PolyMet Mining Corporation

Golden, Colorado

Winter 2000 Wildlife Survey for the Proposed NorthMet Mine Site, St. Louis County, Minnesota

ENSR

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1.0 INTRODUCTION

1.1. Study Overview

PolyMet Mining Corporation (PolyMet) proposes to construct an open pit polymetallic mineral mine and processing facility in northern Minnesota. This project, called the NorthMet Mine Project, is located in St. Louis County on the eastern end of the Mesabi Iron Range, about 60 miles north of Duluth, and 6 miles south of Babbit, Minnesota. PolyMet plans to mine and process polymetallic ore from the northwest portion of the Duluth Complex. The ore contains copper, nickel, gold, platinum, palladium, and cobalt. PolyMet plans to operate a processing facility at this location that will produce copper and nickel anodes, gold ingots, a platinum/palladium concentrate, and a cobalt concentrate.

This project would impact several hundred acres of habitat used by wildlife, including species of concern to federal and state agencies. Habitats that would be affected by the project include conifer forest (comprised primarily of black spruce[1], jack pine, tamarack, and balsam fir), deciduous forest (comprised primarily of trembling aspen and paper birch), mixed conifer/deciduous forest, riparian (dominated by speckled alder, red osier dogwood, and willow), and wetland (dominated by sedges and cat-tail).

Wildlife species of concern (and federal/state status) that could be impacted include gray wolf (federal threatened and state special concern), Canada lynx (federal threatened), mountain lion (state special concern), least weasel (state special concern), northern goshawk (U.S. Forest Service [USFS] Region 9 sensitive species), and boreal owl (U.S. Forest Service Region 9 sensitive species). Loss of habitat for these species was identified as an important issue by state (Berg 2000) and federal (Vora 2000a) agencies during meetings regarding the proposed project.

Several wildlife studies have been conducted in the area. Terrestrial and aquatic ecosystems in the vicinity of the NorthMet Mine Project site were studied as part of the Minnesota Environmental Quality Board Regional Copper-Nickel Study (Johnson and Lieberman 1979, Sather et al. 1979) in the late 1970s; this study included the NorthMet Mine site. Foth and Van Dyke (1999) conducted general surveys for plant and animal species of concern that may be found on the NorthMet Mine site during July and August, 1999.

To supplement information gathered during these surveys, ENSR conducted surveys of wildlife and their habitats during winter 2000. It was anticipated that snow would cover the ground during this period, making it easier to detect mammal tracks, including those

[1] Common and scientific names for plants and animals given in this report are in Appendix A.

of gray wolf, mountain lion, and Canada lynx.

This report describes the results of wildlife surveys conducted during late January and mid March 2000. The objectives of the study were to:

- Determine general wildlife use of the project area;
- Determine the presence of wildlife species of concern; and
- Identify important habitats used by wildlife.

This information will be used to support project environmental review and permitting efforts and to identify potential data collection requirements for proposed spring/summer wildlife surveys.

1.2. Acknowledgements

ENSR appreciates the assistance of Anne Balridge (PolyMet) in setting up the project and coordinating activities with other PolyMet personnel. Tony Pekovich (Minnesota Power) assisted with project logistics in Minnesota and arranged helicopter flight time. Leah Mach (PolyMet) provided field oversight and coordinated with state and federal agencies. Robin Vora and Sherry Phillips (USFS) provided wildlife and habitat information and coordinated additional surveys of goshawks with Minnesota Department of Natural Resources (DNR). Jeff Hines (DNR) provided information on wildlife use of the area and assisted on goshawk surveys. Bill Berg, Jeff Lightfoot, and Fred Thunhorst (DNR), and Bill Route and Linda Aylsworth (International Wolf Center), also provided information on wildlife use of the area.

2.0 STUDY AREA

The NorthMet Mine property is 6 miles south of the village of Babbitt and St. Louis County routes 21 and 70. It is 1.5 to 2 miles south of the active Northshore open-pit taconite mine and 8.3 miles east of LTV's open-pit taconite mine and processing operations (Figure 2-1). The privately run Duluth Mesabi and Iron Range (DM&IR) Railroad, crosses the property. The NorthMet Mine property encompasses 4,162 acres, or 6.5 square miles, in Township 59 North, Range 13 West, Sections 1, 2, 3, 9, 10, 11, and 12 in St. Louis County, Minnesota. The property is zoned for mining, and PolyMet has a 100 percent leasehold interest in the property. The mineral rights are owned by U.S. Steel, and the surface is managed by the U.S. Forest Service. The project site, which is in a previously-logged forest area, is located in the Partridge River drainage, about 3 miles south of Iron Lake and south of the Laurentian Divide. The Partridge River is in the watershed of the East St. Louis River, which discharges into Lake Superior.

The proposed 4,162-acre mine footprint, and an area extending approximately 1 mile outside of the mine footprint, was surveyed. This area included Sections 1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 14, 15, 23, and 24 of Township 59N, Range 13W; Sections 34, 35, and 36 of Township 60, Range 13W; and Sections 6, 7, and 18 of Township 59N, Range 12W. Most effort was spent surveying within the proposed mine footprint.

Figure 2-1

3.0 METHODS

The evaluation of wildlife and their habitat use during winter on the NorthMet Mine project area was based on a review of the literature, personal communications with biologists familiar with wildlife and habitats in the area, natural resource database queries, and from field studies.

3.1. Literature Review and Personal Communications

ENSR reviewed the Supplemental Site Specific Resource Information, August 1999, report prepared by Foth and Van Dyke (1999). This report provided information on sensitive plants, cultural resources, and wetlands likely to be found in the study area, and on gray wolf and Canada lynx. ENSR reviewed the U.S. Forest Service Biological Evaluation (BE) for the Reservoir Analysis Area, Laurentian Ranger District, Superior National Forest, a timber management project proposed for an area 10 miles east of Hoyt Lakes (Phillips 1999). ENSR understands that this draft evaluation was attached to the District Ranger's initial review of PolyMet's June 2, 1999, Plan of Operation.

ENSR conducted telephone and in-person interviews with biologists and other agency staff with the DNR, U.S. Fish and Wildlife Service [USFWS], USFS Superior National Forest, and International Wolf Center. A list of contacts, which includes telephone numbers and addresses, is included in Appendix B.

3.2. Database Queries

The Minnesota DNR conducted an informal database query for ENSR during early January 2000 for wildlife species of interest and priority habitats likely to be found on the site. The survey did not identify any priority habitats, but determined that the site is likely to be used by gray wolves. ENSR requested a formal database search from the Minnesota Natural Heritage Program. The results of that search were received on January 26, 2000, and showed that five rare plant species, but no rare wildlife species, were known to occur within the study area.

ENSR contacted the USFWS for a list of federally-listed plant and animal species of concern for the project area, and obtained a draft copy of the Superior National Forest Threatened, Endangered, and Proposed Species and Region 9 Sensitive Species list for the Superior National Forest. ENSR also reviewed the State of Minnesota Department of Natural Resources species of concern list on the DNR Website (http://www.dnr.state.mn.us/fish_and_wildlife/endangered_species/).

Based on the above discussions, database search, and document reviews, the following

were identified as species of interest for the winter 2000 survey on the NorthMet Mine Project site:

- northern goshawk
- boreal owl
- gray wolf
- mountain lion
- Canada lynx

In addition to surveying for these species, ENSR also surveyed for important prey items of gray wolf, Canada lynx, and mountain lion. These included snowshoe hare, white-tailed deer, and moose.

3.3. Field Surveys

Field surveys were conducted to identify wildlife species and their habitat use during winter. General observations of both of these components were conducted throughout both study periods by helicopter, by vehicle, and on foot. To better determine if species of concern used the site and to approximate the population density of several species of mammals on the site, more structured surveys were conducted along transects, and at bait and calling stations.

3.3.1. General Survey Methodology

ENSR conducted two surveys at the proposed NorthMet Mine site during winter 2000. The first of these surveys was from January 22 to 28, and the second was from March 18 to 24, 2000. A two-person team consisting of a senior biologist and a mid-level biologist conducted the surveys.

During the field and aerial surveys, biologists recorded information on wildlife and wildlife sign observed in the study area. Wildlife sign included calls, tracks, scat, and evidence of habitat use, such as foraging sign, nests, dens, and bedding sites.

Most wildlife observations were conducted near established transect routes, but we also walked to other sites of interest. Binoculars and a night-vision scope were used to locate and identify wildlife and their habitats. The locations of wildlife, their sign, and habitats used were recorded on aerial photographs and topographic maps. Time of day and weather and snow conditions were also recorded during surveys.

Based on discussions with DNR, International Wolf Center, and USFS (Lightfoot 2000, Route 2000, Thunhorst 2000), it is highly unlikely that lynx and mountain lion are residents in the study area, but they may be occasional visitors. We surveyed for lynx and mountain lion tracks along all transects, and also surveyed areas near transects

where snowshoe hare and deer, prey items of lynx and mountain lion, were known to occur.

The goal of the surveys was to determine if species of interest use, or are likely to use, the study area during winter, and to determine use areas and travel corridors for other wildlife found on the site. ENSR also attempted to identify some of the food types consumed by wildlife during winter on the site.

3.3.2. Transect Surveys

Wildlife surveys were primarily conducted along transects and at bait and calling stations (Figure 3-1). Transects were located on primary (roads, railroad grade, powerline right-of-ways) and secondary (logging roads, skid trails) access routes to maximize the amount of area covered during the survey period. Surveys were conducted from a four-wheel drive vehicle along established roads, and on foot in the remaining areas.

Observations of wildlife and their sign that were recorded during the transect surveys included information about the species and number of animals making the sign, habitat associated with wildlife and their sign, and general activity of the animal (where possible). The surveys were conducted during day and night to increase the number of species encountered.

We attempted to identify all tracks observed during transect surveys, and used this information to determine habitat use and to try to estimate population size (Becker et al. 1998). Tracks of interest included those of gray wolf, Canada lynx, deer, moose, snowshoe hare, fisher, pine marten, and grouse. We used the techniques for identifying tracks given in Rezendes (1992), Halfpenny et al. (1995) and Foresman and Pearson (1998).

The track surveys focused on locating fresh tracks in soft soil and mud, or those that had been made since the last snowfall and were new enough that they were clearly identifiable. Generally, these tracks were less than 4 days old. We noted the direction of travel, species and number of animals making the tracks, and habitat use.

3.3.3. Northern Goshawk, Owl, and Gray Wolf Calling Surveys

Calling surveys for northern goshawk were conducted during the day, and for owls and wolves during the night, at pre-determined calling stations along each transect (Figure 3-1). Visual and auditory observations of all wildlife that responded to calls during these surveys were recorded.

Figure 3-1

3.3.3.1. Northern Goshawk

Adult goshawk warning calls were broadcasted at calling stations during the day. We faced in a pre-determined direction and broadcasted a series of calls for 30 seconds. We then rotated 120 degrees and played another 30-second bout. Finally, we rotated another 120 degrees and played the final 30-second bout. We waited several minutes, looking and listening for responses to the broadcasted calls, before initiating another round of calls. This procedure was repeated at each calling station.

If a hawk responded to the calls, a special effort was made to visually identify the species. Since hawks are likely to respond to warning calls if they have a nest nearby, we also tried to locate the nests of hawks that responded to broadcasted calls.

3.3.3.2. Owls

Recordings of owls likely to be found in the area, including boreal owl, great gray owl, barred owl, and short-eared owl, were broadcasted at night at calling stations (see Figure 3-1). A 10-watt amplifier, with a range of 0.5 to 2 miles, was used to broadcast the calls.

Two call replications were conducted at each calling location, with each replication lasting about 1 minute. We broadcasted the male owl territorial calls in three directions during each replication. We began playing the recording while facing a pre-determined direction. Twenty seconds after the call began, we shifted position 120 degrees and played the recording for the next twenty seconds. After 20 seconds in this direction, we once again rotated 120 degrees, for the final 20 seconds of the call. Audible responses and visual observations made during each broadcast were recorded.

In addition, a single set of calls was made for common owl species in the region, including saw-whet owl, long-eared owl, screech owl, and great horned owl at most calling stations.

3.3.3.3. Wolves

Calling surveys for wolves were conducted in the evenings during both survey periods. Wolf calls are believed to play a role in maintaining wolf territories (Joslin 1967), and howling surveys in the past have achieved a 60 percent success rate in detecting wolves (Route 1999). Human vocalizations that imitate wolf howls, and recorded wolf calls, were broadcasted from calling stations using a 10-watt amplifier. At each calling station, calls of a lone wolf and of several wolves in a pack were broadcasted for approximately 3 minutes. These were followed by human-made calls that lasted for approximately 1 minute (Harrington and Meche 1979). If wolves responded, the number of animals involved was estimated and recorded.

3.3.4. Bait Stations

To increase the likelihood of detecting lynx and mountain lion, bait stations were established at several sites in the study area (Figure 3-1). Bait stations were generally located in areas that would receive a suitable amount of fresh snowfall or had soft soil, such as forested areas that lacked complete canopy closure, or along roads or near wetlands. To assist in identifying tracks, we also placed sand around bait stations B-2, B-9, and B-10. Fish pieces weighing approximately 6 pounds were enclosed in wire mesh and tacked to trees. In addition, catnip was spread over and near the bait, and a feather lure was suspended from the bait to increase its attractiveness to lynx and mountain lion. Bait stations were checked at least once during each survey period and at least 2 days after the bait was placed at the station. Although the focus of the bait survey was to detect signs of lynx and mountain lion, all other wildlife tracks observed in the vicinity of the bait station were recorded.

3.3.5. Helicopter Surveys

Aerial surveys were conducted by helicopter for approximately 2 to 4 hours during one afternoon survey period. These surveys were used to identify habitat types on the site, note important habitat features, and identify wildlife and wildlife sign observed from the air. General habitat maps were developed by recording the location of habitat features and wildlife sign on aerial photographs and topographic maps.

3.3.6. Habitat Assessment

Wildlife habitat features on the site, including plant species composition and structure and special features (snags, downed woody debris, rock outcrops, wetlands, deer snow-intercept thermal [SIT] cover) were recorded during field and aerial surveys. In particular, we noted the species composition, density, and size (diameter at breast height [dbh]) of trees and shrubs seen near survey areas, and the use of snags and other special habitat features by wildlife. This information was recorded on aerial photographs, and, in conjunction with information on shrubs and herbaceous vegetation collected during spring/summer surveys, will be used to prepare vegetative cover and special habitat features maps of the NorthMet Mine site.

3.3.7. Data Recording

Observations made during the study were recorded on tape recorders and data sheets. Observations of wildlife, their sign, and habitats were recorded on aerial photographs and topographic maps. Photographic records (still and video camera) were taken as necessary to record wildlife, their sign, and habitats.

4.0 RESULTS AND DISCUSSION

4.1. Introduction

The weather was generally favorable during both study periods. During January, temperatures ranged from -20° F to 20° F during the week. There was light snowfall for short periods each day during the first half of the week. Snow was generally light and dry and drifted easily, making it difficult to observe clean imprints made by wildlife (snow drifted into prints, covering the finer details). Snow depths ranged from 4 to 8 inches over most of the site. Exploratory drilling was occurring on the site during most of our visit, and noise from the drilling rig could be heard over most of the site.

Because of the shallow snow depths, it was impractical to use snowmobiles, as planned. Thus, travel on the site was by vehicle (on roads and exploration roads) and on foot using snowshoes. Despite being restricted to travel by snowshoe most of the time, we were able to survey most areas of the site due to the favorable weather (except the extreme southern and northern portions of the study area). We surveyed both day and night during each day of the survey.

During March, temperatures ranged from 25° F to 55° F during the week. Upon arrival, snow depths ranged from 0 to 4 inches over portions of the site, although most snow was confined to areas shaded by conifers and was generally less than 1 inch in depth. By March 21, most snow had melted, even in shaded areas. Due to recent rainfall and snowfall, soils were damp and many roads were muddy. Thus, it was possible to observe tracks made by wildlife in areas with bare soils. Exploratory drilling did not occur on the site during our visit.

We traversed the site by vehicle (on Dunka Road and site exploration roads) and on foot. Foot travel was mostly confined to open areas, including clearcuts, powerline and railroad right-of-ways, survey lines, roads, and game trails. Despite being restricted to foot travel much of the time, we were able to survey most areas of the site, and covered a much larger area than during January surveys. We surveyed day and night during each day of the survey.

4.2. Transect Surveys

4.2.1. January Surveys

Survey routes were mostly similar to those identified in Figure 1 of the Study Plan (ENSR 2000) and are shown on Figure 3-1 of this report. We did not survey portions of Sections 3, 4, 11, and 14, Township 59N, Range 13W as shown in the Study Plan,

primarily due to lack of time and the long distance between the start point and the more distant portions of these sections. In addition, we did not establish calling stations in these sections as identified in the Study Plan.

We surveyed for mammal and bird tracks and sign along transects. Tracks were observed over most portions of the site, but there was no single area in which they were abundant for any one or all species (Table 4-1). Tracks of the following species were observed: raven, spruce grouse, white-tailed deer, moose, pine marten, weasel, bobcat, coyote, snowshoe hare, and red squirrel. We also observed red squirrel, several species of birds, marten dens, and shelters made by grouse in the snow.

Moose and deer favored clearings associated with conifer forests. There was much evidence of browse in clearings, and the nearby conifer forests provided shelter. Most forest stands contained trees that were 10 inches diameter at breast height (dbh) or less, and thus unable to provide much snow-intercept-thermal cover and snow depths in forest stands were similar to those in more open areas. Snowshoe hares were more common in the northern half of the site. Grouse were seen over most areas, using conifer and mixed conifer and deciduous forest during the day, and often roosting in the snow in more open areas at night. Woodpeckers, including pileated, black-backed, and northern three-toed woodpecker, favored areas with snags, including forest stands and forested wetlands.

4.2.2. March Surveys

Survey routes and the location of calling/bait stations were similar to those identified in Figure 1 of the Study Plan (ENSR 2000) and are shown on Figure 3-1 of this report. We did not locate calling/bait stations in Section 14, or the northern portion of Section 4, in Township 59N, Range 13W, or in sections 7 and 18 in Township 59N, Range 12W, as shown in the Study Plan. These stations were dropped from the study because we lacked the time that surveying these areas would have required.

Tracks were observed over most portions of the site, and although not abundant, were more common during March than in January. Tracks of the following species were observed: white-tailed deer, moose, pine marten, weasel, snowshoe hare, red squirrel, gray wolf, raven, and grouse. We found scat of weasel, northern goshawk, grouse, deer, moose, snowshoe hare, pine marten, red fox, coyote, and river otter. We found owl pellets in the eastern portion of the study area, close to where we heard a barred owl, and in the western portion of the study area near calling station C-17. We saw or heard spruce grouse, goshawk, pileated woodpecker, hairy woodpecker, black-backed woodpecker, northern three-toed woodpecker, eastern wood pewee, gray jay, slate-colored junco, black-capped chickadee, common redpoll, snow bunting, red squirrels, martens, and snowshoe hare while hiking along trails and/or driving. In addition, we observed an old beaver lodge that appeared to be used by otter as a den, abandoned

and active beaver lodges and dams, and several marten dens. We noted that deer and moose browse was most evident in recently harvested areas, and observed that areas with snags were used by woodpeckers and owls.

TABLE 4-1

Transect Survey Summary

Transect[1]	Approximate Transect Distance (mi)	Survey Dates	Observations[2]
T-1	0.9	January 22-23 March 18	Grouse (2), moose (1), snowshoe hare (2) Marten, snowshoe hare, wolf/mountain lion[3]
T-2	0.8	January 25 March 21	Marten (1) Coyote, deer, bobcat
T-3	1.0	January 22 March 18	Grouse (2), marten (1), red squirrel (2), weasel (2) Grouse, marten, weasel, red squirrel, wolf/mountain lion[3]
T-4	0.3	January 25 March 21	Grouse (1), marten (1) Deer, moose
T-5	0.3	January 25-27 March 18	Grouse (1), marten (1), moose (1), snowshoe hare (1) Marten, snowshoe hare, beaver
T-6	1.2	January 26 March 19	Snowshoe hare (4), marten (2), deer (1), weasel (1) Snowshoe hare
T-7	0.4	January 26 March 19	Deer (10), weasel (1) Owl, marten, coyote
T-8	0.8	January 23 March 19	Deer (1), marten (3), beaver (2), weasel (1) Beaver, red squirrel
T-9	0.9	March 22	Grouse, owl, deer, weasel, coyote, fox, marten, wolf, beaver, river otter
T-10	1.1	January 24, 27 March 19	Grouse (1), raven (2), snowshoe hare (1), marten (3), bobcat (1), deer (3), coyote (1) Raven, grouse, red squirrel, bobcat, coyote, deer, moose
T-11	0.9	March 19	Grouse, marten, bobcat, deer, beaver, wolf, otter

TABLE 4-1 (Cont.)

Transect Survey Summary

Transect[1]	Approximate Transect Distance (mi)	Survey Dates	Observations[2]
T-12	0.1	January 25	Snowshoe hare, marten, weasel, moose
		March 20	Grouse, snowshoe hare, moose

1 – Transect locations are shown on Figure 3-1.

2 – Observations include species (and number of sign) and were limited to visual observations and tracks and scat of animals seen on, but not adjacent to, the transect route.

3 – Track similar in size and stride to that of mountain lion or juvenile wolf observed, but species determination could not be made due to age of track and lack of track features needed to make precise determination.

4.2.3. Species of Concern

Gray wolf tracks were found during March in the mud along a road that runs parallel to the railroad tracks in Section 24, Township 59N, Range 13W (T-9), along the electrical transmission line near the railroad grade (T-11), and on Dunka Road on the north side of Section 16 near the calling station. Three sets of tracks were seen on T-9 and Dunka Road, and a single track was seen on T-11. Where there were three sets of tracks, two of the wolves appeared to be adults while one appeared to be a juvenile wolf. In all three sightings, the tracks were found near clearings used by deer and moose, based on evidence of tracks, browse, and scat. It is likely that three or more wolves, comprising a wolf pack, used the study area.

Another set of tracks that belonged to a cougar or wolf was observed in snow on March 18, 2000, on T-3. There was one set of tracks, which appeared to have been made within the past several days. The tracks were similar in size and shape to that of a juvenile wolf, but we did not observe nail marks typical of wolves (although nail marks may have been lost as the snow melted), and the stride and general features of the tracks were similar to those of cougars. A set of wolf tracks was seen along T-11 during the same time period.

Approximately 2,600 wolves reside in northern Minnesota. Wolf packs are generally comprised of four to eight wolves (Aylsworth 2000). Several wolf packs have been identified, and individuals within the pack radio-collared, near the study area by the U.S. Geological Survey/International Wolf Center. A pack of wolves is being tracked that is using an area 5 miles northeast of the study area and an area near Hoyt Lakes. Territory

size for wolves in northern Minnesota ranges from 20 to 150 square miles and wolf packs tend to avoid areas used by other wolf packs. Wolf numbers in northern Minnesota have declined during the past 2 years due to low snowfall. During periods of low snowfall, deer are better able to run and escape wolves during winter, and more wolves starve than during years with heavier snowfalls.

The mountain lion is a habitat generalist that preys primarily on deer and prefers areas with little human disturbance. Mountain lion tracks are often associated with deer tracks. Although increased sightings of mountain lion in Minnesota suggest an increasing population, no mountain lion have been reported in the study area (Phillips 1999). No deer tracks or deer were observed along the transects where the possible track of the mountain lion occurred.

We did not observe evidence of lynx during our surveys. Due to the mild winter, it is unlikely that lynx moved south from Canada into areas near our study area this past winter. We did observe bobcat tracks along the powerline route (T-10 and T-11). While lynx are adapted to deeper snow, bobcat, with their shorter legs, favor areas with little snowfall. The number of bobcat in Minnesota has increased nearly 4-fold since the early 1980s (Department of Natural Resources 1999a).

4.2.4. Population Estimates

One objective of the study was to estimate the population size of wildlife species on the site during winter. However, only a limited number of tracks were observed, and due to a lack of snow during March, few tracks were seen during the second survey in March. In addition, surveys were primarily confined to areas that were easy to walk or drive, and little attempt was made to survey for tracks in dense shrub and forest stands. Species observed during the study appeared to be widely distributed over the site, but not especially common in any one area. The greatest number of tracks was seen in areas with little human disturbance.

Because of the limited amount of snow during March surveys, it was not possible to use numbers seen on transects to develop accurate estimates of numbers of wildlife found in survey areas. The greatest variety and number of wildlife per unit length of transect were seen along transects associated with the powerline right-of-way (T-10 and T-11) and in the southeastern portion of the site (T-9). Both of these transects were little disturbed by humans or mine exploration activity.

Grouse, deer, moose, and snowshoe hare were observed on the site, but when compared to their abundance in other areas of Minnesota, were uncommon on the site. Drumming counts indicate that ruffed grouse are least common in northeastern Minnesota than other parts of the state (Huempfner 1978, Minnesota Department of Natural Resources 1999b); approximately half of the spruce grouse in Minnesota are

found in the northeastern portion of the state. Ruffed grouse favor young aspen/birch forests less than 25 years in age; most forest stands on the NorthMet mine site are more than 25 years old. Spruce grouse primarily use spruce forests, which comprise over half of the site.

An estimated eight to 10 deer are found per square mile in the study area (Huempfner 1978c, Berg 2000). Based on population surveys and hunter kill rates, deer population densities in Minnesota are lower in northeastern Minnesota than in more southerly areas of the state (Berg 2000, Minnesota Department of Natural Resources 2000c). Due to favorable snow conditions the past two winters, deer numbers have increased throughout the state (Berg 2000). Deer tracks were primarily observed on the western and southern portions of the site and in areas containing both scrub-shrub and conifer forest habitat.

Moose sightings were also common in logged areas with abundant shrubs and near young mature forest habitat. Moose populations in the Superior National Forest have fluctuated considerably since the early 1900s and have shown their greatest increases during periods of intense timber harvest (Huempfner 1978b). Based on ground and helicopter surveys, five to perhaps as many as 10 moose used the study area. Aerial surveys conducted in 1978 found about 0.8 moose per square mile in an area that included the NorthMet mine site. Moose primarily used the western half of the study area. Snowshoe hare tracks were seen over much of the site, but usually only one or two tracks were seen along any one transect.

4.3. Northern Goshawk, Owl, and Gray Wolf Calling Surveys

4.3.1. January Surveys

Calling surveys, using recorded calls and human voices, were conducted at 16 different calling stations (Figure 3-1, Table 4-2). Surveys were done for northern goshawk during the day, and for several species of owls and wolves at night. We did not obtain any responses during day or night surveys. We anticipated that wolves might respond to our calls, but did not expect to hear northern goshawks or owls because it was still early in the season for them to respond. We occasionally heard other wildlife sounds during calling surveys, but could not determine the species because the sounds were usually muffled and faint.

TABLE 4–2

Summary of Calling Survey Responses

Calling Station[1]	Survey Dates	Species Surveyed	Observations
1	January 22	Owl, wolf	No response
	January 25	Goshawk	No response
	March 18	Owl, wolf, goshawk	No response
2	January 22	Owl, wolf	No response
	January 25	Goshawk	No response
	March 18	Owl, wolf, goshawk	Goshawk
	March 19, 21	Goshawk	No response
	March 23	Goshawk	Goshawk
3	January 25	Owl, wolf	No response
	January 26	Goshawk	No response
	March 18	Goshawk	No response
	March 21	Owl, wolf	Barred owl
4	January 25	Owl, wolf, goshawk	No response
	March 20	Owl, wolf	Barred owl, saw-whet owl
	March 23	Goshawk	No response
5	January 24	Owl, wolf	No response
	January 27	Goshawk	No response
	March 19	Goshawk	No response
	March 20	Owl, wolf	No response
6	January 24	Owl, wolf	No response
	January 27	Goshawk	No response
	March 19	Goshawk	No response
	March 20	Owl, wolf	Barred owl
7	January 23	Goshawk	No response
	January 26	Owl, wolf	No response
	March 19	Owl, wolf, goshawk	Barred owl
8	January 23	Goshawk	No response
	January 26	Owl, wolf	No response
	March 19	Owl, wolf, goshawk	Barred owl
9	January 23	Goshawk	No response
	January 26	Owl, wolf	No response
	March 19	Owl, wolf, goshawk	No response

TABLE 4-2 (Cont.)

Summary of Calling Survey Responses

Calling Station[1]	Survey Dates	Species Surveyed	Observations
10	January 22	Owl, wolf	No response
	January 25	Goshawk	No response
	March 21	Goshawk	No response
	March 22	Owl, wolf	Barred owl
11	January 22	Owl, wolf	No response
	January 25	Goshawk	No response
	March 18	Owl, wolf	Saw-whet owl
	March 19	Goshawk	No response
12	January 22	Owl, wolf	No response
	January 25	Goshawk	No response
	March 18	Owl, wolf	No response
	March 19	Goshawk	No response
13	January 22	Owl, wolf	No response
	January 25	Goshawk	No response
	March 22	Owl, wolf, goshawk	No response
14	January 22	Owl, wolf	No response
	January 25	Goshawk	No response
	March 22	Owl, wolf, goshawk	No response
15	January 25	Owl, wolf	No response
	January 26	Goshawk	No response
	March 21	Owl, wolf, goshawk	Barred owl
16	March 21	Owl, wolf, goshawk	Saw-whet owl
17	March 23	Goshawk	Goshawk
18	March 19	Goshawk	No response
	March 20	Owl, wolf	Barred owl
19	March 19	Goshawk	No response

1 – See Figure 3-1 for locations of calling stations.

4.3.2. March Surveys

Calling surveys were conducted at 19 calling stations during March (Figure 3-1, Table 4-2). We heard hawk vocalizations on several occasions in response to the goshawk call in the west-central portion of Section 2 and western portion of Section 4, Township 59N, Range 13W. We observed the hawk in Section 2 briefly on two occasions, found its nest, and determined that the hawk was likely a goshawk or Cooper's hawk; later surveys by the USFS and DNR determined that the hawk was a goshawk. We did not have time to search for the hawk heard in Section 4.

During the evening surveys, a saw-whet owl and a barred owl responded to our calls from several calling stations. The saw-whet owl was heard north of the study area. The barred owl was first heard in sections 1 or 12 of Township 59N, Range 13W, and was later heard in sections 3 and 12 as it approached closer to us in response to our calls. No wolf responses were heard, even though we found wolf tracks in the study area. We occasionally heard other wildlife sounds during calling surveys, but could not determine the species because the sounds were usually muffled and faint.

4.3.3. Species of Concern

4.3.3.1. Northern Goshawk

The northern goshawk was the only species of concern that was identified during calling surveys. The goshawk responded to recorded calls at CS-2 and in the vicinity of the nest. We also heard goshawk-like calls to the west of the study area, but were unable to visually observe the hawk or determine if it was the same, or a different hawk, than the one observed near CS-2.

Northern goshawks are widely distributed across the northern half of eastern North America and in many parts of western North America (Squires and Reynolds 1997), but are generally rare over most portions of their range. Population productivity and nesting densities are related to snowshoe hare and grouse populations. Goshawks in Minnesota favor forest stands with large canopy trees and a brushy understory (Phillips 1999). Territory sizes can range up to 6,000 acres, and logging and other human-related activities can discourage goshawks from using an area.

Twenty-four territories were documented in Minnesota between 1994 and 1999, but about half of them are no longer used (U.S. Forest Service 1999). Until this survey, no goshawks were known to be nesting in the Superior National Forest and few active nests were reported in the Superior National Forest, historically (Phillips 1999, Vora 2000b). A second goshawk nest was also found during spring 2000 about 12 miles south of the study area (Vora 2000b).

Goshawk breeding habitat in the Superior Forest is typically older forest with sufficient open space between the bottom live tree branches and the understory for the birds to fly easily (Phillips 1999). Aspen are favored as nest trees. The goshawk pair observed on the study area used a large, 14-inch dbh aspen tree as a nest, and the midstory was mostly open in the vicinity of the nest. The surrounding forest stand was a mixture of deciduous and conifer trees, and was near a recent clear-cut stand and scrub-shrub wetland. Similar habitat was observed at several areas on the study area, and could provide alternative sites for nesting and foraging.

4.3.3.2. Owls

The barred owl and saw-whet owl, both common species in Minnesota, were heard during surveys in March. The barred owl was initially heard in the area near C-10 in mixed conifer-deciduous forest, but was also heard in the vicinity of C-2 and C-3 as it approached the source of the taped vocalizations. The saw-whet owl was heard in the mature bog spruce forest associated with One Hundred Mile Swamp. It did not approach the source of the vocalizations.

4.3.3.3. Gray Wolf

The number of wolves in Minnesota has increased nearly five-fold since the early 1970s, although numbers have declined during the past 2 years (Berg and Benson 1998, Aylsworth 2000). Wolves typically prey on ungulates (hoofed animals), such as deer, elk, and moose in Minnesota (Minnesota Department of Natural Resources 1999). Until recently, wolf have been primarily confined to areas with little human disturbance, but during the past 20 years have been observed using areas with higher levels of human activity (Mech 1995, Thiel et al. 1998). Wolves also appear to avoid areas with a high density of roads, especially those accessible to two-wheeled (versus four-wheeled and ATV) vehicles, although more wolves have moved into areas with higher road densities in recent years (Mech 1988, Minnesota Department of Natural Resources 1999)

Although wolves were known to use the study area, we did not hear any wolf calls during either survey. Several factors may have accounted for the lack of a calling response from wolves. First, wolves may not have been close enough to the source of vocalizations to hear them. Second, it is frequently difficult to evoke a response using taped vocalizations from wolves if they have not howled within the last 20 minutes. Wolves are more likely to howl during the late summer and fall than during early to mid winter (Harrington and Mech 1982). In addition, wolves only respond about 60 percent of the time to artificial wolf calls they hear (Route 2000). As noted above, wolf packs with radio-collared individuals are found several miles to the north and northeast of the study area. It is likely that the study area comprises much of the territory of a wolf pack comprised of three or more individuals. Wolf tracks were associated with areas where deer tracks and browse were seen (T-9 and T-11), and were also seen crossing Dunka

Road. Interestingly, wolf tracks were not observed on the study area during January, when the drill rig was operating, but only during March when the rig was not in operation. Thus, noise and activity associated with drilling activities may have discouraged wolves from using the area in the immediate vicinity of the exploration area.

4.4. Bait Stations

4.4.1. January Surveys

Six bait stations were set up during January. Only two stations (BS-2 and BS-6; Figure 3-1) had evidence of use by wildlife, and both were used by martens. We noted marten tracks by both bait sites, as well as evidence that martens had pulled at the bait in an effort to remove it. We did observe wildlife activity within a hundred yards of all bait stations, indicating that small and large mammals were in the vicinity of the stations.

4.4.2. March Surveys

Nine bait stations were set up during March. Four stations (BS-1, BS-2, BS-3, and BS-9) showed evidence of use by martens, and a marten was observed at night at BS-3. We observed marten tracks by the bait sites in the snow or sand, claw marks where the marten climbed the tree, tufts of hair caught on the wire mesh holding the bait, and evidence that martens had pulled at the bait in an effort to remove it. We also observed scratch marks by grouse in the sand at BS-10.

4.4.3. Species of Concern

No species of concern, including Canada lynx, were observed using the bait stations during either survey period.

The Canada lynx originally ranged throughout the boreal forest of North America and the mixed coniferous-deciduous forests of the northeastern and Great Lakes states (Hazard 1982). Snowshoe hare are the primary prey item of lynx, but they also eat carrion, grouse, and red squirrels. Canada lynx numbers declined sharply in the U.S. and Canada in mid-1900s due to overtrapping and ecological changes caused by settlement, logging, and agriculture (De Vos and Matel 1952, Todd 1985). Individuals move great distances when prey items are scarce, and lynx were seen in most areas of Minnesota during 1962-1963 and 1972-1973, presumably years when snowshoe hares were scarce in Canada (Phillips 1999).

Based on lynx surveys conducted in Minnesota during the past several decades, there is no information to conclude that a resident population of lynx exists in Minnesota. Fewer than 10 lynx have been seen in Minnesota since 1983 (Berg 2000). Observations of lynx based on trapping records and visual observations during the 1970s and 1980s showed

that lynx were more likely to be found in northeastern Minnesota than other portions of the state.

Due to the limited number of snowshoe hare that appear to use the site, and noise associated with drilling and other human-related activities, it is unlikely that lynx would reside in the study area. Low snowfalls the past two winters also have likely discouraged the movement of lynx from Canada down into Minnesota.

4.5. Helicopter Surveys

4.5.1. January Survey

We surveyed the site by helicopter for several hours during the afternoon of January 24th. Tony Pekovitch (Minnesota Power), Chris Boehm, Stuart Paulus (ENSR), and the pilot conducted the survey. We observed few wildlife from the air, which is consistent with the number of animals seen from the ground. We observed two moose and several deer from the air; we also observed scattered deer and moose tracks. Deer abundance appeared to be greater on the western portion of the study area, especially near clear-cuts and areas with a spruce/aspen mix. However, we may have observed more animals in these areas because it is easier to see deer and moose in open areas than in conifer forest habitats. We did not observe wolves or other mammals. However, several bird species were seen from the air, including pileated woodpeckers.

4.5.2. March Survey

We surveyed the site by helicopter for several hours during the afternoon of March 20, 2000. Tony Pekovitch, Chris Boehm, Stuart Paulus and the pilot conducted the survey. The objective of the survey was to observe for wildlife and conduct a general habitat assessment.

As in January, we made few sightings of wildlife from the air. We observed five moose and seven deer from the air, as well as numerous deer and moose trails. We did not observe any other mammals. Several bird species were seen from the air, including grouse and a bald eagle. A raven was seen nesting in an electrical transmission tower near the western boundary of the study area. Beaver dams and lodges were observed along most creeks on the site.

We recorded dominant forest tree species and general vegetative cover types (conifer, mixed, and deciduous forest; scrub-shrub; wetland; and disturbed) on the site during helicopter surveys. This information will be used to develop vegetative cover maps needed by state and federal agencies during the environmental review process.

TABLE 4-3

Bait Station Survey Summary

Bait Station[1]	Survey Dates	Observations
1	January 23-27	No activity
	March 18-23	Marten
2	January 23-27	Marten (2)
	March 18-23	Marten
3	January 23-27	Marten
	March 18-23	Marten
4	January 25-27	No activity
	March 19-23	No activity
5	January 24-27	No activity
	March 19-20	No activity
6	January 24-27	Marten
	March 19-20	No activity
7	January 23-26	No activity
8	March 19-22	No activity
9	March 21-23	Marten
10	March 21-23	Grouse

1 – See Figure 3-1 for locations of bait stations.

4.6. Habitat Surveys

A general assessment of plant cover types was made during helicopter and ground surveys. The relative mix of species forming the forest canopy was determined over much of the site, especially in areas where transect surveys were conducted. Forest canopy coverage was determined over most of the site by the end of the second winter survey; a more detailed assessment can be done in the spring/summer when herbs, grasses, shrubs, and deciduous trees have their foliage.

Habitat observed on the study area was typical of habitats associated with much of the Iron Range. In general, the site consisted of low areas that were flooded or wet, and higher elevation uplands. One Hundred Mile Swamp, and Yelp and Partridge creeks, were the primary aquatic features on the study area. More upland habitat was associated with the central portion of the study area, in the vicinity of the exploration

area.

Forest vegetation varied considerably over the site. In general, the site can be divided into quadrants. The northwest quadrant is dominated by lowland black spruce, with scattered stands of aspen and balsam fir/aspen; tamarack is also scattered throughout these stands. Most trees are estimated to be 60 years or older (U.S. Forest Service 2000). Interspersed within forest stands are brush/sapling tree stands that were recently logged and provide habitat for deer and moose. Several wetlands are found in this quadrant, with One Hundred Mile Swamp comprising most of the western and northern portions of the quadrant (see Figure 3-1).

The northeast quadrant is dominated by nearly equal amounts of jack pine and spruce, with scattered aspen stands. Although there are scattered stands containing trees greater than 60 years in age, most trees are 20 to 60 years in age. There are few recently logged areas within this quadrant. The Partridge River and several large associated wetlands are found in this area. Most shrub/sapling tree habitat is associated with these wetlands and drainages.

Grouse tend to favor areas with younger aspen and birch trees associated with mature conifer forest habitat (Huempfner 1978b), and it appeared that grouse were more common in the northeast quadrant than in any other quadrant. We did notice that grouse would roost at night in more open areas, such as the powerline right-of-way and surveyors lines, by burying themselves in the snow. These snow “caves” probably provided more protection against the cold wind than roost sites in trees.

The southeast quadrant contains a nearly equal mix of lowland and upland spruce, jack pine, and aspen, with some balsam fir and paper birch. Most tree stands are from 40 to 80+ years of age, although tree stands along Dunka Road are from 20 to 40 years of age. The Partridge River and a tributary to the river, Stubble Creek, are found in this quadrant and are dominated by sedge and cattail meadows and shrubs, including beaked alder and willow. The powerline and Duluth Mesabi and Iron Range Railroad are also important features in this quadrant.

Aspen, along with spruce and jack pine, dominates the southeast quadrant. There is more balsam fir in this quadrant than in the other quadrants. Most tree stands are 60 years of age or older, with the oldest stands found near the southern boundary of the quadrant. Clearings comprised of grasses, forbs, and shrubs were associated with the powerline right-of-way, and several recently logged areas. The Partridge River is the dominant aquatic feature in this quadrant, but several wetlands were also found along the powerline route.

The recently logged areas consist of grasses and ferns with aspen saplings and speckled alder. The areas of more mature upland forests consist of jack pine, balsam fir,

and aspen, with lesser amounts of paper birch, red pine and white pine. The mature lowland areas consist mainly of black spruce and tamarack growing on a bed of sphagnum moss and clubmoss with speckled alder, Labrador-tea, and leatherleaf. The open wetland areas consist of grasses, sedges, cattails, speckled alder, and pussy willow.

Upland areas appeared to be used more by wildlife than wetlands, especially by large mammals such as deer and moose, probably because uplands provided greater cover and more browse and other food items during winter than did wetlands. Deer favor aspen and birch forests in northern Minnesota for foraging, while conifer-dominated stands are important in late winter (Mooty 1971, Wetzel 1972). Huempfner (1978a, c) suggested that mixed conifer-deciduous forest stands near recently disturbed areas containing large amounts of browse should be considered prime wintering areas for deer and moose. This appeared to be true on the NorthMet Mine site, as evidence of deer and moose use was greatest in recently logged areas, near right-of-ways, and near wetlands/streams. Wetzel (1972) and Peek (1971) found that winter deer and moose beds were associated with conifer stands, primarily balsam fir, that provided both reduced snow depths and helped to decrease body heat loss. Again, balsam fir stands were most common on the western half of the site.

Most shallow-water wetlands were still frozen on the surface in March, while the larger streams had open running water. Beaver dams and houses were common along major creeks and rivers, including Yelp and Stubble creeks and the Partridge River. We also found evidence of otter using portions of Stubble Creek.

Snags were abundant in several wetlands, and were scattered in other forest stands. Most snags were of small dbh and, thus of limited value to cavity-nesting birds and other wildlife. We did observe several species of woodpeckers, or their sign, in areas with snags. These included black-backed, hairy, northern three-toed, and pileated woodpeckers.

Wetlands comprised approximately half of the acreage. Most wetland habitat was associated with One Hundred Mile Swamp, Partridge River, and Yelp and Stubble creeks, although other wetlands were scattered over much of the site.

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APPENDIX A

Common and Scientific Names of Plants and Animals Given in the Report

Common Name	Scientific Name
Plants	
Balsam Fir	*Abies balsamea*
Black Spruce	*Picea mariana*
Cat-tail	*Typha* spp.
Jack pine	*Pinus banksiana*
Labrador Tea	*Ledum* spp.
Leatherleaf	*Chamaedaphne moench*
Paper Birch	*Betula papyrifera*
Pussy Willow	*Salix discolor*
Red-osier Dogwood	*Cornus stolinifera*
Red Pine	*Pinus resinosa*
Speckled Alder	*Alnus rugosa*
Sedge	*Carex* spp.
Tamarack	*Larix laricina*
Trembling Aspen	*Populus tremuloides*
White Pine	*Pinus strobus*
Willow	*Salix* spp.
Animals	
Barred Owl	*Strix varia*
Black-backed Woodpecker	*Picoides arcticus*
Black-capped Chickadee	*Parus atricapillus*
Bobcat	*Lynx rufus*
Boreal Owl	*Aegolius funereus*
Canada Lynx	*Felis canadensis*
Common Raven	*Corvus corax*
Common Redpoll	*Acanthis flammea linaria*
Coyote	*Canis latrans*
Eastern Wood Pewee	*Contopus virens*
Elk	*Cervus elaphus*
Fisher	*Martes pennanti*
Gray Jay	*Perisoreus canadensis*
Gray Owl	*Strix nebulosa*

APPENDIX A (Cont.)

Common and Scientific Names of Plants and Animals Given in the Report

Common Name	Scientific Name
Gray Wolf	*Canis lupus*
Great Horned Owl	*Bubo virginianus*
Hairy Woodpecker	*Dendrocopus villosus*
Least Weasel	*Mustela nivalis*
Long-eared Owl	*Asio otus*
Moose	*Alces alces*
Mountain Lion	*Felis concolor*
Northern Goshawk	*Accipiter gentilis*
Northern Three-toed Woodpecker	*Picoides tridactylus*
Pileated Woodpecker	*Hylatomus pileatus*
Pine Marten	*Martes americana*
Red Fox	*Vulpes fulva*
Red Squirrel	*Tamiasciurus hudsonicus*
River Otter	*Lutra canadensis*
Ruffed Grouse	*Bonasa umbellus*
Saw-whet Owl	*Aegolius acadicus*
Screech Owl	*Otus asio*
Short-eared Owl	*Asio flammeus flammeus*
Slate-colored Junco	*Junco hyemalis*
Snow Bunting	*Plectrophenax nivalis nivalis*
Snowshoe Hare	*Lepus canadensis*
Spruce Grouse	*Canachites canadensis*
White-tailed Deer	*Odocoileus virginianus*

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