

PROJECT: RAPTOR NESTING SURVEY ON ACTIVE AND POTENTIAL MINING CLAIMS IN WRST 1992

WRST RESEARCH AND RESOURCE MANAGEMENT REPORT: No. 92-05

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INTRODUCTION

Title 36: Code of Federal Regulations, Part 9, Subpart A regulates all mining activities within National Parks resulting from the exercise of valid existing mineral rights on federal mining claims. The purpose of these regulations is to insure that mining activities are conducted in a manner consistent with the purpose for which National Parks were created and to prevent or minimize damage to the environment or other resource values.

Raptors may be impacted by mining activities both from habitat loss in nesting or foraging areas and disturbance caused by exploration and mining activities during critical periods in the breeding cycle. Habitat loss may occur directly from exploration or mining activities, and from construction and utilization of access routes (e.g. roads or ATV trails) to claims. Human activities associated with mining may cause disturbance that significantly alters a pair's behavior or utilization of their breeding territory which may result in nest failure. The purpose of this study was to provide baseline information on raptors nesting and foraging near mining claims in Wrangell-St Elias National Park and Preserve (WRST) and provide managers with information necessary to evaluate and mitigate mining activities prior to approving a proposed Plan of Operations.

STUDY AREA

Four study areas were selected in areas previously identified as having current or potential mining activities (National park Service 1988) (Table 1). Factors used to prioritize study areas include: current or recent exploration and mining activity, access, ore deposit type/commodity, and habitat potential for nesting raptors. Areas in Table 1 are listed in order of survey priority. Some additional surveys were conducted outside of the study areas in an attempt to confirm nesting reports of the federally endangered peregrine falcon (Falco peregrinus) and to document raptor nests where potential human disturbance (non-mining related) may be occurring. Other raptor nests were found while moving between study areas.

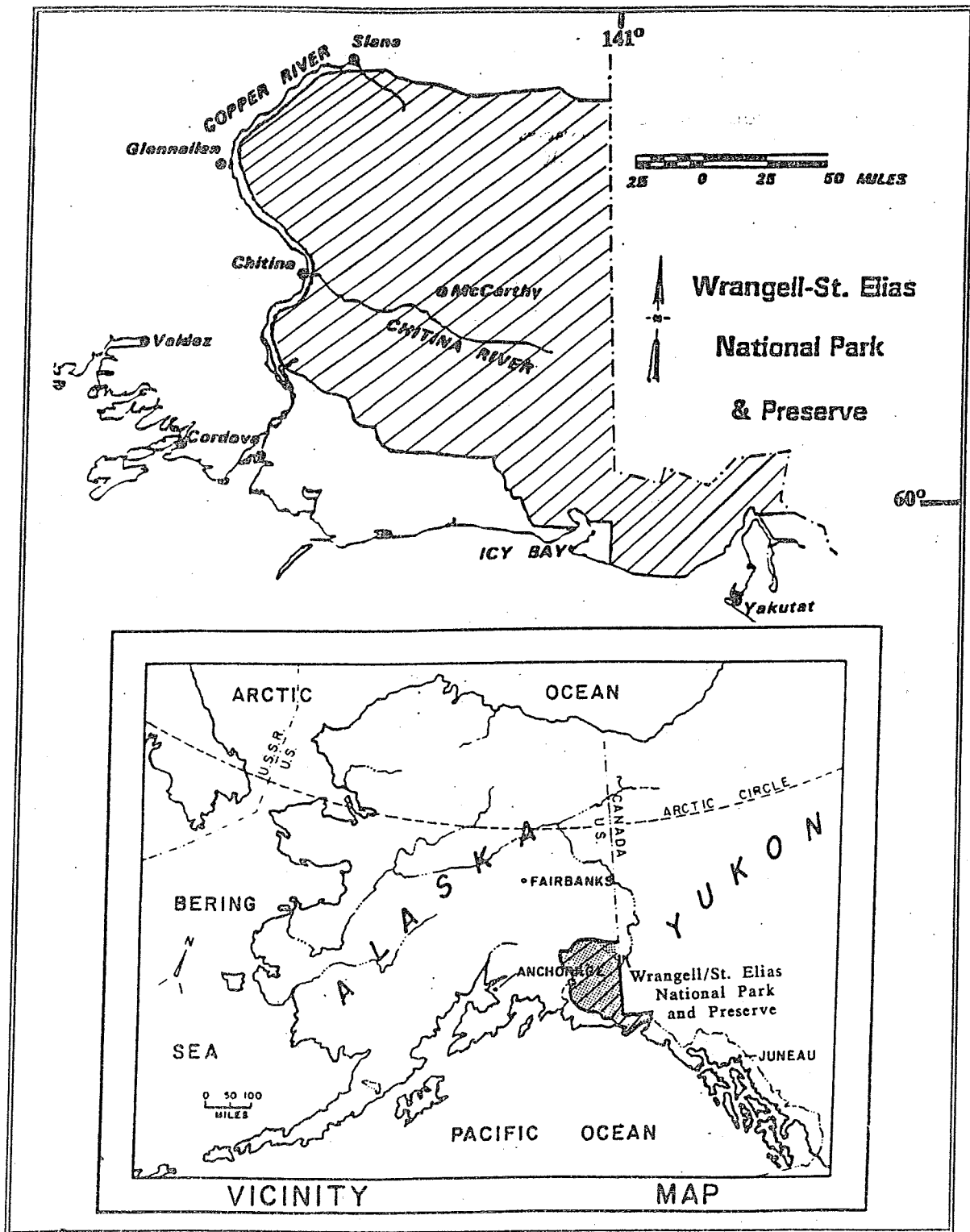


Figure 1. Location of Wrangell-St. Elias National Park & Preserve.

Table 1. Location of study areas for nesting raptors in WRST, 1992.

LOCATION	METHOD OF MINING	STATUS
STUDY AREA 1		
BONANZA CREEK (#1-6 AA029712-7)	Placer	Approved/In operation Plan amended to include 2 more claims
BONANZA CREEK (#1 AA029712)	Placer	Submitted plan-rejected
BIG L (A027002-121)	Lode	Plan of operation submitted exploration activity proposed
BIG ELDORADO CREEK (AA027052-58)	Placer	Approved/In operation Supplement under review
GOLD RUN CREEK (AA02759-61 & AA026817)	Placer	Submitted plan-rejected
CARL CREEK (AA029679-711) (AA019373-422)	Lode	Plan of operation submitted, exploration activity proposed
STUDY AREA 2		
DAN CREEK (MS923 & OTHERS)	Placer	Operating without an approved plan in 1991
GREEN BUTTE (MS1098A&B)	Lode	Submittal of plan expected
CHITITU (A005519 & OTHERS)	Placer	Past approved plan (1980's) Not currently mining
STUDY AREA 3		
ORANGE HILL (AA055512-82)	Lode	No plan has been submitted but industry has indicated interest
NABESNA (MS1591)	Lode	No plan - Exploration activity in the 1980's
STUDY AREA 4		
BERG-MACDOUGALL (MS1558A)	Lode	No plan-High potential for mineral development
CLEAR CREEK (MS918)	Lode	No plan-High potential for mineral development
NUGGET CREEK (A001410-1)	Lode	No plan

Cumulatively, the 4 study areas cover about 1800 km² within WRST (Figs. 1 & 2). Study areas 1 and 3 are north of the Wrangell Mountain Range. Study area 1 covers 397 km² and extends from Chisana, north to Warrick Peak, southeast to include the entire Carl Creek drainage, southwest to Black Hill, and west to Chisana. Study area 3 covers 524 km² and extends along the

Nabesna River drainage from the terminus of the Nabesna Glacier north to Devil's Mountain. The remaining two study areas (2 and 4) are south of the Wrangell Mountains. Study area 2 contains 580 km² and begins at the park/preserve boundary on Bonanza Ridge and extends south to include the access road east of McCarthy, southeast to the confluence of Swede Gulch and Young Creek, northeast to Joshua Peak, northwest to the source of Lubbe Creek, and west to the starting point. Study area 4 covers 300 square km², which includes the entire Kuskulana River drainage and its major tributaries from the source southwest to Strelna. An additional 1800 km² were surveyed by helicopter outside the four study areas, for a combined total of 3600 km² surveyed.

The study areas are comprised of mountainous terrain containing tundra habitat, cliffs, and jagged rock outcrops. Riparian areas predominate the lower elevations in drainages and valleys. Balsam poplar (Populus balsamifera), spruce (Picea spp), willow (Salix spp) and alder (Alnus spp), grow along stream edges and stream bottoms. In the higher elevations above treeline, dwarf shrub and tundra communities composed of willows, dwarf birch (Betula spp), dryas (Dryas spp), lichens, and other small shrubs predominate. Wooded areas below tree line (about 900m above sea level) are comprised mostly of aspen (Populus tremuloides) and spruce (US Department of Interior 1973).

Climatic conditions on the study areas are characterized by extreme temperature variations. Temperatures were highly variable in WRST and across interior Alaska during the 1992 raptor breeding season. Cold temperatures extended late into the spring, delaying nesting of some bird species. A late snow storm moved from west to east across the state in early May and may have affected nest success of some raptors. Within WRST, temperatures were as high as 34° C at Hubert's Landing on June 10. On June 23, 30 cm of snow fell on Gold Hill with a low temperature of -5° C. Precipitation tends to be higher south of the Wrangell Mountains than north due to coastal influences. For example, precipitation averages 20 cm in the Mentasta-Nutzotin area while McCarthy averages 58 cm. Lower elevations of the Copper River basin average about 25-30 cm annually (US Department of Interior 1973).

METHODS

This study was conducted from 18 May-20 August 1992. Aerial surveys for cliff-nesting raptors, including golden eagles (Aquila chrysaetos), peregrine falcons, and gyrfalcons (Falco rusticolus), were conducted from a piper supercub on May 28-29 and from a Bell Jet Ranger 206 helicopter on June 26-29. J Bouton was the observer and J Lee was the pilot during the May surveys. K Kozie and J Bouton were observers during the June surveys, E Kelly piloted. When possible, flight paths were designed to allow optimal lighting (e.g. west-facing cliffs were surveyed in the morning, and east-facing cliffs were viewed on

the return flight in the afternoon).

Individual sightings of raptors by species and all nests located (occupied and unoccupied) were recorded on USGS 1:63,360 series topographic maps. Species, number of adults and young, nest elevation, and other physical attributes were recorded for each nest. Photographs were taken when possible to aid in nest relocation in subsequent years. Data collected was recorded on Alaska Nest Territory Cards issued by the U.S. Fish and Wildlife Service (USFWS), and entered into corresponding DBase files D:NESTOBGE.DBF and D:NESTREC.DBF. All potential prey items, including birds and mammals observed or heard on study areas, were recorded.

Terminology used in this report to describe breeding territory status is discussed in Postupalsky (1974, 1981), and Steenhoff (1987). A nesting territory is an area containing one or more nests within the home range of one pair of mated birds, and where no more than one pair of the same species has bred in the same year (McIntyre 1989). For golden eagles, nests >3 km apart were considered separate territories. This was based on the closest known distance between nesting territories in Denali National Park (DENA) (C McIntyre, National Park Service, Anchorage, AK, pers commun). A territory was considered occupied if a pair of mated adults were in the vicinity, if a lone adult was seen defending the territory, incubating, or brooding, or if eggs or young were observed in the nest. Adults within 1 km of a nest were considered associated with that nest.

Forest-nesting raptor species were located by ground surveys conducted on foot during the breeding season (May-August). Playback recordings of conspecifics and of a great-horned owl (Bubo virginianus) were used to elicit territorial responses from red-tailed hawks (Buteo jamaicensis), northern goshawks (Accipiter gentilis), sharp-shinned hawks (A. striatus), merlins (Falco columbarius), and American kestrels (F. sparverius) along access corridors and on mining claims. An elicited defensive response implies a territorial nesting pair is present. When in appropriate habitat, recorded calls of conspecifics were played in a specific order (merlin, sharp-shinned hawk, northern goshawk). Red-tailed hawk calls were also used during the May 18-19 surveys. Each species' call was amplified through a Johnny Stewart MS512 long-range portable wildlife caller for a period of several minutes and then turned off for an equal amount of time to allow species to respond (Fuller and Mosher 1987). If there was no response to conspecifics, then the same procedure was followed using the great-horned owl call in a further attempt to elicit a territorial response. Calls were amplified every 300 to 500 meters along access corridors and near mining claims depending on habitat and vegetation density (Johnson et al. 1981, Lynch and Smith 1984, Forsman 1983). Small clearings that increased the observers' visibility at playback sites were preferred since raptors will often fly to investigate calls without vocalizing and might otherwise be missed.

The southern portion of the Green Butte trail (Fig 3) was surveyed on May 18-19. Chisana (Fig 4) was surveyed on June 20-21 and the northern portion of the Green Butte trail was surveyed on July 8-9 (Fig 5). The final ground survey was conducted on August 7-10 in the vicinity of Orange Hill (Fig 6).

RESULTS AND DISCUSSION

CLIFF NESTING RAPTORS

Fifty-six golden eagle territories, 6 gyrfalcon territories, and 1 peregrine falcon territory, were located. The aerial surveys conducted by supercub in late May proved to be rather ineffective. Success of these early surveys was limited due to adverse weather conditions and the high air speed required to keep fixed-wing aircraft aloft. It would be advisable in the future to locate nests and check productivity by helicopter, which can maintain slower air speeds, including hovering, and are more maneuverable.

Golden Eagles

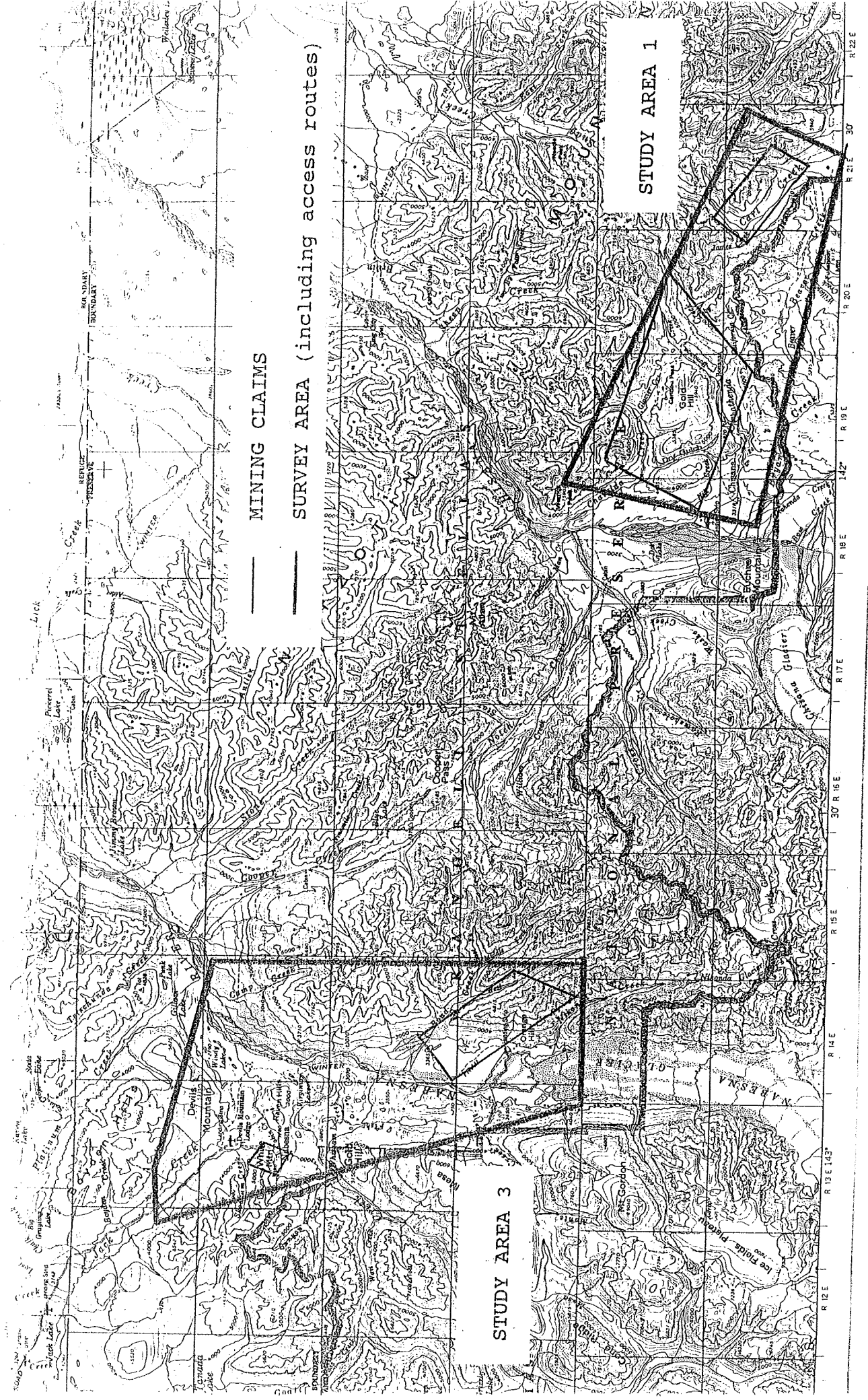
Sixteen of 56 (29%) golden eagle nest sites were occupied in late June. Observations of adults at occupied sites included 4 pairs and 3 single adults at nests with young, 5 pairs at empty nests, 1 single adult at an empty nest which was observed in a territorial interaction with an immature golden eagle, and 3 nests with young where no adults were observed. An additional 8 single adults were observed near empty nests. These may also represent occupied territories but breeding was unable to be confirmed. Brief aerial checks may easily miss a second adult which is foraging away from the nest (S. Ambrose, USFWS, Fairbanks, AK, pers commun, Fraser 1978, Fraser et al 1983, Steenhof 1987).

Ten pairs and 28 single adults were observed in areas where no nests were located. Some of these may also represent occupied territories where nests were not found. These areas should be re-checked in future surveys, especially where paired adults were observed. Several of the single adults may have been associated with known nests but were foraging >1 km away. Others may have been non-breeders or adults from failed territories foraging away from nests sites.

Two of the four (50%) golden eagle pairs found incubating (or brooding small young) in late May failed by late June when they were re-checked by helicopter. Although it is difficult to draw conclusions about golden eagle productivity in WRST from the data collected, the large number of unoccupied territories and empty nests suggest productivity was low.

Golden eagle productivity in DENA, where surveys have been conducted for the past 6 years, was also low in 1992. Many pairs did not attempt to nest; only 65% of known territories were

Figure 2. Location of raptor study areas near active or potential mining claims in Wrangell-St. Elias National Park & Preserve.



STUDY AREA 2

STUDY AREA 4

— MINING CLAIMS
- - - SURVEY AREA (including access routes)

STUDY AREA 4

MINING CLAIMS

SURVEY AREA (including access routes)

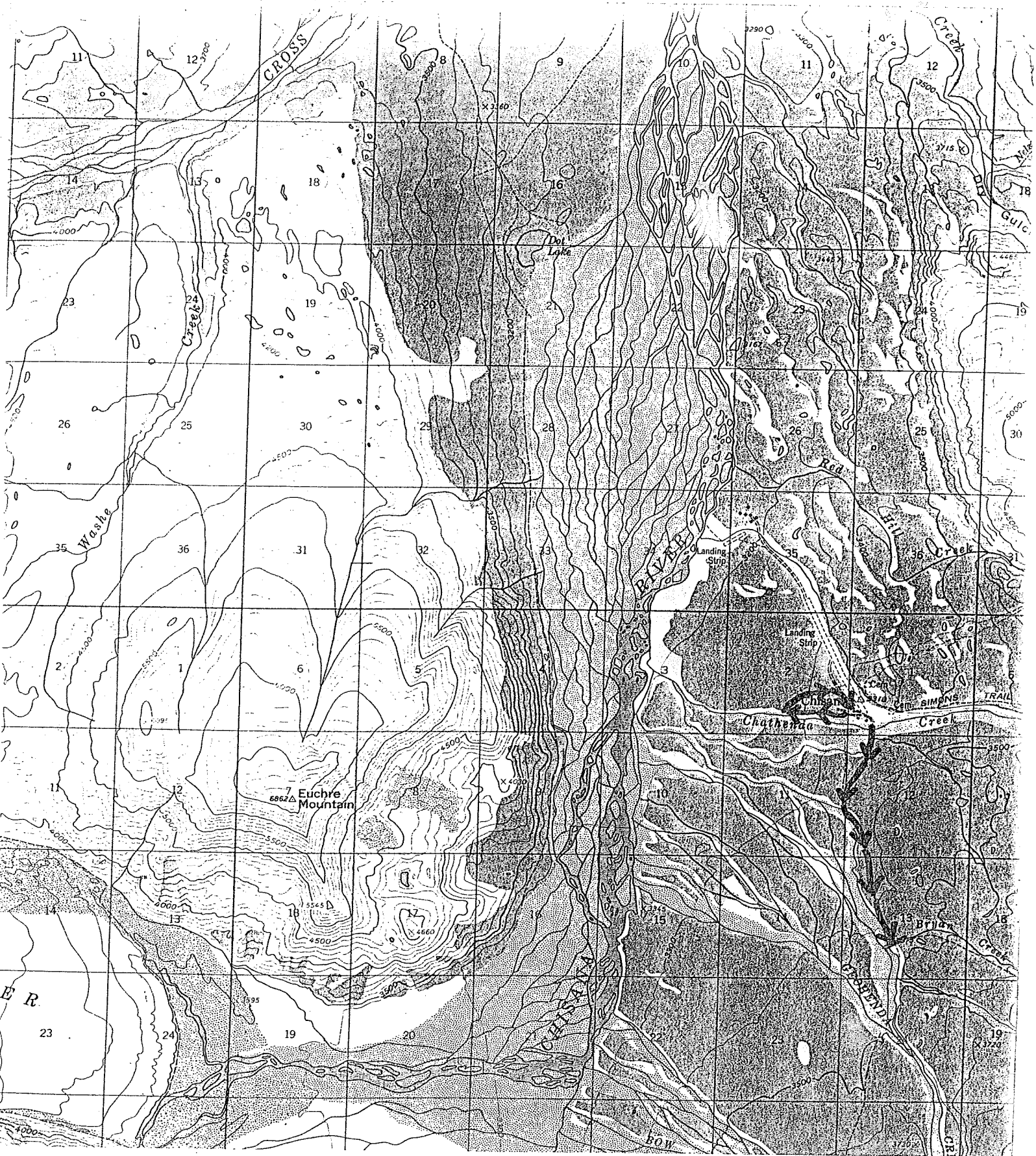


Figure 4. Survey route for forest nesting raptors in study area 1, June 20-21, 1992, Nabesna A-3 1:63,360 topographic quadrangle.

occupied. Nest success (successful nests/occupied nests) was 26% and the number of young/occupied nest was 0.36 (C McIntyre, pers commun of preliminary data calculations). Mean nest success and number of young/occupied nest of golden eagles in DENA was 74% and 1.12, respectively, from 1986-1991.

A variety of environmental pressures may affect nest success, including lack of adequate prey and adverse weather conditions. Golden eagles are opportunistic feeders that consume a wide variety of prey species, but the majority of their diet is probably arctic ground squirrel (Citellus parryi) (Murie 1944, Ritchie and Curatolo 1982) and snowshoe hare (Lepus americanus) (Lawrence 1988). Ground squirrels are considered non-cyclic but their populations are erruptive, experiencing irregular highs and lows. Ground squirrels were commonly observed at Gold Hill (study area 1), but a local guide along the White River reported ground squirrels there were scarce this year (T Vadden, Solo Creek Guide Service, Sutton, AK, pers commun). C McIntyre noted ground squirrel populations appeared low in DENA as well although no survey data exists for either Park. Snowshoe hares, an alternate prey for golden eagles were also low. Hare turd counts conducted within WRST indicate hares are in the decline phase of their 10 year cycle (B Route, WRST, Glennallen, AK, unpubl data). Cold temperatures extending late into the breeding season and a late spring snowfall may also have contributed to lower nest success.

Nest Aspect and Elevation

Golden eagles in Alaska generally nest on southeast facing slopes (Palmer 1988). The majority of the nests located in WRST had an aspect ranging from 90°(E) to 225°(SW) (Table 2). Less than 9% (N=8) of the nests were located on north facing cliffs (N, NE, NW), while 64% (N=56) of the nests had southerly aspects (S, SE, SW). The average elevation of golden eagle nests (N=85) was 1273 m (range 854-1524 m) (Table 3).

Table 2. Aspect of golden eagle aeries located in WRST, 1992

Compass facing/Degrees*	# Nests Located
N / 360	1
NE / 45	6
E / 90	18
SE / 135	20
S / 180	23
SW / 225	13
W / 270	9
NW / 315	1
	N = 91

* nest aspect is estimated to the nearest 45 degrees from map locations

Table 3. Elevation of golden eagle aeries located in WRST, 1992

Elevation in meters *	# Nests Located
900	4
1000	2
1100	11
1200	18
1300	13
1400	16
1500	<u>11</u>
	N = 85

* elevation rounded to the nearest 100 m

Breeding Phenology

Of the 10 golden eagle nests which had young in late June, nestlings ranged in age from about 2-5 weeks, resulting in young fledging from late July through most of August. By back calculating, using 45 days for mean length of incubation (Nice 1954), eggs were laid from about 10-28 April.

Nests Affected By Mining Activity

Golden eagles were the only species potentially affected by mining activity. A total of 14 golden eagle territories may be affected. Six territories had nests located within 0.8 km ($\frac{1}{2}$ mile) of mining claims and an additional 8 territories had nests within 0.8 km of probable access routes (Table 4). More information on these nests is presented in a separate report (Kozie and Bouton, in prep) containing nest locations and site specific management recommendations.

Table 4. Golden eagle territories which may be affected by mining or potential access routes in each study area.

	# Territories Affected by Mining Activity	# Territories Affected by Potential Access Routes
Study Area 1	2	5
Study Area 2	0	1
Study Area 3	2	1
Study Area 4	2	1

Gyr Falcon

Six gyrfalcon territories were located in WRST in 1992. Two were in the Nabesna area, 1 was along the White River, and the remaining 3 were near the Copper Glacier. Three of the 6 nests either failed or young had fledged and dispersed by late June when found by helicopter. Cade (1960) reports that gyrfalcons in Alaska typically hatch within the month of May, and that only the earliest young could fledge by late June. Therefore, it is more likely that these attempts failed or nesting did not occur, because young should not have dispersed until mid-July.

The 3 gyrfalcon aeries near the Copper Glacier were between 9.2 and 15 km apart from each other. All adults observed were of the grey color phase, which is most similar to the blue-grey plumage of adult peregrine falcons. Two peregrine sightings investigated this season were grey gyrfalcons. It is possible that several previous peregrine sightings in WRST were gyrfalcons.

Peregrine Falcon

Despite several reports, only 1 pair of nesting peregrine falcons was located in WRST in 1992. The pair was nesting along the Chitina River in what appeared to be an abandoned common raven (Corvus corax) nest. The adults most resembled the (Falco peregrinus anatum) plumage type. However, there is current disagreement among raptor biologists regarding whether these are legitimate sub-species or just extreme plumage variations between individual birds. The female was photographed incubating on the nest.

Both adult peregrine falcons were seen flying together when the helicopter was more than 800 m away. The female returned to the nest as the helicopter was passing, allowing researchers to see 3 or 4 dark brown eggs in the scrape. The female resumed incubation and the male flew out of sight to the north.

The aerie was located near the top of a steep face overlooking the Chitina River and was overhung by a 1 m ledge, providing excellent protection. There were also 2 other old nests nearby which may be used in alternate years. Since these birds were incubating on June 28, the earliest one could expect fledged young would be August 3.

Other reliable reports of peregrine falcons came late in the season from the Barnard Glacier area and near the Gulkana River to the west of WRST. The former report was a single sighting and came late enough in the season that the bird may have been a migrant. Several reports from multiple observers of the Gulkana River pair almost certainly indicate that an occupied territory exists (K McCarthy, Copper River Wranglers, Gakona, AK, pers commun). The pair was also seen defending against a bald eagle in early June by C Dooley, a peregrine falcon researcher.

FOREST NESTING RAPTORS

No nests were found during ground surveys for any forest-nesting species. While there were many individual sightings of birds in suitable habitat, very few birds were confirmed breeding. In all, there were 40 sightings of 9 different woodland species made during the breeding season. Details of these sightings are discussed by species.

Response to Taped Calls

Attempts to locate forest nesting raptor species using playback tapes were made on 10 days at 3 of the 4 study areas. Most wooded areas along potential access routes were surveyed except in study area 4.

There are differences in response among species, by age and sex, time of year, lunar cycle, and perhaps across geographic range (Fuller and Mosher 1987). Since adult raptors are most vocal during the courtship stage, this is the best time to use this technique. The southern portion of the Green Butte trail was surveyed during the courtship or early incubation stages for most forest nesting raptor species. Unfortunately, no birds were seen or heard. This may have been due to a poor quality tape, which was replaced later in the season. Other survey attempts were made during probable nestling, and post-fledging periods at Chisana, the northern Green Butte trail, and Orange Hill. One merlin, a great-horned owl, and either a great-horned or great-grey owl responded.

Poor response of raptors to survey tapes may have been due to inclement weather on 7 of the 10 survey days that reduced audibility of tapes and probably affected bird behavior. Lack of replication along survey routes during various stages in the breeding cycle also contributed to reduced detectability (Fuller and Mosher 1987, Iverson and Fuller 1991). Unfortunately, logistic and personnel constraints made it impractical to return to survey sites under more favorable weather conditions or to replicate transects.

While the use of playback tapes to locate forest nesting species was largely unsuccessful, this methodology has been used in other areas and can be successfully implemented in WRST if confined to smaller areas. Efforts should be made to conduct multiple surveys (5-10 replicates) (Fuller and Mosher 1987, Iverson and Fuller 1991) to locate forest nesting species in areas in which forest habitat destruction is specified (to create or improve access routes) in proposed plans of operations.

Northern Harrier

Only 1 northern harrier was recorded in study area 1. An adult female was seen foraging in tundra habitat on Gold Hill on August 20. Northern harriers have been observed in past years in this

area during the breeding season and probably nest in the tundra habitat (M Cook, WRST, Glennallen, AK, pers commun). Many other harriers were recorded throughout the season in flat tundra along the western boundary of WRST.

Sharp-shinned Hawk

Seven sightings of sharp-shinned hawks were recorded during the breeding season. In study area 1, an adult male was seen carrying prey near Chisana. Sharp-shinned hawks were heard vocalizing on 2 other occasions at this same site and probably bred nearby. Adult and immature sharp-shinned hawks were seen foraging in late August in 3 different locations on Gold Hill. These birds were probably migrants or birds dispersing pre-migration, because the habitat in these areas is mostly dwarf shrub/tundra and void of suitable nest trees.

Sharp-shinned hawks were also observed at Orange Hill in study area 3. An adult female was seen feeding a fledged youngster two times on August 9. This constitutes the only confirmed sharp-shinned hawk breeding in WRST this season. Another adult female was seen in early September in study area 2 at May Creek. Although the habitat surrounding May Creek is suitable for nesting, the breeding status of this bird is unknown.

Northern Goshawk

Northern goshawks were recorded 4 times in study area 1 and 2. Adult birds were seen 3 times in Chisana (study area 1) throughout the season, but were never observed exhibiting territorial behavior or heard vocalizing. The only other sighting was by helicopter in study area 2 up the west fork of the Nizina River.

Red-tailed Hawk

Red-tailed Hawks were observed throughout WRST, but only three were seen in study areas 1 and 2. On August 2 and 9, red-tailed hawks were seen in wet areas between May Creek and Dan Creek in study area 2. Both were light color phases of the red-tailed hawk but neither was observed well enough to determine subspecies. The other sighting was of an adult dark color phase "western" red-tailed hawk (Buteo jamaicensis calarus) seen along the Chisana airstrip on August 20. Many red-tailed hawks were seen from the air in areas between the Copper River and Mount Drum.

Eight different plumage types of red-tailed hawks (as described in Clark 1987) were recorded in WRST. The one most commonly observed was the immature and adult plumage of the dark color phase "Harlan's" race (B. j. harlani). Also observed were immature and adult light color phases of "Harlan's" and "western" red-tailed hawks. The light "western" race was observed less frequently than the light "Harlan's". The least observed form

was the dark phase of the "western" red-tailed hawk.

Unidentified Buteo

A lone light colored buteo was observed in the rain from a super cub on May 29 over the Raven Hills near Nabesna (study area 3). The bird was only observed briefly as it flew over the plane heading northeast. Unfortunately, the bird could not be relocated, but the long slim pointed wings eliminated red-tailed hawk as a possibility. This bird was either a rough-legged hawk (Buteo lagopus) or Swainson's hawk (B. swainsoni). Further attempts to relocate this bird later in the season by air and on the ground were unsuccessful. The bird may have been a late migrant.

American Kestrel

One American kestrel was observed along the short cliffs along Cathenda Creek east of Bonanza Creek in study area 1. The bird was observed 2 times at great distance on June 25. On June 20 an adult kestrel was observed harassing an adult goshawk in Chisana. The same birds were seen repeating this behavior 3 days later (D Rozenkrans, WRST, Glennallen, AK, pers commun). The bird's aggressive behavior suggests it was defending a territory, but no further nesting evidence was discovered. A pair of adult kestrels were foraging and vocalizing near the Orange Hill airstrip (study area 3) on August 7. These birds were in suitable habitat for nesting, but no young were seen.

Merlin

Merlins were one of the species that responded to taped vocalizations. An adult repeatedly responded to the tape on June 21 from the NPS cabins in Chisana (study area 1). An adult male merlin was also observed hunting white-crowned sparrows (Zonotrichia leucophrys) near chicken airstrip on Gold Hill (study area 1) on June 28. The nearest suitable tree nesting habitat for the bird was >3 km away on Chavolda Creek although merlins do occasionally nest on cliffs and on the ground. It is possible this bird was breeding nearby. Additionally, merlins will forage as far as 8-10 km from nest sites (S Wilbor, Univ of Alaska, Fairbanks, AK, pers commun).

Three merlins were seen on August 7-8 near Orange Hill (study area 3). Two sightings were of an adult female, and the third was an immature female. Again because of the date, it is unknown if these birds bred in the area, but the terminus of the Nabesna Glacier is obviously an important hunting area for these particular birds. All 3 observations were of merlins foraging on the mud flats there. The adult female captured a spotted sandpiper (Actitis macularia) from glacial pools mid-afternoon 8 August.

The only record of a merlin in the southern study areas was a

lone bird observed along the McCarthy Road between study areas 2 and 4 on May 28 (B Route, pers commun). Probable migrant birds were seen throughout late August and early September along the Copper River and near the Gulkana airport on the west boundary of WRST. All merlins seen were of the "taiga" race (Falco columbarius columbarius).

OWLS

Owls were not a focus of this study since this project began in mid-May, well after owls have completed breeding and can be detected by call. Incidental observations were recorded, however, and are discussed below.

Great Horned Owl

Great horned owls were observed in two locations within WRST during this study, however regular owl surveys conducted annually the Nabesna and McCarthy Road corridors indicate that the bird is common (K Kozie, unpubl data). On June 7, M Steigerwald (WRST, Glennallen, AK, pers commun) confirmed great-horned owl breeding by finding a dead nestling near the May Creek ranger cabins. Numerous other sightings of adult birds near May Creek in study area 2 have been noted this year and many previous. Great horned owls also were heard responding to tapes on 7 August at Orange Hill (study area 3) indicating territoriality. Another lone owl was observed on June 24 roosting in willows along the banks of Glacier Creek on Gold Hill (study area 2).

Northern Hawk Owl

No northern hawk owls (Surnia ulula) were recorded within WRST through this study, but they were reported just outside the western park boundary near Gulkana Airport on 3 or 4 occasions and a single bird was seen during the 1992 breeding bird survey along the Nabesna Road.

Boreal Owl

Boreal owls (Aegolius funereus) were not recorded during the course of this study, but owl surveys along the McCarthy Road in 1991 suggest they are common in that area (K Kozie, unpubl data).

Unidentified Owl Species

On August 9 an owl was heard responding to great-horned owl calls north of the Orange Hill airstrip (study area 3) at 1730 hours. The bird was distant and could not be heard well, but may have been a great grey owl (Strix nebulosa), and would have been in suitable habitat, but was not heard or seen again after the initial three calls.

PREY BASE INFORMATION

Data on passerine bird species, shorebirds, and waterfowl was opportunistically recorded on study areas and in other seldom visited areas in the park (appendix 1). A singing adult Brewer's sparrow (Spizella breweri) was seen in low shrubs above tree line, on the hillside NW of the confluence of Bonanza Creek and the unnamed drainage N of Canyon Creek on Gold Hill (study area 1). This is the first sighting of a Brewer's sparrow in Alaska, and if confirmed as a breeder would represent a significant range extension for this species. There is an isolated population of Brewers sparrows that breed to the southeast in Kluane National Park. Observations to confirm breeding of this species will be attempted in 1993.

RECOMMENDATIONS

Recommendations are as follows:

1. A detailed, site specific management plan should be developed for golden eagles nesting on Bonanza and Gold Run Creeks at Gold Hill (Study area 1) during the 1993 breeding season. Proposed mining activities may directly affect the nest success of these pairs and the recommended protective guidelines to mitigate potential human disturbance from mining related activities needs to be evaluated.
2. More information is needed on productivity of cliff nesting raptors in WRST to better evaluate the cumulative impacts mining may have on these populations, especially in study area 1 where multiple mines are active or proposed. Productivity data should be collected for a minimum of 3 years.
3. Further observations should be conducted at the remaining nest sites which may be affected by mining to gain more detailed observational data on each pair's use of their territory and to evaluate the potential effect of mining activities on the nest success of these pairs, e.g. develop site specific management plans.
4. Future research should be directed at composing more comprehensive protective guidelines that would be applicable to most golden eagle nest sites where mining or recreational activities may occur. This will require observing multiple pairs of eagles' and evaluating their reactions to disturbance at different distances from the nest and at different stages in the breeding cycle.

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Appendix 1: Bird species seen by study area in WRST, 1992.

<u>Species Scientific Name</u>	<u>Common Name</u>	<u>Study Areas</u>
Cygnus buccinator	Trumpeter Swan	2
Anas acuta	Green-winged Teal	1
Bucephala islandica	Barrow's Goldeneye	1,2,3
Bucephala albeola	Bufflehead	3
Histrionicus histrionicus	Harlequin Duck	1
Haliaeetus leucocephalus	Bald Eagle	1,2
Circus cyaneus	Northern Harrier	1
Accipiter striatus	Sharp-shinned Hawk	1,2,3
Accipiter gentilis	Northern Goshawk	1,2
Buteo jamaicensis	Red-tailed Hawk	2
Aquila chrysaetos	Golden Eagle	1,2,3,4
Falco sparverius	American Kestrel	1,3
Falco columbarius	Merlin	1,3
Falco peregrinus	Peregrine Falcon	2*
Falco rusticolus	Gyr Falcon	3
Dendragapus canadensis	Spruce Grouse	1
Lagopus lagopus	Willow Ptarmigan	1
Lagopus mutus	Rock Ptarmigan	1
Charadrius semipalmatus	Semipalmated Plover	1
Pluvialis dominica	Lesser Golden Plover	1
Tringa solitaria	Solitary Sandpiper	3
Bartramia longicauda	Upland Sandpiper	3
Actitis macularia	Spotted Sandpiper	1,3
Heteroscelus incanus	Wandering Tattler	1
Phalaropus lobatus	Red-necked Phalarope	1
Gallinago gallinago	Common Snipe	1,2,3
Aphriza virgata	Surfbird	1
Calidris minutilla	Least Sandpiper	3
Stercorarius longicauda	Long-tailed Jaeger	1,3
Larus argentatus	Herring Gull	2
Larus canus	Mew Gull	1,2,3
Larus philadelphia	Bonaparte's Gull	3
Sterna paradisaea	Arctic Tern	3
Bubo virginianus	Great Horned Owl	1,2,3
Ceryle alcyon	Belted Kingfisher	2,3
Colaptes auratus	Northern Flicker	1,2,3
Picoides villosus	Hairy Woodpecker	2
Sayornis saya	Say's Phoebe	1,3
Empidonax alnorum	Alder Flycatcher	1,2,3
Contopus borealis	Olive-sided Flycatcher	3
Eremophila alpestris	Horned Lark	1,3
Tachycineta thalassina	Violet-green Swallow	1,2,3
Riparia riparia	Bank Swallow	3
Hirundo pyrrhonota	Cliff Swallow	1,2,3
Hirundo rustica	Barn Swallow	1
Perisoreus canadensis	Gray Jay	1,2,3
Corvus corax	Common Raven	1,2,3,4
Pica pica	Black-billed Magpie	1,2,3
Parus atricapillus	Black-capped Chickadee	1,2,3
Parus hudsonicus	Boreal Chickadee	1,2,3

<u>Species scientific Name</u>	<u>Common Name</u>	<u>Study Area</u>
Cinclus mexicanus	American Dipper	1
Turdus migratorius	American Robin	1,2,3
Ixoreus naevius	Varied Thrush	1,2
Myadestes townsendi	Townsend's Solitaire	1,2
Catharus guttatus	Hermit Thrush	2,3
Catharus ustulatus	Swainson's Thrush	1,2,3
Catharus minimus	Gray-cheeked Thrush	1,3
Oenanthe oenanthe	Northern Wheatear	3
Regulus calendula	Ruby-crowned Kinglet	1,2,3
Anthus spinoletta	Water Pipit	1,2,3
Bombycilla garrulus	Bohemian Waxwing	1,2
Lanius excubitor	Northern Shrike	1
Vermivora celata	Orange-crowned Warbler	1,2,3
Dendroica petechia	Yellow Warbler	1,3
Dendroica striata	Blackpoll Warbler	1,2
Seiurus noveboracensis	Northern Waterthrush	2,3
Wilsonia pusilla	Wilson's Warbler	1,2,3
Passerculus sandwichensis	Savannah Sparrow	1
Junco hyemalis	Dark-eyed Junco	1,2,3
Spizella breweri	Brewer's Sparrow	1
Spizella arborea	American Tree Sparrow	1
Zonotrichia leucophrys	White-crowned Sparrow	1,2,3
Zonotrichia atricapilla	Golden-crowned Sparrow	2
Passerella iliaca	Fox Sparrow	1,2
Calcarius lapponicus	Lapland Longspur	1
Calcarius pictus	Smith's Longspur	1
Pinicola enucleator	Pine Grosbeak	2
Carduelis flamea	Common Redpoll	1,2,3
Carduelis pinus	Pine Siskin	1,2,3
Loxia leucoptera	White-winged Crossbill	1,2,3

* seen just outside study area to south