Regional Copper-Nickel Study

WOLF (*Canis lupus*)

Minnesota Environmental Quality Board

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ABSTRACT

The last thriving population of timber wolves in the contiguous United States resides in northern and northeastern Minnesota. Estimates of the population in the Study Area range from 153 to 200 animals. Using the rough estimate of 1200 as the current Minnesota wolf population, the Study Area contains between 13 and 17 percent of the State's total population. These percentages provide an adequate estimate of the proportion of wolves living within the contiguous United States that reside in the Study Area.

Specific habitat requirements of wolves in the Superior National Forest (SNF) have not been determined. However the heavy reliance on deer as food suggests that deer and wolf forest types are similar. Loss of large tracts of upland forest to mining operations, primarily those dominated by aspen and birch, can be expected to further reduce the number of deer (and thus wolves) on the Study Area. Similar utilization of lowland conifer, bog and shrub types will have a limited affect on both densities. Loss of deciduous-coniferous habitats would be intermediately detrimental relative to wolf densities.

The pattern of land use, especially in the eastern one-half of the Study Area, will markedly influence the future distribution of wolves in Minnesota.

INTRODUCTION TO THE REGIONAL COPPER-NICKEL STUDY

The Regional Copper-Nickel Environmental Impact Study is a comprehensive examination of the potential cumulative environmental, social, and economic impacts of copper-nickel mineral development in northeastern Minnesota. This study is being conducted for the Minnesota Legislature and state Executive Branch agencies, under the direction of the Minnesota Environmental Quality Board (MEQB) and with the funding, review, and concurrence of the Legislative Commission on Minnesota Resources.

A region along the surface contact of the Duluth Complex in St. Louis and Lake counties in northeastern Minnesota contains a major domestic resource of copper-nickel sulfide mineralization. This region has been explored by several mineral resource development companies for more than twenty years, and recently two firms, AMAX and International Nickel Company, have considered commercial operations. These exploration and mine planning activities indicate the potential establishment of a new mining and processing industry in Minnesota. In addition, these activities indicate the need for a comprehensive environmental, social, and economic analysis by the state in order to consider the cumulative regional implications of this new industry and to provide adequate information for future state policy review and development. In January, 1976, the MEQB organized and initiated the Regional Copper-Nickel Study.

The major objectives of the Regional Copper-Nickel Study are: 1) to characterize the region in its pre-copper-nickel development state; 2) to identify and describe the probable technologies which may be used to exploit the mineral resource and to convert it into salable commodities; 3) to identify and assess the impacts of primary copper-nickel development and secondary regional growth; 4) to conceptualize alternative degrees of regional copper-nickel development; and 5) to assess the cumulative environmental, social, and economic impacts of such hypothetical developments. The Regional Study is a scientific information gathering and analysis effort and will not present subjective social judgements on whether, where, when, or how copper-nickel development should or should not proceed. In addition, the Study will not make or propose state policy pertaining to copper-nickel development.

The Minnesota Environmental Quality Board is a state agency responsible for the implementation of the Minnesota Environmental Policy Act and promotes cooperation between state agencies on environmental matters. The Regional Copper-Nickel Study is an ad hoc effort of the MEQB and future regulatory and site specific environmental impact studies will most likely be the responsibility of the Minnesota Department of Natural Resources and the Minnesota Pollution Control Agency.

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INTRODUCTION

The last thriving population of eastern timber wolves in the contiguous United States resides in northern and northeastern Minnesota. Mech (Wildl. Res. Biologist, U.S. Dept of Interior, Fish and Wildl. Serv., Hdg. at North Central For. Exp. Stat., St. Paul, Minn.; pers. comm. March 1978) has provided a "rough estimate" of the wolf population within Minnesota. He estimates that there are currently only 50 wolves living in the U.S. outside of Minnesota and 1200 in the state, for a total population of 1250 animals. The stronghold of the subspecies (C.l. lycaon) is Ontario (Clarke 1970), with all 17 wolf subspecies having a circumpolar distribution (Banfield 1974).

The past and present status of wolves in Minnesota has long been an inflamable issue between protectionists and those advocating a year round extermination program for this forest predator. The Minnesota Department of Natural Resources (MDNR) ceased wolf control in the state in 1950 and ended the bounty on this animal in 1965 (Mech and Karns 1977). Wolves within the boundaries of the Superior National Forest (SNF) were protected on these Federal Lands in 1970 by a U.S. Department of Agriculture (USDA) decree, and received full protection throughout Minnesota in August, 1974, under the Federal Endangered Species Act of 1973. The status of this species has recently been changed (Spring, 1978) to threatened, which may allow authorized trapping and/or shooting of nuisance animals suspected of killing livestock in certain regions of the state.

METHODS

The majority of the information for this paper was derived from a literature review and personal communications with wildlife researchers working in and adjacent to the Regional Copper-Nickel Study Area. L.D. Mech was especially

helpful in making available unpublished data. Field observations of wolves by Copper-Nickel staff are also included.

RESULTS

The SNF has traditionally been the home for most of the timber wolves in Minnesota. Densities are still highest in this area, but wolves have expanded their range in the state to include approximately a 78,000 km^2 area and are distributed throughout the entire Regional Copper-Nickel Study Area (Mech per. comm. March 1978). It appears that the Study Area presently contains 6.7 percent (5200 km^2/78,000 km^2) of the estimated wolf range in Minnesota. In the future if wolves are again largely restricted to the SNF as has been the case in the past, the Study Area will contain a much greater proportion of the state's wolf habitat. Since about 3135 km^2 of the Study Area lies within the borders of the SNF (10752 km^2), this would represent 29.2 percent of the range.

Recently, wolf density on a portion of the SNF has been sharply reduced. "From 1972 to 1975, wolves declined about 40 percent in an area of about 2560 km^2 in and near the Interior Area" (Mech and Karns 1977). This is an area bordering the northeastern edge of the Study Area and extending to Grand Marais in the east and the Canadian border to the north. Both white-tailed deer (Odocoileus virginianus) densities and wolves have declined sharply in the past 7-10 years, with deer essentially being eliminated from this area in the past few seasons (Mech and Karns 1977). If this interior area (2560 km^2) is subtracted from the total for the SNF (10752 km^2), the remaining 8192 km may be considered "prime" wolf range. The Study Area assumes an even greater importance to this further reduced timber wolf range (3135 $km^2 \div$ 8192 km^2 = 38.3 percent).

Within the SNF the wolf population was considered saturated during the winter of 1971-72 with 1 wolf/25.6 km^2 (Mech and Karns 1977). The majority of these animals were members of packs (77.8 percent), with the remainder (22.2 percent) occuring as lone wolves (Mech 1977 A). The distribution of known denning areas (Fig. 1), along with pack territory boundaries and pack size (Fig. 2, Table 1) indicate heavy use of the northeastern portion of the Study Area by wolves. Other intensively used denning sites and pack territories surely exist and are not noted on these figures because the principle research efforts for wolves have typically included only a small portion of the Study Area. More detailed information must await site-specific studies. However, the six random observations of wolves by Copper-Nickel staff within and adjacent to the Copper-Nickel Development Zone within the Study Area (Fig. 3) add additional support to the conclusion that wolves are generally more numerous in this northeastern region.

Mech (per. comm. March 1978) suggests that wolf densities in the Study Area range from a maximum of 1 wolf/26 km^2 to a minimum of 1 wolf/34 km^2. At these densities estimates of the population in the Study Area range from 153 to 200 animals. Using the rough estimate of 1200 as the current Minnesota wolf population, the Study Area contains between 13 to 17 percent of the state's total population. These percentages are also an adequate estimate of the proportion of wolves living within the contiguous United States that reside in the Study Area.

Habitat Requirements

Specific habitat requirements of wolves have not been determined for the population living within the SNF (Mech, pers. comm. March 1978). Since white-tailed deer are the primary prey on a year-round basis, habitats favorable to deer within the Study Area can also be expected to support

the greatest density of wolves. Preferred deer cover types include aspen and aspen-birch-coniferous mixtures (25 years old or younger) near recently disturbed sites. Extensive areas of bog, conifer swamps or conifer uplands, shrub swamps and mature (50 years or older) stands of deciduous or coniferous species are marginal, low density habitats for both species. The use of aspen, young plantations and recently harvested types by the Harris Lake Pack in the Study Area was especially high (Mech 1977 B; interpretation of his radio-tagged wolf locations and vegetation cover types from this study).

Food Requirements

The future abundance and density of wolves on the SNF depends upon the population of the principle prey species, the white-tailed deer. Mech and Karns (1977) state that "wolves in the study area (SNF) prey primarily on deer, supplementing their diet with beaver (Castor canadensis) from March through November, and with moose (Alces alces)." These authors support their extensive knowledge of this area with additional studies by Frenzel (1974) and Van Ballenberghe and Mech (1974). Wolves on the SNF apparently prey upon moose in winter only under stressful conditions when deer are scarce (Mech 1977 B).

Sources of Mortality

The major predator of the wolf on the SNF in the past was man. With protection, wolf populations increased during the 1960's (Mech 1973). The recent decline is largely attributed to the death of pups caused by malnutrition due to the dwindling deer herd (Van Ballenberghe and Mech 1975; Mech 1977 B). This, combined with intraspecific mortality caused by members of one pack trespassing on the hunting territory of other packs (Mech 1977 B, 1977 C), is reducing the entire wolf population in northeast Minnesota to a level compatable with their

reduced food supply.

Impact

The density of wolves in the SNF is directly related to the distribution and density of white-tailed deer in this region. The deer herd in Minnesota in recent years has been severely reduced by a series of stressful winters, compounded by maturing forest in many northern areas. These environmental and successional factors have been especially acute in northeastern Minnesota and are believed directly related to current low densities of deer and the declining number of wolves in certain areas (Mech and Karns 1977).

It is doubtful that present wolf densities in the Study Area can be maintained. The moose population, which has been stable or increasing in the region for a number of years, is not an alternative prey to maintain high wolf densities.

Loss of large tracts of upland forest to mining operations, primarily those dominated by aspen and birch, can be expected to further reduce the number of deer (and thus wolves) on the Study Area. Similar utilization of lowland conifer bog, and shrub types will have a limited affect on both densities. Loss of deciduous-coniferous habitats would be intermediately detrimental relative to wolf densities.

Unlike deer, wolves have a rather low tolerance for increased human settlement within their territories. Mech (1970) contends that maintaining wolf populations in the future will be done almost exclusively in wilderness areas. A pattern of scattered rural residents with the normal association of clearings and fields may have a positive effect on deer, but would decrease wolf densities in these areas. The same would likely be true of mining operations

with the marked increase in the number of roads, powerlines and other such features supporting this industry.

A large proportion of the timber wolf range in Minnesota and the contiguous United States occurs within the boundaries of the Study Area. The pattern of land use, especially in the eastern one-half of this area, will markedly influence the future distribution of this threatened species in Minnesota.

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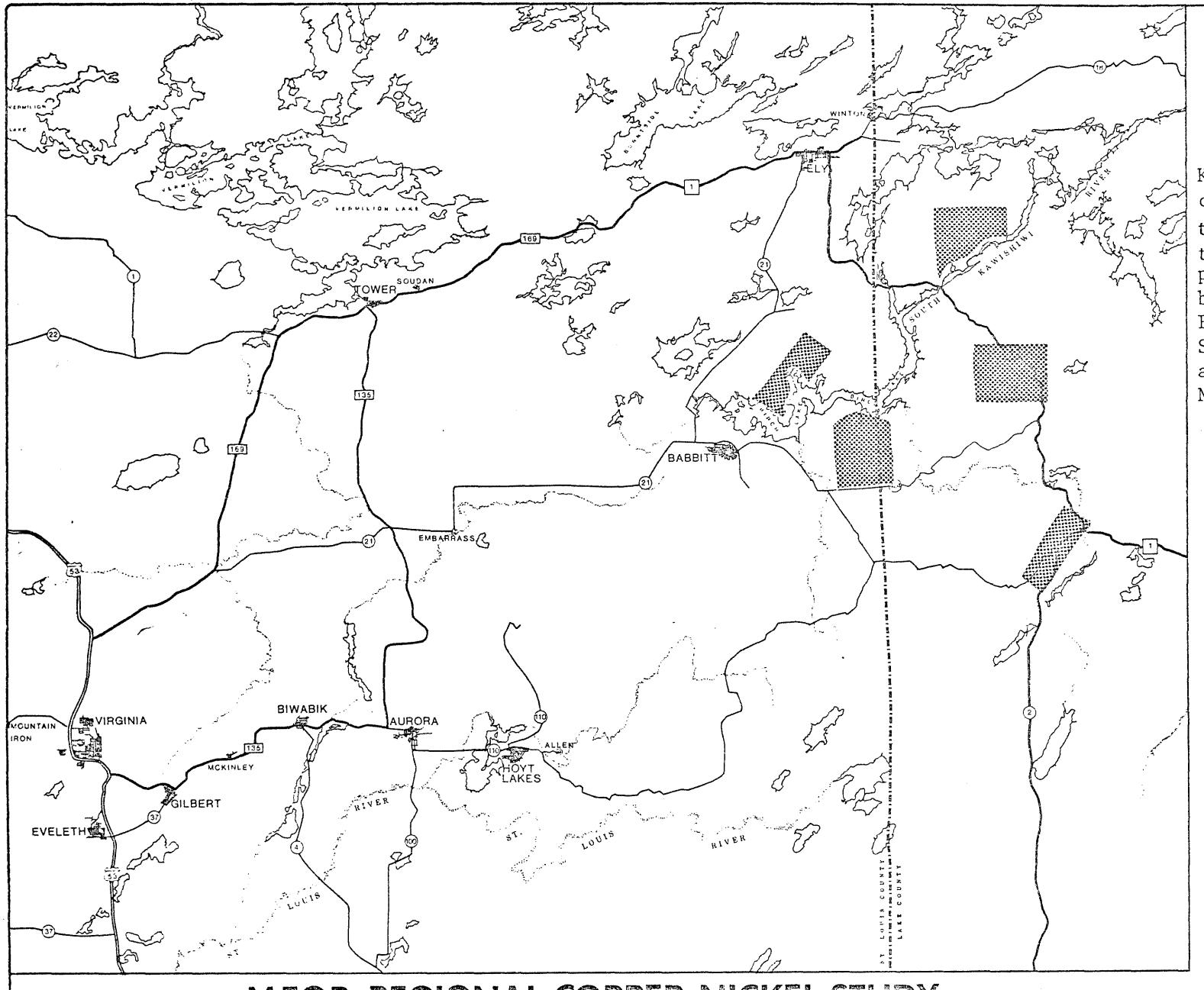
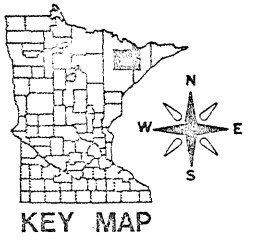


MEQB REGIONAL COPPER-NICKEL STUDY

LEGEND

Fig. 1.

Known timber wolf denning sites within the eastern portion of the Study Area(Data for producing map provided by L. David Mech, USDI, Fish and Wildlife Service, headquartered at NCFES, St. Paul, Minnesota.)



KEY MAP

1 422.400

MILES 0 1 2 3 4 5 10

0 1 2 3 4 5 10 15 KILOMETERS

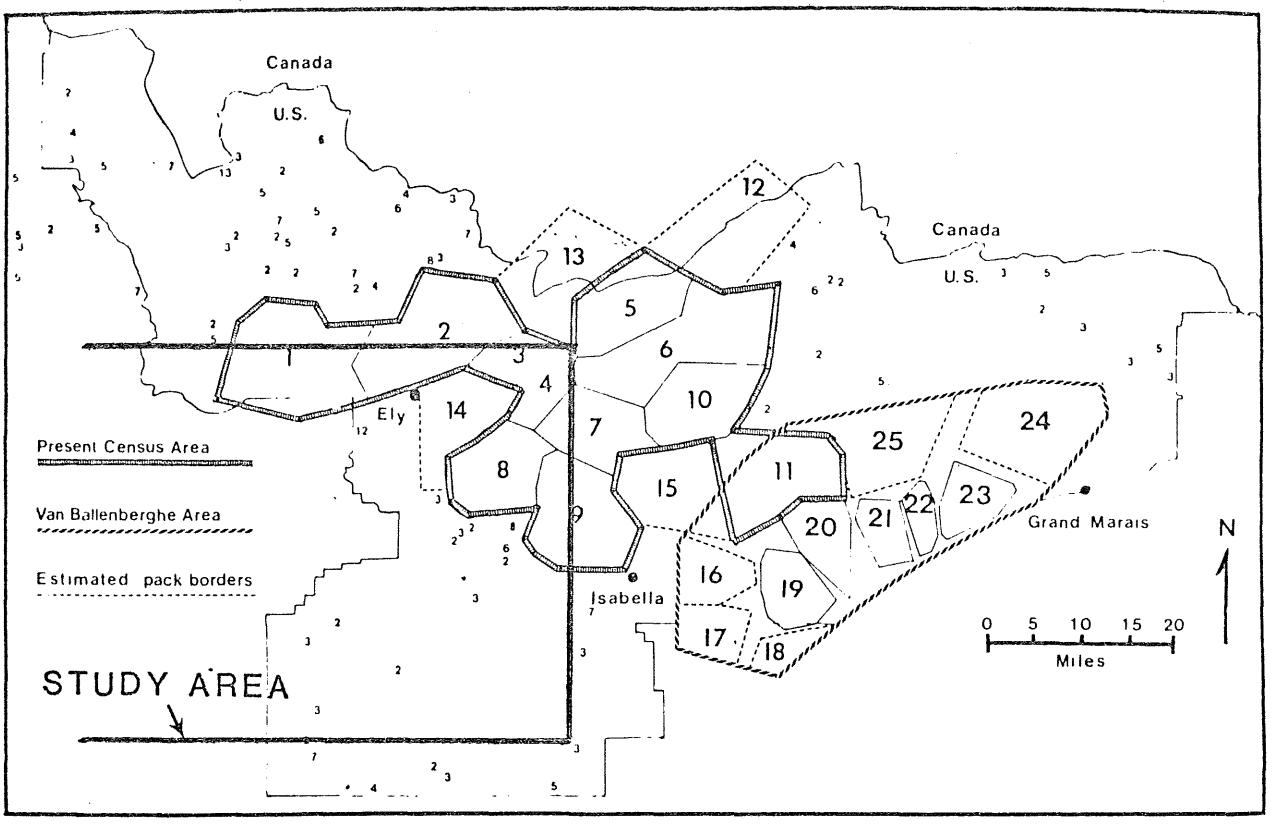


Fig. 2. Known Timber Wolf Pack size and location of territories within the eastern portion of the Study Area.

(Map from Mech 1973, his Fig. 1,

"The Superior National Forest study area. Large numerals identify wolf packs A, and lines around them indicate approximate pack territory borders. Small numerals represent the sizes of packs or their tracks observed outside of the intensive census areas (lone wolves not plotted)." Map modified by drawing in the boundary of the study areas.

A. See Table 1 for seasonal sizes of wolf packs indicated in figure.

Fig. 3. Timber wolf observations by Copper-Nickel staff.

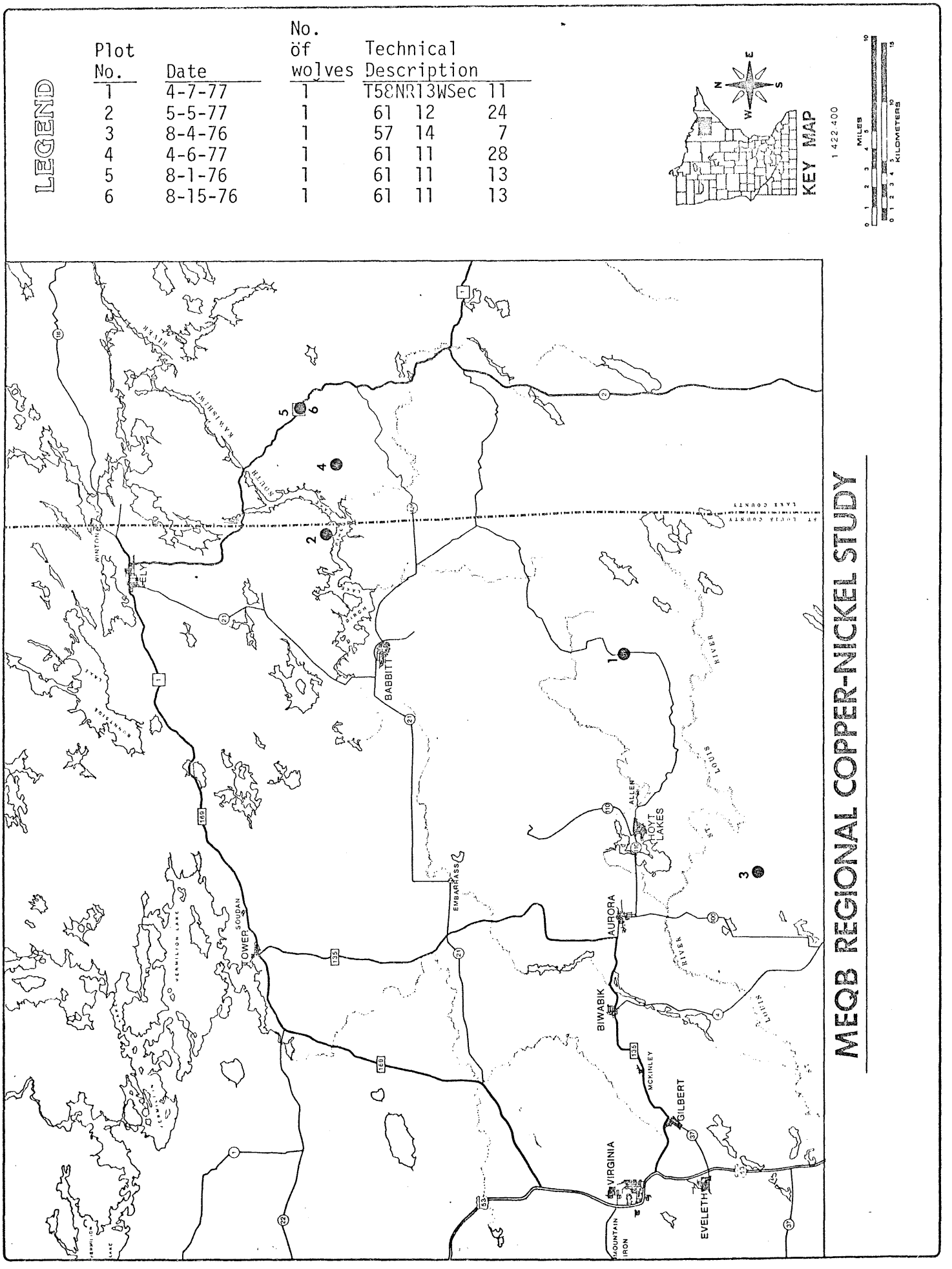


Table 1A--*Sizes of known wolf packs on the Superior National Forest (Underlined figures indicate pack was radioed. Packs 16 to 28 from Van Ballenberghe (1972). Winter figures are the maximum pack sizes observed from December through February; spring figure represents maximum pack size observed during March and April.)*

(In numbers)

Pack No. 1/	Name	1966-67		1967-68		1968-69		1969-70		1970-71		1971-72		1972-73	
		Winter	Spring	Winter	Spring	Winter	Spring	Winter	Spring	Winter	Spring	Winter	Spring	Winter	Spring
1.	Glenmore L.	6	--	--	--	8	--	--	--	--	--	12	8	12	4
2.	Newton L.	6	--	6	--	8	--	11	11	--	7	7	7	2/6	--
3	Pagami L.	6	--	--	--	--	--	--	--	6	6	5	3/3		
4.	Greenstone L.	--	--	--	--	4	--	--	--	5	5	4	3/3	6	3
5.	Ensign L.	4/7	--	--	--	--	--	--	--	--	11	15	3/6	10	5
6.	Thomas L.	--	5	5	--	6	--	--	--	--	6	5	5	7	0
7.	Quadga L.	--	--	--	--	--	--	--	--	6	6	5	3/4	2	--
8.	Harris L.	--	--	--	--	5	5	--	4	9	6	3	2	5	4
9.	Jackpine	--	--	--	--	--	--	6	5	7	6	9	6	7	6
10.	Maniwaki L.	8	8	6	--	10	7	14	--	7	--	9	7	10	3
11.	Timber L.	--	--	--	--	--	--	8	--	--	--	5/8	3/7	7	--
12.	Knife L.	--	--	--	--	13	9	--	--	--	--	--	8	--	--
13.	Canadian Pt.	7	6	--	--	4/6	--	--	9	8	4	4	--	--	--
14.	Birch L.	--	6	--	--	--	--	--	--	--	--	--	--	6	--
15.	Sawbill	--	--	--	--	6	--	--	--	3	2	5	3	2/4	--
16.	Houghtaling Creek	--	--	--	--	--	--	--	--	--	--	5	--	--	--
17.	Manitou R.	--	--	--	--	--	--	--	--	--	--	6	--	--	--
18.	Byers L.	--	--	--	--	--	--	--	--	--	--	8	--	--	--
19.	Cross R.	--	--	--	--	--	--	--	--	--	--	9	--	--	--
20.	Temperance R.	--	--	--	--	--	--	--	--	--	--	8	--	--	--
21.	Onion R.	--	--	--	--	--	--	--	--	--	--	8	--	--	--
22.	Lutsen	--	--	--	--	--	--	--	--	--	--	5	--	6/5	6/5
23.	Ward L.	--	--	--	--	--	--	--	--	--	--	10	--	--	--
24.	Devils Track	--	--	--	--	--	--	--	--	--	--	7	--	--	--
25.	Clara L.	--	--	--	--	--	--	--	--	--	--	5	--	--	--

1/ See figure 1.
2/ Based on a single observation from the ground.
3/ May be less.
4/ May be more.
5/ Van Ballenberghe (1972).
6/ Lloyd Scherer (personal communication).

A. Table from Mech 1973, his table 3.