

REGIONAL COPPER-NICKEL STUDY
BALD EAGLE (HALIAEETUS LEUCOCEPHALUS)

Minnesota Environmental Quality Board

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PRELIMINARY DRAFT REPORT, SUBJECT TO REVIEW

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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.

ABSTRACT

Bald eagles in Minnesota are a "threatened" species and protected by both state and Federal law. The principal breeding populations in the state are within the Chippewa National Forest (CNF) and the Superior National Forest (SNF).

There are two active nests within the Copper-Nickel Development Zones, and a total of 12 in the Study Area. These two nests represent 1.0 percent of all nests in the Eastern Region of the United States Forest Service (USFS), 5.1 percent of active nests on the SNF, and 1.7 percent of the 116 active nests in the state. These same figures for the 12 nests on the Study Area are 6.1, 30.8 and 10.3 percent.

Eagle nesting sites are usually in stands of mature forest. Preferred cover types are conifer and conifer-deciduous uplands. Nests are most often built in red pine, but jack pine, white pine, aspen and birch are occasionally used. Nests are normally within 1.6 miles of water supporting adequate fish populations, and often surrounded by natural openings on at least one side.

The principal food item is fish. From 50-95 percent of the diet in the Study Area is probably composed of walleye, yellow perch, and northern pike, followed by white sucker and tullibee. Waterfowl may be important to residents and migrants alike in fall.

Mining development within the northern one-third of the Study Area would be the most detrimental to the bald eagle population. Minimal harm would result from development within the southern two-thirds.

INTRODUCTION

The bald eagle (Haliaeetus leucoccephalus) in Minnesota is listed as threatened by both the United States Fish and Wildlife Service (USFWS) and the Minnesota Department of Natural Resources (MDNR). This threatened status presently includes both the southern (H.l. leucocephalus) and northern (H.l. alascanus) subspecies. The breeding population in Minnesota is thought to be the northern subspecies (Dr. Frenzel, U of M pers. comm.). The only discernable difference "seems to be that the northern bald eagle is larger and heavier than the southern bald eagle" (USDI 1973).

The principal bald eagle breeding population in Minnesota is currently distributed between two National Forests, the Superior (SNF) and Chippewa (CNF). Nearly twice as many active nests were recorded in the Chippewa (n=77) in comparison with the Superior (n=39) in 1977 (K. Siderits, biologist, U.S. Forest Service (USFS), SNF: pers. comm.). Known, active nests on these two areas are the only ones considered in this paper.

METHODS

Information pertaining to food and habitat preferences, natural history and population density was obtained from a literature review and personal communications with biologists working in the state. Eagle observations made by copper-nickel staff on and adjacent to the Copper-Nickel Development Zone are included.

RESULTS

The total wintering population of bald eagles in the contiguous United States (both subspecies included) has been estimated at 3,700 for the

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period from 1961-1963 (Sprunt et al. 1966). The number of breeding pairs in 1972 in this same area was estimated at 750 (1,500 individuals; Knoder 1972, cited in USDI 1973). This is approximately 3-4 percent of the 35-40,000 eagles estimated for the most densely populated state, Alaska (Robards 1973, cited in USDI 1973).

Studies have indicated that eagle populations in Alaska, Wisconsin, Minnesota and Florida are probably stable, while those in Michigan, the remaining Great Lakes area and Maine are declining. East coast populations are declining at a more rapid rate (Sprunt et al. 1966, Sprunt 1969). A principal cause for this reduction is the complete lack of reproduction of certain pairs rather than generally declining reproduction for the population as a whole.

HABITAT

Eagle nesting sites are normally in stands of mature forest. Of 1,700 nests located in Alaska, none were in young timber cover (USDA 1972, cited in USDI 1973). Although mature upland conifer stands of red pine (Pinus resinosa), white pine (Pinus strobus), and jack pine (Pinus Banksiana) are preferred in the Lake States, mixtures of these species with aspen (Populus spp.), birch (Betula spp.), fir (Abies spp.) and spruce (Picea spp.) are also used. Nest trees are often surrounded by large, natural openings on at least one side such as marshes, stunted swamp vegetation or open water (Kussman 1977). In addition, approximately 90 percent of all nests in the CNF are within 1.6 km of open water that support the fish populations used as food (S. Mathisen, biologist, USFS, pers. comm.).

Telemetry studies and annual census on the CNF (Kussman 1977, Mathisen 1968) and annual census on the SNF (K. Siderits, USFS, pers. comm.) have revealed an overwhelming preference for mature and over-mature red and white pines as nest trees in north central and northeastern Minnesota. Mature aspen trees have also been used, but only 3 (SNF) to 12 (CNF) percent of all nest trees located were aspen. Both aspen and birch are used more commonly as perch trees, both adjacent to and distant from nest trees (Kussman 1977). Unlike an Alaskan study which showed a preference for spruce as nesting sites (Corr 1974), this species is not considered an important alternative in the Lake States.

FOOD

The principal food of bald eagles, on a seasonal basis, is fish. A field study at nest sites in the CNF by Dunstan and Harper (1975) found the following frequency breakdown during the nesting season: fish, 90.1 percent (35.1 percent bullhead, Ictalurus spp.; 29.1 percent sucker, Catostomus spp., Moxostoma spp., 13.9 percent northern pike, Esox lucius); 7.9 percent birds (4.6 percent ducks, 2.0 percent gulls, 1.3 percent other); 1.3 percent mammals (all muskrat, Ondatra zibethicus); 0.6 percent invertebrates (0.3 percent crayfish, Cambarus spp.; 0.3 percent clam, Lampsilis spp.). Other studies have shown that fish range from 50.8 percent of the diet on San Juan Island, Washington (Retfalvi 1970), to 70-96 percent in Ohio (Herrick 1924) and 90 percent in New Brunswick (Wright 1953; last three references cited in Dunstan and Harper 1975).

Kussman (1977), also working in the CNF, found that northern pike, bullheads and tullibee (Coregonus artedii) were the most important fish taken, followed by suckers and yellow perch (Perca flavescens). Both young and

juvenile eagles captured waterfowl in the late summer-late fall. Mallards (Anas platyrhynchos), coot (Fulica americana), and blue-winged teal (Anas discors) were captured during their molt, along with individuals that were crippled and not recovered during the waterfowl hunting season.

Kussman speculated that waterfowl may be an important source of food to resident and migrating eagles, alike, at this time of the year.

Within the Development Zones, there are presently two nesting pairs of bald eagles. One pair nests near Seven Beaver Lake, the other on the Kawishiwi River near White Iron Lake and Birch Lake. The most abundant fish species in Seven Beaver Lake is the walleye (Stizostedion vitreum), with yellow perch a close second and northern pike, white suckers (Catostomus commersoni) less than half as numerous (See Copper-Nickel Fisheries Report). On a weight basis the order is walleye, sucker, pike and perch. Birch Lake probably supplies the majority of the food for the eagle pair and their young in the northern area. Fish species in this lake, ranked by biomass, are similar to the above but also include the tullibee.

It is likely that the above five fish species represent 80-90 percent of the diet of adult and nesting bald eagles within the Copper-Nickel Development Zones.

Fish population reductions and/or heavy metal contamination, especially in Birch and Seven Beaver Lake, may decrease eagle reproductive success or cause abandonment of nesting territories.

MORTALITY

The largest single source of direct mortality of bald eagles is illegal shooting. Eagles examined by Mulhern et al. (1970, n=69) and Coon et al. (1970, n=76) revealed that between 40-60 percent had been shot. The next

most important loss is by contamination of adults and young through their food chains by organochlorines (especially DDT and DDE). These chemicals decrease reproductive success and may cause death of adults and juveniles if ingested in large quantities. Other sources of mortality or population reductions are loss of waterfront habitat to development, car impact, and electrocution of eagles perching on certain types of transmission lines, (USDI 1973).

IMPORTANCE OF STUDY AREA TO NESTING BALD EAGLES IN MINNESOTA

Within the Copper-Nickel Development Zone, there are presently two known nesting pair of bald eagles (K. Siderits, USFS, pers. comm.; locations presented earlier in this paper). These two active nests represent 1.0 percent of the 197 active nests located on the national forest land within the Eastern Region of the USFS during 1977 (K. Siderits, USFS, pers. comm.). They also represent 5.1 percent of the 39 active nests known for the SNF and 1.7 percent of the 116 active nests (SNF=39, CNF=77) on Federal land in Minnesota.

Within the Study Area, there were 12 active eagle nests in 1977 (K. Siderits, USFS, pers. comm.). These nests represent 6.1 percent (12/197) of the active nests in the Eastern Region, 10.3 percent (12/116) of active nests in Minnesota, and 30.8 percent (12/39) of the active nests in the SNF.

DISTRIBUTION OF EAGLE OBSERVATIONS

Copper-nickel field staff reported 9 eagle observations at 8 different locations (6 in 1976, 2 in 1977, Fig 1) on or adjacent to the Copper-Nickel Development Zone. All were adjacent to or north of Highway 1 in the northeastern portion of the Study Area. These observations agree with the location of nest sites which are almost exclusively in the

northern one-third of this area (K. Siderits, USFS, pers. comm.; nest sites have not been plotted for protection purposes).

CURRENT PROTECTION FOR NEST SITES

Current management for eagles on the CNF includes a Management Plan Document for each nesting territory, whether the territory is currently active or not. This document includes photos of the site and surrounding cover, characteristics and measurements of the nests and adjacent perch trees, pair behavior and other information used to form specific management plans for each site. (Mathisen et al. 1977).

Similar documents will soon be compiled for eagle territories on the SNF (K. Siderits, USFS, pers. comm.). All known nests are currently protected by a 0.4 km radius buffer zone. Various degrees of protection are provided within this zone, ranging from no human disturbance or cutting at any time to no disturbance during the nesting season and/or only logging beneficial to eagles. In some cases this radius is extended to 0.8 km to provide additional protection to pairs in areas particularly vulnerable to disturbance (Mathisen et al. 1977). These regulations are currently being strengthened. Mining permit requests which would require trespassing on these eagle territories will need special approval of the USFS, USFWS, and MDNR.

IMPACT

Within the Copper-Nickel Development Zones (Figure 2) portions of watersheds 3, 7, 11 and the eastern one-third of 17, are the most important for eagles. Mining development in the remainder of the region, and especially within watershed 12, 14 and the western two-thirds of 17, would not affect nesting

and/or hunting areas for the resident eagles.

For the Study Area as a whole, development within and below township 60N (southern two-thirds) will have marginal, if any, affect on the eagle population. Operations above this point, even if nesting areas are left intact, could reduce eagle densities in the region. Agents of this reduction could include: breeding season disturbance caused by increased human population, roads, industrial noise, private residences, etc.; increased water pollution and/or turbidity which may reduce the number of species, biomass of fish, and/or availability of fish as food for eagles; and "parceling" of large contiguous forest in to smaller units by roads, wasterock and tailing ponds, power lines, and other mining and support facilities. With an increase in the number of residents in the northern area, the incidences of illegal shooting (a major source of mortality for eagles) may also be expected to increase.

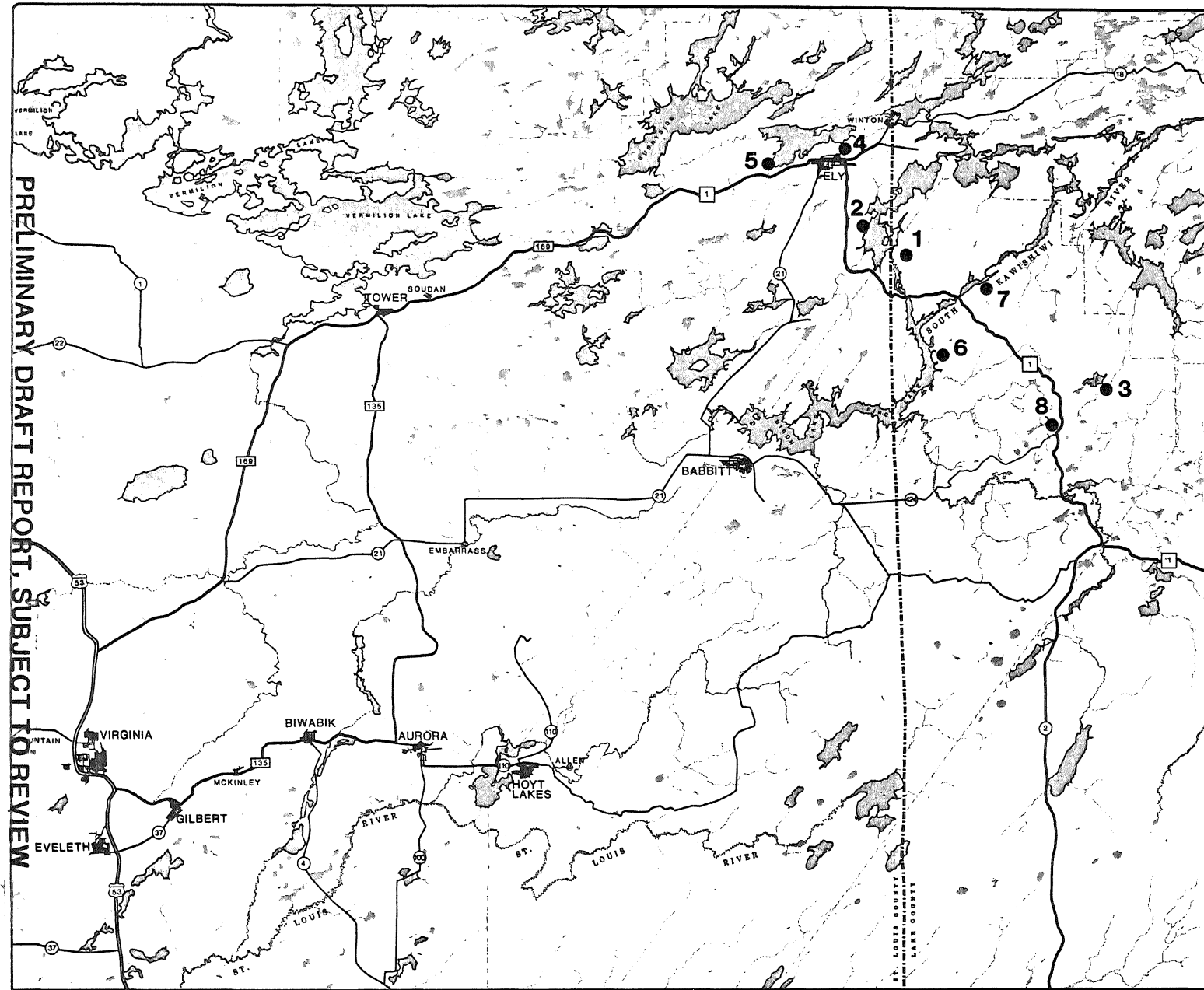
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LEGEND

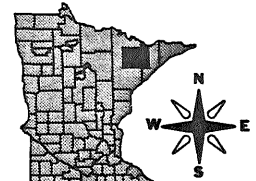
Fig. 1. Observations of bald eagles on and adjacent to the Copper-Nickel Development Zones..

A. See Fig. 1 (cont.) for technical description, date and number pf eagles seen.



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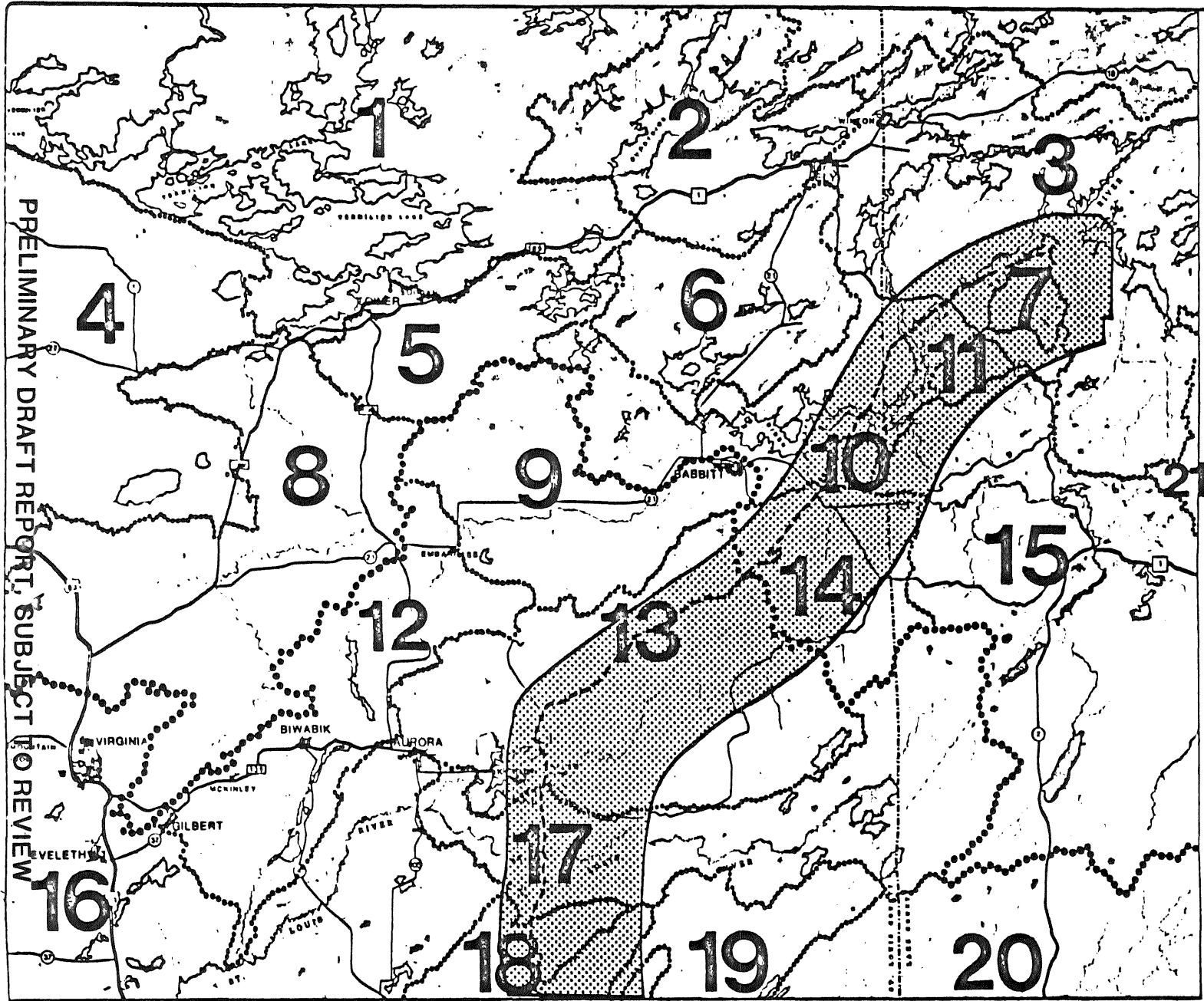
KEY MAP

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Fig. 1 (Cont.)

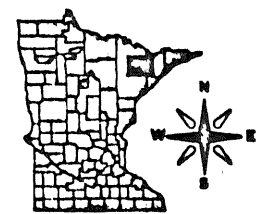
Map Location No.	Date	Number seen	Technical Description
1	7-19-76	1	T62NR11W Sec30
2	7-21-76	1	T62NR12W Sec14
3	9-1-76	1	T62NR10W Sec15
4	9-22-76	1	T63NR12W Sec27
5	11-7-76	1	T63NR12W Sec31
6	12- 3-76	2	T61NR11W Sec8
7	7-20-77	1	T62NR11W Sec34
8	8-1-77	1	T61NR10W Sec31



LEGEND

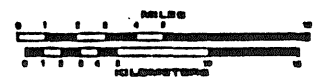
-  CU-NI DEVELOPMENT ZONES
-  LAURENTIAN DIVIDE
-  WATERSHED BOUNDARY
-  DULUTH CONTACT

1. Vermilion
2. Shagawa
3. Kawishiwi
4. Little Fork River
5. East & West River
6. Bear Island
7. Filson Creek
8. Pike River
9. Embarrass River
10. Unnamed Creek
11. Keeley Creek
12. Lower Embarrass
13. Partridge
14. Dunka
15. Stony River
16. Lower St. Louis
17. St. Louis
18. Water Hen
19. White Face
20. Cloquet
21. Isabella



KEY MAP

1:422,400



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FIGURE 2. Watershed Dessignations within the Copper-Nickel Study Area.