REGIONAL COPPER-NICKEL STUDY

OSPREY (*PANDION HALIAETUS*)

Minnesota Environmental Quality Board

Dick Huempfner

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PRELIMINARY DRAFT REPORT, SUBJECT TO REVIEW

TABLE OF CONTENTS

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

The North American osprey population has declined gradually since the late 1800's. Their decline accelerated in the 1950's and 60's and coincided with widespread use of DDT. This pesticide has often been mentioned as the causative agent of the decline.

Osprey breeding in the Superior National Forest (SNF) has been highly successful compared to many other locations where populations are monitored. There are a minimum of 8 active nests in the Study Area, all located in the northern one-third of that area. Only one active nesting site is known for the Copper-Nickel Development Zone. Active nests within this zone and the Study Area represent 0.9 and 7.3 percent of active osprey nests in Minnesota, respectively. Comparative proportions of nests on these two areas with nests occuring on Federal land in the U.S. Forest Service's (USFS) Eastern Region are 0.6 and 5.0 percent respectively.

Traditional osprey nesting sites are dead tree "snags" either surrounded by water or along shorelines of lakes, rivers, bays or man-made reserviors. Nests in the SNF are commonly built in white or red pine, with black spruce used only occassionally.

Fish are the principal food of osprey and commonly amount to 90 percent of the diet. Although uncommon, mammals, birds, reptiles, amphibians and invertebrates may be eaten. Walleye, white sucker, northern pike, cisco and yellow perch are probably the most utilized species on the Study Area.

Nest sites appear to be adequately protected from development by existing laws.

INTRODUCTION

Osprey (Pandion haliaetus) are currently protected by law throughout the United States. Inadequate field data currently prevent the U.S. Fish and Wildlife Service (USF & WS) from classifying this species as either threatened or endangered (Kahl 1971).

The North American osprey population has declined gradually since the late 1800's. Widespread use of DDT started in 1947 and is suspected of accelerating this decline in the late 1950's and early 1960's (USDI 1974). Levels of these chlorinated hydrocarbons have been linked with considerable thinning of egg shells that often break during normal incubation. Reduced nestling vigor and increased infertility of eggs may also result (Kennedy 1972).

Osprey nesting strongholds in Minnesota are the Chippewa National Forest (CNF) and the Superior National Forest (SNF). A total of 87 and 23 active nests were reported for these two forest, respectively in 1977. (K. Siderits, Biologist, USFS, pers. comm.).

METHODS

Information on food and habitat requirements, natural history and reproductive trends was obtained largely from the literature. Field biologists from several agencies provided updated census statistics and current management policies.

RESULTS

Population Status

Osprey, in the contiguous United States, are distributed primarily along

the east and west coast, with smaller concentrations occuring in the Lake States, Idaho, Montana and Wyoming. The principal wintering grounds are in South America, but portions of California, the Gulf Coast and the West Indies are also used (USDI 1974; Henney et al. 1972).

Breeding densities on the CNF in Minnesota have been relatively stable since 1969. The number of active nest on the SNF during this same period has increased 2-3 fold (USFS 1976). The increase largely represents a greater effort to locate nests in the northeastern region, although recently the number of young raised on the SNF has increased substantially (K. Siderits, UFSF, pers. comm.; Table 1).

Osprey reproduction in Minnesota is considerably better than the Lake States in general. Osprey on the shores of Lake Michigan, especially, are still characterized by poor reproductive success (Postupalsicy 1972). Inland regions generally have higher and more stable reproductive gains.

HABITAT

Traditional osprey nesting sites are dead tree "snags" either surrounded by water or along shorelines of lakes, rivers, bays or man-made reserviors. Osprey in highly disturbed areas, especially along the mid-Atlantic Coast, have adapted to nesting primarily on man-made structures (Reese 1972). Reese concluded that even a reduction of forest cover from 27 percent to 2 percent on the Chesapeake Bay study area caused no serious problems for ospreys.

Habitats and/or characteristics of osprey nest sites from a number of different studies are summarized below:

1. Roughly 50 percent of all nest are within 100m of water,

with roughly 75 percent occuring within 1km, (USDI 1974, summarized mostly from California studies).

2. Dead conifers are used more commonly than living trees, and use of deciduous species are uncommon to rare (Postupalsry 1972, Michigan Study). Nest trees may be living or dead white spruce (Picea glauca), white cedar (Thuja occidentalis), black spruce (Picea mariana) and tamarack (Larix laricina). Nests are placed in mature, large diameter trees, often with broken tops and tall enough for sufficient security and visibility for detecting potential predators (Kahl 1971, California Study).

3. Man-made impoundments are beneficial to osprey and may increase the density of this predator in certain regions (Roberts and Lind 1972, Oregon Study).

Within the SNF, Siderits (USFS, pers. comm.) estimates that approximately 90 percent of all osprey nests are located along lake shores, the rest adjacent to old beaver ponds. White pine (Pinus strobus) and red pine (Pinus resinosa) are used about equally, with black spruce used only occasionally.

In the CNF of Minnesota, osprey commonly nest in spruce (Picea spp.), with nest trees commonly located near small potholes or beaver ponds (Mathisen, Biologist, USFS; pers. comm.). Forest cover types, ranked from most to least preferred, were: mature lowland conifers (spruce and tamaracks; mature white cedar-tamarack-spruce; mature upland hardwood (trembling aspen (Populus tremuloides) and paper birch (Betula papyrifera)); and mature northern hardwood stands (maple (Acer spp.) and basswood (Tilia americana)).

FOOD

Fish are the principle food of osprey. At any given location, their diet is usually made up up of 1-3 species (USDI 1974). Although mammals, birds, reptiles, amphibians and invertebrates may be taken in small amounts occassionally, fish often form 90 percent or more of the diet (Brown and Amadon 1968, Grossman and Hamlet 1964, Wiley and Lohrer 1973).

Dunstan (1974) conducted a food study in the CNF at six active nests. He found that fish taken as prey did not exceed 1 kg in weight and were the same species most commonly caught by local anglers and in gilled seine nets. The top three fish species, based on biomass delivered to the nest, were northern pike (Esox lucius), northern redhorse (Moxostoma macrolepidotum) and the less commonly used largemouth bass (Micropterus salmoides). The largest number of captures were made on bluegills (Lepomis macrochirus), black crappies (Pomoxis nigromaculatus) and yellow perch (Perca flavescens).

The only active osprey nest within the Copper-Nickel Development Zone is located adjacent to Birch Lake. This site has been active since at least 1974 (K. Siderits, USFS, pers. comm.).

Roberts (1969), working in Oregon, has suggested that decreases in rough fish or game fish, in certain lakes heavily used by ospreys may reduce hunting and reproductive success. Mills (1972) has also suggested that a reduction in food supply caused by pesticides and herbicides reducing fish population and the more efficient harvest methods employed by modern-day commercial fisherman may be an important factor in osprey declines in New Jersey. Similar considerations may be important for lakes, used

by osprey for hunting in the Study Area.

LOCAL BREEDING POPULATION

Within the Copper-Nickel Development Zones there is currently only one active osprey nest (K. Siderits, USFS, pers. comm.). This site is located near the shoreline on Birch Lake. Four other sites which have received use in the past are all adjacent to or north of Hwy 1. Most or all of these nests have blown down.

This one nest represents 4.3 percent (1/23) of the known and active nests within the SNF, 0.9 percent (1/110) of all osprey known to nest on National Forest land in Minnesota (SNF and CNF), and 0.6 percent (1/59) of all active nests on Federal land within the Eastern Region of the USFS (K. Siderits, USFS, pers. comm.).

Within the boundaries of the Study Area there are at least seven additional (8 total) breeding pairs (K. Siderits, USFS, pers. comm.). Most are located in the northern one-third of the Study Area. (The location of nest sites is not indicated in this report in keeping with established USFS policy of confidentiality). These 8 total nests represent 34.8 percent (8/23) of all active nests in 1977 within the SNF, 7.3 percent (8/110) within Minnesota on Federal land (SNF and CNF), and 5.0 percent (8/159) on Federal lands within the USFS's eastern region.

NEST SITE PROTECTION

Osprey nest sites receive the same general protection under Federal regulations, accorded bald eagle nests, a basic 0.4 km radius buffer zone which in certain instances is extended to 0.8 km (see Copper-Nickel Bald Eagle Report). No land clearing or human disturbance is allowed within the

0.4 km zone, especially during the nesting season.

SOURCES OF MORTALITY

Banding data from osprey raised in California suggest that 53 percent of these birds die after dispersing from the nesting area during their first autumn (Kahl 1971). The average length of life of juveniles is 1.8 years, increasing to a mean of 4.8 years once maturity is reached.

Kahl (1971) has suggested three major sources of mortality. Most important is the impairment of reproduction by biomagnification of pollutants (especially DDT) which cause egg shell thinning, infertile eggs, and can directly cause death of fledglings and adults. Second is indiscriminate shooting. (Shooting is considered the major cause of death in Idaho, was high in Oregon, and may be the key factor in other areas (USDI 1974)). Third is destruction of habitat. Finally, reduced fish population may also be a major factor if Mills (1972) is correct.

IMPACT

Like bald eagles, osprey nesting sites on Federal land will continue to be protected. The major impacts may result from water quality changes in lakes and rivers used for hunting. Abandonment of nest sites on the Study Area many result if one or several of the following potential mining stresses occurs:

1. increased water turbidity-may significantly reduce capture success of fish;
2. increase water temperature above normal ranges-may cause most fish to use deeper, cooler water, making them unavailable as prey;

3. reduced reproductive success or relative abundance of fish species because of 1 or 2 above;
4. management decisions are made favoring game fish over rough fish, if the game fish are less numerous and/or occupy deeper waters than the rough fish they replace;
5. elevated levels of chemicals or heavy metals in fish tissue may reduce reproductive success of ospreys.

In addition to potential habitat or food related impacts it is likely that indiscriminate shooting will increase as local human density increases. This is especially important in the northern one-third of the Study Area. Human settlement and/or mining development in watersheds 1 through 11 could have the most significant detrimental affect on the osprey population in the Study Area. Within the Development Zone (Figure 1), increased activity in watershed 3, 7, and 11 may seriously reduce the importance of this area to osprey breeding populations.

Table 1. Osprey Nesting Success on the Superior National Forest.[A]

OSPREY NESTING DATA

Year	Known Territories	Observed Territories	Active Territories No.	Active Territories %	Successful Territories No.	Successful Territories %	Number of Young	Average Brood Size at Fledging	Young/ Active Territory
1973	47	29	15	52	6	40	9	1.5	0.6
1974	49	36	24	67	12	50	22	1.8	0.9
1975	40	34	25	73	10	40	15	1.5	0.6
1976	34	34	21	62	21	100	32	1.5	1.5

A. Data provided by K. Siderits, Biologist, USFS.

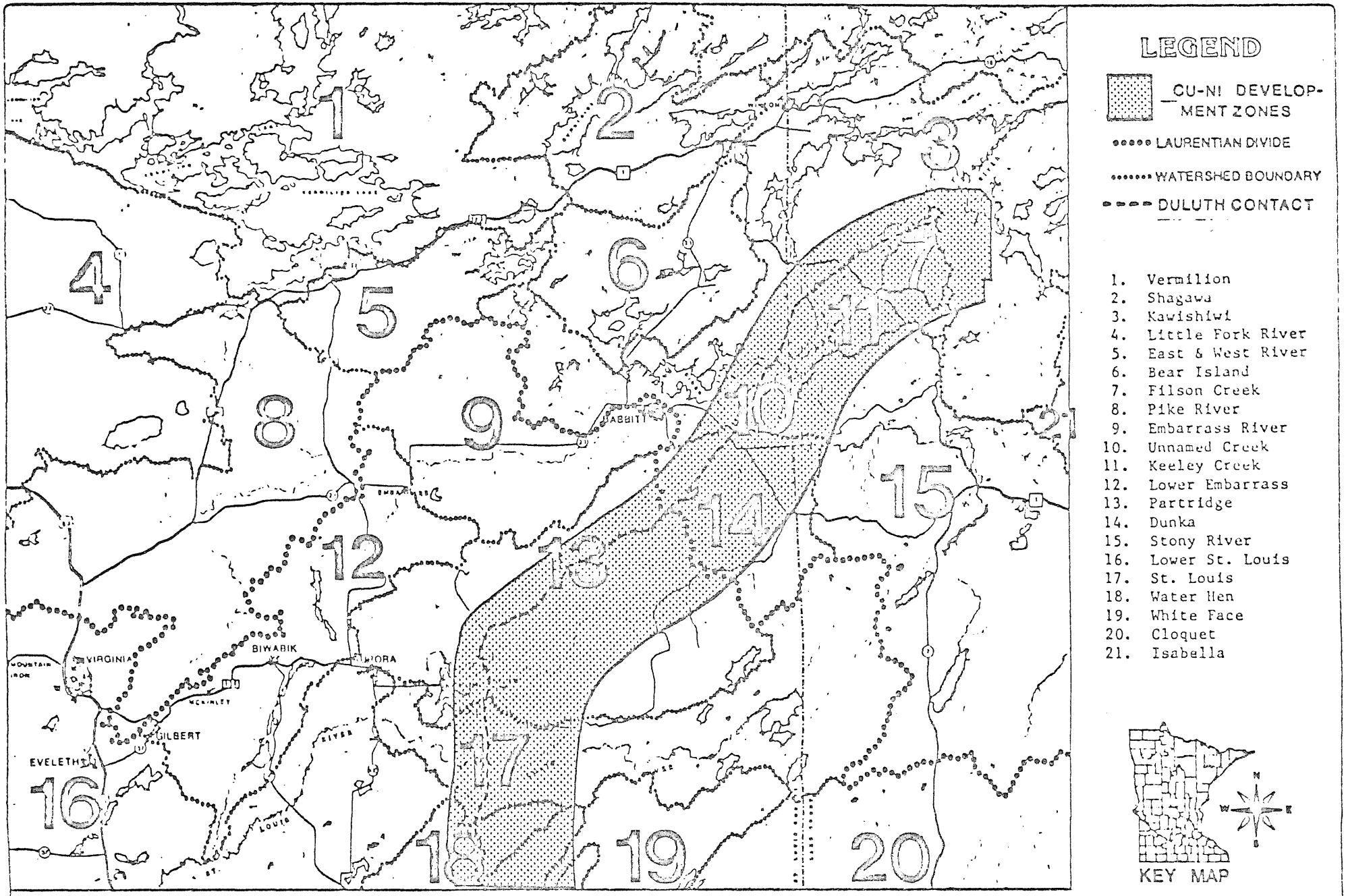

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FIGURE 2. Watershed Dessignations within the Copper-Nickel Study Area.

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