Wisconsin Endangered Resources Report 57

Wolf Recovery Plan Environmental Assessment - 1988

by Richard Thiel

SUMMARY

The federal recovery plan has identified four major factors important to the survival of wolves. They are:

(1) Availability of adequate wild prey
(2) Large tracts of wild land with low human densities and minimal accessibility
(3) Ecologically sound management
(4) Adequate understanding of wolf ecology and management

In January 1986, a 12 member Recovery Team was established to oversee the development of the Wisconsin Timber Wolf Recovery Plan. The Recovery Plan consists of various management activities selected to assist the expansion of the existing Wisconsin wolf population to the recovery goal of 80 wolves.

One of the major issues of the Recovery Plan is in the area of public education regarding wolf ecology.

The purpose of this Environmental Assessment is to determine whether any of the proposed management activities described in the Recovery Plan will significantly affect the quality of the human environment, and whether an Environmental Impact Statement is required.

Implementation of the Recovery Plan will not affect land ownership patterns in the northern forest region.

Some management alternatives:

(1) Strengthen protective measures
(2) Stock wolf packs
(3) Establish management areas
(4) Allow natural regulation
(5) Adopt minimal management activities

The Plan specifies that the Department of Natural Resources should conduct periodic evaluations of the program with the option to modify programs as needed to ensure that every reasonable effort if being made to restore the wolf to Wisconsin.

Bureau of Endangered Resources
Wisconsin Department of Natural Resources
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October 1989

CORRESPONDENCE/MEMORANDUM — STATE OF WISCONSIN

DATE: August 25, 1988

TO: Persons Interested in Wisconsin Timber Wolf Recovery Plan

FROM: Dick Thiel, Chairman, Wisconsin Timber Wolf Recovery Team

SUBJECT: Wolf Recovery Plan Environmental Assessment

Enclosed is an Environmental Assessment of the Wisconsin Timber Wolf Recovery Plan. The purpose of the Assessment is to discuss wolf management alternatives, and to determine whether the management activities listed in the Recovery Plan pose a significant alteration to the human environment.

Following public review of the draft Recovery Plan released in October 1987, the Recovery Team made certain modifications and produced a revised Recovery Plan. The revised Plan was submitted to the Division of Resource Management in April. Approval of this Plan awaits the outcome of an Assessment. Differences between the Draft Plan and revised Plan are discussed in Section 1 of the Assessment.

We welcome your review of the enclosed Environmental Assessment. Please return any comments by September 23, 1988 to:

Timber Wolf EA - ER/4
Dept. of Natural Resources
P.O. Box 7921
Madison, WI 53707

Thank you.

DRAFT
WISCONSIN TIMBER WOLF RECOVERY PLAN
ENVIRONMENTAL ANALYSIS*

Applicants:
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* Information in this Environmental Assessment was prepared by Richard P. Thiel, Wolf Biologist, Bureau of Endangered Resources, Wisconsin Department of Natural Resources (See Attachment 1).

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Section 1. Project Summary

General Description of Proposed Action:

In January 1986 the Secretary's Office established a 12 member Recovery Team to oversee the development of a Wisconsin Timber Wolf Recovery Plan. Citizen comments and concerns were sought by the Team at various intervals as the plan was created (See also Section 5: Summary of Issue Identification Activities and Attachment 2). The latest citizen input was obtained in response to a draft Wisconsin Timber-Wolf Recovery Plan (hereafter referred to as Draft Plan) made available for public review in October 1987. Following their review of public responses to the Draft Plan the team made modifications and submitted the latest version of the Wisconsin Timber Wolf Recovery Plan (hereafter referred to as the Wisconsin Timber Wolf Recovery Plan, or simply Recovery Plan) to the Division of Resource Management Administration in April 1988 for their review and approval. The Recovery Plan, which has not been approved awaits the outcome of an Environmental Assessment.

The Draft Plan and the Recovery Plan, while similar, differ in some areas. The goal of the Draft Plan of 60 to 100 wolves has been changed in the Recovery Plan to 80 wolves. The following management activities have been added to the Recovery Plan: (A) conduct periodic program evaluations to assure that actions meet the Goal, (B) establishment of a committee to develop a wolf management program for the species once the Goal has been met, and (c) use volunteers to assist in Educational and population monitoring activities. These actions were not present in the Draft Plan, but were created in response to public comments on the Draft Plan. Also, under Protective Measures the development of a reward fund, established in cooperation with various organizations, is listed in the Recovery Plan.

The Wisconsin Timber Wolf Recovery Plan consists of various management activities selected to assist the expansion of the existing Wisconsin wolf population to the Recovery Goal of 80 wolves. The following activities are recommended: (1) increase public education activities, (2) reduce the incidence of human caused killings through increased protective measures and improved law enforcement actions, (3) enter into cooperative habitat management with landowners, (4) monitor population changes annually, (5) curb losses of litters due to disease, (6) conduct periodic program evaluations, (7) implement an acceptable livestock damage control program, (8) increase cooperation/coordination of activities with other agencies and interested organizations, (9) continue a Citizen Participation program, (10) use of volunteers to assist in educational and population monitoring activities, (11) establish criteria for delisting the wolf and establish an inter-disciplinary committee to develop a wolf management program following delisting, and (12) consider translocation of individual wild Wisconsin wolves after year 5 if necessary.

Purpose and Need:

The purpose of this Environmental Assessment is to determine whether any of the proposed management activities described in the Wisconsin Timber Wolf Recovery Plan will significantly affect the quality of the human environment, and whether an Environmental Impact Statement is required.

The purpose of the Wisconsin Timber Wolf Recovery Plan is to review the processes that have caused significant declines in the number and distribution of Eastern Timber Wolves (Canis lupus lycaon Schreber) within Wisconsin and to propose measures to recover this species. The Eastern Timber Wolf was listed as an Endangered Species within Wisconsin by the U.S. Department of Interior, U.S. Fish & Wildlife Service in 1967 and by the State of Wisconsin, Department of Natural Resources in 1975.

The Bureau of Environmental Analysis and Review has determined an Environmental Analysis is necessary because there are several alternatives regarding wolf recovery and these should receive public and agency review before proceeding.

Authorities and Approvals:

The Wisconsin Department of Natural Resources (DNR) is directed by state statute 29.415 (7a) to implement programs "directed at conserving, protecting, restoring and propagating selected state endangered and threatened species to the maximum extent practicable." The Eastern Timber Wolf is listed as an endangered species in Wisconsin by the U.S. Fish & Wildlife Service (FWS) and the Wisconsin DNR. The purpose in developing a Wolf Recovery Plan is to comply with state statute by restoring this species to a secure population level. The option to "do nothing" is not consistent with the intent of state law, and should not be considered unless Wisconsin's wolf population fails to respond to practical management activities. It will be necessary to extend the federal permit to capture and radio collar wolves for purposes of telemetry studies. It may also be necessary to obtain a federal permit to allow taking of individual wolves causing livestock depredations, pursuant to Section 9 (2)(A & B) of the US Endangered Species Act, Amendments of 1982. Permits may also be required if translocation of individual wolves within the state is recommended.

Funding Sources/ Estimated Costs:

Funding sources for Timber Wolf Recovery in Wisconsin could be a combination of Endangered Resources funds, Federal Endangered Species Act funds, Pittman-Robertson funds, direct donations and wildlife Management Segregated funds in the form of wildlife managers salary to help implement the plan. The Bureau of Endangered Resources should develop a funding strategy to insure an adequate budget for the implementation of this plan. Table 1 provides estimated annual Recovery Plan program costs developed by the Team.

TABLE 1 - SCHEDULE OF MANPOWER AND COST (in 1,000s) FOR IMPLEMENTING THE WISCONSIN TIMBER WOLF RECOVERY PLAN BY FISCAL YEAR[1]

ACTIVITY	(1) 1988-89		(2) 1989-90		(3) 1990-91		(4) 1991-92		(5) 1992-93		(6) 1993-94		(7) 1994-95		(8) 1995-96		(9) 1996-97		(10) 1997-98	
	HRS.	$	HRS.	$	HRS.	$	HRS.	$	HRS.	$	HRS.	$	HRS.	$	HRS.	$	HRS.	$	HRS.	$
1. EDUCATION	450	7.7	460	9.9	310	5.2	310	1.9	230	8.9	20	10								
2. PROTECTION	80	.4	90	1.2	50	.2	50	.2	90	.2	50	.2	50	.2	50	1.2	50	10.2	40	.2
3. HABITAT MANAGEMENT	480	1.4	480	1.4	310	1.1	190	0.3	190	0.3	190	0.3	190	0.3	190	0.3	190	0.3	190	0.3
4. MONITORING	500	25	400	25	400	25	400	25	400	25	400	25	400	25	400	25	400	25	400	25
5. DISEASE ABATEMENT	40	2.0	40	2.0	40	2.0	40	2.0	40	2.0	40	2.0	40	2.0	40	2.0	40	2.0	40	2.0
6. EVALUATION					40	1.0			80	1.0					40	1.0			80	1.0
7. DAMAGE CONTROL	50	0.5	30	0.2	30	0.2	30	0.2	30	0.2	40	0.2	40	0.2	40	0.2	40	0.2	40	0.2

1 Hours are for project coordination; salary costs for project coordinator and intra-agency cooperation are not included in the cost estimates. Coop salary are not in dollar costs but costs of project coordinator are included.

TABLE 1 - SCHEDULE OF MANPOWER AND COST FOR IMPLEMENTING THE WISCONSIN TIMBER WOLF RECOVERY PLAN BY FISCAL YEAR[1]

ACTIVITY	(1) 1988-89		(2) 1989-90		(3) 1990-91		(4) 1991-92		(5) 1992-93		(6) 1993-94		(7) 1994-95		(8) 1995-96		(9) 1996-97		(10) 1997-98	
	HRS.	$	HRS.	$	HRS.	$	HRS.	$	HRS.	$	HRS.	$	HRS.	$	HRS.	$	HRS.	$	HRS.	$
8. COORDINATION	70	1.1	60	0.8	60	0.5	60	0.5	60	0.5	60	0.5	60	0.5	60	0.5	60	0.5	60	0.5
9. CITIZEN PARTICIPATION	200	2.0	200	2.0	200	2.0	200	2.0	200	2.0	200	2.0	200	2.0	200	2.0	200	2.0	200	2.0
10. VOLUNTEERS	270	2.2	250	3.2	130	3.0	90	2.0	90	2.0	90	2.0	90	2.0	90	2.0	90	2.0	90	2.0
11. RECLASSIFICATION																			660	1.3
12. TRANSLOCATION (If Necessary)									450	2.5	110	13.5								
TOTALS	2130	43.2	2010	43.9	1570	39.5	1370	34.1	1860	45.6	1190	55.7	1060	32.2	1100	34.2	1060	32.2	1780	34.5

Section 2. Affected Environment

Issues of Concern:

The following issues and concerns were developed by the Recovery Team from public contacts and numerous meetings with professional resource managers within and outside the agency. Public involvement process is summarized in Attachment 2.

1. Concern over costs and sources of funding the Recovery Plan.
2. Who within the Department will be charged with implementing the Plan, especially if a coordinator position is not established?
3. Wisconsin Recovery Plan's wolf population goal should compliment federal and regional goals for this species.
4. Educating the public about wolves is of paramount importance to succeed.
5. Increase fines on the state level for killing wolves.
6. Fear that access management will adversely affect logging and the timber industry, and may create hardships for snowmobilers, hunters, hikers, handicapped etc.
7. Fear wolves will have adverse impact on deer herd.
8. Oppose translocating wolves.
9. Support compensation for depredations on livestock.
10. What will the Department do if wolf numbers exceed the goal level?

Physical Environment of Importance:

The federal Eastern Timber Wolf Recovery Plan (Bailey 1978) identified four major factors critical to the survival of wolves. They are:

> "(1) availability of adequate wild prey, (2) large tracts of wild land with low human densities and minimal accessibility, (3) ecologically sound management, and (4) adequate understanding of wolf ecology and management."

Wolves are habitat generalists and can survive anywhere where they are not persecuted. At present vast portions of the state are unsuitable to wolves because of direct conflicts with human land uses; however many areas in Wisconsin's northern forest region could potentially support wolves.

Two factors have limited wolf populations: 1.) availability of ungulate prey, and 2.) the presence of people, the wolf's only significant predator. Presently wolf distribution in Wisconsin is governed by (1) human uses of land, and (2) the level of mortality caused by humans.

Many areas within the northern forest region of Wisconsin are considered potential wolf habitat because of an abundance of deer, their primary prey (Map 1). Wolves are capable of surviving anywhere within this region where they are not molested by humans. The impact of persecution by humans is relative to the proximity of wolves to humans and their activities. More inaccessible or relatively remote areas may have greater potential in sustaining packs of wolves.

Biological Environment:

Wolves are predators that occupy an apex position in the ecological food pyramid (Figure 1.). In the Upper Great Lakes region, which includes Wisconsin, wolves prey primarily on deer and beaver. All three species (wolf, deer, beaver) are, in turn, preyed on by humans.

Wolves may potentially affect their prey populations; and may themselves be affected by humans.

Deer: Biologists studying wolves and deer believe that wolf predation generally poses no serious threat to deer herds. In Minnesota legal and illegal harvesting by humans and severe winters (which occur about every 4 years), have the greatest impact on deer numbers, even where wolves are common. Wolves can impact deer populations especially during and following a series of severe winters, but wolf predation usually "compensates" for other forms of deer mortality during severe winters. Wolf predation rates of 8 adult deer per wolf per year, and 4 fawns per wolf from October through May were determined from a recent radio telemetry study in north-central Minnesota (T. Fuller, pers. comm.).

Most wolf-prey relations studies concluded that wolves do not deplete prey populations. Studies conducted in the Upper Great Lakes region by Stenlund (1955), Thompson (1952) Pimlott et al. (1969) and Kolenosky (1972) indicated that wolves were not present in sufficient numbers to adversely affect deer populations.

In one study area monitored by Mech and Karns (1977) wolves were involved in the depletion of a deer population. Contributing factors in the decline of deer in their study area were a series of severe winters, forest succession and a concomitant deterioration of deer habitat, and unusually high wolf densities. These biologists argued, "...logic dictates that if a predator depletes its prey resource over a large enough area, the predator-prey system cannot persist.", and they concluded, "From this analysis, and from the fact that deer herds so seldom disappear, we can conclude that deer populations are remarkably resilient. Only when such important factors as declining habitat, inclement weather, and intensive predation are combined for several consecutive years are local herds unable to survive."

The Recovery Plan wolf population goal of 80 individuals represents a three to four fold increase over existing numbers of wolves in Wisconsin. As the wolf population increases (under proposed management activities), wolf distribution in Wisconsin will also change. Wolves will spread out and occupy other deer management units. However, the impact of wolves on deer even within any additional units will probably be negligible because of the unlikelihood that any one unit would be 100% occupied by wolves.

The Team believes the presence of Wolves will not affect deer populations in general. Northern Wisconsin overwinters approximately 265,000 deer. If 80 wolves each eats 18 deer per year, 1450 deer would be required. Even if all

these deer were removed from the wintering herd (the low point in the annual population trend) wolves would take less then 1/2 of 1 percent of the northern forest deer herd. Wolves may impact deer numbers on a local basis during and following especially severe winters but a population of 80 wolves will not affect northern Wisconsin's deer population.

Beaver: Beaver constitute an important seasonal component of the wolf's diet in the Upper Great Lakes States (Mandernack 1983, Peterson 1977, Pimlott et al. 1969, Voight et al. 1976). In some areas beaver provide a "buffer" prey species during summer months, which may actually augment pup survival.

Wolf predation on beaver is not considered intense enough to affect their populations, although no studies have been conducted to ascertain any impacts. In Wisconsin beaver populations have been considered at "nuisance" levels since the late 1970's (Bureau of Wildlife Management files, Pils 1983). Wolf predation on beaver, which occurs during the snow-free months (Mandernack 1983), has little or no affect on beaver populations (Thiel, unpublished data).

Northern Forests: The northern forest region of Wisconsin encompasses approximately 15,000 square miles of contiguous forested land in the northern quarter of the state (McCaffery 1987, Map 1). Numerous studies of white-tailed deer habitat needs, summarized by McCaffery (1987), indicate that shade intolerant forest tree species such as aspen, jack pine and scrub oak, provide vital summer range for deer in northern Wisconsin. About 30 % of the northern forest region is composed of shade intolerant species, but acreage of these vegetative components are decreasing (Raile, 1985: Table 1, page 16) due to natural succession and conversion to other timber types (McCaffery 1987). Most deer habitat management activities focusses on the maintenance of shade intolerant forest types in areas where they presently occur, and depend principally on commercial forestry operations.

Wolf-Human Interactions: Deer, beaver and wolves are, in turn, affected by humans - the prime apex predator within any biological system (Figure 1), including Wisconsin's northern forest region. Deer harvests have been regulated since 1927 when the Wisconsin Conservation Department was established (Lindberg and Hovind 1985, Scott 1980). Annual deer harvest levels vary, and have averaged over 200,000 statewide during the 1980's (DNR files). Deer hunting (both archery and gun) provide a significant recreational opportunity for hundreds of thousands of hunters annually.

Beaver were drastically reduced within Wisconsin by the turn of the century due to over-trapping and loss of habitat with the felling of our forests. A fur trapping season was re-established on them in the 1930's following a lengthy period in which they were either totally protected or short restrictive seasons were in effect. Currently the statewide beaver population is at an all-time high. An average of 32,000 beaver were harvested annually in Wisconsin since 1983. An additional 5000 beaver were taken as nuisances under a special control program in 1985 and 1986.

Wolves were found throughout Wisconsin prior to settlement, but in this century they have been limited to the northern forest region of the state. Keener (1955) reported that wolves were restricted to perhaps 4 or 5 localities in the north and, using Thompson's (1952) density estimate of 1 wolf per 42 to 50 square miles, he estimated 50 individuals occupied 2,000 square miles of occupied habitat by 1953-55. Thiel (1978) felt that the breeding population of wolves had been extirpated by 1960, but documented occasional activity of lone wolves within the state between 1968 and 1975. A state bounty, which operated from 1865 to 1957, was a major cause of the inevitable extirpation of the species from the state by 1960.

By this time Minnesota held the last remaining wolf population in the conterminous United States. Shortly after that population was afforded protection through the federal Endangered Species Act of 1966, the wolf's range began expanding. Individual wolves began reappearing in Wisconsin during the early 1970's, and several wolf carcasses were recovered in the mid 1970's (Mech and Nowak 1981). The presence of wolf packs and breeding among wolves was documented in the late 1970's (Thiel and Welch 1981), and telemetry studies conducted by the Department of Natural Resources since 1979-80 indicate the presence of 15 to 25 wolves in 4 to 6 breeding groups (or packs) in Wisconsin (Thiel 1982, Thiel 1987).

The presence and actions of people are considered significant in limiting wolf distribution. Negative attitudes and misconceptions perpetuate human caused deaths to this day (Hook & Robinson 1982, Knight and Thiel in prep.) despite laws protecting the species. Surveys of people in Michigan and Wisconsin indicate that approximately 15 percent display anti-predator attitudes and believe wolves should be eliminated. Human persecution of wolves probably suppresses their re-establishment in Upper Peninsula Michigan and Wisconsin (Robinson and Smith 1977, Mech and Nowak 1981, Thiel and Hammill Submitted).

Accidental and intentional deaths by people account for about 70 percent of all known Wisconsin wolf deaths (Table 2).

TABLE 2. Summary of 21 known Wisconsin wolf-mortalities, 1975-1986

	Man Caused				Natural	Unknown	Total
	Shot	Trapped*	Other	Subtotal			
No. Wolves	9	3	3	15	5	1	21
Percent	43	14	14	71	24	5	100

*In addition, single wolves were trapped and released in 1982, 1985, and 1986 by private trappers with the help of DNR officials.

An annual adult wolf mortality rate of 38 percent was calculated for radio-collared Wisconsin wolves between 1979 and 1984 using the method described by Heisey and Fuller (1985). Only three types of mortality-natural, unknown and shot- were identified based on necropsied radioed wolves. Shootings, the major source of mortality, were highest in fall, while natural deaths occurred only during winter.

Wolf range is determined by the degree and intensity of human activity in any area. As human activity increases, wolf mortality increases, either through accidental or intentional killings by humans.

Human activity is conditioned by access. As access (principally via roads) improves, so does the use of roads by people. And as use increases (for whatever reason) so, too, the likelihood of encounters between wolves and people.

Roads don't kill wolves; people do. The simple truth is that if the roads weren't there fewer people would be there also. Roads increase wolf-human encounters that can potentially result in accidental or intentional deaths.

Recently scientists learned that levels of roads greater than one linear mile of open, improved road per square mile seems to impact adversely on wolf populations. (Thiel 1985, Mech et al. 1988)

People specifically those with negative attitudes towards wolves, who use roads in wolf county pose the greatest hazard to wolves. In order to use the road system, they must be open to public use.

Given current attitudes, improved roads open to public travel that are easily used and receive a fairly high and consistent level of use, make it possible for humans to over-exploit wolves. Autumn is the critical period for wolves in the upper Great Lakes states. The majority of deaths, caused by humans, occur during this season.

Cultural Environment:

Land Use: Historically some cultures have despised wolves (ie. western Europeans) while others revere the species (ie. North American Indian tribes) (Lopez 1978). In recent times Wisconsinites have displayed a wide range of animosity towards wolves. Negative attitudes towards wolves are generally formed through (1) fear of wolves, (2) a real or perceived threat of livelihood, and/or (3) the competition wolves pose for game animals. These stem from such diverse items as the influence of a culture's childhood fairy tales (ie. "Little Red Riding Hood"), conflicts arising from depredations on livestock, to differences in the manner in which certain forms of wildlife (ie. big game) are valued by various factions within the culture.

Among Wisconsinites of largely European background (Current 1977), attitudes towards wolves are mixed (Knight 1986, Nelson and Hanson 1988). The wolf is held in esteem by Wisconsin's Indian tribes, and many individuals are members of tribal Wolf Clans (eg. Winnebago and Oneida, among others).

Wolf attacks on humans in North America are unsubstantiated (Mech 1970). However, certain conflicts can and do arise in areas where wolves and humans coexist. Wolves need an available prey base and sufficient areas of land to roam in. Conflicts frequently result from the rather large land requirements of wolves and the diverse use of land by humans. Examples of direct conflict

over land use by humans include livestock production, urban areas, and intensive recreational opportunities. Conflicts may also arise anywhere people have the opportunity to encounter and kill wolves either accidentally or intentionally.

Social/Economic: County, federal and state lands occupy about 40 percent of the northern forest region. Eleven percent is owned by industrial forests and an additional 4 percent is owned by the US Bureau of Indian Affairs and Indian tribes. The remaining 47 percent is owned by private landowners (Raile 1985).

The major economic industries in the northern forests region, timber production and tourism, depend on maintaining the integrity of our forests (Lindberg and Hovind 1985). Statewide, primary timber industries generate an estimated 1.6 billion dollars, and the tourist industry generates 3.5 billion dollars into the Wisconsin economy (Lindberg and Hovind 1985).

Recreational pursuits contribute substantially to the tourism industry. Fishing, hunting, hiking, snowmobiling, cross-country skiing are examples of forms of recreation that contribute greatly in tourist dollars expended in the northern forest region.

Harvesting of deer and beaver provides economic gains for Wisconsin citizens. Deer hunters spend roughly 120 million dollars each year in Wisconsin (Bureau of Wildlife Management files). In the past decade approximately 4.2 million dollars in beaver pelts were sold in the state, making beaver one of the more valuable Wisconsin furbearers (Pils 1983). Snowmobiling and cross-country skiing have transposed the winter months in northern Wisconsin from a tourism "off-season" period to a major economic boon (Cooper et al. 1979).

The forested region of northern Minnesota is home to approximately 1200 wolves. Educational touring packages and night howling recreational opportunities are gaining popularity and are helping to boost some local economies in that state (Miller 1988, Kjellstrand 1988). Lindberg and Hovind (1985:72) wisely observed, "Also immeasurable in meaningful economic terms are the ethereal feelings Wisconsinites have for the [forest] resource". The wolf contributes to that sense and may, in the near future, play a more active role in contributing positively to Wisconsin's economy just as they are in Minnesota.

Protecting, enhancing and wisely utilizing the renewable resources of Wisconsin's northern forest region is a responsibility shared by many agencies, organizations and individuals. The Department of Natural Resources works in cooperation with others in managing the state's forest resources.

Archeological/Historical: No development is proposed; hence any information in the environment would be preserved.

Section 3: Environmental Consequences

Physical:

With implementation of the Wisconsin Timber Wolf Recovery Plan the wolf population should expand to a goal level of approximately 80 wolves in 10 packs within 10 years.

In selecting the various management prescriptions, the Recovery Team made certain assumptions based on biological and socio-political data. These assumptions were:

Biological:

1). With optimal prey base and minimal molestation from disease or predators (principally humans) wolves have a high reproductive potential (Mech 1970).

2). The northern forest region will continue to support adequate prey populations to sustain wolves.

3). Adult wolf mortality (human caused and natural - including disease) in Wisconsin will not exceed current levels of approximately 35 percent per year.

a). With an adequate educational program human-caused wolf deaths will decrease.

4). Litter losses caused by disease will decline and stabilize below 1983 and 1984 levels.

5). Finite rate of population increase will approximate 1.15.

6). Finite rate of pack increase will approximate 1.08.

Socio-political:

1). Although human attitudes towards wolves and other controversial wildlife is gradually improving, human tolerance towards wolves is "delicate" (eg. Nelson and Hanson 1988)and can be upset easily.

a).Certain types of management programs may be particularly offensive to some which could, through biological and/or political manifestations, compromise efforts to help the wolf.

b). Management programs must be sought which would improve conditions for the wolf in Wisconsin without negatively influencing human tolerance of the species.

2). Management activities should be compatible with existing programs, and should be timely and cost effective.

Biological:

Prey base: The wolf's major diet in Wisconsin consists of deer and beaver (Mandernack 1983). These herbivores are dependant upon shade intolerant forests as their prime habitat. At present the shade intolerant forest component in the northern forest region is maintained predominantly through commercial forestry operations on government, industrial forest, Indian and private landholdings. Despite commercial cuttings, this component is decreasing in total acreage (McCaffery 1987, Raile 1985). Implementation of the Recovery Plan will assist the Department in maintaining the habitat necessary to support deer populations at goal levels in the northern forest region (McCaffery 1987).

Wolves occasionally prey on livestock, and any wolf recovery program must provide a fair and effective damage abatement and compensation program. It is important, however, to keep this issue in proper perspective. Neighboring Minnesota is home to an estimated 1,000 to 1,200 wolves. There are more than 12,000 livestock operations in Minnesota's wolf range; yet between 1979 and 1984 an average of only 23 farms per year lost livestock to wolves. Wisconsin has had a population of 15 to 25 wolves for the past decade or more, and only two cases of wolf depredation on livestock have been confirmed. Livestock depredation by wolves will probably not be a serious problem in Wisconsin even if the population Goal is attained.

The DNR, US Department of Agriculture, and FWS will cooperatively agree upon a livestock damage control program to remove individual wolves causing damage. DNR or federal agents will verify losses and carry out nonlethal or lethal actions necessary to curtail depredations, following procedures established in Minnesota.

A federal permit will be necessary to control wolves causing livestock damage pursuant to Section 10 (A and B) Endangered Species Act, 1982 Amendments.

Three percent of the annual check-off revenue is placed in the endangered Resources Fund which establishes money for paying damage caused by endangered species. If wolf depredation becomes a problem, legislation will be drafted recommending that a fund be established for a wolf damage abatement program providing 100% compensation for verified livestock losses.

Northern forests: The Recovery Plan directs that shade intolerant forest management programs be adopted between the Department of Natural Resources and other agencies and landowners willing to cooperate in maintaining habitat for deer and wolves. This program is intended to support those already in existence for the purpose of maintaining quality summer deer range in the northern forest region. The majority of maintenance activities occur on soils and in types dominated by shade intolerant species. Implementation of the Recovery Plan may assist the Department in diminishing the amount of shade intolerant forest expected to be lost due to natural succession and conversion to other types. It is not anticipated that these actions will result in any significant alteration of any present day northern forest timber type components.

No significant adverse impact should be felt by deep forest species such as interior avifauna due to the Recovery Plan since no alteration in forest timber types should result from implementation of the Recovery Plan. Browse damage to herb layers in old growth forest caused by deer should not increase from implementation of the Recovery Plan because most deer herd maintenance activities would occur in shade intolerant forest types. It is also anticipated that the northern forest deer herd will decline in the future because this forest type is expected to diminish in acreage (McCaffery 1987). Bald eagles, ravens, numerous small bird species, fisher, marten and other mammals should benefit from an increased wolf population because wolf kill sites provide an important source of food for many species especially during winter months (Pimlott et al. 1969:42).

Cultural:

Land use: One of the major thrusts of the Recovery Plan is in the area of public education regarding wolf ecology. If implemented an educational program may significantly decrease negative attitudes towards wolves. This would eventually give rise to a more environmentally enlightened and understanding public, and as a consequence fewer wolves would be killed by humans.

Recovery Plan programs such as the Cooperative Habitat Management concept, Livestock Damage Control and Citizen Participation activities should mitigate and/or minimize conflicts that could arise with other land management objectives (eg. rearing livestock, maintaining old growth forest).

The Cooperative Habitat Management and Citizen Participation activities of the Recovery Plan will provide a balance at the local level between the type and levels of access necessary for the continuation of logging activities as determined through forest management, recreation (eg. snowmobiling, ORVs, handicapped/ special use, hunting, hiking, skiing) and associated multiple use activities while assuring the integrity of the forest in providing the degree of seclusion necessary for wolf survival (Thiel 1985).

Access management is controversial among the public (Nelson and Franson 1988) primarily because it is construed by some to be synonymous to road and trail "closures". The focus of access management will be to hold access at present levels by encouraging landowners to (1) manage for the minimum amount of access necessary to fulfill multiple use objectives, and (2) limit motorized public access on lower standard roads wherever possible through gating, berming, etc. This should not be construed as recommending the closure of existing improved roads or motorized recreational trails such as snowmobile trails, ATV trails, etc.

Recovery Team members carefully selected an access management program that would not inconvenience logging practices, pursuit of recreation by Wisconsin citizens (eg. snowmobiling, cross-country skiing, hiking trails, hunter walking trails), or interfere with the manner in which land owners prefer to

manage their lands. Any modification of an area's access system under the Recovery Plan would be carried out on the initiative of the land owner through Cooperative Habitat Management and Citizen Participation activities.

Approximately 95 percent of the northern forest region is within 1 mile of an improved road (defined as a road graded at least once per year) (Smith 1986: 12;45). Since the Recovery Plan stresses holding access on improved roads and existing recreational trails at present levels, little or no impact should be felt by users. The Plan advises that motorized public access on lower standard roads (ie. woods trails) should be held to a minimum. Use of these poorer roads is minimal and should not create any major problems since use is light, and foot travel would still be possible.

Social/Economic:

Implementation of the Recovery Plan will not affect land ownership patterns in the northern forest region, nor significantly alter the manner in which landowners presently manage their forest lands. Managing lands to benefit wolves will be voluntary, and conducted in a cooperative spirit.

Implementation of the Recovery Plan should not have an adverse impact on the economy within the northern forest region. The two major industries, timber production and tourism, should not be affected by implementation of the Recovery Plan. The plan is compatible with logging interests because it recognizes the value of commercial cuttings in maintaining shade intolerant forest types. Tourism in the northern forest region should not be adversely affected, and may ultimately gain economically through creation of an additional form of recreation (organized tours of wolf country). Existing forms of recreation should not be adversely affected, and additional opportunities may be created.

Cooperation between the Department and other agencies, organizations and individuals will result from implementation of the Recovery Plan. The Department is presently participating in the Integrated Resource Management Team (IRM) planning activities initiated by the US Forest Service to implement National Forest Land and Resource Management Plans for the Nicolet and Chequamegon National Forests (C.D. Besadny memo dated September 11, 1986). A part of the IRM process includes discussions on implementation of habitat management actions of benefit to wolves.

Summary of Adverse and Unavoidable Impacts:

(1)It is anticipated that some farms within the northern forest region may occasionally experience wolf - livestock depredations. (2) As a consequence of depredations authorities may occasionally need to kill individual wolves to terminate depredations on livestock.

Section 4: Alternatives

Several alternative management activities were either proposed by citizen participants and/or by the Recovery Team. On 12 August 1986 the Team circulated a letter to approximately 3000 organizations and individuals describing its purpose and acquainting prospective participants of the process by which a management plan for wolves would be developed. The Team stated it will, "make every effort to consider all interests..." in making decisions in developing the plan.

Alternatives were prepared for public scrutiny in the "Issues Report" released for public review in February, 1987. Decisions on the selection of alternatives were made by the Team as it prepared the Draft Plan (released for public review in October, 1987) based on (1) the biological "needs" of the species and (2) public response to the Issues Report.

Management alternatives, summarized below, were considered by both the Recovery Team and numerous interested citizens, agencies and organizations that participated in one or more of several public reviews as the plan was developed (Attachment 2).

Management Alternatives:

(1) Strengthen protective measures, including an increase in state fines to $5,000 - $10,000, revocation of hunting privileges for life, and increase law enforcement efforts.

(2) Stock wolf packs to attain the Recovery Plan population goal quickly and cheaply.

(3) Establish management zones; regions in Wisconsin where wolves would be allowed to roam, and areas where - because of the likelihood of conflict - wolves would be removed by government agents.

(4) Allow natural regulation of wolf population without any disease control actions (eg. vaccinations) to minimize losses.

(5) Adopt minimal management activities limited to modest protective measures in an effort to be cost effective, and to assure that wolves will not be nurtured unnecessarily.

In making its decisions, the Recovery Team compared each of the respective management alternatives with the set of assumptions (listed above) and attempted to predict whether the response would produce the desired outcome (ie. a population goal of 80 wolves in 10 years in a tolerant societal setting).

Alternatives (1), (2) and (3) address aspects of the biological and environmental needs of wolves at the cost of certain social and economical considerations. Substantial increases in fines may not be warranted, and may be unnecessarily harsh and socially unacceptable. A modest increase in state

fines, comparable to forfeitures for poaching big game, was proposed in the Recovery Plan.

When considering the notion of stocking the Recovery Team had to ask, "Is it biologically necessary to stock wolves in Wisconsin in order to restore a population?" Wisconsin has been home to a small breeding population of wolves for about 15 years. In that time the Wisconsin population has weathered significant problems caused by humans and disease. It may be argued that the proliferation of wolves into Wisconsin in recent times has not resulted in the reoccupation of a significant portion of the available habitat. Yet up until now no management programs have been devised to improve wolf survival. The presence of wolves and their recolonization of isolated areas of northern Wisconsin is a product of this species remarkable tenacity to survive. Based on these observations the Team has concluded that stocking is not biologically necessary at this time.

Aside from biological considerations, social and political realities must also be weighed when making a decision to stock wolves. Wherever they would occur, stocking of wolves would not take place in a biological vacuum. Brown (1983:171-2) pointed out the administrative entanglements inherent in approving such a program involving a controversial predator like the wolf. As an example he mentions, "Those responsible for a reintroduction effort could find themselves liable for any losses incurred from the animals' release."(Ibid.:172). Mech (1979:445) provides some balance with his statement, "Ecological, social, economic, political and legal studies must be conducted to determine the suitability of the target area for wolves."

Public support is crucial to program success. Mech (1979:445) stressed the importance of public input in the decision-making process. The Team presented the stocking option to participants in its Issues Report in order to obtain public input. A majority of those responding to this issue opposed it. The Team received numerous comments in opposition to stocking in response to the draft recovery plan even though stocking wasn't mentioned.

The Team consulted with many DNR and US Forest Service personnel in developing its plan. In the assessment of these professionals, public resentment to stocking is high and would not only cause the failure of any stocking activities, but might also jeopardize the survival of existing wolf packs in the state. In listening to these comments the Team was reminded of the most recent wolf stocking project attempted in upper Michigan in 1974 (Weise et al. 1975). Despite the fact that an attitudinal study (Hook and Robinson 1982) indicated less than 15 percent of Michigan residents displayed intensely negative attitudes towards wolves, all four transplanted wolves were killed by humans in less than 10 months.

The Team weighed the positive and negative aspects of stocking and it concluded that stocking is not presently necessary nor advisable because of certain socio-political risks.

The Department process of establishing management zones would probably be perceived as somewhat arbitrary and indifferent to the management decisions of other agencies and private land owners. Much confusion was expressed at various public review meetings regarding the authority of the Department to dictate management on non-Department lands. No clear authority exists. The Wisconsin Endangered and Threatened Species law (State Statute 29.415) states "the Department [of Natural Resources] may enter into agreements with federal agencies, other states, political subdivisions of this state, or private persons with respect to programs designed to conserve endangered or threatened species of wild animals or plants". The Team felt that establishment of zones would further confuse the public regarding state authority, increase apprehensions, and otherwise disrupt the Department goal of re-establishing a wolf population.

Alternatives (4) and (5) are economically cost-effective since they advocate minimal actions and they are socially preferred by those who either have negative attitudes towards wolves, or are uncertain about whether the return of wolves to Wisconsin's northern forest region is personally acceptable. However, while these alternatives may be attractive economically and perhaps within certain social circles, they do not satisfy the legal commitment of the state (State Statute 29.415) to effectuate reasonable management efforts to restore an endangered species such as the wolf because they do not address many of the biological needs necessary for the species to continue to exist within the state, and they fail to consider the desires of that segment of society who believe that efforts should be made to restore wolves to the state.

The management activities selected by the Recovery Team as written in the Plan (major actions are reiterated below) provides a balance in management activities necessary to provide a biological and socio-political environment suitable for recovering a population of 80 wolves. To review, these include: (1) increase public education activities, (2) reduce the incidence of human caused killings through increased protective measures and improved law enforcement actions, (3) enter into cooperative habitat management with landowners, (4) monitor population changes annually, (5) curb losses of litters due to disease, (6) conduct periodic program evaluations, (7) implement an acceptable livestock damage control program, (8) increase cooperative/coordination of activities with other agencies and interested organizations, (9) continue a Citizen Participation program, (10) use of volunteers to assist in educational and population monitoring activities, (11) establish criteria for delisting the wolf and establish an inter-disciplinary committee to develop a wolf management program following delist, and (12) consider translocations of individual wild Wisconsin wolves after year 5 if necessary.

The Team made certain assumptions, and recognized that in so doing, it invited the possibility of error. It made one final assumption (not listed above); one or more of those assumptions may be in error. This could substantially change the management programs prescribed to achieve the Plan goal. Therefore the Plan specifies that the Department should conduct periodic evaluations of the program with the option to modify programs as needed to ensure that every

reasonable effort is being made to restore the wolf. The Plan also describes a five year evaluation to include an assessment, involving citizen participation, of whether limited translocations of individual wolves might further recovery efforts.

Section 5: Evaluation of Project significance

The actions proposed in the Recovery Plan represent a topic significant to citizens of Wisconsin and the nation (McNaught 1987) - the restoration of a rare carnivores mammal to an area it formerly inhabited. The actions proposed in the Wisconsin Timber Wolf Recovery Plan would have a lasting, positive influence on the environment by rebuilding a modest population of the state and federally endangered timber wolf within the state of Wisconsin. It would further contribute to more meaningful cooperation between the Department, other agencies, organizations and Wisconsin citizens, and it would improve citizen appreciation for the resources of Wisconsin.

Significance of Cumulative Effects:

Few, if any, adverse cumulative effects on the environment are anticipated as a result of implementing the Recovery Plan. The Recovery Plan is compatible with federal (US Fish & Wildlife Service and US Forest Service) recovery goals, and with the interests of the states of Michigan and Minnesota in contributing to the restoration of a wolf population in the Upper Great Lakes northern forest region. A possible conflict may result from public fear that wolf proliferation into Upper Peninsula (a possible effect of the Wisconsin Recovery Plan) may conflict with sportsmen's efforts to restore moose in that region of Michigan.

It is also possible that localized deer herds could be reduced if conditions described by Mech and Karns (1977) were repeated in northern Wisconsin.

Significant Risks:

Several risks appear to be possible. (1) If action is not taken to increase the existing Wisconsin wolf population the Department invites the risk that wolves could become extirpated once again within Wisconsin. (2) If the wolf population response to management activities listed in the Recovery Plan exceeds the Teams expectations, what risks might result and how can these be resolved? Signs of wolf overpopulation may include, but not be limited to, the appearance of wolves in areas where conflicts with livestock and/or human land use could become common place; noticeable reductions in localized prey populations (per Mech and Karns 1977); increased wolf social stress resulting in an increased incidence of starvation, disease, and interspecific strife among wolves, etc. In the Recovery Plan the Team recommends the establishment of an interdisciplinary committee to develop a wolf management program for a recovered wolf population (Management Action #11). The committee is formed in the 5th year of the 10 year recovery effort so that an approved program can be instituted once the population is recovered (by year 10). Many legal and

practical management applications need to be reviewed in preparing a program to manage a wolf population at recovery levels. One of the responsibilities of the committee would be to establish programs responding to a possible overpopulation problem, should that occur. (3) In developing the Plan the Recovery Team made certain assumptions (See Section 3) from which they measured possible scenarios resulting from proposed management activities. If one or more of these assumptions is incorrect the Team may have erred in selecting the appropriate actions. However, to circumvent any such problems the Team designed a "failsafe" mechanism into the plan with the stipulation that the Department conduct periodic reviews of Plan activities with the option to make alterations if and when necessary.

Significance of precedent:

Implementation of the Wisconsin Timber Wolf Recovery Plan:

(1) would not influence future decisions or options that may affect the quality of the human environment,

(2) would not conflict with local, county, state, federal or private plans or policies that provide protection for, and the wise use of Wisconsin's renewable resources.

Any conflicts with landowner policies and plans would be mitigated in the process of drafting cooperative agreements with landowners desiring to assist the Department. Problems of wolf depredation on livestock, although anticipated to be minimal (Fritts 1982, Thiel unpubl data), will occur occasionally. Recovery Plan education, livestock loss compensation, and control activities will reduce any conflicts that may develop from time to time.

It would be naive to believe that all controversy regarding the wolf would cease upon implementation of the Recovery Plan. Persons who dislike wolves will continue to express their dissatisfaction over Department actions. Of the many issues and concerns the Recovery Team and citizen participants identified in the planning process, the following will likely continue to create controversy: (1) concern over the deer resource, (2) concern that government funds are ill-spent on wolves.

The following issues will in all likelihood be viewed with skepticism and will diminish as management activities demonstrate that such concerns are unfounded: (1) shade-intolerant forest type management conflicts with old growth types (Refer to discussion in Section 3; Biological - subsection on Northern Forests), (2) access management may pose an adverse impact on forest management practices and timber cutting (with impacts on the timber industry), snowmobiling, cross-country skiing, hunting, fishing and related forms of recreation (and spin-off affects on tourism)(refer to discussion in Section 3; Cultural - subsection on Land Use), (3) Department authority (per State Statute 29.415) will supercede other agencies, industry's, and private citizen's ability to manage their own lands (Refer to discussion in Section 4; Management Alternatives).

Summary of Issue Identification Activities:

The Recovery Team recognized at the outset of preparing the Wisconsin Timber Wolf Recovery Plan that citizen involvement was crucial for success. Their emphasis early in the planning process was getting to know affected interests and sharing information on needs and concerns. Later attention shifted to meeting individually with various interest groups to address key issues and find common ground. Finally, the Team sought comments on a draft recovery plan before developing a final version. Citizen involvement was not limited to the public segment; other federal, state, tribal and county agencies were consulted and included in this process.

The Team held 9 public information forums; 71 meetings; 25 talks; 8 statewide Department news releases; 5 statewide mailings (initial =3000; 2nd and 3rd=1000); 3 articles and over 30 interviews with newspapers, radio and television media. The first major public contact occurred in August through October, 1986. A second major public contact period extended from February through April, 1987, and a third major effort occurred from October 1987 to January 1988.

Individuals, Agencies, Organizations contacted:

During the recovery planning process the Recovery Team consulted with and sought comments from major state and national conservation and environmental organizations, the U.S. Forest Service, the County Forest Association, individual County Forestry Administrators, Great Lakes Indian Fish & Wildlife Commission, National Park Service, U. S. Fish and Wildlife Service, Wisconsin, Michigan and Minnesota DNR personnel, and numerous private citizens. Attachment 2 lists major participation with these interested publics. A list of the team's participants are available on request to the Bureau of Endangered Resources.

LITERATURE CITED

Brown, D. (Ed.). 1983. The wolf in the southwest: the making of an endangered species. Univ. Arizona Press, Tucson, Az. 177 pp.

Cooper, R., P. Sadowske and M. Kantor. 1979. Winter recreation visitor study Wisconsin 1979. UW - Extension, Recreation Resour. Center. 54 pp.

Current, R. 1977. Wisconsin: a history. W.W. Norton & Co. N.Y. 226 pp.

Fritts, S. 1982. Wolf depredation on livestock in Minnesota. Fish & Wildl. Serv. Resour. Publ. 145. 11 pp.

Heisey, D. and T. Fuller. 1985. Evaluation of survival and cause-specific mortality rates using telemetry data. J. Wildl. Mgmt. 49(3):668-674.

Hook, R. and W. Robinson. 1982. Attitudes of Michigan citizens toward predators. pp. 382-394 In: Harrington, F. and P. Paquet. (Eds.) Wolves of the world. Noyes Press, Park Ridge N.J. 474 pp.

Keener, J. 1955. The case for the timber wolf. Wis. Cons. Bull. 20(11): 22-24.

Kellart, S.R. 1986. The public and the timber wolf in Minnesota. Trans. 51st N.A. Wildl. & Nat. Res. Conf. 193-200.

Kjellstrand, T. 1988. Wolf. The Minnesota daily. Complement Section. pp 9-11. March 31.

Knight, J. 1986. A survey of deer hunters attitudes towards wolves in two Wisconsin counties. MS Thesis, UW-Madison.

Kolenosky, G. 1972. Wolf predation on wintering deer in east-central Ontario. J. Wildl. Mgmt. 36:357-369.

Lopez. B. 1978. Of wolves and men. Chas. Scribner's Sons. N.Y. 309 pp.

Lindberg, R. and H. Hovind. 1985. Wisconsin forests an assessment. Wis. Dept. Natur. Resour. Publ. FR-041 86. 86 pp.

Mandernack, B. 1983. Food habits of Wisconsin timber wolves. M.S. Thesis. Univ. of Wis.-Eau Claire. 52 pp.

McCaffery, K. 1987. Deer carrying capacity in northern Wisconsin. pp. 54-69. In: Regan, R.J. and S.R. Darling (Eds). Trans. 22nd NE Deer Tech. Comm., Fish & Wildlife Dept., Waterbury, VT. p. 88.

McNaught, D. 1987. Wolves in Yellowstone? - park visitors respond. Wildl. Soc. Bull. 15:518-521.

Mech, L.D.1970. The wolf: ecology and behavior of an endangered species. Natural History Press. Garden City N.Y. 384 pp.

Mech, L.D. 1979. Some considerations in re-establishing wolves in the wild. pp. 445-457. In: Klinghammer, E. The behavior and ecology of wolves. Garland Publ.,Inc. N.Y. 588 pp.

Mech, L.D. and P. Karns. 1977. Role of the wolf in a deer decline in the Superior National Forest. USDA Forest Service Res. Pa. NC-148.

Mech, L. D. and R. Nowak. 1981. Return of the gray wolf to Wisconsin. Am. Midl. Nat. 106(2):408-409.

Mech, L.D., S. Fritts, G. Radde and W. Paul. 1988. Wolf distribution and road density in Minnesota. Wildl. Soc. Bull. 16: 85-87.

Miller, D. 1988. Cross country skiing Minnesota's gunflint trail. Midwest Living. February: 33-39.

Nelson, E. and D. Franson. 1988. Timber wolf recovery in Wisconsin: the attitudes of northern Wisconsin farmers and landowners. Research Manage. Findings. Bureau of Research, Publ. RS-713 88 WI. Dept. Natur. Resources. No. 13, June. 4 p.

Peterson, R. Wolf ecology and prey relationships on Isle Royale. Natl. Park Service Sci. Monogr. Ser. 11. 210 pp.

Pils, C. 1983. The beaver (Castor canadensis). Wis. Dept. Nat. Resour. Publ. 11-2300(83). 2 pp.

Pimlott, D., J. Shannon and G. Kolenosky. 1969. The ecology of the timber wolf in Algonquin Park. Ontario Dept. Lands and Forests Res. Rep. (Wildlife) 87. 92 pp.

Raile, G. 1985. Wisconsin forest statistics, 1983. USDA Forest Service Res. Bull. NC-94. 113 pp.

Robinson, W. and G. Smith. 1977. Observations on recently killed wolves in upper Michigan. Wildl. Soc. Bull. 5:25-26.

Scott, W. 1980. A Wisconsin deer management chronology (1836-1980). pp 111-116. In: Hine, R and S. Nehls (Eds.) White-tailed deer population management in the north central states. Proc. Symposium of 41st Midwest Fish and Wildl. Conf. NC Sect. Wildl. Soc. 116 pp.

Smith, W. B. 1986. Wisconsin's fourth forest inventory: area. USDA Forest Service N. Centr. For. Exp. Sta. Resour. Bull. NC-97. 48 pp.

Stenlund, M. 1955. A field study of the timber wolf (Canis lupus) on the Superior National Forest, Minnesota. Minn. Dept. Conserv. Tech. Bull. 4, 55 pp.

Thiel, R. 1978. The status of the timber wolf in Wisconsin, 1975. Trans. Wis. Acad. Sci., Arts and Letters. 66:186-194.

_____. 1982. Status of the timber wolf (Study 101), October 1, 1981 - September 30, 1982, Performance Rept., Unpubl. Wis. Dept. Nat. Resour. Rept. 18 pp.

_____. 1985. The relationship between road densities and wolf habitat in Wisconsin. Am. Midl. Nat. 113: 404-407.

_____. 1987. Status of the timber wolf in Wisconsin, Performance Rept., October 1, 1986 - September 30, 1987. Unpubl. Wis. Dept. Nat. Resour. Rept. 8 pp.

_____ and R. Welch. 1981. Evidence of recent breeding activity in Wisconsin wolves. Am. Midl. Nat. 106 (2): 401-402.

Thompson, D. 1952. Travel, range and food habits of timber wolves in Wisconsin. J. Mammal. 33:329-442.

Voight, D., G. Kolenosky, and D. Pimlott. 1976. Changes in summer food habits of wolves in central Ontario. J. Wildl. Mgmt. 40:663-668.

Weise, T., W. Robinson, R. Hook and L.D. Mech. 1975. An experimental translocation of the eastern timber wolf. Audubon Conserv. Rept. No. 5. 28 pp.

ATTACHMENTS

Attachment 1

Richard P. Thiel biographical sketch.

Through the late 1960's and 1970's Richard P. Thiel was involved in the documentation of wolf occurrences in Wisconsin. This resulted in the 1975 reclassification of wolves by the DNR from "extirpated" to an endangered species. Privately funded investigations in the late 1970's enabled Thiel to verify the presence of wolf packs and breeding among wolves within the state.

In 1980 Thiel assumed duties as Project Leader of the Wisconsin Timber Wolf Field Study for the Bureau of Endangered Resources. In 1986 he was appointed Chairman of the 12 member Wisconsin DNR Timber Wolf Recovery Team. Thiel has written seven technical papers on various aspects of wolf ecology in Wisconsin, and has written numerous articles on wolves.

Attachment 2

Summary of Major Public Review Periods in the Wolf Recovery Planning Process, 1986 to 1988.

Dates	Event	Number of Participants
August 1986	Announce Public Forums	3000 mailings; news releases.
September 1986	9 Public Forums	628 participants; 120 written comments.
February 1987	Issues Report Review	700+ mailings.
Mar-Apr 1987	Meetings re. Issues Rept.	17 meetings with interested publics.
October 1987	Draft Recovery Plan Review	1000 mailings.
Oct 1987-Jan 1988	Meetings re. Draft Plan	19 meetings with interested publics.

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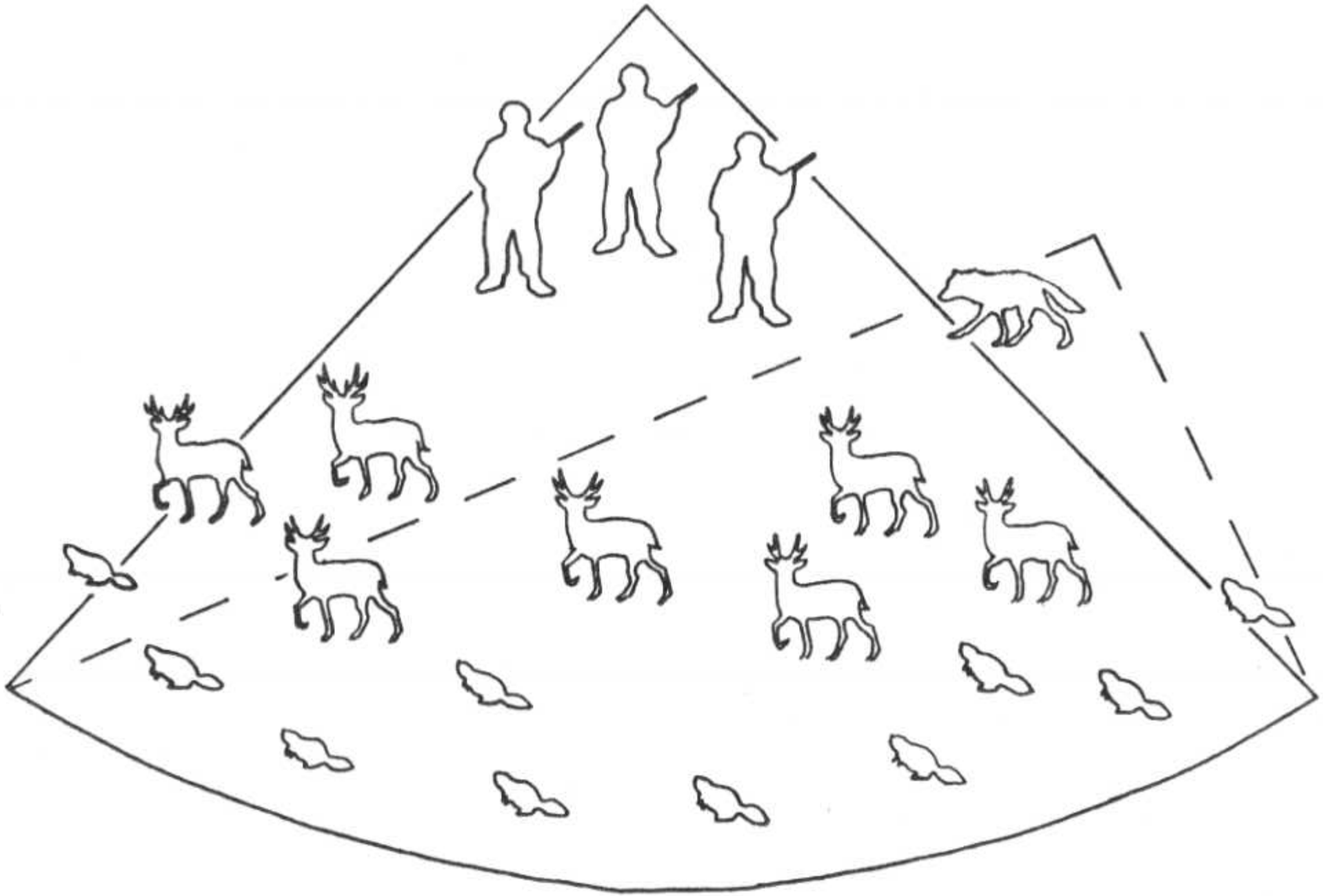

Figure 1. Humans have replaced wolves as the apex predator in Wisconsin's ecosystem.