by the International Wolf Center in Ely, Minnesota, with support from the U. S. Forest Service, Michigan Department of Natural Resources, National Park Service, U. S. Fish and Wildlife Service, and Sigurd Olson Institute. Data collection and analysis were done by Dr. Stephen Kellert of the Yale University School of Forestry and Environmental Studies, and HBRS, Inc., a social science research firm located in Madison, Wisconsin.

Study data were obtained through mail surveys to a random sample of 300 Upper Peninsula and 300 Lower Peninsula residents and special samples of 150 Michigan deer hunters, 150 Upper Peninsula trappers, and 150 Upper Peninsula farmers. The 22-page mail survey consisted of about 150 questions.

Table 3. Percent of Respondent Groups Supporting Upper Peninsula Wolf Recovery.

Group	Support Percentage
Upper Peninsula residents	64%
Lower Peninsula residents	57%
Michigan deer hunters	76%
Michigan trappers	66%
Upper Peninsula farmers	37%

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Most respondents emphasized the wolf's existence as a native species and its ecological value as reasons for wanting to restore wolves in Michigan. Substantial appreciation and goodwill toward the wolf were found among the general public, including most respondents from the Upper Peninsula and particularly deer hunters. Most groups supported the view that they would be "proud to live in a state that had restored wolves." Additionally, the general public sample groups agreed that "it would be wonderful to hear a wolf howl in the wild." Most groups said they would very much like to visit an area where wolves could be found.

Michigan's deer hunters expressed the greatest support, outdoor recreational interest, and ecological appreciation, for the wolf of any group surveyed. A majority of deer hunters and Upper and Lower Peninsula respondents favored banning coyote hunting during firearm deer season in areas where wolves are found. Trappers were most knowledgeable about the wolf and its restoration. The survey revealed concern on the part of livestock farmers toward wolf recovery.

A majority of the groups supported the reintroduction of wolves under a wolf recovery plan, should it be necessary to ensure the survival of wolves in Michigan. Most groups agreed that if wolves are restored to Michigan, government officials should do all they can to keep them from becoming extirpated. On the other hand, all the sample groups supported limiting the number of wolves in the Upper Peninsula if they became too numerous. Generally, most groups did not support restrictions on mining, forestry, or recreation to permit wolf recovery. There was widespread support among all survey respondents to provide farmers with more information on how to protect livestock as wolves are restored in Michigan. The lower level of support among farmers surveyed strongly suggests the need for special efforts to work with them. Most groups supported the capture and relocation of wolves as a management tool and as a strategy to control wolves that might kill livestock.

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4.2 1993 PUBLIC WOLF FORUMS

Since public acceptance and support are essential for the long-term survival of a viable wolf population in Michigan, the first step in developing this Plan was for the Recovery Team to meet directly with Michigan residents to determine their concerns regarding wolf restoration in the state (Appendix 1). A series of 15 public forums was held during March and April 1993. Ten meetings were held in the Upper Peninsula and five in the Lower Peninsula. Over 622 people attended the 15 meetings. Twenty-nine written responses were received during the concurrent open written comment period. Over 90 percent of the people speaking at the meetings or submitting written comments supported wolf recovery in Michigan. Seven percent were opposed, and three percent were undetermined. This level of support is higher than that reported previously (Weise et al. 1975, Hook and Robinson 1982, Kellert 1990).

Support for wolves included the notions that they are native to Michigan, are an integral component of our northern ecosystem, and that their recovery would help restore an ecological balance. Many people expressed satisfaction in just knowing wolves are present in the state. Tribal groups supported wolf recovery and urged protection for spiritual reasons.

Despite general support for wolves, some people expressed concern regarding the effect of wolf predation on deer. There was some opposition to additional land use restrictions such as road closures and the establishment of wilderness areas or sanctuaries solely for wolf protection. Some livestock producers had concerns about potential wolf depredation and urged compensation for losses caused by wolves. Some hunters said that hunting license money should not be used to manage wolves. A great deal of interest was expressed at the forums about wolf population goals, wolf distribution, and how wolves would be managed after recovery goals are met. Most people supported restoration of the resident wolf population but did not favor an introduction program.

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Concern was expressed regarding the effects of diseases and parasites on wolf recovery. Some felt that the ownership and increasing numbers of wolf-dog hybrids kept as pets would negatively affect recovery.

Public education and free information exchange between the agencies and the public were recognized as important factors in the long-term success of wolf recovery in Michigan.

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5. RECOVERY GOALS

The goal is to establish and maintain a population of gray wolves in the Upper Peninsula at a level that assures wolf population sustainability and is consistent with available wolf habitat and compatible with human land use practices. Since Isle Royale wolves are isolated from the rest of Michigan's wolves, they are not counted toward these recovery goals.

This Plan is directed at wolf recovery in the Upper Peninsula. No wolf population goals have been established for the Lower Peninsula, and no wolves will be introduced there. However, wolves are capable of crossing the ice into the northern Lower Peninsula during winter. Such movements of wolves into the northern Lower Peninsula will be detected through the wolf monitoring program. Any wolves crossing into the Lower Peninsula would be protected under prevailing state and federal regulations.

Wolf restoration goals are presented at three levels.

5.1 *Federal Recovery Plan Goal*

In addition to the requirement that the survival of the wolf in Minnesota is assured, the following two wolf recovery conditions pertaining to Michigan wolves are described in the federal Eastern Timber Wolf Recovery Plan (U. S. Fish and Wildlife Service 1992).

1. When there are 80 wolves in Wisconsin (based on late winter counts) for a minimum of three consecutive years, the wolf can be recommended for downlisting to federally-threatened status in Wisconsin. Although specific criteria were not defined, the federal plan requires that consideration be given to downlisting the Michigan wolf population to federally-threatened status at the same time.

The Recovery Team recommends that wolves should also be changed to federally threatened in Michigan if there are at least 50 wolves present in the Upper Peninsula during late winter counts during the same three consecutive years that there are 80 or more wolves in Wisconsin.

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Since the Wisconsin wolf population has been over 80 animals since 1995 and there have been over 50 wolves in the Upper Peninsula each year since 1994, they now can be reclassified to federally-threatened status.

2. Wolves will be considered recovered and removed from the federal endangered and threatened species list if the combined Wisconsin and Michigan winter wolf population is at least 100 animals for five consecutive years.

The combined Michigan and Wisconsin count exceeded 100 wolves in 1994, 1995, 1996, and 1997. If these populations are sustained, wolves could be recommended for federal delisting as early as 1998. Wolves should be changed to threatened status on the Michigan Endangered Species List when this federal delisting goal is met.

Lethal wolf control may be allowed in some localized areas in special circumstances, such as repeated livestock depredations, when wolves attain federally threatened status or when they are removed from the federal list.

5.2 *Minimum Sustainable Population*

The *federal recovery plan goal* depends on the continued immigration of wolves into Michigan. However, factors in Ontario, Minnesota, and Wisconsin are outside the jurisdiction of Michigan and the long-term exchange of wolves with these populations cannot be assured. Therefore, to meet the population viability goal and ensure their long-term survival in the state, Michigan wolves need to be considered as an isolated population, as defined in the Eastern Timber Wolf Recovery Plan. This requires a minimum population of 200 wolves.

Wolves will be considered recovered in Michigan with a winter population of 200 wolves for five consecutive years. The wolf should then be recommended for removal from the Michigan Endangered Species List. When the *minimal sustainable population* goal is attained, the wolf should be considered for reclassification and regulation under the Michigan Wildlife Conservation Act.

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5.3 Fully Occupied Range

Existing wolf habitat in the Upper Peninsula can easily support more than the 200 wolves set as the *minimum sustainable population* goal. A recent analysis done at University of Minnesota-Duluth using road, prey, and human densities concluded that there is greater than 50 percent probability of wolves occupying 11,331 square miles (29,348 km²) in the Upper Peninsula (Table 4, Figure 2). Using these data, it is estimated that available habitat could support over 800 wolves (Mladenoff et al. 1995b).

Table 4. Percent Probability of Wolf Packs Occupying Habitat Areas in the Upper Peninsula (Mladenoff et al. 1995a).

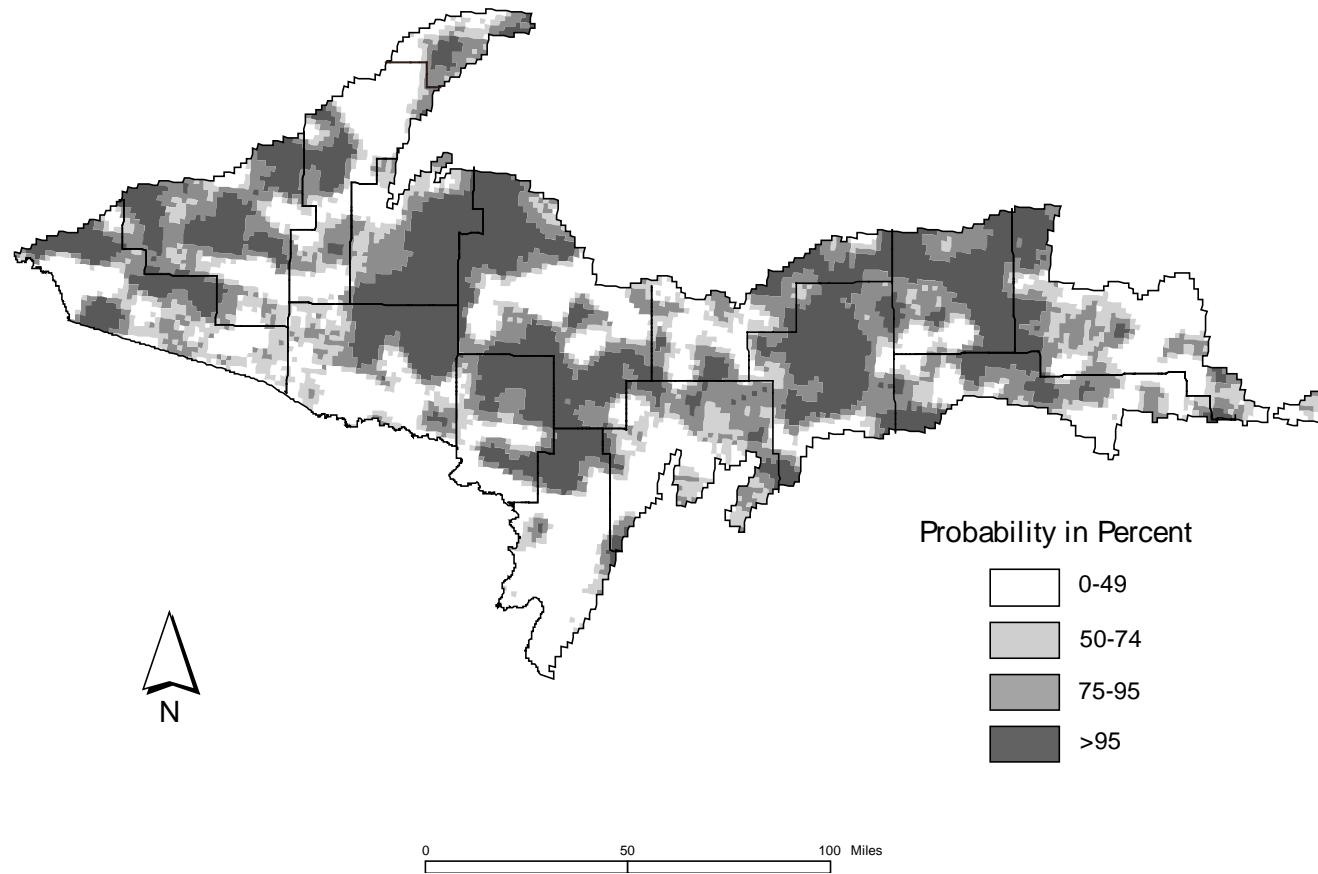
Percent Probability	Km²	Mi²
>95	13,032	5,032
75-95	9,972	3,850
50-74	6,344	2,449
25-49	4,448	1,717
10-24	2,712	1,047
<10	5,476	2,114
Totals	41,984	16,209

The upper limit that is compatible with human land use practices and human tolerances (*cultural carrying capacity*) is unknown. Wolf numbers and human attitudes must be closely monitored and evaluated to determine this level.

Some degree of wolf population stabilization or control is likely. Agencies need to communicate with the public that some wolves will likely need to be killed under controlled conditions in the future.

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Figure 2. Michigan Wolf Habitat with 50 Percent and Greater Probability of Occupancy by Wolf Packs (Mladenoff et al. 1995a).



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6. WOLF MANAGEMENT

Wolf management in Michigan will consist primarily of public communication and education along with wolf monitoring and protection. The development of additional wolf habitat, or the development of new programs for prey management are not now needed to meet the recovery goals. Based on the trend in wolf numbers, it is anticipated that wolves will continue to increase toward the wolf population goals. However, the recovery of wolves in Michigan is not yet assured. Monitoring is essential to estimate wolf numbers, to detect problems that may need research, and to indicate needed changes in wolf management.

6.1 EDUCATION AND INFORMATION

Public support and acceptance are essential for the long term-survival of wolves in Michigan. Public education and communication need to receive a high priority.

6.11 Develop A Coordinated Information And Education Plan

The best method to maintain support is to provide a free flow of information to and from people regarding wolves in Michigan. Such an information exchange does not happen without planning. Therefore a coordinated, long-term information and education plan needs to be developed. This plan should be implemented and evaluated on an annual basis.

An information and education plan will be coordinated by the DNR and involve people from the appropriate state, federal, and tribal agencies, along with private organizations such as Timber Wolf Alliance (TWA), Timber Wolf Information Network (TWIN), Michigan United Conservation Clubs (MUCC), and other groups. Coordination is important to prevent duplication of effort and to ensure that conflicting materials and outdated information are not being distributed.

6.12 Develop Materials For Specific Educational Needs

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Appropriate printed materials, slide shows, videos, films, educational kits, and wolf displays will be developed or purchased and maintained for statewide use by agencies, schools, groups, and individuals.

The educational requirements for different interest groups and age levels necessitate the development of specific informational materials and products. Specific materials will be developed for diverse groups such as schools, general audiences, agencies, hunters, trappers, livestock owners, timber producers, and private landowners.

The Team supports the concept that a “code of conduct” be developed for use by those who want to observe wolves and for guides while leading field trips to see or hear wolves. Such a code should be cooperatively developed, and initiated through private organizations such as TWIN, TWA, and the International Wolf Center (IWC).

6.13 Maintain Public Contact

A mailing list of interested people and groups will be maintained by the DNR and information distributed through the Natural Heritage Program newsletter. Special reports and information will be distributed through timely news releases and other media contacts.

6.14 Public Presentations And Events

Michigan needs to expand its recognition of Wolf Awareness Week held during late October in conjunction with the TWA, Wisconsin, and Minnesota.

Michigan will continue to work with private organizations in developing public education and information programs. The TWA will be encouraged to maintain their volunteer speakers' bureau program that provides trained people to give public presentations or workshops for schools and other groups. Organizations such as the TWA and TWIN will be encouraged to continue work in the Upper Peninsula and expand their programs to the Lower Peninsula.

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Whenever feasible, members of the public and media will be invited and encouraged to participate in activities and projects involved with wolf management and education.

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6.15 Training For Agency Personnel

Agencies need to provide periodic internal training for their personnel regarding wolf recovery and management. Agencies are encouraged to provide funding for representatives to attend regional wolf management meetings, to provide other appropriate training, and to purchase appropriate publications and educational materials.

6.2 WOLF POPULATION RESEARCH AND MONITORING

The primary monitoring goal is to measure the progress toward a *minimum sustainable population* in Michigan. Estimates of wolf numbers are based on winter counts during the January-to-March winter period. Annual monitoring needs to receive a high priority for a minimum of five years after federal delisting and at least until the *minimum sustainable population* goal is met.

The DNR will lead the cooperative wolf monitoring effort and seek funding and assistance from the other agencies to ensure that all agency mandates are met. This plan addresses monitoring through *the minimum sustainable population* level is achieved. Periodic surveys are recommended after this goal is met; methods and frequency will need to be determined. Monitoring programs need to be designed to provide scientifically valid results.

6.21 Monitoring

6.211 Monitoring Objectives

- (1) Estimate wolf numbers annually
- (2) Determine special management and protection needs
- (3) Estimate wolf productivity and mortality
- (4) Determine wolf distribution and delineate wolf territories
- (5) Determine wolf movements within pack territories

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- (6) Locate home sites (dens and rendezvous sites)
- (7) Locate dispersal and migration corridors
- (8) Determine rate, direction, and success of wolf dispersal

6.212 Radio Telemetry

A population of radio-tagged wolves will be maintained until the *minimum sustainable population* level is met. Attempts will be made to radio-collar at least one member in each pack. An emphasis should be placed on monitoring during the January-to-March winter period to help determine wolf numbers.

6.213 Winter Tracking Surveys

Annual winter tracking surveys should be continued as a complement to the aerial radio-telemetry surveys at least until the *minimum sustainable population* level is met.

6.214 Wolf Observation Reports

The development and wide distribution of wolf observation forms by the Department of Natural Resources have provided important new wolf location information. This inexpensive method to obtain valuable information on wolf observations and to increase public interest and participation will be continued.

6.215 Wolf Health Monitoring

All dead wolves will be taken to the DNR Rose Lake Wildlife Research Station for necropsy. Necropsies are needed to determine the cause of death and to provide information on diseases, parasites, condition, age, reproductive status, and food habits.

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All live wolves handled need to be examined and routine samples taken. Blood, fecal samples, and skin scrapings will provide information on Lyme disease, heartworm, canine parvovirus, distemper, hepatitis, mange, parasites, and DNA structure. Wolves handled will be vaccinated for canine distemper and canine parvovirus, and treated for parasites.

The DNR will coordinate the development of protocols for handling wolves and for collecting standard data and samples.

6.22 Research

A great deal of research has been done on wolves in the past 35 years in North America. Much of this work has been done in Minnesota and Wisconsin and has direct application to Michigan. Research on wolves in Michigan should be directed toward problems that are specific to Michigan and toward cooperative regional wolf research projects with Minnesota, Wisconsin, and Ontario, rather than duplicate previous research. A great deal of information will be obtained on Michigan's wolves through the monitoring program.

6.221 Human Dimension Research

The success of wolf recovery depends on support from people who live in the Michigan wolf range. Periodic attitude surveys and other methods to work closely with people are needed make sure that problems are identified and solved.

6.222 Data Management Coordination

An important aspect of wolf recovery and management in Michigan is the integration of research and monitoring information into management practices.

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Because of wolves' wide-ranging movements, they can be effectively managed only at the ecosystem level, with involvement by community planners, corporate and private land owners, and state, federal, and tribal land managers. Information must be shared among these entities, particularly spatial data concerning habitats and land use.

Several landowners and managers are independently developing computer-based geographical information systems (GIS) for integrating and analyzing resource data. Coordination of data development and database management is essential for effective ecosystem-level management. Possibilities for coordination exist within current interagency efforts (e.g., the Eastern Upper Peninsula Ecosystem Management Group) as well as through state universities. The agencies involved with gray wolf recovery should explore these possibilities in order to facilitate wolf management among land owners and managers.

6.223 Computer Models

Computer population and habitat simulation models are becoming more useful in predicting future outcomes under different assumptions. These models can be especially useful if a GIS component is included. It is recommended that new models be developed or existing models be adapted for use in Michigan.

6.224 Other Research

Other research needs, such as disease problems or disturbance factors, will become evident through the monitoring program and should be addressed as needed.

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6.3 WOLF HABITAT MANAGEMENT

Wolf habitat can be defined as a relatively large land area that provides an adequate prey base coincident with a degree of remoteness that offers wolves an opportunity to avoid people.

The elements of wolf habitat that need to be considered while assessing and planning land management activities include human access, disturbances at den and rendezvous sites, habitat corridors or linkage zones, area closures, protection of critical habitat, and habitat management for prey species.

At present, the majority of the Upper Peninsula is considered to be suitable wolf habitat (Figure 2). The northern portion of the Lower Peninsula is less suited, due to higher human population densities and related land use activities. However, there are areas in the northeastern Lower Peninsula that might provide suitable habitat for wolves that emigrate across the ice from Ontario or the Upper Peninsula. The DNR is coordinating an ecosystem based landuse assessment and planning project that will provide a landscape look at various habitat types and provide more complete information on the suitability of the Lower Peninsula to support wolves. The initial landscape assessment is expected to be completed by the Northern Lower Peninsula Ecosystem Planning Team by 1998.

The southern portion of the Lower Peninsula is unsuited to support wolves, due to even greater human development.

6.31 Access Management

Wolves do best in areas with limited human access. Several researchers reported that wolves have difficulty sustaining themselves in areas with average road densities greater than one mile of road per square mile (0.6 km/km²) of land area (Thiel 1985, Jensen et al. 1986, Mech et al. 1988). Along with increasing the probability of wolf-vehicle collisions, roads provide access that can lead to increased mortality due to illegal shooting and trapping (Mech 1977, Robinson and Smith 1977, Berg and Kuehn 1982).

A road as defined in the Eastern Timber Wolf Recovery Plan includes primary; secondary; arterial; collector; local all-weather; federal, state, and

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county highways; bituminous concrete; soil aggregate; graded and drained; and/or U. S. Forest Service traffic service levels A, B, and C roads.

In addition to road densities, road standards can be significant. Mech (1986b) found that where paved roads pass through wolf range, vehicle strikes constitute an important mortality factor. A study is underway in Wisconsin (Kohn et al. 1991) to document the effect of the US-53 highway upgrading project on wolf mortality and dispersal, before, during, and after completion of the project. Information from this study will be valuable in predicting the effects of such projects if proposed in Michigan.

There is recent evidence that wolves may be able to recolonize areas with greater densities of both roads and humans if people are generally tolerant of wolves (Mech 1993) or if it is adjacent to an extensive roadless area (Mech 1989). In the Upper Peninsula, attitudes of most residents are becoming more supportive of wolf recovery (Section 4). That being the case, it may not be as important to reduce existing road densities as it is to avoid increasing road densities or road standards much beyond their present levels. If current road densities are at or below one lineal mile per square mile (0.6 km/km^2) in forested areas, land managers should attempt to contain road development at or below this level. Temporary access roads constructed for resource management or research purposes should be closed as soon as their intended purpose has been achieved.

Roads may be closed or reduced for a variety of reasons not directly related to wolf management. Among them are road construction and maintenance costs, erosion reduction, vandalism prevention, forest fragmentation reduction, and management for other species with large home ranges or other special requirements.

6.32 Home Site Management

The term "home site" refers to both dens and rendezvous sites. Dens are dug by wolves to provide early protection for young pups since they are born

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blind, deaf, and have difficulty in maintaining their body temperature for the first few days after birth. Wolves may use the same den for six consecutive years or more (Fuller 1989). Territories often have several den sites, but usually only one or two are used per year (Mech 1970).

Rendezvous sites are above ground areas where pups are taken after weaning and used until the pups have developed enough to travel with the pack. Rendezvous sites become the focus of pack activity after denning. They are usually located in open areas of grass or sedge near wetlands (Mech 1970).

Generally packs use a series of rendezvous sites (Mech 1970, Fuller 1989, Harrington and Mech 1982, Carbyn 1987) from mid-June to mid-September, but occupancy can start in mid-May and last through October (Van Ballenberghe et al. 1975, Fritts and Mech 1981). The number of rendezvous sites used by a pack during one summer is usually four to six but can range from one to ten (Fuller 1989). An area used as rendezvous site one year can be used as a den site the next year, and vice-versa (Peterson 1977).

Several studies (Joslin 1967, Stephenson 1974, Allen 1979) suggest that human disturbance can cause den abandonment or movements to new dens. Wydeven and Schultz (1993) documented possible abandonment of dens and rendezvous sites in Wisconsin as a result of nearby road construction and logging activity.

Wydeven and Schultz (1993) developed guidelines for protection of wolf home sites in Wisconsin. The size of areas closed under these guidelines is small. Normally only one to three dens and perhaps one or two rendezvous sites would need to be protected per territory. For a wolf pack territory of 100 square miles (259 km²), the area needing protection at each home site would be about eight acres (3 ha). If four home sites were involved (two dens and two rendezvous sites), a total of 32 acres (13 ha), or about 0.05 percent, of the pack's territory would need total protection.

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Since denning and pup rearing are activities critical to the well-being of wolves, protection from human disturbance is important. This is especially true now in Michigan, since wolf populations are low and recovery not yet assured. See Appendix 3 for home site protection recommendations.

6.33 Habitat Corridors/Linkage Zones

Increased fragmentation of wolf habitat due to human developments such as roads, residences, and commercial enterprises may lead to reduced capability of such areas to support wolves. It has been suggested that regional corridors, or “habitat linkage zones,” are needed to allow wolves and other species to move through and live within areas influenced by human activities. This approach has been used for grizzly bears in the western United States (Servheen and Sandstrom 1993). We recommend that linkage zones be identified for Minnesota, Wisconsin, Michigan, and Ontario using geographic information systems to overlay various data layers such as human populations, prey populations, road densities, and forest cover types.

Because of the mixed state, federal, tribal, corporate, and private ownership of lands within linkage zones that cover such a large region, it is imperative that any such effort be cooperative. The Team supports the concept of linkage zones and urges participation by as many affected agencies and landowners as possible in their development.

6.34 Area Closures

Although protected areas provide refugia for wolves, it is not essential that sanctuaries or large tracts of wilderness areas be set aside solely for wolf management. Those areas that now exist should be maintained, and wolves need to be one of the components evaluated in establishing new reserved areas.

6.35 Critical Habitat

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Isle Royale is classified as critical habitat for wolves under the Federal Endangered Species Act. No other critical wolf habitat has been considered for Michigan. Designation of critical habitat will end when Federal delisting occurs.

6.4 PREY SPECIES AND PREY MANAGEMENT

6.41 Wolf Predation On Deer

Wolves will have a negligible effect on deer numbers in the Upper Peninsula. Each wolf will consume an estimated 15-18 deer per year (Mech 1977, Fuller 1995). Like most predators, wolves are opportunistic hunters and will take advantage of situations where food can be obtained with the least amount of energy expended. Many of the deer consumed by wolves will be scavenged from deer dying of starvation, unrecovered during hunting season, or killed by automobiles. Others might be weakened by old age or be vulnerable young of the year. Of 238 deer carcasses examined in the Upper Peninsula in late winter between 1932 and 1939, only 31 were taken by predators (including five killed by dogs); other losses resulted from malnutrition, parasites, diseases, accidents, and gunshot (Stebler 1944). Studies in Wisconsin have shown no differences in deer populations between similar areas that have wolves and those where wolves are absent (Wisconsin DNR 1989). Minnesota now has relatively high deer numbers and record wolf numbers (Berg 1995).

Wolf predation could cause some local reductions in deer numbers or cause some changes in deer distribution. In one case on a 1,200 square mile (3,000 km²) study area in the interior Superior National Forest, wolf predation was believed to be the major cause of the drastic decline of deer coupled with declining deer habitat and a series of seven severe winters (Mech and Karns 1977, Nelson and Mech 1981, Mech 1986a, Nelson and Mech 1986a, 1986b). With relatively low deer numbers and contiguous wolf territories in the central Superior National Forest, deer were most abundant along wolf

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pack territory edges (Hoskinson and Mech 1976, Rogers et al. 1980, and Nelson and Mech 1981). The highest winter predation rates occur with a combination of a long, severe winter and deep snow (Nelson and Mech 1986b).

6.42 White-tailed Deer Population Management

Deer numbers in the Upper Peninsula (UP) have fluctuated greatly in recent decades. The spring deer population in 1972 was estimated at 156,230, or 9.69 deer per square mile (3.57/km²) (Ryel et al. 1972). With increased demand for wood products, an aggressive deer habitat improvement program, and moderate winter weather, the UP deer population increased through the 1980s and 1990s to a high of 595,879 deer (37 deer per square mile, 14 deer/km²) in the spring of 1994 (Hill 1994).

Deer are not uniformly distributed throughout the Upper Peninsula. Populations are lowest in the northern regions close to Lake Superior (5 deer per square mile (2 deer/km²) in Keweenaw County) and highest in the southern part of the Peninsula (>50 deer per square mile (>19 deer/km²) in Menominee County). There are also seasonal changes in distribution and density, as deep snow and cold weather cause deer to move to winter yards dominated by coniferous cover. These yards constitute about 10 percent of the total land area.

The Michigan statewide deer population objective is 1.3 million deer. The UP portion of this objective is 375,000 deer (23 deer per square mile, 8 deer/km²). The population now exceeds the winter carrying capacity. Upper Peninsula winter losses in 1993-94 were estimated at 81,516 deer (Hill 1994) and 198,785 in 1995-96. Historically, about half of the winter deer losses result from starvation. In addition, deer-vehicle accidents and crop damage are unacceptably high in some areas. In 1995, 8,558 deer-vehicle accidents were reported in the Upper Peninsula. In 1993, there were 213 permits issued to farmers for crop damage block permits, which resulted in the take

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of 5,689 antlerless deer from farmlands during deer season, and 156 summer shooting permits were issued which took 1,640 deer out of season. Deer hunters killed an estimated 116,000 deer in the UP in 1995.

The deer population will be regulated primarily through deer hunting seasons. Efforts will be directed toward maintaining a healthy deer herd that is consistent with the carrying capacity of the range.

6.43 Deer Habitat Management

Adequate summer and winter habitat must be provided to maintain healthy deer populations. Good summer habitat consists of a high percentage of shade intolerant, short-rotation tree species interspersed with forest openings. Proper timber age-class distribution is important to provide life requirements for various wildlife species and to insure a continual supply of timber products. Winter range consists of mature conifer cover such as hemlock (*Tsuga canadensis*) and northern white cedar (*Thuja occidentalis*) stands with brushy edges or adjacent stands of aspen (*Populus tremuloides*, *P. grandidentata*), lowland hardwoods, or sugar maple/yellow birch (*Acer saccharum*/*Betula alleghaniensis*) with adequate regeneration to provide browse for deer.

The timber industry has a significant impact on Upper Peninsula forests and can have a positive effect on wolves. Harvest by commercial timber sale is the preferred method of managing deer habitat. Demand for timber products from both public and private lands is high. In 1990, 2.2 million cords (8.0 million m³) were cut in the Upper Peninsula. Conservative projection of a two percent annual growth in the market means a demand for 2.7 million cords (9.8 million m³) in the year 2000.

Since 1972 the Michigan Department of Natural Resources has actively managed deer habitat through the Deer Range Improvement Program. Under this Program \$1.50 of each deer hunting license sold in the state is earmarked for deer habitat improvement or deer habitat acquisition.

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Approximately 150,000 acres (61,000 ha) of forested land have been treated in the Upper Peninsula to improve deer habitat. Major efforts are directed at creating and maintaining forest openings, increasing or maintaining short rotation species such as aspen and jack pine (*Pinus banksiana*), and regenerating coniferous cover in deer wintering areas. Cuttings in or next to deer yards are done in winter to provide browse.

The Hiawatha and Ottawa national forest plans provide for managing coniferous cover for wintering deer and for maintaining other forest types that benefit deer. National forest plans have designated about 256,000 acres (104,000 ha) on the Ottawa Forest and 64,000 acres (26,000 ha) on the Hiawatha Forest to be managed to provide habitat for bears, wolves, fishers, pine martens, and other large home range species. One objective for these areas is to maintain habitat for deer as a prey base for wolves, other predators, and scavengers.

Existing habitat programs and deer population objectives will maintain deer numbers at a level that will provide adequate prey for wolves and provide for the needs of viewers and hunters.

6.44 Moose, Beaver, And Other Species

Moose were translocated to Michigan's central Upper Peninsula in 1985 and 1987 from Algonquin Provincial Park, Ontario, Canada. The 1995 winter population was estimated at 305 moose in the west-central UP resulting from the releases, plus an additional 150 native moose in the eastern UP. Moose are important prey species for wolves on Isle Royale and in other states and provinces. In Minnesota where deer and moose occur in the same area, deer are the primary prey. Moose are generally not important prey for wolves unless deer numbers drop to less than two per square mile (0.7/km²) (Fuller 1995).

Moose are potential prey for wolves in Michigan, but healthy adult moose are formidable opponents for wolves and calves are aggressively protected by

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their mothers. Moose are susceptible to brainworm (*Parelaphostrongylus tenuis*) infestations, with some losses documented in Michigan moose since the releases. Such diseased or old, weakened individuals are the most susceptible to predation. Wolf predation on the Michigan moose population is expected to be insignificant.

Beavers represent a substantial food supply for wolves during the ice-free period of the year. In Quebec, wolves removed 15 percent of a beaver population per year; but with wolf control beaver numbers increased by 20 percent over three years (Potvin et al. 1992). Beaver populations are now high in the Upper Peninsula. Up to 42,000 beaver are trapped annually. The take varies considerably according to weather conditions and fur prices. High beaver numbers have resulted in numerous nuisance beaver complaints from county road commissions, commercial timberland owners, utility companies, railroads, recreational property owners, and trout fishermen. It is expected that beaver populations will remain high, although diseases may cause fluctuations. Even though relatively abundant now, beaver need to be retained and managed as a functional component of the watersheds they inhabit.

Coyotes and wolves have an adversarial relationship. Wolves are known to kill coyotes found within their territories and generally replace coyotes when contiguous wolf territories develop. It remains to be seen if a reduction in coyote numbers will occur in parts of the Upper Peninsula as wolves increase.

Populations of other prey species such as snowshoe hares, mice, voles, and squirrels will fluctuate naturally. Wolf predation will not significantly affect populations of these species.

6.5 WOLF PROTECTION

6.51 Coordinated Law Enforcement

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Law enforcement investigations relating to wolves will be the primary responsibility of the Michigan DNR, Law Enforcement Division. Investigations will be coordinated as needed with the U. S. Fish and Wildlife Service, National Park Service, U. S. Forest Service, Great Lakes Indian Fish & Wildlife Commission, and local law enforcement agencies.

6.52 Hunter and Trapper Cooperation

Hunter and trapper cooperation and support are important for successful wolf recovery. Efforts have been made and should continue to be made each year prior to the firearm deer season to contact hunting camps in resident pack areas to alert hunters of the presence of wolves. Educational materials, wolf observation forms, and explanation of the wolf recovery effort should be provided. Wolf information and identification guidelines should continue to be placed in the hunting and trapping guides.

A special effort should be made to have trappers immediately report to wildlife biologists any inadvertently trapped wolves so they can be examined, radio-collared, treated, and released.

6.53 Landowner Cooperation

Private and commercial landholders are a key element in wolf recovery, since private land will be included in many pack territories. As wolf pack locations are better known, a focused effort will need to be directed toward landowners, farmers, and recreationists on private land to obtain voluntary cooperation for wolf management and protection.

6.54 Agency Regulations

Since 1993, the coyote season has been closed in the Upper Peninsula during the November 15-30 firearm deer season to prevent the killing of wolves misidentified as coyotes. This regulation should be continued.

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Other appropriate agency regulations should be developed, if necessary, to help achieve wolf management goals.

6.6 DEPREDAATION

6.61 Policies And Programs In Minnesota and Wisconsin

Although wolves infrequently prey on livestock, the losses incurred by an individual landowner can be significant. Both the Wisconsin recovery plan and the Minnesota management plan consider damage control and compensation programs critical to the recovery of wolves.

Initial responses in Minnesota are handled by the U. S. Department of Agriculture (USDA), Animal Damage Control (ADC), and by the DNR in Wisconsin. Both states consider quick responses to wolf depredations important to verify and to resolve complaints promptly. Once a loss is verified as wolf-caused, an economic value is determined by a third party and payment made within a reasonable time. Minnesota pays market value on livestock up to \$400 per animal. Payment is equivalent to the current fair market value in Wisconsin.

Wisconsin legislation sets aside three percent of their nongame tax checkoff for endangered species depredations. Minnesota's depredation claims are paid from annually appropriated funds administered by the Minnesota Department of Agriculture. Payments over the past five years have averaged \$40,000 per year in Minnesota and \$1,200 per year in Wisconsin.

Another difference between the two depredation programs is the way offending wolves are handled. Since 1978 wolves have been classified as federally threatened in Minnesota and are killed when repeated wolf depredation has been confirmed. Since wolves are classified as endangered in Wisconsin, they cannot be killed but may be live-captured and relocated.

6.62 Michigan Action Plan for Depredation Complaints

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Quick and professional responses to depredation complaints can prevent negative attitudes developing toward wolves. Providing timely advice and assisting livestock owners to prevent further losses will help reduce wolf mortality. Upper Peninsula conservation officers and wildlife biologists are prepared to make investigations after having been trained in identifying wolf damage by Animal Damage Control agents from Minnesota.

6.621 Depredation Investigation

Those suspecting livestock depredation from wolves need to contact the nearest conservation officer or DNR district office. A conservation officer will respond to the depredation site and make an investigation to determine the cause for the livestock loss. If something other than wolf depredation is determined to be the cause, recommendations will be given to the owner to help prevent additional losses.

If the reported depredation appears to have been done by a wolf, the conservation officer will contact either the District Wildlife Biologist or the designated biologist in charge of wolf investigations. The biologist will investigate to confirm the officer's findings and jointly determine the appropriate action to be taken.

All wolf depredation complaints must be handled quickly to assure the most accurate identification of the cause of the livestock death and to help prevent recurring depredation.

6.622 Translocation And Release Sites

If repeated wolf depredation occurs, the only option under federally endangered status is to live-capture and relocate the offending animals. Relocation sites will be selected on public land in areas that will minimize the likelihood that wolves will cause additional problems. Recapture collars will be placed on relocated wolves at

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the time of release if suitable collars are available, otherwise traditional radio-collars will be placed on all translocated wolves. Limited lethal control may be done when wolves are reclassified as federally threatened or when they are removed from the federal endangered species list.

6.623 *Communication With Livestock Owners*

The Department of Natural Resources, the Michigan State University Cooperative Extension Service, and livestock producers should cooperatively develop livestock management practices that minimize the risk of predation on livestock from wildlife and dogs. Open communication will be maintained with livestock producers.

6.63 Insurance

Some farm insurance policies cover losses caused by wild animals, and may provide standard coverage for the loss of domestic animals or livestock to wolves. Insurance claims could help recover livestock losses but current policies will not prevent them.

6.64 Compensation

Resolution of the potential conflict between wolf depredation and livestock owners is recognized as one of the most important elements in wolf restoration worldwide. In addition to compensation payments for livestock losses in the Great Lakes region and in the western United States, other countries worldwide—including Italy, Spain, France, Germany, and India—have recognized the need for compensation payments for documented livestock losses to wolves as a necessary component of wolf management (Wolves and Humans 2000, 1995 International Wolf Symposium, Duluth, Minnesota).

Compensation for confirmed livestock (cattle, sheep, goat, and turkey) losses caused by wolves would benefit the wolf recovery effort in Michigan. The

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average losses expected from 100 wolves in Wisconsin and Michigan combined was estimated at \$4,000 to \$5,000 annually (Fritts 1993).

While the DNR does not accept liability for damage caused by wild animals, the DNR will cooperate with private organizations in developing an outside funding source to reimburse livestock producers for wolf losses confirmed by DNR conservation officers and wildlife biologists. The DNR needs to work with livestock associations and private funding groups to provide timely resolutions for wolf depredations on livestock. Payment should be based on the fair market value of the animal at the time of the loss for mature animals and fall market value for calves and lambs. Values for livestock can be determined with assistance from the Michigan State University Cooperative Extension Service.

6.65 Preventive Actions To Reduce Livestock Losses

A variety of techniques has been used to reduce depredations on livestock including flashing lights, flagging, sirens, guard dogs, donkeys, llamas, and taste-aversion conditioning. These techniques do not always work but can be effective under certain circumstances. No single technique will solve the depredation problem, but a combination of approaches can reduce losses. Governmental agencies can foster a cooperative response from livestock producers by showing concern in helping develop livestock management techniques designed to prevent or reduce depredations.

Based on observations in other areas, certain animal husbandry practices can lead to the reduction of depredation problems and make livestock less vulnerable to losses. The following four practices are representative of the type of preventive measures that livestock owners can use to help reduce livestock losses to predators.

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- (1) Dispose of livestock carcasses in a manner that will not attract wolves, coyotes, or dogs. In particular, avoid placing dead livestock in pastures or in areas used for calving or lambing.
- (2) Keep calving and lambing operations close to the barn and farmhouse.
- (3) Avoid pasturing livestock in large wooded areas that are poorly monitored.
- (4) Raise turkeys in confinement rather than under open range conditions.

6.7 DISEASES AND PARASITES

Michigan's wolves could be affected by several diseases, including canine distemper, canine parvovirus, rabies, canine heartworm, sarcoptic mange, Lyme disease, and hydatid disease. Of these diseases, sarcoptic mange appears to have the greatest potential to affect the wolf population in Michigan. Diseases and parasites may slow the recovery of wolves in Michigan but are not expected to prevent the establishment of a viable population. In most cases, there is no practical treatment of diseases and parasites in free-ranging wolves. Wolf health will be monitored (Section 6.224).

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6.71 Sarcoptic Mange

Sarcoptic mange is caused by a microscopic mite, *Sarcoptes scabiei*. Signs include scratching, chewing, licking, weakness, emaciation, hair loss, flaky material in the fur, and thickening and wrinkling of the skin. Cross-transmission of *S. scabiei* is possible among red foxes, coyotes, wolves, and domestic dogs. Animals become infested by contact with other animals or by contact with contaminated areas such as dens or burrows. Sarcoptic mange is the most common disease found in wolves in Michigan and may slow down population growth and expansion of wolves in the state. At least two wolves died from mange in 1993, one in 1994, and four in 1997. Captured wolves will be treated with oral doses of ivermectin. Free-ranging animals are more difficult to treat, but techniques should be explored if monitoring indicates that mange is a serious problem to wolf restoration.

6.72 Canine Parvovirus

Only members of the Canidae (dogs, wolves, coyotes) are known to be susceptible to canine parvovirus. Clinical signs include diarrhea, dehydration, and depression, often rapidly followed by death. Transmission is by contact with virus excreted in the feces or other body secretions. The disease was observed to be highly pathogenic in captive coyotes and presumably could cause substantial mortality in the wild. The importance of canine parvovirus in wolves is unclear but was circumstantially implicated in the decline of wolves on Isle Royale and has caused some pup mortality in Wisconsin. Treatment is feasible only in a clinical situation. Prevention through vaccination is possible with animals that are handled.

6.73 Lyme Disease

Lyme disease is caused by the bacterium *Borrelia burgdorferi*. Dogs, cats, horses, cows, wild animals, and humans can be affected. Diagnosis is difficult, due to the unreliability of tests. Transmission is through the bite of the tick *Ixodes scapularis*. The importance of this disease to wolf populations

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in Michigan is unclear, but probably insignificant. Treatment is possible with antibiotic therapy but is unrealistic for wild wolves. There is public health significance with this disease but not from wolves.

6.74 Canine Heartworm Disease

Canine heartworm disease is caused by a nematode, *Dirofilaria immitis*. Other hosts include dogs, coyotes, foxes, and black bears. Diagnosis can be made by finding adult worms in the pulmonary artery or in the right side of the heart, or by observing microfilariae in blood samples. Transmission takes place when an infected mosquito injects larvae into the bloodstream while feeding on the host. Heartworm has been found in caged wolves but not is not an important mortality factor in wild wolves. Treatment or prevention is not feasible in free-ranging wolves.

6.75 Canine Distemper

Canine distemper is caused by a paramyxovirus. Visual signs may include pneumonia, thickening of the foot pads, and discharge from the eyes and nose. Other hosts include coyotes, foxes, and raccoons. Transmission is made through contact with infected animals, their excretions, or secretions. Effective treatment in wild populations is not feasible. There is a vaccine available for prevention but effective treatment in wild populations is not feasible. Distemper often occurs as an outbreak, but isolated sick or dead animals may be found. There is no public health significance. However, neurological signs may suggest rabies.

6.76 Rabies

The rabies virus can infect all mammals; however, wolves historically have been infrequent wildlife hosts to the virus. Diagnosis cannot be achieved on a live animal; brain tissue must be examined using the direct fluorescent antibody technique. Transmission is possible when virus-laden saliva is introduced by a bite, scratch or other fresh break in the skin. The disease is rare in Michigan, and the potential for rabies to affect Michigan's wolves is

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very small. Treatment is not possible once an animal is showing symptoms. Effective vaccines are available for humans and domestic animals.

6.77 Cystic Hydatid Disease

Cystic hydatid disease is caused by *Echinococcus granulosus*, a small tapeworm. This parasite causes no problem in wolves, the definitive host; or in moose, the intermediate host unless heavy infested; but can cause a severe disease and possibly death in humans. Humans become infected by ingesting food or water contaminated by egg-bearing canine feces or through contact with pelts or other contaminated objects. Personal hygiene is the best way to prevent human infection. Wolves in-hand can be treated with an anthelmintic to rid them of the parasite.

6.8 WOLF INTRODUCTIONS

Wolf introductions are not recommended and probably will not be needed in Michigan. Introducing additional wolves should be considered only if it becomes essential to ensure their survival.

6.9 CAPTIVE WOLVES AND WOLF–DOG HYBRIDS

6.91 Wolf-dog hybrids

Hybridization, the result of two animals of different species mating and producing offspring, is possible between wolves and domestic dogs (*Canis familiaris*). Chance wolf-dog matings in nature are extremely rare and of less concern than the intentional mating of captive wolves with domestic dogs to produce hybrids for sale as pets. Even though wolf-dog hybrid ownership is prohibited in nine states, restricted in 16 states, and requires a special permit in three others, the Milwaukee Journal (1992) reported that there are an estimated 300,000 to 1,500,000 wolf-dog hybrids in private possession in the country. The number of hybrids kept as pets in Michigan is unknown but likely numbers in the thousands, as there were an estimated 60,000 hybrids reported in Wisconsin (Milwaukee Journal 1992). The number or percentage

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of wolf genes in a wolf-dog hybrid is not at issue nor can it be measured by existing DNA analysis techniques.

The Michigan DNR considers wolf hybrids as dogs and places no restrictions on hybrid ownership. The Federal endangered species act does not protect wolf-dog hybrids, but the USFWS is working on a policy to address “intercrosses and intercross progeny” that would apply to all federally-listed species.

Although they may be similar in appearance, the greatest difference between hybrids and wild wolves is in their behavior. Most wolf-dog hybrids are poorly adapted as pets and are difficult to train (Jenkins 1991, Warrick 1991, Duman 1993, Sikarskie 1993). Hybrids are frequently destructive of their owners' property, attack people and domestic animals, and are generally too wary of people to be effective guard animals. As a result, some problem or unmanageable hybrids have been intentionally released into the wild. Two feral wolf-dog hybrids were recovered in Delta County in 1989 and three were captured in Chippewa County in 1995.

The release of wolf-dog hybrids into the wild could jeopardize the genetic integrity of the wild wolf population (Sikarskie pers. comm. 1993). Although it is unlikely that a released hybrid would be accepted into a wolf pack, the possibility exists for a hybrid to encounter a lone wolf, mate, and introduce domestic dog genes into the wild wolf population. This potential is higher now in the Upper Peninsula since the wolf population includes several dispersing single animals. The desire to breed and raise wolf hybrids could result in the illegal capture of wild Michigan wolves. No rabies or other vaccines have been federally approved or licensed for wolf hybrids making them an additional health risk to humans and domestic animals (O'Connor 1993). Therefore, in all injurious cases wolf hybrids are considered to be wild, non-vaccinated animals, regardless of their vaccination status.

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Wolf-dog hybrids are a threat to the long-term survival of wild wolves in Michigan. The negative behavior and images generated by hybrids will likely impede the recovery effort. A resolution passed by The International Union for Conservation of Nature and Natural Resources (IUCN) Wolf Specialist Group views the existence and expansion of wolf-dog hybrids as a threat to wolf conservation and recommends that governments and appropriate regulatory agencies prohibit or at least strictly regulate interbreeding between wolves and dogs and the keeping of these animals as pets (Hummel and Pettigrew 1991). The Michigan Veterinary Medical Association endorsed a ban on wolf-dog hybrid ownership.

The ownership and proliferation of wolf-dog hybrids in Michigan should be banned, or their ownership and possession regulated through the enactment of legislation to prevent possible deleterious effects on the native wolf population.

6.91 Captive Wolves

In Michigan, wolves cannot be legally held in possession except by permit. Permits are not issued for wolves to be kept as pets in Michigan. No matter how well intentioned, maintaining captive wolves by private individuals will not save the species in the wild. Well-designed wolf exhibits at publicly financed zoos may serve an educational function. Money and effort need to be spent on field work with wild wolves rather than on studies of captive animals or going to great expense to save an individual wolf.

6.92 Injured Wolves

When a wolf with minor injuries is encountered, it should be treated on site and released. In cases where a severely injured wolf is encountered (e.g., hit by a vehicle), it is often more humane and prudent to euthanize the animal than subject it to long-term captive treatment and rehabilitation. Severe injuries often result in permanent damage to an animal, making it unfit for release back into the wild. Captivity is a traumatic experience for any wild

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animal, and it is unknown if a wolf would be readily accepted back into its pack after extended confinement.

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7. PLAN MONITORING AND REVIEW

An interagency wolf steering committee should be appointed by the DNR Wildlife Division to direct the annual and long-term aspects of this Plan.

This Plan should be evaluated and updated on a five-year interval, or at the time Federal delisting is proposed if sooner than five years. Appropriate changes should be made if wolf recovery and management goals are not being met. Methods need to be maintained to ensure that the public is informed regarding significant changes to the Plan.

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8. IMPLEMENTATION SCHEDULE

Activity	Plan section number	Priority	Responsibility	Funding source	96-97	97-98	98-99	99-00	00-01	01-02	02-03
Education	6.11 Education planning	1	All	DNR, FWS, USFS, NPS, Pvt.	x	x	x	x	x	x	x
	6.12 Materials	1	All	DNR, FWS, USFS, NPS, Pvt.	x	x	x	x	x	x	x
	6.13 Public contact	1	All	DNR, FWS, USFS, NPS, Pvt.	x	x	x	x	x	x	x
	6.14 Public events	1	All	DNR, FWS, USFS, NPS, Pvt.	x	x	x	x	x	x	x
	6.15 Training	2	All	DNR, FWS, USFS, NPS	x	x	x	x	x	x	x
Monitoring/ Research	6.2121 Telemetry	1	All	DNR, FWS, USFS, NPS	x	x	x	x	x	x	x
	6.2122 Tracking	1	All	DNR, FWS, USFS, NPS	x	x	x	x	x	x	x
	6.2123 Obs. form	1	DNR	DNR	x	x	x	x	x	x	x
	6.2124 Necropsies	1	DNR	DNR	x	x	x	x	x	x	x
	3.22 Isle Royale	1	NPS	NPS	x	x	x	x	x	x	x
	6.221 Human dimensions	1	All	DNR, FWS, USFS, NPS	x	x	x	x	x	x	x
Habitat	6.31 Access mgt.	1	DNR USFS	DNR, USFS	x	x	x	x	x	x	x
	6.32 Home sites	1	DNR USFS	DNR, USFS	x	x	x	x	x	x	x
	6.33 Linkage zones	2	ALL	DNR, FWS, USFS, NPS, Private		x	x				x
Protection	6.51 Enforcement	1	DNR, FWS	DNR, FWS	x	x	x	x	x	x	x
	6.52 Hunters/trappers	1	DNR	DNR	x	x	x	x	x	x	x
	6.53 Landowners	1	DNR USFS	DNR, USFS	x	x	x	x	x	x	x
Depredation	6.62 Investigations	1	DNR	DNR	x	x	x	x	x	x	x
	6.64 Compensation	1	DNR, Private	Private	x	x	x	x	x	x	x
Plan Update	7. Plan evaluation	1	All	DNR, FWS, USFS, NPS						x	

This schedule is included for planning purposes and implies no commitment of funding but serves to alert the agencies for the need of these actions and to justify seeking funds to carry them out. This schedule recognizes the possible federal delisting of wolves in 1998 and indicates the actions that will need to be continued for a minimum of five years thereafter. An "x" indicates that the activity needs to be done that year.

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10. APPENDICES

APPENDIX 1. SUMMARY OF PUBLIC FORUM MEETINGS

The analysis of the public comments presented at the 15 public forums was taken from written records and recordings made at the forums. The analysis was done by making a tally of the comments given by people attending the forums and from written responses received on wolf management issues in Michigan.

1993 Wolf Forum Attendance Summary

Meeting	Date	Location	Number Attending	Number Participating
1	March 2	Marquette	40	12
2	March 3	Manistique	46	18
3	March 9	Iron Mountain	55	10
4	March 10	Escanaba	51	13
5	March 11	Stephenson	28	7
6	March 16	Ironwood	38	29
7	March 17	Houghton	60	13
8	March 23	Newberry	38	11
9	March 24	Sault Ste. Marie	38	18
10	March 30	St. Ignace	32	12
11	March 31	Gaylord	22	11
12	April 13	Mt. Pleasant	59	18
13	April 14	Grand Rapids	39	14
14	April 27	East Lansing	65	20
15	April 28	Ypsilanti	11	7
TOTALS			622	213

Written Comments During Meeting Period

Type of Response	Number	Number of People
Individual Letters	26	26
Multiple Signature Letters	2	33
Petitions	1	131
TOTALS	29	190

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First level of analysis—Overall response to determine the level of public support

One response was counted for each person writing or speaking.

Written + Oral Response Summary

Category	Number	Percent
Supportive	363	90.1%
Non-supportive	29	7.2%
Undetermined	11	2.7%
TOTAL	403	100.0%

Second level of analysis—Definition of issues

- a. Similar concerns from people giving a reason for their responses were grouped into categories to identify the basic issues surrounding wolf management in Michigan.
- b. Each issue given by one person was counted under the appropriate category in the analysis. People presenting more than one issue were counted once under each appropriate issue category.
- c. Responses for groups were counted singly unless documentation such as petitions or signed statements were provided.

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Wolf Public Forum Analysis—Issues and Concerns Combined

Issue	Number	Percent
• Predatory interactions	44	13.5%
• Access/recreation	29	8.9%
• Stewardship	29	8.9%
• Wolf management		
General	22	6.7%
Funding	18	5.5%
Importation	16	4.9%
Wolf goals	14	4.3%
Timber harvest	6	1.8%
Agency cooperation	2	0.6%
• Depredation	27	8.3%
• Appreciation	18	5.5%
• Education	18	5.5%
• Balanced ecosystem values	16	4.9%
• Wolf-dog hybrids	13	4.0%
• Protection/enforcement	11	3.4%
• Diseases/parasites	10	3.1%
• Human safety	9	2.8%
• Biodiversity	5	1.5%
• Spiritual	5	1.5%
• Wolf-coyote interactions	4	1.2%
• Manage as game	2	0.6%
• Tax incentives	2	0.6%
• Tourism	2	0.6%
• Wolf distribution	2	0.6%
• Wolf population growth rate	2	0.6%
• Legal ESA	1	0.3%
TOTAL	327	100.0%

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Wolf Public Forum Analysis—Three major concern categories

1. ECOLOGICAL CONCERNS

Issue	Number	Percent
• Predatory interactions	44	29.7%
• Wolf management general	22	14.9%
• Wolf importation	16	10.8%
• Wolf goals	14	9.5%
• Balanced ecosystem values	16	10.8%
• Wolf-dog hybrids	13	8.8%
• Diseases/parasites	10	6.8%
• Biodiversity	5	3.4%
• Wolf-coyote interactions	4	2.7%
• Wolf distribution	2	1.4%
• Wolf population growth rate	2	1.4%
TOTAL	148	100.0%

2. ECONOMIC CONCERNS

Issue	Number	Percent
• Depredation	27	49.1%
• Wolf management funding	18	32.7%
• Timber harvest	6	10.9%
• Tourism	2	3.6%
• Tax incentives	2	3.6%
TOTAL	55	100.0%

3. SOCIAL CONCERNS

Issue	Number	Percent
• Access/recreation restrictions	29	23.4%
• Stewardship	29	23.4%
• Appreciation	18	14.5%
• Education	18	14.5%
• Protection/enforcement	11	8.9%
• Human safety	9	7.3%
• Spiritual	5	4.0%
• Agency cooperation	2	1.6%
• Manage as game	2	1.6%
• Legal ESA	1	0.8%
TOTAL	124	100.0%

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Wolf Issues and Concerns

The following outline summarizes the issues and concerns obtained from people who attended the 15 public forum meetings held by the Michigan Gray Wolf Recovery Team during March and April 1993 and from those who sent written responses during the open comment period. The numbers indicate the number of times the issues under the heading were raised by different people.

1. Predatory Interactions—44
 - a. General anti-predator comments were expressed.
 - b. There are too many predators.
 - c. Wolves will take the old and sick and improve the deer herd.
 - d. Wolves will help control deer and beaver.
 - e. Wolves will take too many deer.
 - f. Wolves will have no effect on the deer herd.
 - g. What effect will wolves have on the moose reintroduction?
2. Access/Recreation—29
 - a. Roads
 - (1) Roads should/should not be closed to protect wolves.
 - (2) Logging roads should be closed after timber sales are completed.
 - b. Concern For Area Closures
 - (1) Wolf sanctuaries should/should not be created.
 - (2) Wilderness areas should not be created solely for wolves.
 - (3) Areas should not be closed to timber harvest to protect wolves.
 - c. Recreation Impacts
 - (1) Large areas should not be closed to hunting and trapping.
 - (2) Access should/should not be reduced or restricted to some areas to protect wolves.
 - (3) There should be minimum restrictions on hunting seasons for other species.
3. Stewardship—29
 - a. Wolves are native to Michigan and have a right to exist here.
 - b. Humans have a responsibility to manage wolves.
4. Wolf Management
 - a. General—22
 - (1) How will wolves be managed when goals are reached?
 - (2) How will wolves be controlled if needed?
 - (3) Wolf management should not reduce management efforts for other species.
 - (4) DNR needs to manage on an ecosystem basis.
 - (5) Only minimal management is needed for wolves.
 - (6) Wolves will recover on their own.
 - (7) Manage the wolf as a game animal.
 - (8) Provide wolf travel corridors between wolf habitat areas.
 - b. Wolf Management Funding—18
 - (1) Fish and game money should not be spent on wolves.
 - (2) The cost of wolf management may be too high.
 - (3) Wolf management should not take money away from management of other species.
 - (4) What is the source of wolf management funds?
 - (5) Will adequate funding will be available to manage wolves?
 - c. Wolf Importation and Release—16
 - (1) Wolves should not be introduced.
 - (2) Wolves coming in on their own is acceptable.
 - (3) Wolf introductions may be needed to maintain genetic viability.

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- (4) Will wolves will be introduced if they do not recover on their own?

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- d. Wolf Goals—14
 - (1) What is the wolf population goal?
 - (2) What will happen when the goal is reached?
 - (3) How many wolves the UP can support?
 - (4) Wolves are important because delisting wolves depends on a viable population in Michigan.
- e. Timber Harvest—6
 - (1) Forest management can be compatible with wolf management.
 - (2) Timber harvest should not/should be restricted on public land for wolf protection.
- f. Organizational Cooperation—2
 - (1) Relationships and coordination among USFWS, USFS, and MDNR needs improvement.
 - (2) Coordination should be done with Ontario MNR
- 5. Wolf Depredation on Livestock—27
 - a. Concern was expressed for possible loss of livestock
 - b. Livestock losses will be minimal.
 - c. Use livestock husbandry practices that minimize losses.
 - d. DNR must respond quickly to losses.
 - e. Compensation for livestock losses should be provided.
 - f. Concern was expressed that anti-wolf sentiment will develop if wolf depredation management is not handled properly.
 - g. Concern was expressed for possible loss of pets.
- 6. Appreciation—18
 - a. People said they would like a chance to see wolves or wolf sign in Michigan.
 - b. People would like to hear a wild Michigan wolf howl.
 - c. There is a value in knowing that wolves exist in the state even if they are never seen or heard.
 - d. People reported that after seeing wolves or sign they felt good knowing that a wolf had been there earlier at the same location.
- 7. Education—18
 - a. More education about wolves is needed.
 - b. Education is essential for wolf recovery.
 - c. Volunteer programs are needed to provide ways people can help with wolf recovery.
- 8. Balanced Ecosystems—16
 - a. Wolves are part of the balance of nature.
 - b. Wolves will help produce healthy prey populations.
- 9. Wolf-Dog Hybrids—13
 - a. There is a possibility that released hybrids could introduce dog genes into the wolf population.
 - b. Negative attitudes toward wolves may develop based on problems caused by hybrids.
 - c. Ownership of hybrids should be banned.
 - d. Use “look-alike” clause in Endangered Species Act to control hybrids.
 - e. Will wild wolves cross with domestic dogs?
- 10. Protection/Enforcement—11
 - a. Increase the level of law enforcement.
 - b. Increase fines for killing a wolf.
 - c. Why have people not been convicted in the past for killing wolves?
 - d. Trappers expressed concern that they may be fined for the unintentional take of wolves in legally set traps.
- 11. Diseases and Parasites—10
 - a. What are the implications of mange, parvovirus, and heartworm on wolf recovery in Michigan?
 - b. What can be done to minimize parasite and disease problems?

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12. Human Safety—9
 - a. Wolves are not a danger to humans.
 - b. Wolves can be detrimental to personal safety.
13. Biodiversity—5
 - a. Wolves are part of the native fauna of Michigan.
 - b. The return of the wolf will add a missing component.
 - c. Species diversity leads to stability and a healthier ecosystems.
 - d. Suitable wolf habitat is available in the Upper Peninsula.
14. Spiritual—5
 - a. Wolves are an important part of native American traditions.
 - b. Wolves are like brothers.
 - c. Wolves should not be killed.
 - d. There is a value in just knowing that wolves exist in Michigan.
15. Wolf-Coyote Interactions—4
 - a. Will mange spread from coyotes to wolves?
 - b. What will happen to coyote numbers in wolf areas?
 - c. Will wolves and coyotes cross?
16. Property Tax Incentives—2
 - a. People who protect wolves on their property should be given a tax break.
17. Tourism/Economics—2
 - a. People will come to the UP to see wolves or wolf sign.
 - b. There will be an opportunity for sale of wolf related products in the UP.
 - c. There will be an added appeal for the UP as an area that is still wild enough to have wolves.
 - d. Wolves are a tourist attraction in Ely, Minnesota, and Algonquin Park, Ontario, and could be an economic asset in Michigan.
18. Wolf Distribution—2
 - a. Why is the northern Lower Peninsula (NLP) not considered for wolf populations?
 - b. What will happen if wolves enter NLP on their own?
 - c. Where will wolves be distributed in the UP?
19. Wolf Population Growth Rate—2
 - a. What is expected rate of increase of wolves in Michigan?
 - b. When will goals be met?
20. Legal Concerns—1
 - a. Endangered Species Acts are being misused; wolves are not endangered in North America.

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APPENDIX 2. DELISTING PROCEDURES

Federal

The goal of the federal Endangered Species Act (ESA) is to return a listed species to a point when ESA protection is no longer required. A species may be delisted or reclassified when recovery criteria are met according to the best scientific and commercial data available.

The delisting process (50 CFR 121) requires:

- (1) A proposed rule published in the *Federal Register*
- (2) A public comment period
- (3) Consideration of all comments and data received
- (4) Publication of the final decision in the *Federal Register*

Once recovered and removed from the federal list, a species must be monitored for at least five years to prevent a significant risk to its well-being. Should such a risk develop, a species may be again listed under emergency listing authorities in the federal ESA.

State

The Michigan Endangered Species Act requires that the list of threatened and endangered species be reviewed every two years. It is during these reviews that technical committees and advisors evaluate the status of species and recommend the appropriate listing category. Amending the list requires public hearings and legislative approval under Joint Rules procedures. A species can be listed under the state Act, even though it is not federally listed.

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APPENDIX 3. RECOMMENDED HOME SITE MANAGEMENT

All actively used wolf home sites should be reported to the DNR Wildlife Division or to the appropriate District Wildlife Supervisor. Generally, only established home sites (used within last two years) should be recommended for protection. Intensive investigations of den and rendezvous sites should be done only after wolves have discontinued use for the year.

(1) **0-5 chain primary zone (330 feet, 100 m)**: Land use activity, including timber harvest, should not be permitted at any time of the year within 100 m (330 feet) of the home site. No new roads or trails should be constructed in this area; existing trails and roads should be obliterated, closed, or rerouted. Human activity should be restricted to those activities specifically related to wolf research and generally done only when wolves are not active in the area. No attempt is needed to actively keep recreational users outside the zone, but road closure and obliteration should eliminate most such activity. Recommended road closures apply only to forest roads and trails that are not major public travel ways.

(2) **5-40 chain secondary zone (330-2,640 feet, 100-800 m)**: Land use activity is permitted from August 1 through February 28. Timber harvest, mineral exploration, and other land use activities should be allowed during this period. Clearcutting is not likely to be detrimental to wolf activity if done during the open period, but care should be taken to avoid leaving the wolf home site areas isolated from other areas of standing timber. No new permanent roads or trails should be constructed in the zone; temporary roads and trails should be closed to vehicle traffic after timber harvests are completed. Existing trails and roads should be examined on a case-by-case basis and obliterated, closed, or rerouted if needed; this would not apply to major public travel ways such as town, county, state or federal highways.

These guidelines were modified from the 1995 addendum to the Wisconsin Wolf Recovery Plan.