

REGIONAL COPPER-NICKEL STUDY
SPRUCE GROUSE (Canachites canadensis)

Minnesota Environmental Quality Board
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PRELIMINARY DRAFT REPORT, SUBJECT TO REVIEW

ABSTRACT

Spruce grouse are probably distributed throughout the entire Study Area, but highest densities are expected in the northern one-half of this area. This species is an important component of the boreal forest in Canada and Alaska, and has very limited distribution in the contiguous United States.

Major habitats include middle-aged and mature jack pine dominated uplands and black spruce dominated lowlands. Late summer and fall densities, based on field studies in spruce cover types from nearby Koochiching County, indicate that 4-5 spruce grouse are present on each 12 hectares of favorable forest cover.

Spruce grouse are only a minor game bird species in Minnesota, with far fewer harvested than any other upland game. The main importance of this bird in the state and Study Area is its aesthetic value as a member of boreal forest ecosystem.

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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Figure 1. Field location of spruce grouse observations.

INTRODUCTION

Spruce grouse (Canachites canadensis) are generally considered a bird of the mature coniferous forest dominated by jack pine (Pinus Banksiana) and/or spruce-fir (Picea spp.-Abies spp., Aldrich 1963). This species is distributed across the boreal forest of Canada and Alaska, with a distribution in the United States restricted to portions of certain northern states.

In the past, spruce grouse were found as far south as Mille Lacs County in the central portion of the state (Hatch 1892, cited in Haas 1974). Extensive logging and fires during the late 1800's and first two decades of the 1900's greatly diminished this former range. Their present distribution is largely restricted to the northern portion of five counties along the Canadian border from Lake of the Woods to Cook County (Roberts 1932, cited in Haas 1974).

Spruce grouse, unlike ruffed grouse, are seldom actively pursued by Minnesota hunters. These birds are often called "fool hens" by sportsmen because they commonly flush from the ground and remain perched in trees as hunters approach. This behavior, plus a belief that their flesh is tainted by the large quantities of spruce needles that they consume, renders spruce-grouse a rather unimportant ranking as a game bird.

METHODS

A literature review has provided most of the information for this report. Emphasis is placed on two spruce grouse studies from nearby Koochiching County by Haas (1974) and Anderson (1973). Field observations from the eastern one-third of the Regional Copper-Nickel Study Area (Study Area) are included.

RESULTS

Spruce grouse were protected by the Minnesota Department of Natural Resources (MDNR) from 1915 to 1968 (Longley and Knudson 1974). A hunting season was established in 1969, with statewide harvest for the first two years estimated at 11,537 and 11,559, respectively.

As noted earlier, spruce grouse are a relatively unimportant game bird in Minnesota. This is a result of their limited distribution, behavior and folklore pertaining to their palatability. The following are ratios of other game birds to spruce grouse harvested during the 1969 and 1970 seasons in Minnesota. These are the only two years with harvest statistics for comparison for this species, with all figures used to calculate these ratios from Longley and Knudson (1974):

1. Ruffed grouse (Bonasa umbellus), 63:1
2. Pheasants (Phasianus colchicus, 1470 data only), 14:1
3. Woodcock (Philohelo minor), 2:1
4. Sharp-tailed grouse (Pedioecetes phasianellus), 2:1
5. Hungarian (Gray) partridge (Perdix perdix) 1:1

The state-wide population ratio (not harvest ratio) of ruffed grouse: spruce grouse in Michigan was estimated at 100:1 by Robinson (1969).

Field observations by Copper-Nickel staff and AMAX biologist within and adjacent to the mineralized portion of the Study Area indicate that spruce grouse are probably distributed throughout this area where favorable habitat exist. This may also be true for the entire Study area. However, as Fig 1 indicates the highest densities and widest distributions are probably in

the northern one-half of the Study Area. The highest proportions of mature conifer uplands and lowlands are located in this region, the principal habitat of this species.

A total of 34 individual spruce grouse were observed at 21 different sites (Fig. 1). The majority of observations were in northern watersheds 3, 7, 10, 11, 13, 14, and 15 (Fig. 2). No observations were reported in 17, 19, and 20. Twenty-nine of the 34 individual spruce grouse observations were in areas north of Township 58N in the northeastern portion of the Study Area. Only a single siting of 5 birds was made to the south of this point (Fig. 1).

HABITAT

Spruce grouse occupy two major and ecologically distinctive forest types, these are lowland black spruce (Picea mariana) forest on peat soils (Anderson 1973, Haas 1974) and upland sites dominated by jack pine on mineral soil (Robinson 1969). Mixtures of these two conifers with tamarack (Larix laricina) white spruce (Picea glauca), trembling aspen (Populus tremuloides), and paper birch (Betula papyrifera) are also used.

Although spruce grouse are generally most common in mature conifer forests, seasonal requirements can and do require a variety of age classes. Findings from nearby Koochiching County within a black spruce dominated forest indicated that territorial males preferred more mature, closed canopy black spruce during, before and after the spring breeding season

(Anderson 1973). Nesting females preferred younger forest of the same type, but generally avoided these same areas when accompanied by broods (Haas 1974). Young birds and hens were found most often in black spruce and rich swamp forest dominated by black spruce, with balsam fir (Abies balsamea), white pine (Pinus strobus), and willows (Salix spp.; Haas 1974). Summer range on a jack pine barren in Michigan (Robinson 1969) included a generally more open forest with tree branches that extended to the ground. Stands were 50 years old or younger. Types generally avoided by spruce grouse on a seasonal basis are black spruce clearcuts between 1-30 years old (Haas 1974) and mature Jack pine stands (Robinson 1969).

Spruce grouse in the Study Area appear to use both jack pine and black spruce habitats. The following is a list of specific habitat that are important to spruce grouse.

1. Middle-aged to mature black spruce and/or middle-aged jack pine forest with moderate to heavy stocking rates meet seasonal needs. Poorly stocked stands (20-40 percent canopy closure) are not substitutes for the above types.
2. Jack pine-spruce mixtures are required on upland sites. Pure jack pine stands are seldom used.
3. Productive forests are preferred. Slow growing ("unproductive") forest and/or swamps are not important as alternative habitats for spruce grouse in Minnesota (Haas 1974, Anderson 1973).
4. Moderate amounts of habitat disturbance by logging or fire are not detrimental to this species. Small clearings created by either factor may even be beneficial for broods, or provide additional nesting cover (Haas 1974). Burned areas containing unburned trees may be used as feeding sites during the winter season (Ellison 1975).

Density estimates from black spruce habitats can be used to evaluate the effect of alternate land use on spruce grouse in the Study Area. Haas (1974) and Anderson(1973) estimated that 4-5 individuals would be present on a 12 ha. area. This figure includes both the breeding population and yearly reproductive gain. This same density figure may also be applicable to jack pine-spruce and jack pine- deciduous forest lost to mining in the Study Area.

Habitat information is also available for 25 of the 34 individual spruce grouse observations plotted on Fig 1. Of these, a slightly larger proportion were in jack pine forest (N=10, 40 percent) than black spruce (N=8, 32 percent). Other types included mixed deciduous-coniferous stands (N=2, 8 percent) birch-aspen (N= 3, 12 percent) and aspen forest (N=2, 8 percent). All but 2 of these stands were judged or known to be 25 years or older, while one was a 5-10 year old jack pine plantation and another, a 5-10 year old aspen.

FOOD

Food studies during the snow-free period show that needles from jack pine, spruce and tamarack are used, but the diet is usually dominated by leaves, flowers, seeds and insects obtained from the forest floor (Ellison 1966, Crichton 1963, Jonkel and Greer 1963). Many studies concluded that the single most important food during this season is fruits, especially blueberries (Vaccinium spp.). During the winter spruce grouse obtain their entire diet by browsing. The predominant or exclusive food during this 5-7 month period are the needles of black spruce, white spruce and jack pine.

CONCLUSION

The occurrence of spruce grouse in the Regional Copper-Nickel Study Area is important for a number of reasons. Aside from being a component of the boreal forest, spruce grouse have a rather limited distribution in Minnesota that includes only a narrow band from Lake of the Woods to Cook County. This species has had a history of past protection, a situation that could possibly be reinstated if large amounts of habitat are destroyed.

Spruce grouse are often reluctant to flush when encountered by man. This behavior allows close-range observation by both bird watchers and photographers. This opportunity is available in only a limited number of locations in the entire contiguous United States.

Request for permits by mining companies which include extensive stands of middle-aged and mature spruce, spruce-fir, jack pine, or jack-pine-spruce aspen should be required to evaluate these areas and their importance to the regional distribution of spruce grouse. This is true in watersheds 3, 7, 10, 11 where we believe a substantial proportion of the population in the Study Area is currently located. Development within watersheds 17, 18, 19, and 20 will probably have a very marginal effect on habitat for this species. On the other hand, land alteration within watershed 5 where we have no information on spruce grouse should be preceded by a general census directed at determining density and distribution parameters. The extensive spruce and spruce-fir forest in this region may provide ample habitat for spruce grouse.

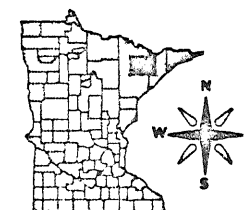
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LEGEND

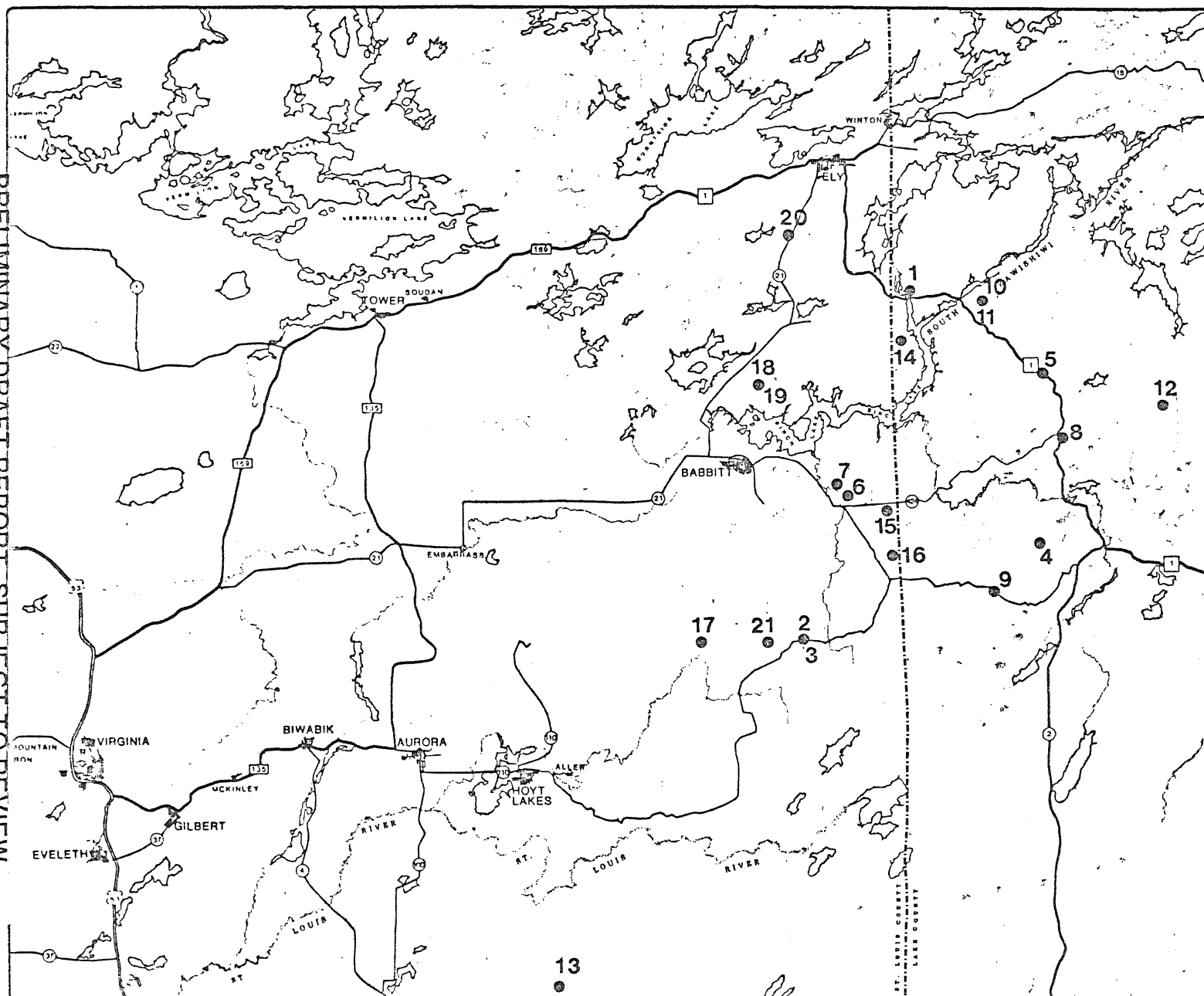
Fig. 1. Field location of spruce grouse observations. A

A. See accompanying list of technical descriptions.



KEY MAP

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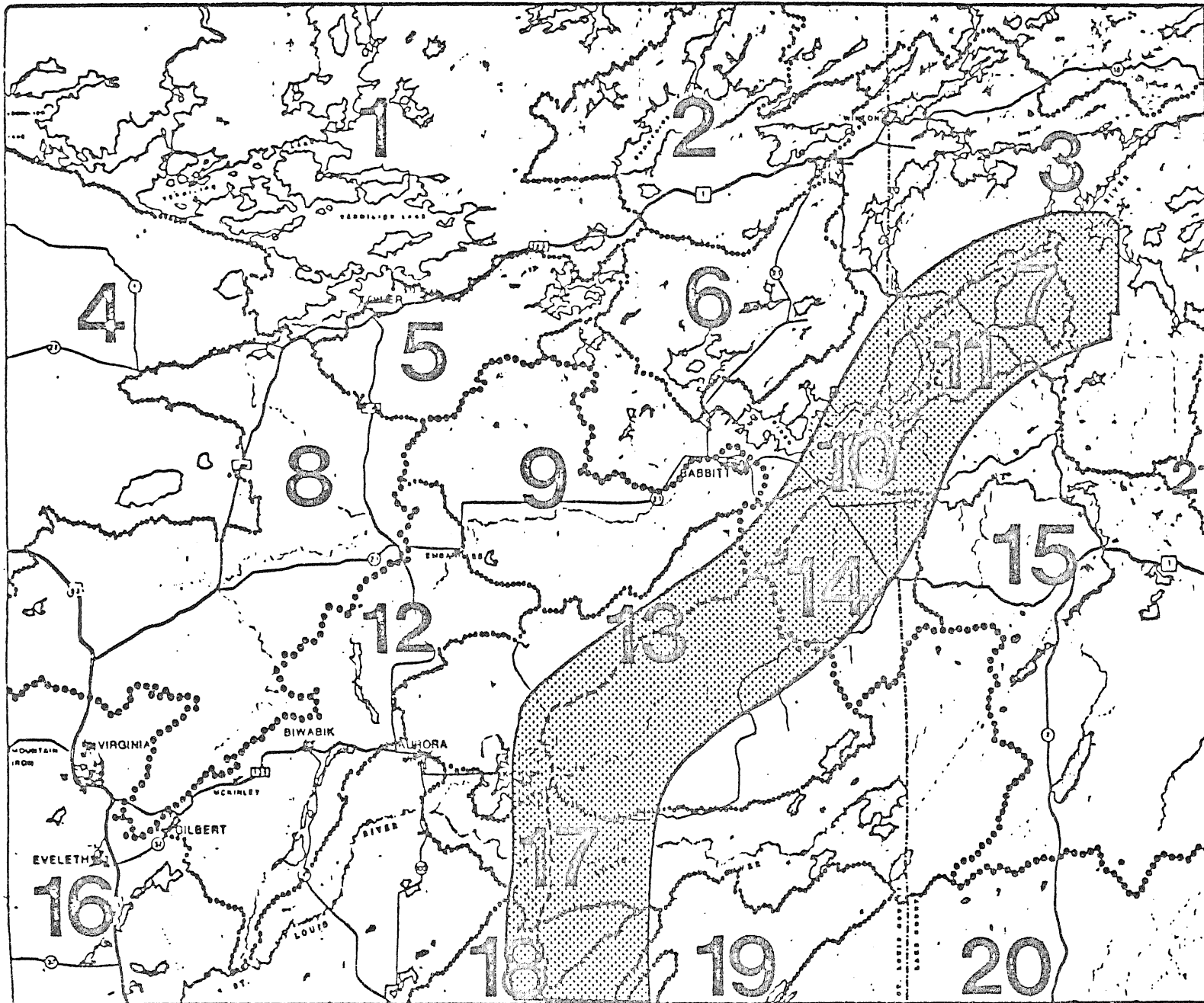
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Fig. 1 (cont'd)





	Plot No.	Date of Observation	Technical Description _B	No. of Spruce Grouse Seen
	1	2-7-77	T62R11Sec31	1
	2	2-7-77	T60R11Sec9	4
	3	2-8-77	T60R11Sec9	1
	4	10-30-76	T60R11Sec25	2
	5	10-30-76	T60R10Sec18	1
	6	9-4-76	T60R12Sec10	1
Copper-Nickel Obser.	7	9-5-76	T60R12Sec10	1
	8	9-5-76	T61R10Sec32	1
	9	9-5-76	T59R11Sec3	1
	10	9-30-76	T62R11Sec34	1
	11	9-30-76	T62R11Sec34	1
	12	9-9-76	T61R9Sec19	1
	13	9-18-77	T57R14Sec34	5
	14	6-18-76	T61R11Sec7	5
	15	5-6-76	T60R12Sec13	1
	16	11-12-76	T60R12Sec25	1
Amax. Obser.	17	10-4-77	T59R12Sec7	1
	18	10-22-77	T61R12Sec18	1
	19	10-29-77	T61R12Sec18	1
	20	10-22-77	T62R12Sec17	1
	21	10-25-77	T59R12Sec7	2
			Total	34 Individual Spruce Grouse

B. All townships (T) are North,
All range (R) are west.

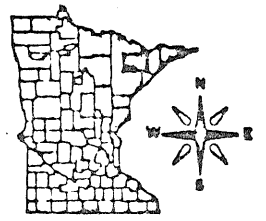
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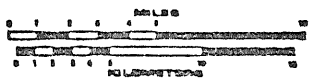
-  CU-NI DEVELOPMENT ZONES
-  LAURENTIAN DIVIDE
-  WATERSHED BOUNDARY
-  DULUTH CONTACT

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

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