CHUITNA COAL PROJECT:

SUMMARY AND REVIEW OF PREVIOUS BASELINE STUDIES FOR TERRESTRIAL WILDLIFE AND MARINE BIRDS

Prepared For

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31 March 2006

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INTRODUCTION

This report summarizes the existing baseline data on terrestrial wildlife that were collected in the 1980s for what was then known as the Diamond Chuitna Project, a proposed coal mining operation in the Beluga/Tyonek area on the western side of Upper Cook Inlet, Alaska. The project has recently been re-planned (see Figure 1) and is now known as the Chuitna Coal Project. In addition to the baseline data collected specifically for the Diamond Chuitna Project, this report summarizes what is known from other wildlife and marine bird studies in the western portion of Upper Cook Inlet. Most of these additional studies are state or federal government agency-sponsored studies focused on wildlife management issues. Wildlife studies from the more-developed regions of Upper Cook Inlet near Anchorage were not evaluated because of the possibility of alterations in species occurrence and numbers due to impacts from intensive human development. It was felt that studies from relatively undeveloped areas in western Upper Cook Inlet would provide a more appropriate measure of baseline information for the current Chuitna Coal Project.

This report is intended as a summary and review of the salient conditions for wildlife in the project area based largely on studies conducted in the 1980s. As this is a review, no effort was made to present the original data from the existing baseline studies in either a tabular or figure format but numbers observed (when available) and areas of high wildlife use are noted. Because the existing baseline data are now 19–24 years old, the locations of specific observations (e.g., raptor or waterfowl nests) are likely not suitable to use in impact assessment or permitting efforts and hence this type of information is not presented here. Those data, of course, are available in the original baseline studies reviewed in this report. Even areas of wildlife concentrations for some species or species groups may have changed over a 20 year period, especially for those species or groups that have increased or decreased substantially in population number.

Finally, it should be noted that no specific efforts to evaluate of the importance of the project area to wildlife were conducted as this report is not intended as a NEPA document. A determination of the importance of the project area to wildlife, relative to other areas in the region (to facilitate impact assessments), will be conducted later as part of the EIS for the Chuitna Coal Project.

MOOSE

BACKGROUND AND STATUS

In the 1985 permit application and Wildlife Protection Plan (Diamond Alaska Coal Company 1985), the moose was considered the most important wildlife species in the project area because of its abundance, wide-ranging distribution, and importance for subsistence and sport harvest. Since the baseline information on moose was collected in the 1980s, the moose population has declined in the region (Game Management Unit [GMU] 16B), prompting the Alaska Board of Game (ABOG), on the recommendation of the Alaska Department of Fish and Game (ADFG) to implement a predator control program (ABOG 2004, 2006) and confirming moose as a priority species for monitoring.

BASELINE SURVEYS AND OTHER DATA SOURCES

A radio-telemetry study of moose habitat use and movements was conducted in the mine area by ADFG from March 1983 to January 1985 (Faro 1985). Moose were captured in wintering areas near the mouths of the Beluga River (northeast of the area currently proposed for development) and the Chuitna River and in the region surrounding Granite Point during late March 1983, and in the Lone Ridge rutting area (encompassing the coal lease area) during late November 1983. Aerial radio-tracking surveys were flown 40 times from 26 March 1983 to 15 January 1985, resulting in >900 relocations of collared animals, which were obtained most often during the calving and rutting seasons. The 1,768-km² study area was delineated empirically by the movements of 36 radio-collared moose and generally included the drainages of the Beluga River, Chuitna River, Nikolai Creek, Theodore River, and the lower reaches of the McArthur River and the Chakachatna River (Figure 2). Habitat information was collected for each moose location, providing valuable data on seasonal habitat use and sightability of moose during aerial surveys. As calculated by the minimum convex polygon method, 25 of the 36 collared moose had home ranges that included the proposed development. Concentration areas used during winter and the breeding season (rut) were delineated, as was the seasonal dispersal of moose across summer ranges. No specific movement corridors were identified, but gradual migrations from winter to summer ranges occurred broadly through most riparian areas in the study area. More rapid movements to rutting areas occurred during autumn, but again not in specific movement

151°30'0"W
151°20'0"W
151°10'0"W
61°15'0"N
61°10'0"N
61°5'0"N

CHUITNA COAL MINE LEASE BOUNDARY

Mine Area

Lone Creek

Threemile Creek

Beluga River

Chuit Creek

Preliminary Airport Entrance/Exit Road

Mine Facilities

Personnel Housing and Airstrip

Preliminary North Ladd Road and Conveyor

Preliminary Road and Conveyor

Ladd Landing Development

Ladd Coal Export Terminal Trestle and Berth

Chuitna River

Tyonek

Cook Inlet

N
W E
S

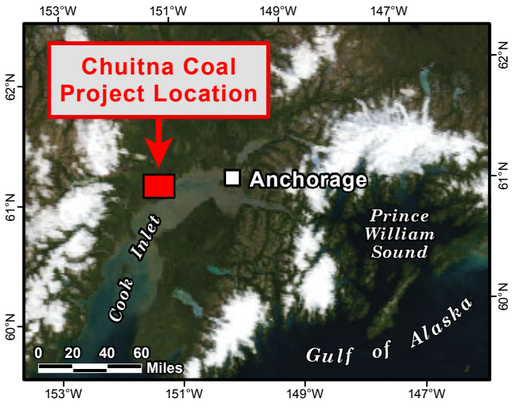
Approximate scale = 1:97,000

1 0 1 2 3 Km

1 0 1 2 Mi

Notes:
Background imagery: true-color Landsat 7 acquired August 16, 2000; 30-m pixel resolution.
Inset map imagery: Blue Marble Next Generation, NASA

Facility layout from PacRim Coal, Feb. 16, 2006.
Map projection: ASP Zone 4, NAD83, US foot



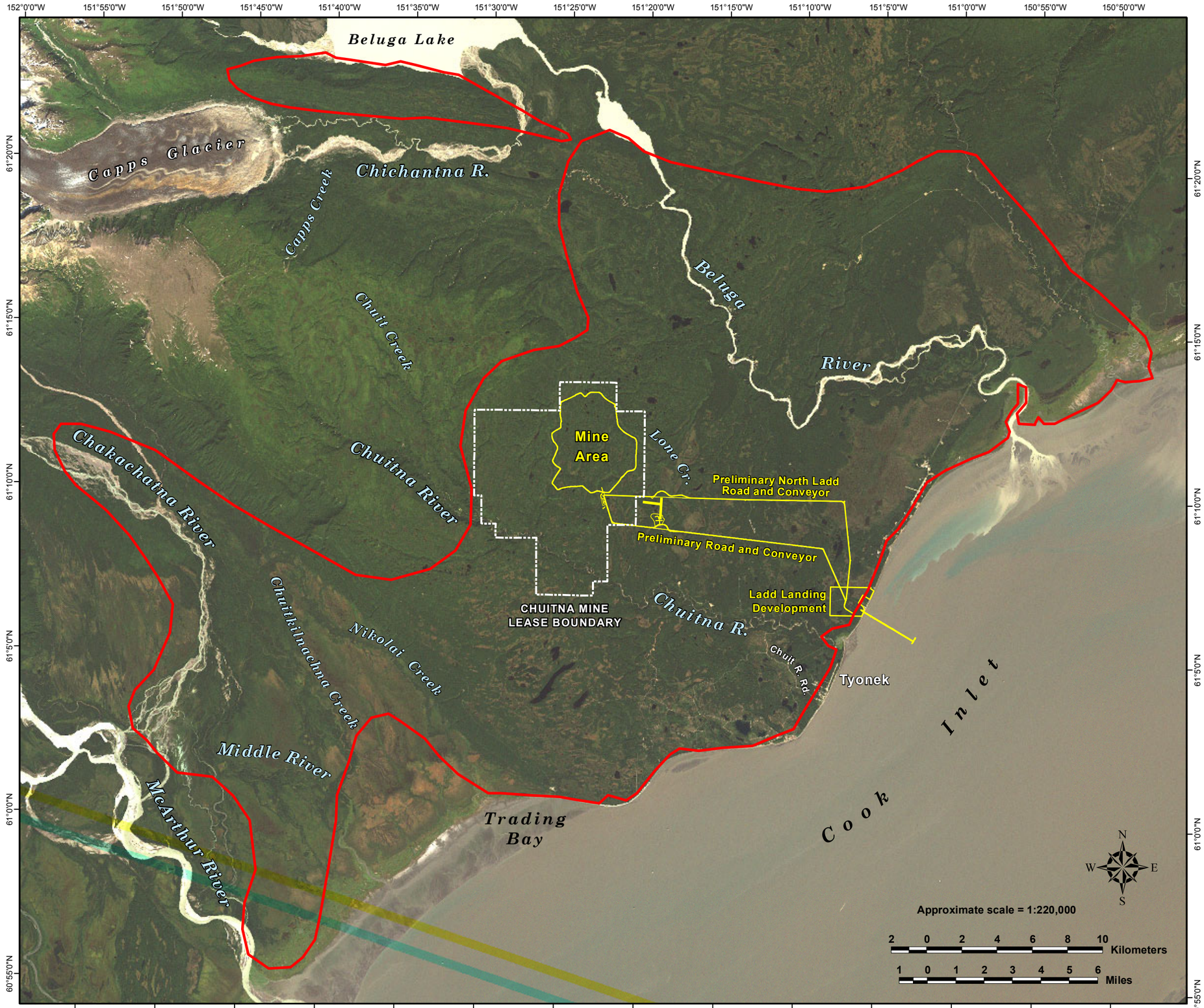
PACRIM COAL

Chuitna Coal Project

Figure 1.
Proposed Project Layout

map prepared by:
ABR inc. *environmental research & services*

23 March 2006 | ABR file: Chuitna_Baseline_Project_Layout_05-172.mxd



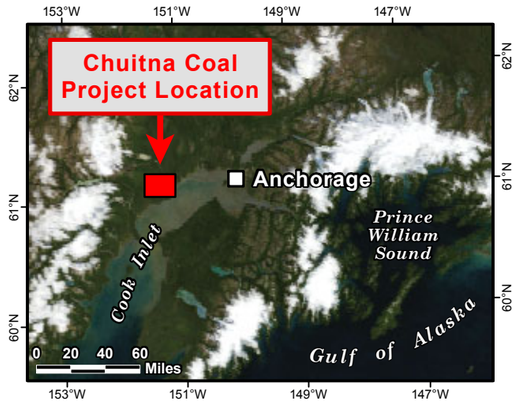
Legend

Approximate Area Used by Radio-collared Moose

Notes:
Radio-collared Moose use areas were digitized from: Diamond Shamrock, Diamond Alaska Coal Co. 1985. Diamond Chuitna Mine: Permit Application to Conduct Surface Coal Mining. Part C: Environmental Resources Information. Permit application No. 003.

Background imagery: true-color Landsat 7 acquired August 16, 2000; 30-m pixel resolution.
Inset map imagery: Blue Marble Next Generation, NASA.

Facility layout from PacRim Coal, Feb. 16, 2006.
Map projection: ASP Zone 4, NAD83, US foot



PACRIM COAL

Chuitna Coal Project

Figure 2.
Area Used by Radio-collared Moose: March 1983–April 1984

map prepared by:
ABR, Inc. *environmental research & services*

30 March 2006 | ABR file: Chuitna_Baseline_Moose_05-172.mxd

corridors. The telemetry methods used by ADFG (employing VHF transmitters) were adequate for delineating home ranges, general habitat use, and movements of moose in the proposed development area.

Standard trend-count surveys for sex and age composition data were conducted in the project area during December 1983 and November 1984 and produced estimated mean ratios of 42 bulls:100 cows and 30 calves:100 cows (Faro 1985). ADFG found ratios of 31 bulls:100 cows and 13 calves:100 cows in GMU 16B in fall 2001 (Del Frate 2004) and estimated 23–35 bulls:100 cows and 14–23 calves:100 cows in fall 2003–2005 (ABOG 2006).

A stratified random aerial census conducted in February 1984 produced estimates of 792 ± 159 (90% CI) moose in the 1,343-km² survey area between the Beluga River and Nikolai Creek and 1,305 ± 185 moose in the entire 1,768-km² study area used by radio-collared moose (corresponding roughly to GMU 16B South) (Faro 1985). Population status and trend surveys have been conducted by ADFG over the years in GMU 16B, an area of 26,950 km² (Harkness 1993, Griese 1998, Del Frate 2004). The coal mine lease is located in GMU 16B South (south of the Beluga River, excluding Kalgin Island). ADFG biologists speculated that the moose population in all of GMU 16B exceeded 10,000 animals in the early 1980s (Harkness 1993, Griese 1998, Del Frate 2004), but supporting data were scant. In contrast, a census of GMU 16B in November–December 1991 estimated 5,748–7,200 moose (Del Frate 2004), although it excluded GMU 16B South. The available data indicated that moose numbers in GMU 16B declined through the late 1980s and 1990s, due in large part to severe winter conditions in some years (most notably 1989–1990 and 1999–2000). By fall 2001, the population estimate for all of GMU 16B was 3,700–4,000 moose, including an estimated 718 moose in GMU 16B South (range 700–850; based on an incomplete survey) (Del Frate 2004). This estimate indicated a decline from the two previous population estimates for GMU 16B South, which were 810–1,210 moose in November 1994 and 1,081 ± 145 (80% CI) in February–March 1996 (Del Frate 2004). The most recent estimate of the moose population in the mainland portion of GMU 16B was 3,193–3,951 animals in fall 2005 (ABOG 2006). This population level is substantially below the state's objective of 6,500–7,500 moose (minimum density of 1 moose/2.6 km², assuming that suitable moose habitat covers 16,835 km² of the unit) for GMU 16B, an area in which intensive management for human harvest has been mandated by the state government (ABOG 2004, 2006).

SUMMARY OF FINDINGS

Moose were common throughout the project area during spring, summer, and fall seasons in past studies (EPA 1990). Calving occurred between mid-May and mid-June, primarily in lowland bog and open mixed spruce/hardwood forest below 150 m elevation. Most cows with calves remained in those habitats throughout the summer, whereas bulls and cows without calves followed the receding snowline to open shrub and tundra habitats above timberline (>380 m). Many moose remained at higher elevations until forced downward by the deepening snowpack in November and December (ERT 1983–1984).

During the rut (breeding season) in October and November, relatively large numbers of moose congregated in at least four rutting areas at higher elevations in the project area, particularly in the Lone Ridge/Denslow Lake area (the Lone Ridge rutting area) that largely coincided with the proposed mine site (Faro 1985). No data were obtained on the total number of moose using these rutting areas, but Faro (1985) speculated that as many as 250 moose may have used the Lone Ridge rutting area at least once during 1983–1984. During the rut, moose gather in small groups that remain in the rutting area throughout the breeding season. Rutting areas are traditionally used areas of generally open habitats. However, rutting areas do not appear to be identifiable strictly by vegetation composition or other habitat characteristics (Diamond Alaska Coal Company 1985).

The late winter (February) survey in 1984 of the 1,343-km² area between the Beluga River and Nikolai Creek produced an estimated mean density of 0.59 moose/km² (Faro 1985). Although moose can be widely distributed throughout the project area during winter, they are not uniformly distributed but tend to concentrate in lowland flats extending 3–6 km inland along a wide band from the Beluga River to Nikolai Creek, presumably due to deep snow farther inland (Faro 1985, EPA 1990). Wintering moose also may be scattered through riparian areas of the Chuitna River, Chuit Creek, and tributary streams in the proposed project area (EPA 1990), and riparian areas served as movement corridors between seasonal ranges (Faro 1985). The area of the mine deposit reportedly was little used by wintering moose (EPA 1990).

Over all seasons, radio-collared moose were found most frequently (75% of locations) in mixed spruce–hardwood forest habitats with both open and closed canopies; the greatest use of these habitats occurred during winter and spring (Faro 1985). The use of open-canopy forests

increased during summer and fall and the greatest use occurred during the rut. Riparian habitats were used during all seasons and were the third most commonly used habitat (10% of locations).

Baseline studies reported that wolves were uncommon in the project area and probably not a major predator of moose but that bears were potentially significant predators, particularly of moose calves (ERT 1983–1984). However, season and bag limits in GMU 16B recently have varied in response to hunting pressure and population changes. In particular, regulations restricted season and bag limits during the 1960s and 1970s, prior to baseline investigations, and an apparent overpopulation of moose prompted the ADFG to increase harvest during 1983. Since the baseline information on moose was collected in the 1980s, ADFG estimates indicated that the moose population has declined in the region (GMU 16B) (Del Frate 2004), resulting in the current predator control program to increase the moose population in the unit (ABOG 2004, 2006).

BEARS

BACKGROUND AND STATUS

Brown and black bears are found throughout the project area, with brown bears occurring mainly in open terrain at higher elevations and black bears primarily in forested areas at lower elevations. Both species are targeted by hunters, although sport hunting pressure tends to be lower than in other areas where bears may be larger and hunts easier and more successful. Black bears, in particular, appear to be taken mainly during hunts for either brown bear or moose. Bears are taken by local subsistence hunters, but do not appear to be important for food; rather, they are taken during hunts for other species or in defense of life and property. The habitats in the project area were described by previous investigators as being of high quality for black bears and moderate quality for brown bears.

BASELINE SURVEYS AND OTHER DATA SOURCES

Ground-based surveys (using helicopter access) were conducted in August 1982 and 1983 to identify important summer feeding areas for bears along salmon spawning streams. About 27 km of stream were surveyed on foot in 1982 along the Chuitna River, stream numbers 2004 and 2003, and Lone Creek, and ~19 km were surveyed along the same streams in 1983 (Figure 3). The 1982 survey followed a 2-week period without rain, making conditions good for assessing bear activity

from tracks. In 1983, conditions were less suitable because the survey occurred 2 days following a heavy rainfall and tracks were assumed to be less than 2 days old. Observations of bear sign, including tracks and salmon carcasses exhibiting evidence of consumption by bears, confirmed the use of salmon streams by both species of bears, but did not indicate areas of concentrated use. Rather, bear use appeared to be dispersed along the streams and occurred periodically, instead of long periods of continuous use.

A brief aerial survey in early May 1983 was conducted to identify spring feeding areas along the Chuitna River. Two observers surveyed both banks of the river from helicopter at an altitude of ~45 m and ground speed of 80 km/h; survey conditions were rated as good. Three black bears and no brown bears were observed during that survey. These observations suggested that seeps supporting early emergent vegetation on the south-facing bluffs of the Chuitna River between Chuit Creek and Lone Creek probably were important areas for black bears in early spring. Bear locations also were recorded opportunistically by personnel working in the project area and, although such sightings were not systematic, they confirmed the widespread distribution of both species in the area.

Prior to project-related investigations, DOWL (1981) delineated denning habitats in the general area of the project and identified three potential denning areas for brown bears in the upper reaches of Wolverine Creek, the Chuitna River fork, and in the Chichantna River drainage, all outside the mine lease area. Considerable post-denning activity also was noted in the headwaters of the Chichantna River, hilly areas of North Capps Creek, the mainstem of upper Capps Creek, the upper Chuitna drainage, upper Chuit Creek, and the upper edge of the Nikolai Creek escarpment. The mine lease area was considered marginal denning habitat for brown bears. Primary denning habitat for black bears was identified along the Nikolai Creek escarpment and in forested portions of the upper Chuitna and Lone Creek drainages.

ADFG has not specifically enumerated bear numbers in GMU 16B South, but some broad estimates are available for the entire area of GMU 16 (McDonough 2002; Del Frate 2003a; Kavalok 2005a, 2005b). Using a mean density of 11.3 black bears/100 km² in northern GMU 16, the black bear population of GMU 16B was estimated at 2,100 animals in spring 2000 and 2001 (McDonough 2002, ABOG 2004). This estimate was higher than the preceding range of 1,300–1,600 black bears in GMU 16B (ABOG 2004).

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61°15'0"N 61°10'0"N 61°5'0"N 61°0'0"N

Chuit Creek

Beluga River

CHUITNA MINE LEASE BOUNDARY

Mine Area

Lone Creek

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Preliminary North Ladd Road and Conveyor

Preliminary Road and Conveyor

Ladd Landing Development

Chuitna River

Nikolai Creek

Chuit R. Rd.

Tyonek

Cook Inlet

Trading Bay

N
W E
S

Approximate scale = 1:120,000

1 0 1 2 3 4 5 Kilometers

1 0 1 2 3 4 Miles

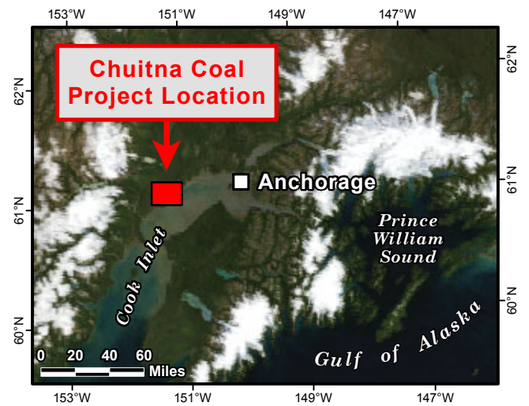
Legend

- Bear Study Area
- Bear-Salmon Feeding Survey Routes

Notes:
Study area and survey routes for bears were digitized from: Environmental Research and Technology, Inc. 1984. Diamond Chuitna Project Terrestrial Wildlife Baseline Studies Report. Prepared for Diamond Shamrock - Chuitna Coal Joint Venture, Anchorage, Alaska.

Background imagery: true-color Landsat 7 acquired August 16, 2000; 30-m pixel resolution.
Inset map imagery: Blue Marble Next Generation, NASA.

Facility layout from PacRim Coal, Feb. 16, 2006.
Map projection: ASP Zone 4, NAD83, US foot



PACRIM COAL

Chuitna Coal Project

Figure 3.
Study Area and Survey Routes for Bears - 1982

map prepared by:
ABR, Inc. *environmental research & services*

30 March 2006 | ABR file: Chuitna_Baseline_Bears_05-172.mxd

The brown bear population in GMU 16B was estimated at 586–1,156 animals in the early 1990s (Del Frate 2003a) and at 530–1,050 animals more recently (ABOG 2004), but documentation for both estimates is lacking. The similarity between these estimates runs counter to a reported increase in the brown bear population (Del Frate 2003a). A more rigorous survey attempt was begun in spring 2000, yielding a preliminary density estimate of 23.3 brown bears/1,000 km² in northern GMU 16B (Del Frate 2003a). Later estimates placed the mean density at 26.7 bears/1,000 km² in northern GMU 16B and perhaps as high as 150 bears/1,000 km² in southern GMU 16B, based on densities farther down the Alaska Peninsula in GMU 9A (Kavalok 2005b). The amount of brown bear habitat in all of GMU 16 was estimated to be 24,206 km² (most of which is GMU 16B), constituting the area of the unit below 4,000 ft elevation (McDonough 2002). The coastal and foothill areas of Redoubt and Trading bays were presumed to have the highest densities in the unit (Del Frate 2003a), suggesting that brown bear density is fairly high in the nearby mine lease area.

Harvest goals and hunting seasons for brown and black bears were liberalized in 1999 in response to local public complaints about high bear densities. Seasons and harvests for brown bears were liberalized further in 2003. In 2005, the bag limit for brown bears was increased to two per year in GMU 16B in response to public concerns about the continued decline of moose and increased reports of large numbers of bears in the unit (Kavalok 2005b). Brown bear harvest levels generally reflect these regulatory changes, increasing with liberalized hunts but generally remaining level during periods of consistent season and harvest restrictions. There is no closed season for harvest of black bears in GMU 16. Current management goals for bears reflect the state's management intent to increase moose populations by decreasing the number of predators in GMU 16B (ABOG 2004, 2006).

SUMMARY OF FINDINGS

Brown and black bears are found throughout the project area during the spring, summer, and fall. They may be found in any vegetation type, but brown bears tend to prefer open habitats, particularly shrub and tundra communities, while black bears tend to prefer forested habitats. The distribution of both species of bears is strongly affected by food availability, with emerging grasses and herbs being critical spring foods and spawning salmon and berries critical late summer foods. Bears of both species enter dens during October or November and remain there

until late April or May. Brown bears tend to den at higher elevations largely outside of the proposed project area. Black bears probably den throughout the project area and baseline investigations reported that the project area provided high-quality denning habitat for black bears (ERT 1983–1984).

Baseline studies reported that important spring feeding habitats for black bears occurred along the Chuitna River (EPA 1990). During summer, baseline studies reported that the mainstem of the Chuitna River was little used by bears, but tributaries of the Chuitna in the proposed project area showed substantial use during salmon runs (ERT 1983–1984, EPA 1990). Baseline studies reported no particular concentration areas for bears feeding on salmon, rather bears were dispersed along meandering, mid-elevation sections of these creeks. No population data on bears are available for the project area, although baseline studies reported that the black bear population probably was relatively high (EPA 1990).

Nearly the entire permit area was considered to provide important foraging habitat for brown bears and excellent availability of forage for black bears (Diamond Alaska Coal Company 1985).

FURBEARERS

BACKGROUND AND STATUS

Beavers are one of the most common furbearers in the project area, occurring in all freshwater aquatic habitats bordered by woody shrub and forest vegetation. The only aquatic habitats unsuitable for beavers are fast-moving streams and rivers and those with widely varying levels of flow. Beavers are a keystone species whose presence and activities affect the distribution of aquatic and riparian habitats and the abundance of fish and other wildlife species in those areas. Previous investigations in the project area reported beaver as ubiquitous from coastal lowlands to upland alpine and subalpine shrub communities. Habitats in the project area were considered by previous investigators to be highly productive for beaver.

Other furbearers documented in the project include gray wolf, coyote, red fox, wolverine, river otter, marten, mink, ermine, least weasel, lynx, and muskrat. Previous investigators concluded that the project area provides a diverse mix of high-quality habitats for furbearers. Habitats were considered to be highly productive for marten, otter, coyote, and weasels; moderately productive for mink; and of low quality for wolf, lynx, muskrat, red fox, and

wolverine. A few local residents of GMU 16B trap full time to generate income, primarily from marten and beaver (Kavalok 2004).

BASELINE SURVEYS AND OTHER DATA SOURCES

A survey of beaver caches was conducted by helicopter in October 1983 to locate active colonies in the project area (ERT 1983–1984). The survey included the entire length of Lone Creek and stream numbers 2003 and 2004, including side tributaries, and the Chuitna River from Chuit Creek to the mouth, the east fork of Chuit Creek, the transportation corridor to Granite Point, and the proposed port area, housing area, and most of the upland aquatic habitats in the lease area (Figure 4). All lodges, dams, and food caches were recorded. A similar cache survey was conducted in the North Road corridor during October 1987 (ERT 1987).

A ground-based survey of furbearer sign was conducted in February 1983 (ERT 1983–1984) along stream numbers 2003 and 2004, Lone Creek, and the Chuitna River (Figure 5). The transportation corridor to Granite Point also was surveyed. Observers covered ~64 km on cross-country skis during the survey. The survey was conducted after a recent snowfall that created excellent conditions for tracking. All tracks or browse sign were recorded by habitat and the abundance of each species was estimated. Tracks of marten, mink, weasel, and coyote were common. Scattered tracks of snowshoe hares and one set of lynx tracks were observed. Previous investigators reported that red foxes, muskrats, and wolves were uncommon in the project area. Observations of furbearers also were recorded opportunistically by other project personnel.

Wolves have garnered much attention recently in the region, although specific estimates of numbers in the project area (GMU 16B South) generally are lacking. The first systematic survey by ADFG in GMU 16 was flown in March 1993, producing an estimate of 48–62 wolves in 8–10 packs in the entire unit (Del Frate 2003b). In concert with investigation of an ongoing lice infestation in fall and winter 1998–1999, a more detailed unit-wide effort resulted in an estimated fall population of 120–140 wolves in 16–19 packs and another estimate in fall 2001 indicated 160–245 wolves in 25–28 packs (Del Frate 2003b). The population is thought to have tripled between spring 1993 and fall 2001 and to have peaked in 2001–2002 (Del Frate 2003b), although the comparability of these estimates is unclear and no statistical evidence was presented. Taken together, these estimates suggest that the population of wolves in GMU 16 has increased in the last decade while the moose population continued to decline, a trend that was used to justify a

predator control program targeting wolves (ABOG 2004, 2006). Based on the intensive management mandate by the Alaska legislature, the objective of the current predator control program approved and begun in 2004 by the Board of Game is to maintain a wolf population of 30–60 wolves in at least 4 packs in all of GMU 16, including 22–45 wolves in 3–5 packs in GMU 16B. Most recently (and since wolf control began in GMU 16B in 2004), the unit-wide wolf population was estimated in fall 2005 at 85–114 wolves in 10–12 packs, a density of 0.32–0.42 wolves/100 km² (ABOG 2006). Reported harvests for the entire GMU 16 during 1994–2002 ranged between 15 (1995–1996) and 88 (2001–2002) and averaged 50 wolves per year; specific harvest numbers were not available for the area of the mine project in GMU 16B South.

ADFG has not reported surveys to determine the population size of other furbearers in GMU 16. Trapping conditions were most recently described as fair to good in GMU 16 (Kavalok 2004). The Tyonek and Beluga areas of GMU 16B South are reported to be common problem areas where beavers have plugged culverts, prompting occasional issuance of permits for removal of nuisance beavers.

SUMMARY OF FINDINGS

Baseline surveys reported that beavers were widely distributed and abundant throughout the proposed project area from coastal lowlands to upland shrub and tundra on top of Lone Ridge (~500 m elevation) (EPA 1990). Beaver were most common along major tributaries of the Chuitna River in the current project footprint/buffer area and along the main stem of the Chuitna River. Beaver dams were found to have a profound influence on the distribution of wetlands and spawning salmon. Streams in the permit area (Lone Creek and tributary 1003, including a 1.6-km buffer) had the highest density of beaver caches (1.6 caches/km of stream length) and nearby streams in the permit study area had 0.52–1.1 caches/km (ERT 1985a). No beaver colonies were reported within 1.6 km of the Ladd port site (EPA 1990).

Muskrats reportedly were rare in the project area during 1982–1983; one colony was noted in a tributary of upper Lone Creek (ERT 1983–1984, 1985b). River otter sightings and sign were noted throughout the project area in lakes and streams below timberline. Marten sign was common during a February 1983 furbearer survey and the species probably is common in mature white spruce forests. Mink were common and probably are distributed throughout the project area in riparian habitats. Ermine and least weasel sign were common. Baseline surveys by ERT (1983)

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61°15'0"N

61°10'0"N

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61°0'0"N

Chuit Creek

Chuitna River

CHUITNA MINE
LEASE BOUNDARY

Mine
Area

Lone Creek

Beluga River

Preliminary North Ladd Road and Conveyor

Preliminary Road and Conveyor

Ladd Landing
Development

Chuitna River

Nikolai Creek

Chuit R. Rd.

Tyonek

Cook Inlet

Trading
Bay

N
W E
S

Approximate scale = 1:120,000

1 0 1 2 3 4 5 Kilometers

1 0 1 2 3 4 Miles

Legend

Beaver Study Area

Notes:
Study area for beavers was digitized from:
Environmental Research and Technology, Inc. 1984. Diamond Chuitna Project Terrestrial Wildlife Baseline Studies Report. Prepared for Diamond Shamrock - Chuitna Coal Joint Venture, Anchorage, Alaska.

Background imagery: true-color Landsat 7 acquired August 16, 2000; 30-m pixel resolution.
Inset map imagery: Blue Marble Next Generation, NASA.

Facility layout from PacRim Coal, Feb. 16, 2006.
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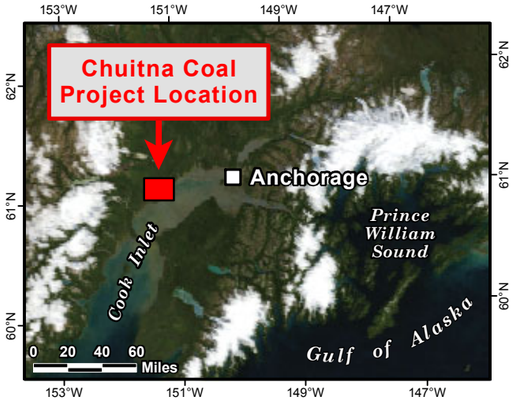

PACRIM COAL

Chuitna Coal Project

Figure 4.
Study Area for Beavers - 1983

ABR inc. *map prepared by:*
environmental research & services

30 March 2006 | ABR file: Chuitna_Baseline_Beavers_05-172.mxd

151°40'0"W 151°35'0"W 151°30'0"W 151°25'0"W 151°20'0"W 151°15'0"W 151°10'0"W 151°5'0"W

61°15'0"N 61°10'0"N 61°5'0"N 61°0'0"N

Chuit Creek

Beluga River

CHUITNA MINE
LEASE BOUNDARY

Mine Area

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Old Tyonek Creek

Chuit R. Rd.

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Cook Inlet

Trading Bay

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S

Approximate scale = 1:120,000

1 0 1 2 3 4 5 Kilometers

1 0 1 2 3 4 Miles

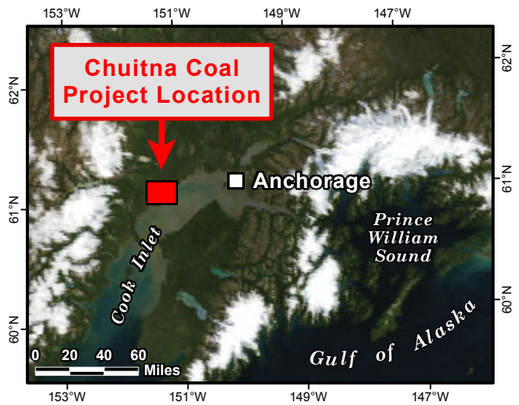
Legend

Furbearer Survey Routes

Notes:
Furbearer survey routes were digitized from: Environmental Research and Technology, Inc. 1984. Diamond Chuitna Project Terrestrial Wildlife Baseline Studies Report. Prepared for Diamond Shamrock - Chuitna Coal Joint Venture, Anchorage, Alaska.

Background imagery: true-color Landsat 7 acquired August 16, 2000; 30-m pixel resolution.
Inset map imagery: Blue Marble Next Generation, NASA.

Facility layout from PacRim Coal, Feb. 16, 2006.
Map projection: ASP Zone 4, NAD83, US foot



PACRIM COAL

Chuitna Coal Project

Figure 5.
Survey Routes
for Furbearers - 1983

map prepared by:
ABR, Inc. *environmental research & services*

30 March 2006 | ABR file: Chuitna_Baseline_Furbearers_05-172.mxd

found that lynx, red foxes, and wolves appeared to be rare in the project area during 1982 and 1983. Wolves were judged to not be a significant predator in the area during baseline investigations. In contrast, coyotes were common. No wolverine sightings or sign were reported, although suitable habitat exists.

SMALL MAMMALS

BACKGROUND AND STATUS

Small mammals that are known or suspected to occur in the project region include the little brown bat (the occurrence of silver-haired bat suggested by ERT (1983–1984, 1985b) was erroneous [Parker et al. 1997]), up to 6 species of shrews (common [or cinereus] shrew, pygmy shrew, dusky [or montane] shrew, tundra [formerly arctic] shrew, and probably water shrew and tiny shrew), lagomorphs (snowshoe hare and collared pika), hoary marmot, porcupine, 3 species of squirrel (arctic ground squirrel, red squirrel, and northern flying squirrel), and up to 7 species of mice and voles (northern red-backed vole, tundra vole, meadow vole, northern bog lemming, meadow jumping mouse, and possibly brown lemming and singing vole). The most abundant of these species play important ecological roles as insectivores, herbivores, and prey animals for predators. It is possible that the Norway rat and house mouse may have been introduced locally in areas of human habitation, but these species are not important ecologically in the region.

BASELINE SURVEYS AND OTHER DATA SOURCES

Small mammals have been collected or observed for at least four studies in the vicinity of the project area (Osgood 1901; BCM 1981, 1983; ERT 1983–1984) and additional regional information is available in specimen records of the University of Alaska Museum and a few other reports (e.g., ADFG 1994).

SUMMARY OF FINDINGS

Snowshoe hares were reportedly uncommon in the project area during the February 1983 ground survey, but were common near Granite Point in December 1983 (ERT 1983–1984). Snowshoe hare populations were believed to be at a cyclic low during the 1983 surveys. No subsequent published information is available on the population status. Red squirrels and

porcupines were common throughout forested habitats. Arctic ground squirrels were common in open habitats above timberline, particularly in the Lone Ridge area.

RAPTORS

BACKGROUND AND STATUS

All raptor species are protected by the Migratory Bird Treaty Act and because they are relatively uncommon, yet important in ecosystem function, we expect they would be included in the 'important species' classification of the Alaska Surface Coal Mining Program (ADNR 1999). In addition, the nests of Bald and Golden eagles receive special protection under the Bald and Golden Eagle Protection Act (U.S.C. 688). For these reasons, development actions require identification and protection of current nest sites from destruction or disturbance.

Until recently (1999), Peregrine Falcons were listed as endangered under the Endangered Species Act (ESA) and currently they are listed as *Birds of Conservation Concern* (USFWS 2002a). They are monitored regularly only on specific rivers in northern and interior Alaska, and the ESA does not require the identification of their nests elsewhere in the state. Nonetheless, Peregrine Falcons are high-profile species that generally are identified as important species for monitoring when impacts from developments are expected, and they typically are included in pre-development wildlife inventory efforts in Alaska (e.g., Pogo and Pebble mines). They are traditional in their use of nesting sites and, therefore, susceptible to disturbance, although such disturbance can be avoided with careful planning once nesting sites have been identified.

Although the subspecies of Northern Goshawk (*Accipter gentilis laingi*) in southeastern Alaska has been considered for Endangered Species status (e.g., 50 CFR 17), the Northern Goshawks found in the upper Cook Inlet are likely members of the continental race in North America (*A. g. atricapillus*; Squires and Reynolds 1997). The continental race of Northern Goshawks has not been considered for ESA listing, although their status in the Cook Inlet area is poorly understood. Like Peregrine Falcons, goshawks are traditional in their use of nesting sites, making them susceptible to disturbance. The goshawk is a high-profile species and is typically included among raptor species monitored for potential development impacts.

BASELINE SURVEYS AND OTHER DATA SOURCES

GOLDEN EAGLES AND PEREGRINE FALCONS

Golden Eagles and Peregrine Falcons are cliff-nesting raptors, which are surveyed primarily by aerial surveys of suitable cliff habitats. During these surveys other raptor species that use cliffs opportunistically for nesting are recorded, such as Rough-legged Hawks and Gyrfalcons. No historic records were found of nesting Peregrine Falcons in the Upper Cook Inlet–Susitna River area (Cade 1960). Aerial surveys of cliff habitats were conducted to locate endangered Peregrine Falcons in 1982 and 1983 (ERT 1983–1984). Although the entire project area was surveyed, most effort was spent in areas that might support cliff-nesting raptors, including the canyon area of the Chuitna River, the Beluga River, and cliffs near the Capps Glacier coal leases. Surveys extended ~40 km inland from the coast (Figure 6) and were conducted in a Bell 206B helicopter with two observers for each survey. Researchers appeared to have inspected all cliff-nesting habitats in the region. Other aspects of the survey techniques (e.g., altitude, timing) appeared to follow standard operating procedures. One Golden Eagle nest was identified in the survey area but no Peregrine Falcon nests were located and observers reported that little suitable habitat was identified. The spatial coverage of the 1982 and 1983 surveys was adequate to verify the occurrence of nesting Golden Eagles in mountainous terrain west of the project area and they appeared adequate to determine the general distribution and abundance of Peregrine Falcons.

Peregrine Falcons were only beginning to recover from a pesticide-induced population crash at the time of these earlier surveys (Ambrose et al. 1988), and it is not surprising, therefore, that no Peregrine Falcons were observed in prior studies. With recovery of the species now recognized statewide, ‘suitable’ habitat currently being used includes steep banks and lower cliffs, which previously were described as unsuitable by raptor biologists in the 1980s. Therefore, it is possible this species now nests in the project area in appropriate habitats. Surveys as conducted in the 1980s cannot, therefore, be considered adequate to determine the current status of nesting for Peregrine Falcons in the region. Baseline data collected in the 1980s are not adequate to assess the current populations or nest sites of cliff-nesting raptors in the project area and would not provide adequate support for permit applications to be submitted in 2007.

BALD EAGLES

Extensive aerial surveys were conducted in the entire project area, as well as the northeastern portion of Trading Bay and portions of the Beluga River, north of the project area, between 1980 and 1987 (ADFG 1984, ERT 1983–1984, 1987). Emphasis was placed on riparian areas with large cottonwood trees, a preferred tree for nesting by Bald Eagles (Figure 6). Limited information on other tree-nesting species appeared to be collected opportunistically on surveys (e.g., Red-tailed Hawk). In addition, more recent surveys have been conducted by the U.S. Fish and Wildlife Service (USFWS) along the Beluga River in 1988 and 1997 (Parker 1988; J. Conner, USFWS, pers. comm.) and the Chuitna River in 1988 (Parker 1988).

Project-related surveys for Bald Eagles (1982, 1980, and 1987) were conducted in a Bell 206B helicopter with two observers for each survey. Agency surveys were conducted in a fixed-wing aircraft. Surveys were primarily linear (following river and coast lines), but one exception was a survey in 1987, which also investigated Bald Eagle off-river habitats (e.g., lakes) near a proposed alternative transportation corridor (ERT 1987). Other aspects of the survey techniques (e.g., timing) appeared to follow standard operating procedures and were adequate to determine the general distribution, abundance, and productivity of Bald Eagles in the region.

Surveys conducted between 1980 and 1987 (including ADFG surveys [ADFG 1984]) were sufficient to identify most active Bald Eagle nests, especially along major river systems where primary nesting habitat occurs. (Location data from agency sponsored surveys in 1988 and 1997 were not available at the time of this document's preparation.) We feel that the baseline surveys conducted in the 1980s encompassed a broad enough region surrounding the currently proposed development so as to be adequate in spatial coverage (Figure 6).

In 1988, USFWS conducted fixed-wing aircraft surveys of the Susitna and associated rivers, including the Beluga (mouth to Triumvirate Glacier) and Chuitna rivers (mouth to Wolverine Fork) (Parker 1988). A Cessna 206 was used with two observers (plus pilot) and flight altitude of 300 ft agl and ~100 mph flight speed. Surveys were conducted on 20 May. Twelve nests were located on the Beluga River and four nests were found on the Chuitna River. That report identified two other surveys that covered these rivers: Timm (1980) on the Chuitna River and King (1980) on the Beluga River. At least one additional survey of the Beluga River was conducted by USFWS during the 1990s (J. Conner, USFWS, pers. comm., January 2006), but those data were not available for this report.

Legend

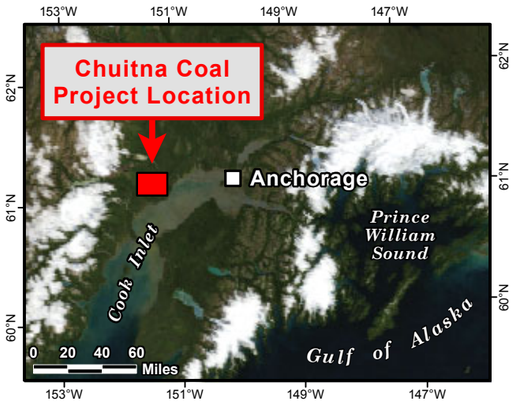
Approximate survey areas for Bald Eagles (May 1992 & 1983) and Peregrine Falcons (where cliffs present, July 1982)

Approximate Additional Upland Areas Searched for Peregrine Falcons (July 1982)

Notes:
Study areas for Bald Eagles and Peregrine Falcons were digitized from: Environmental Research and Technology, Inc. 1983. Diamond Chuitna Project Terrestrial Wildlife Baseline Studies Report. Volume 1 - Text. Prepared for Diamond Shamrock - Chuitna Coal Joint Venture, Anchorage, Alaska.

Background imagery: true-color Landsat 7 acquired August 16, 2000; 30-m pixel resolution.
Inset map imagery: Blue Marble Next Generation, NASA.

Facility layout from PacRim Coal, Feb. 16, 2006.
Map projection: ASP Zone 4, NAD83, US foot



Chuitna Coal Project

Figure 6. Study Areas for Bald Eagles (1982 & 1983) and Peregrine Falcons (1982)

map prepared by:
ABR, inc. environmental research & services

30 March 2006 | ABR file: Chuitna_Baseline_Raptors_05-172.mxd

Bald Eagle surveys from the 1980s and, to a lesser extent, 1990s would be adequate to describe the distribution, but not necessarily the specific nest locations or current abundance of the species in the area today. Although many of the same Bald Eagle territories that were occupied in the 1980s and 1990s might still be used today, many nest trees would have been lost to windfall, shoreline erosion, and other natural phenomena in the intervening years. In addition, Bald Eagle populations have increased in interior Alaska in the past decades (Ritchie and Ambrose 1996). Increasing numbers of nesting pairs on Kodiak Island, also suggest the possibility of population increases in the greater Cook Inlet region (D. Zwiefelhofer, USFWS, pers. comm.). Considering both of these factors, many new nest trees (that would be protected by the Eagle Act) may be present in the project region.

NORTHERN GOSHAWK

We are not aware of any specific surveys for Northern Goshawks in the Chuitna project study area. Limited information on other raptor species, such as Red-tailed Hawk, appeared to have been collected opportunistically during surveys for other bird species in the project area in the 1980s. No data were presented in the baseline studies, but the project area supports appropriate habitat for Northern Goshawks (Squires and Reynolds 1997) and they were described as an uncommon resident breeder in the area in the 1980s (ERT 1983–1984).

SUMMARY OF FINDINGS

Baseline studies reported a relatively diverse raptor community, including 12 species of hawks and falcons (10 of which probably breed in the area and 5 of which were observed during field studies), 7 species of owls (4 of which probably breed in the area and 4 of which were observed), and Common Ravens (while ravens are technically a passerine, they act functionally in the ecosystem as a raptor, and are probably year-round residents, although no nests were reported) (ERT 1983–1984). Bald Eagles were the most common raptor reported in the project area during baseline investigations (EPA 1990). Bald Eagles occurred along the coast and the Chuitna River upstream as far as Chuit Creek during spring, summer, and fall seasons. They were less common but regularly observed along the major tributaries of the Chuitna River in the mine area, particularly during salmon spawning from July through October (ERT 1983–1984). Altogether, 16 Bald Eagle nests were reported in the region during baseline surveys, 7 on the Beluga River, 7

on the Chuitna River, 4 on Nikolai Creek, and 1 east of Tukallah Lake. Only the Tukallah Lake nest site (if it still exists) would lie within the currently proposed project footprint/buffer area. The permit application stated that no Bald Eagle nests were found in the permit area, primarily because appropriate nesting trees were absent. Small numbers of Bald Eagles may remain in the project area during winter.

A Golden Eagle nest was reported >12 miles northwest of the project area on Capps Creek in both 1982 and 1983 (ERT 1983–1984). The permit application stated that the permit area is not within the normal hunting range of these eagles during the nesting season (Diamond Alaska Coal Company 1985). No Peregrine Falcon nests were found in the survey area.

Information for other raptors is anecdotal or limited. Red-tailed Hawks reportedly were common in lower elevation mixed-forest habitats near Lone Ridge and one nest was reported in 1983 near the Chuitna River (ERT 1983–1984). The permit application stated that Red-tailed Hawks were expected to be the most common breeding raptor in the permit area (Diamond Alaska Coal Company 1985). Northern Harriers also were observed near Granite Point and on Lone Ridge where several pairs probably nested in 1982 and 1983 (ERT 1983–1984). During baseline field programs, one Merlin and one Rough-legged Hawk were observed. Sharp-shinned hawks also probably breed in the project area, although no nests were reported (ERT 1983–1984). Great Horned Owls and Short-eared Owls also were reported to be common nesting birds in the project area.

LANDBIRDS

BACKGROUND AND STATUS

Landbirds (primarily passerines, game birds, and woodpeckers) represent much of the terrestrial wildlife diversity found in North America, including Alaska, and trends in their populations often are viewed as indicators of ecosystem health (Pashley et al. 2000). Since the baseline surveys for passerines and game birds were conducted for the Diamond Chuitna Project in 1982–1987, conservation needs of landbirds have increased at both the national and state levels in the US (BPIF 1999, USFWS 2002a, ADFG 2005, Rich et al. 2004). In particular, several species recorded in the project area in the 1980s (Olive-sided Flycatcher, Golden-crowned Kinglet, Blackpoll Warbler, Varied Thrush, and Rusty Blackbird) now are listed as priority

species for conservation in Alaska and/or nationally (BPIF 1999, Rich et al. 2004). Conservation concerns for landbirds in Alaska are primarily focused on those species for which recent population declines are known and/or species considered vulnerable to population threats such as deforestation (BPIF 1999). The Blackpoll Warbler and Rusty Blackbird have shown broad and consistent population declines across their North American breeding ranges over the past several decades, and there are indications the Rusty Blackbird may be considered for listing under the Endangered Species Act in the future. Additionally, the Gray-cheeked Thrush and Northern Shrike, species that were not observed during baseline surveys in the 1980s but were expected to occur and breed in the project area (ERT 1983–1984), are now considered conservation priority species for Alaska (BPIF 1999, ADFG 2005). Because of the conservation needs of some landbird species and the broad roles of landbirds in ecosystem function (e.g., insectivores, herbivores, prey), it seems likely that landbird populations would be considered important in permitting decisions for the Chuitna Coal Project.

BASELINE SURVEYS AND OTHER DATA SOURCES

During the baseline environmental studies for the Diamond Chuitna Project, ground-based "time area count" transect surveys for breeding passerines and upland gamebirds were conducted in the proposed mine project area during early June 1982 (ERT 1983–1984) and along the proposed North Road Transportation Corridor in mid-June 1986 and 1987 (ERT 1987). Additional observations of passerines and gamebirds were recorded while observers moved on foot between transect survey locations and during other field studies conducted in the project area in 1982, 1983, 1986, and 1987. The transect surveys used for the baseline studies are similar to current USFWS bird checklist/inventory survey protocols, which are designed to determine species presence and relative abundance information for land management areas in Alaska (e.g., Andres et al. 1999).

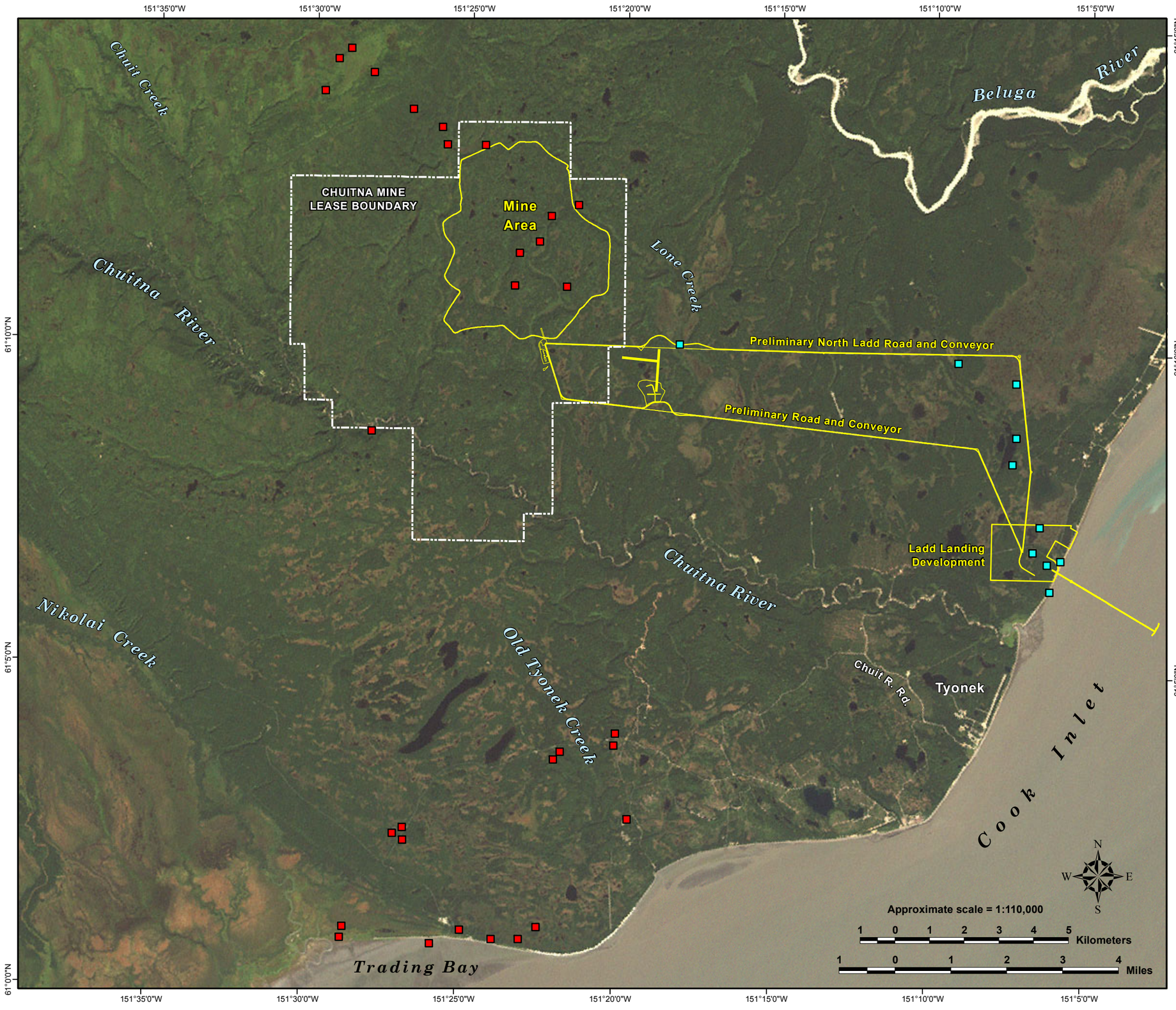
In 1982, 30 transect surveys were conducted in 8 major habitat types in the Diamond Chuitna Project area between Granite Point and Lone Ridge. The surveys were limited to the most accessible areas and were clustered primarily within 8 km of the coast near Granite Point, within the proposed mine lease area, and on Lone Ridge (Figure 7). In 1986 and 1987, five and eight transects, respectively, were conducted in the major habitat types found along the proposed North Road alignment (Figure 7). Transect were 200–500 yards in length and were located in

homogeneous habitat types. While walking each transect, observers identified and recorded all birds detected visually and/or audibly, also recording the length of time spent on each survey. In 1982, most counts were conducted during the early morning, but some occurred in the afternoon and evening. In 1986 and 1987, all counts occurred during morning hours.

For analysis, all bird observations were summarized and each species was ranked as relatively abundant, common, or rare, based upon the number of birds observed per hour (birds/h) within each habitat. The birds/h calculations (data not presented) also were used in an attempt to provide a measure of habitat value for each species.

The baseline surveys conducted in 1982 and 1986–1987 were adequate for determining landbird presence or absence, relative abundance, and breeding status in the habitat types surveyed within the project area at that time. The survey data are too old, however, to be considered representative of the present-day avian community. Additionally, the use of birds/h as an index to habitat value is inappropriate, as this method is known to provide a biased assessment of abundance and habitat value that does not meet current standards. Bird detections using transect methods have several inherent problems (Verner and Ritter 1985, Ralph et al. 1995, Norvell et al. 2003); in particular, using birds/h as a measure of habitat value for a species is biased by differences in the amount of time spent surveying in each habitat. A bias occurs because breeding males typically are conspicuous and quickly documented in any particular habitat when they are singing and defending territories, and increasing amounts of time spent in a habitat only reduces the importance value of that habitat when expressed on a birds/h basis. Current protocol for landbird surveys calls for counts to be conducted in set time periods, which do not change across habitats (Ralph et al. 1995). In addition to the inherent bias, the survey transects in the 1980s were not allocated to habitats by either systematic or random methods and it is uncertain whether the data are representative of the entire area.

Further, the project area has changed since the 1980s (the Granite Point area is no longer being considered as a port site, being replaced by port facilities envisioned in the Ladd Landing area) and the baseline data on landbirds during the 1980s covered little of the currently proposed project area (Figure 7). Incomplete survey coverage, coupled with problems inherent to transect counting methods and the passage of more than two decades, compromises the usefulness of the original baseline data for landbirds. Because landbird populations are well known to fluctuate over time, it will be important to collect current information on landbird numbers in the area to



Breeding Landbird Transects

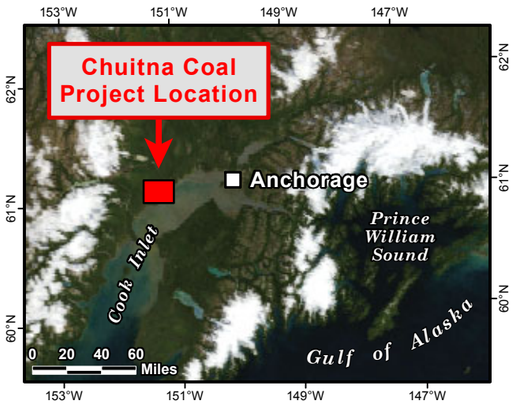
- 1982
- 1986 and 1987 (includes shorebirds)

Notes:
Breeding landbird transects were digitized from: Environmental Research and Technology, Inc. 1984. Diamond Chuitna Project Terrestrial Wildlife Baseline Studies Report. Prepared for Diamond Shamrock - Chuitna Coal Joint Venture, Anchorage, Alaska.

North road breeding bird transects were digitized from: Environmental Research and Technology, Inc. 1987. Diamond Chuitna Project North Road Baseline Studies Report. Prepared for Diamond Alaska Coal Company, Anchorage, Alaska

Background imagery: true-color Landsat 7 acquired August 16, 2000; 30-m pixel resolution.
Inset map imagery: Blue Marble Next Generation, NASA.

Facility layout from PacRim Coal, Feb. 16, 2006.
Map projection: ASP Zone 4, NAD83, US foot



PACRIM COAL

Chuitna Coal Project

Figure 7.
Breeding Landbird Transects - 1982, 1986, and 1987

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map prepared by:

30 March 2006 | ABR file: Chuitna_Baseline_Breeding_Birds_05-172.mxd

support the mine permit application. Current information on landbird habitat use also will be required to facilitate appropriate mine reclamation plans.

SUMMARY OF FINDINGS

Based on the range maps in Armstrong (1980), it was noted that the ranges of 72 species of songbirds included the Beluga area, and it was thought 65 species probably breed there, although the analysis did not include any corrections for the habitats available or unavailable in the Beluga area (ERT 1983–1984). Ultimately, 37 passerine species were observed in the project area during baseline field surveys in 1982 and 1983 (see ERT 1983–1984: Table 3-2). Only relative abundance information was presented for each species. Songbird habitat in the project area was reported to be typical of that found throughout south-central Alaska (EPA 1990). Baseline studies reported that the Bank Swallow was the most abundant breeding bird in the study area (ERT 1983–1984), followed by Tree Swallow, Yellow-rumped Warbler, Common Redpoll, Blackpoll Warbler, Savannah Sparrow, Hermit Thrush, Golden-crowned Sparrow, Wilson's Warbler, and Swainson's Thrush. In contrast, the permit application reported that the Savannah Sparrow was the most common species recorded, followed by Tree Swallow, Wilson's Warbler, Hermit Thrush, and Yellow-rumped Warbler (Diamond Alaska Coal Company 1985). Spruce-birch forests and wet meadow habitats were identified as particularly important nesting habitats for these passerines (ERT 1983–1984). Tall brush habitats reportedly had the highest diversity of passerines and were common in the permit area; these areas were dominated by Wilson's Warbler, Hermit Thrush, Song Sparrow, and Golden-crowned Sparrow (Diamond Alaska Coal Company 1985). (The identification of Song Sparrows in inland tall brush habitats is questionable given that, in Upper Cook Inlet, this species occurs only in strictly-coastal habitats; most likely Song Sparrows were confused with Fox Sparrows, which are common in tall brush throughout the Cook Inlet area.) Low brush habitats, which were scattered in the permit area, had the second highest species diversity, dominated by Tree Swallow, Savannah Sparrow, and Hermit Thrush. Mixed hardwood/spruce-birch forest occurred extensively in the permit area and had diversity similar to the low brush habitats, dominated by Yellow-rumped Warbler, Swainson's Thrush, Ruby-crowned Kinglet, and Blackpoll Warbler.

Upland game birds in the Beluga area include the Spruce Grouse and three species of ptarmigan. Rock Ptarmigan were reported to be common breeding birds in the area, while Spruce

Grouse, White-tailed Ptarmigan, and Willow Ptarmigan were reported to be uncommon breeders (ERT 1983–1984). Spruce Grouse and Willow Ptarmigan, however, were the only species observed in the project area during baseline surveys and reportedly they did not occur in the permit area during summer but were found primarily in willow communities along major streams during late fall and winter (ERT 1983–1984, Diamond Alaska Coal Company 1985).

SHOREBIRDS, CRANES, AND LARIDS

BACKGROUND AND STATUS

Since the baseline surveys for shorebirds were conducted for the Diamond Chuitna Project in 1982–1987, awareness of the conservation needs of shorebirds has increased at both the national and state levels in the US (ASWG 2000, USFWS 2002a, ADFG 2005, USSCP 2004). In particular, several species recorded in the project area in the 1980s (Hudsonian Godwit, Whimbrel, Upland Sandpiper, Solitary Sandpiper, Ruddy Turnstone, Western Sandpiper, Rock Sandpiper, Short-billed Dowitcher) are now listed as priority species for conservation in Alaska and/or nationally (ASWG 2000, USSCP 2004). The conservation plans and priority species lists for shorebirds are intended to encourage conservation measures now in an attempt to keep these species from becoming federally threatened or endangered in the future. As such, they do not carry legal status, as listing under the Endangered Species Act (ESA) does, but they do indicate increased awareness and concern for maintaining viable populations of these non-game species. It should be noted that the USFWS, in particular, is taking greater efforts to enforce the ‘no take’ provisions of the Migratory Bird Treaty Act with respect non-game bird species in Alaska. Some of the conservation concerns for shorebirds in Alaska are related to population declines, other concerns are for species having small and/or isolated populations with known or suspected threats, or species with large portions of their populations (or entire populations of some subspecies) concentrated in Alaska during migration or breeding. For example, virtually the entire population of the nominate race of the Rock Sandpiper overwinters in Upper Cook Inlet, where they depend on intertidal habitats for foraging (Gill and Tibbitts 1999). Similarly, some 20–47% of the world population of Western Sandpiper is estimated to migrate through Cook Inlet each spring (Gill and Tibbitts 1999). This information was unknown in the 1980s during the original baseline surveys.

The Sandhill Crane is a large, conspicuous, gruiform bird that can be found in both upland and wetland habitats in coastal and interior Alaska. This species migrates in large flocks through south-central Alaska to its primary breeding areas in western Alaska and Russia. Most of the cranes passing through the project area are likely from the Pacific Coast population, which winters in the Pacific Northwest. This species is hunted both in Alaska and on its wintering grounds and may be taken by local subsistence hunters as well as game bird hunters during fall migration.

Gulls and terns (family: Laridae) in the area include species that breed primarily in freshwater habitats (Mew and Bonaparte's gulls, Arctic Tern) and those associated more with estuarine and marine habitats (Glaucous-winged Gull). These species are of importance due to their vulnerability to disturbance associated with marine transport, and the possible attraction to human facilities, especially for Mew and Glaucous-winged Gulls.

Concerns regarding shorebirds for the Chuitna Coal Project likely will focus on the potential for direct loss of habitat (all seasons) and indirect effects on reproduction (for breeding birds) from development. For migrating cranes and migrating and wintering shorebirds, concerns are likely to include the potential for direct effects from port-site activities and from oil and/or fuel spills in estuarine areas near the proposed port site. Similar concerns are likely for gulls and terns in the project area.

BASELINE SURVEYS AND OTHER DATA SOURCES

Aerial and/or ground-based surveys for shorebirds were conducted in the Diamond Chuitna Project area during 1982–1983 and 1986–1987 (Figure 8). Ground-based surveys for spring migrant shorebirds were conducted in the vicinity of the previously proposed port site at Granite Point in May 1983 (ERT 1983–1984). These surveys focused on shorebird use of intertidal mudflats.

In May 1986, helicopter surveys for migrating waterfowl and shorebirds (see Figure 8) were conducted from the Susitna Flats to Nikolai Creek in Trading Bay over a 2-day period (ERT 1987). Species identifications of shorebirds were lacking and the presentation of data suggests that most effort was dedicated to waterfowl. In May and June 1987, aerial surveys and ground-based observations of shorebirds were conducted on transects (see Figure 8) along the proposed North Road alignment, from the lease boundary to the coast, roughly along the

Threemile Creek drainage (ERT 1987). The field methods for the aerial surveys were not stated and the methods for the ground-based surveys were described under the section for landbird surveys. The ground-based surveys appeared to adequately assess the numbers of shorebirds in the limited survey areas along the North Road alignment. Habitat use was not evaluated, however, and no differentiation was made between those shorebirds that were breeding in the area and those that were migrants or non-breeders. It is difficult to assess the adequacy of the aerial survey information in this study because no survey methods were presented.

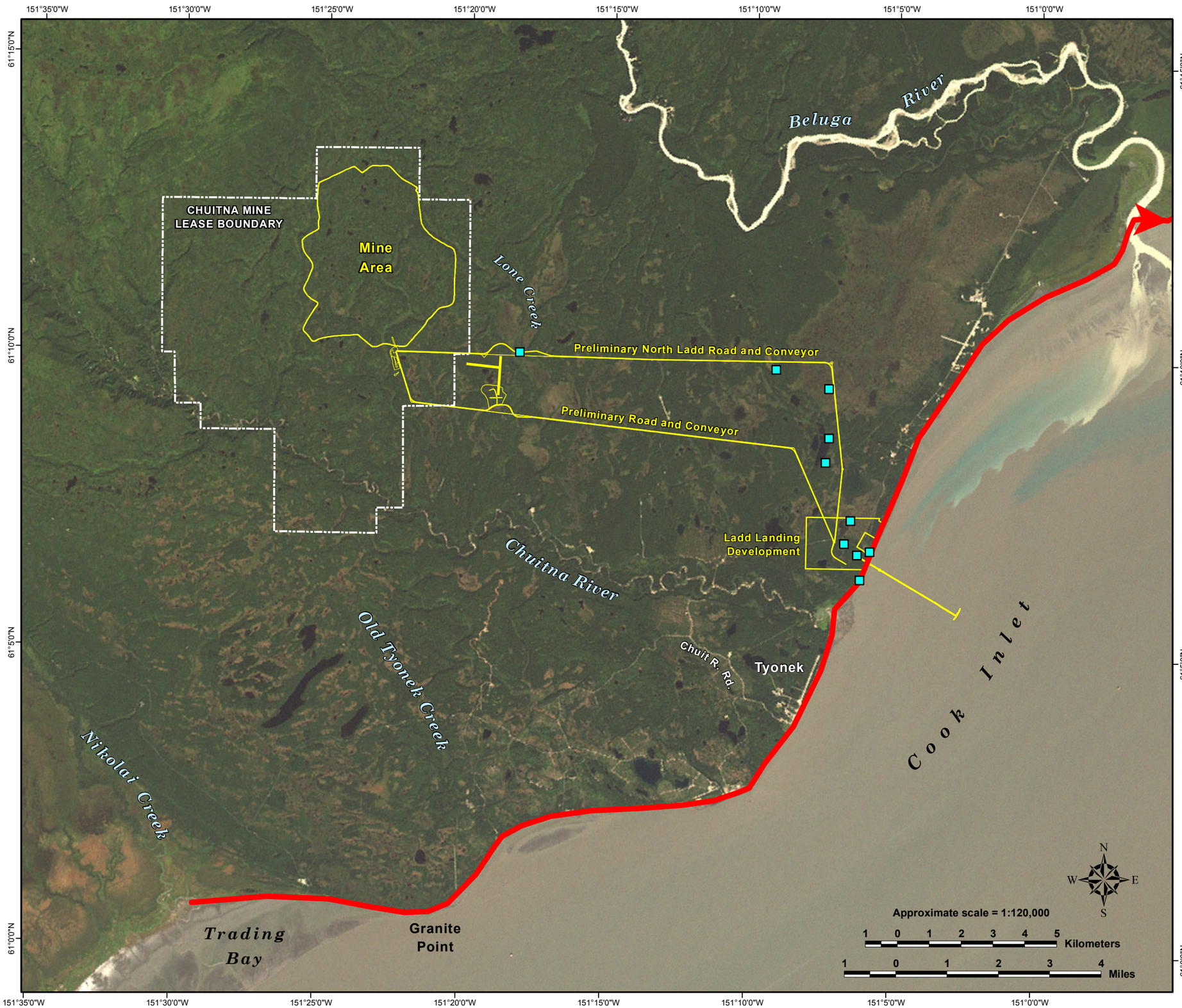
A few more recent studies of migrating and wintering shorebirds have been conducted in Cook Inlet (Butler and Gill 1987, Gill and Tibbitts 1993, Gill and Tibbitts 1999). The study of Gill and Tibbitts (1999), in particular, clearly shows the importance of the estuarine areas on the west side of Upper Cook Inlet to large numbers of migrant and wintering shorebirds. The region around Beluga and Tyonek, however, was not surveyed during these studies, likely because that habitat is of relatively less value to nonbreeding shorebirds than the large estuarine areas in Upper Cook Inlet.

For migrating shorebirds, previous investigations provided no clear documentation of the relative importance of the Beluga and Tyonek area; only one aerial survey was conducted in this area (in May 1986) and shorebirds were not identified to species. This region may be of minor importance to migrating shorebirds relative to estuarine areas in Upper Cook Inlet, but this should be documented with systematic surveys. Surveys for migrant shorebirds were conducted in the Granite Point area, but this site is no longer being considered as a possible port site.

No surveys for wintering shorebirds were conducted during the baseline studies for the Diamond Chuitna Project (ERT 1983–1984, 1987). The studies of wintering shorebirds (Rock Sandpipers) by Gill and Tibbitts (1999) do not address the Beluga and Tyonek areas. The western portion of the Susitna Flats in the region of the Beluga River estuary, however, is noted as an area of concentration for wintering Rock Sandpipers (Gill and Tibbitts 1999).

For nesting shorebirds, no specific surveys were conducted in the mine permit area, although notes on nesting shorebirds were collected opportunistically and during the landbird surveys (Diamond Alaska Coal Company 1985). The use of various inland habitats by breeding shorebirds in the project area was discussed (ERT 1983–1984), but no data were presented.

With regard to use of the project area by breeding shorebirds, only limited data were available (North Road alignment only). The occurrence of breeding shorebirds in other areas of



Legend

- Shorebird Migration Survey Route
- Breeding Landbird Transects - 1986 and 1987 (includes shorebirds)

Notes:

Shorebird survey route and transects were digitized from: Environmental Research and Technology, Inc. 1987. Diamond Chuitna Project North Road Baseline Studies Report. Prepared for Diamond Alaska Coal Company, Anchorage, Alaska

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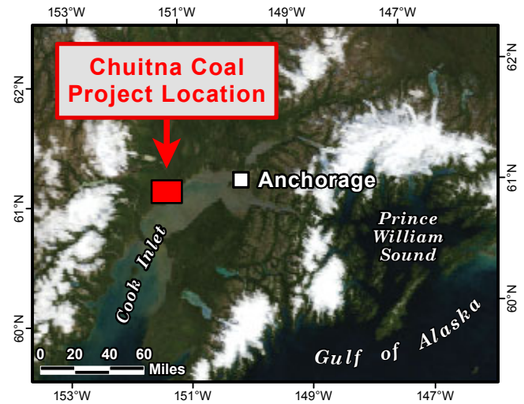


Chuitna Coal Project

Figure 8.
Survey Areas for Shorebirds - 1982–1983 and 1986–1987

map prepared by:
ABR, Inc. environmental research & services

30 March 2006 | ABR file: Chuitna_Baseline_Shorebirds_05-172.mxd

the project area is discussed but no data were presented for evaluation. In the North Road study, no habitat evaluation was done to assess the possibility of use of similar habitats by breeding shorebirds in other parts of the study area. Project-wide habitat-use information will be essential to conduct quantitative assessments of direct impacts of the proposed development on breeding shorebird habitats (see below).

No specific surveys were conducted for Sandhill Cranes or gulls and terns during the baseline studies but observations were recorded opportunistically during other field investigations (ERT 1983–1984, 1987).

The project-specific baseline data collected in the 1980s and the broader, regional data collected in the 1990s do not provide an adequate understanding of current conditions for shorebirds or cranes or larids in the project area and would not provide adequate information for a permit application. This is so primarily because of incomplete survey coverage of the current project area, the lack of species identifications on some surveys, and because the baseline data for the project area are now 2 decades old.

SUMMARY OF FINDINGS

Based on the range maps in Armstrong (1980), it was thought that 32 shorebird species could occur in the Beluga area. Ultimately, 19 species were documented by observations during baseline studies and 15 shorebird species were reported to potentially nest in the area (see ERT 1983–1984: Table 3-2). The project area was reported to be not important for migrating or breeding shorebirds, although it is bordered by important migration areas, including the estuarine areas in Trading Bay and the western portion of the Susitna Flats near Beluga River mouth (EPA 1990). In particular, the mudflats between Granite Point and Nikolai Creek were found to be very important for migrating shorebirds (ERT 1983–1984). Shorebirds also were reported to be common during migration at the mouth of the Chuitna River and on the mudflats east of the Beluga Airstrip towards the Beluga River mouth (ERT 1987). Both of these areas are outside of the current proposed project area (see Figure 8). Shorebirds were reported to be uncommon during migration at the proposed Ladd port site (ERT 1987).

Baseline reports mentioned surveys conducted in the project area during June 1982, but no data were presented. Baseline reports indicated that, during ground-based surveys of intertidal and nearshore habitats at Granite Point on 9–10 May 1983, the most commonly observed

shorebird was the Least Sandpiper; however, the data presented did not differentiate between Least, Semipalmated, and Western sandpipers (see ERT 1983–1984: Table 3-12). Later studies by Gill and Tibbitts (1999) have found the Western Sandpiper to be the most common spring migrant in Upper Cook Inlet. Other common spring migrant species reported were Semipalmated Plover, Hudsonian Godwit, Whimbrel, Short-billed Dowitcher, and Semipalmated Sandpiper (ERT 1983–1984).

The baseline reports mentioned observations of shorebirds in the project area during the fall migration, as late as 26 October 1982, but no data were presented. No peak migration date was noted, but observations of several hundred shorebirds in intertidal areas near Granite Point were reportedly common between late August and early October (ERT 1983–1984). Common fall migrant shorebirds reported by baseline studies included American Golden-Plover, Wandering Tattler, Black Turnstone, Red Phalarope, Long-billed Dowitcher, Western Sandpiper, Pectoral Sandpiper, and Rock Sandpiper (ERT 1983–1984).

The baseline reports indicated that some shorebirds breed in the project area, but provided few specific observations of breeding shorebirds and no actual numbers. Yellowlegs (both Greater and Lesser Yellowlegs) reportedly were the most common nesting shorebirds in the project area (ERT 1983–1984). Wilson's Snipe also was reportedly common. These species occurred from coastal areas to Lone Ridge (ERT 1983–1984). Nesting Red-necked Phalaropes were common in freshwater coastal ponds and tidal flats and were abundant near Granite Point; they also were found nesting in lower densities at higher elevations in the lease area. Spotted Sandpipers were common along large streams and the Chuitna River. Baseline studies reported that shorebird nesting habitats included gravel beaches (Black Oystercatcher), freshwater shorelines (Spotted Sandpiper), mesic tundra (Semipalmated Plover and Least Sandpiper), and wet tundra and marsh (Greater Yellowlegs, Lesser Yellowlegs, Red-necked Phalarope, Wilson's Snipe, and Short-billed Dowitcher).

Baseline studies reported observations of Sandhill Cranes in the project area from mid-May to mid-September in 1982 and 1983 (ERT 1983–1984). Cranes appear to be uncommon but regular breeders in the Trading Bay Game Refuge to the south of the project area, as well as in the area north of Granite Point, where 2–3 nesting pairs of Sandhill Cranes were reported (ERT 1993). Cranes were common migrants during August and September, observed primarily in coastal wetlands and mudflats near the Granite Point airstrip, but also in open areas between the

lease area and Granite Point. No cranes were observed in the lease area during the 1982 and 1983 surveys and the project area was reported to be not important for cranes (EPA 1990). The permit application reported that cranes were not observed in the permit area and that nesting cranes were not expected to occur there (Diamond Alaska Coal Company 1985).

Baseline studies also identified larids nesting in the project area, including Arctic Tern, Mew Gull, Glaucous-winged Gull, and Bonaparte's Gull (ERT 1983–1984, 1987). Terns nested near tundra ponds in the lease area and in coastal wetlands. A colony of about 35 pairs of Mew Gulls was reported north of the Granite Point airstrip and additional Mew Gull nests occurred throughout the project area, including uplands near Lone Ridge. Glaucous-winged Gulls were reported nesting in ponds near Granite Point and in the lease area. Two gull colonies were reported near the Beluga Flats area (ERT 1987), one colony of about 25 Mew Gulls and 30 Glaucous-winged Gulls and another smaller colony of about 10 Mew Gulls and 10 Glaucous-winged Gulls, with some Bonaparte's Gulls, occurred near the proposed North Road corridor. Information on nesting larid populations in the broad region surrounding the project area are presented in the *Marine Birds* section below.

WATERFOWL

BACKGROUND AND STATUS

The Chuitna Coal Project area lies between the Trading Bay and Susitna Flats State Game Refuges, which are important wetland areas for migrating and nesting swans, geese, and ducks. The 1985 permit application and Wildlife Protection Plan for the Diamond Chuitna Project identified waterfowl as an important wildlife group (Diamond Alaska Coal Company 1985). The conclusions of the ADNR permit review (ADNR 1987) recognized that the permit area contained suitable habitat for nesting, brood-rearing, and staging waterfowl, and that adverse impacts to waterfowl would occur if habitats were lost and not reclaimed.

All 34 species of waterfowl that nest in Alaska are protected under the Migratory Bird Treaty Act and managed by the USFWS under objectives in the North American Waterfowl Management Plan (NAWMP 2004). The primary goal of the North American Waterfowl Management Plan is to maintain abundant waterfowl populations through partnerships that seek to conserve habitats. The Upper Cook Inlet area is recognized in the plan as an important waterfowl habitat area.

In addition, several species of waterfowl that nest in Alaska and have been recorded in the Chuitna Coal Project area are currently considered of conservation concern. These species (Trumpeter Swan, Tule White-fronted Goose, Common Eider, Harlequin Duck, Long-tailed Duck, and Black Scoter) are of concern for various reasons, including known population declines; high contaminant levels; high harvest levels; habitat degradation; increased mortality from fish bycatch; concentration of flocks during migration and/or wintering; sensitivity to disturbance; and small, isolated populations susceptible to impacts (Henson and Grant 1991, ADFG 1994, Mitchell 1994, Bordage and Savard 1995, Goudie et al. 2000, Robertson and Savard 2002, Conant and Groves 2005). One subspecies, the Tule White-fronted Goose, with a world population of only 5500 birds (NAWMP 2004), is known to breed and molt only in marsh and flooded shrub habitats of Upper Cook Inlet (ADFG 1994, Ely et al. 2006). The Harlequin Duck, which nests only on clear, undisturbed rivers, is listed in the Sea Duck Joint Venture Species Status Report, (SDJV, March 2003), as susceptible to impacts from mining operations because of the potential adverse effects on water quality and nesting habitat. Given this information, it is likely that waterfowl in the Chuitna Coal Project area will fall under the Important Species classification of the Alaska Surface Coal Mining Program (ADNR 1999).

BASELINE SURVEYS AND OTHER DATA SOURCES

BREEDING AND BROOD-REARING

A waterfowl breeding population survey was conducted in June 1982 in the Diamond Chuitna Project area (ERT 1983–1984). An aerial survey was flown in a fixed-wing aircraft (Cessna 170) with two observers following the USFWS protocol for aerial waterfowl breeding surveys (USFWS 1977; these procedures were updated in USFWS 1987). Transect segments were flown along east-west section lines between Chuitkilnachna Creek and the Beluga River and extended from Cook Inlet to a section line just north of Felt Lake (Figure 9). Five transect segments intercepted the permit area during this survey. Each of the two observers identified all waterfowl within a distance of 200 m on opposite sides of the aircraft, resulting in a sampling intensity of 25%. Surveys using the same methods are conducted annually by USFWS in the Susitna Flats area (Conant and Groves 2005). A recent study of the Tule White-fronted Goose determined that the Sustina River Valley is the primary area used for breeding, molting, and

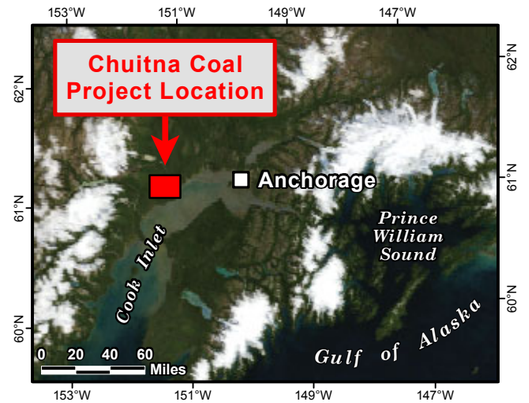
Legend

Breeding Waterfowl Study Area

Notes:
Breeding waterfowl survey area was digitized from: Environmental Research and Technology, Inc. 1984. Diamond Chuitna Project Terrestrial Wildlife Baseline Studies Report. Prepared for Diamond Shamrock - Chuitna Coal Joint Venture, Anchorage, Alaska.

Background imagery: true-color Landsat 7 acquired August 16, 2000; 30-m pixel resolution.
Inset map imagery: Blue Marble Next Generation, NASA.

Facility layout from PacRim Coal, Feb. 16, 2006.
Map projection: ASP Zone 4, NAD83, US foot



Chuitna Coal Project

Figure 9.
Study Area for Breeding Waterfowl - 1982

map prepared by:
ABR, Inc. *environmental research & services*

28 March 2006 | ABR file: Chuitna_Baseline_Waterfowl_05-172.mxd

brood-rearing birds. Geese staged along the coast of Cook Inlet, including the area between the Beluga and Susitna rivers, during spring and fall migration (Ely et al. 2006).

Aerial surveys for nesting Trumpeter Swans were conducted in June 1982 and 1983 (ERT 1983–1984). A fixed-wing aircraft (Cessna 170) with two observers was used to survey what was considered suitable nesting habitat within the project area. The flight path involved parallel north-south passes over "good swan habitat" but the actual boundaries of the survey area were not presented in the baseline reports. Little swan nesting habitat was reported to occur in the permit area (Diamond Alaska Coal Company 1985). Swan surveys conducted in the region since 1975 by the USFWS, ADFG, and private consultants were reported on in the 1985 permit application (Diamond Alaska Coal Company 1985). In 1987, a survey for nesting Trumpeter Swans was conducted by helicopter along the proposed North Road alignment. All nest locations known from previous years were checked for occupancy and all waterbodies within 1.6 km of the proposed North Road were surveyed. Nests found during that survey were checked by helicopter for hatching success in July and for fledging success in August.

Breeding Harlequin Duck populations are not adequately estimated by the waterfowl breeding population surveys because they pair and stage on rivers before nesting. For the Diamond Chuitna Project baseline studies, Harlequin Duck observations were recorded incidentally during other field activities in the project area.

MIGRATION

A number of surveys, using various survey techniques, were conducted to determine waterbird migration in the project area and along the coast. First, in early May 1983, two observers conducted spring shorebird surveys on foot from the Granite Point airstrip to a point 0.8 km northeast of Granite Point; four surveys were conducted at high and low tide. All birds, including waterfowl, were counted and identified to species. The survey provided information on numbers of waterfowl in the area and mentioned important resting and feeding areas within the limited survey area.

In fall 1983, 11 aerial surveys were conducted to assess the use of the project area by waterfowl during migration. A helicopter was used to survey ponds and rivers in the uplands between the Granite Point airstrip and Nikolai Creek and along the coast from the Middle River to the Chuitna River. The transportation corridor, housing area, port area, and most of the lease area

were surveyed (ERT 1983–1984). Waterfowl observations also were recorded opportunistically during various other investigations (Diamond Alaska Coal Company 1985).

A survey for staging swans was conducted by helicopter in the project area during fall 1983 in conjunction with a beaver cache survey (ERT 1983–1984). Swans also were recorded in summer and fall during other field activities in 1982 and 1983.

As part of the North Road Baseline Study, aerial and ground surveys for waterfowl and shorebirds were conducted during spring and early summer in 1986 and 1987 over the uplands near the proposed road and along the coast from the Beluga Landing Area to the Chuitna River (ERT 1987). One spring survey was conducted in 1986 and seven surveys were conducted in 1987. In both years, one mid-June survey also was conducted. The survey platform and methodology were not described in the report, therefore, it is difficult to assess the adequacy of these surveys.

Many other surveys, unrelated to the Diamond Chuitna Project, were conducted in the 1980s and 1990s for migrating waterfowl in Upper Cook Inlet (Handel and Gill 1983; Butler and Gill 1985, 1987; Loranger and Eldridge 1986; Slater and Sharpe 1986; Eldridge 1995). Most surveys focused on the Trading Bay and Susitna Flats areas to determine the importance of these areas for waterfowl populations, the timing of use of habitats in Upper Cook Inlet by each species, and the relative importance of the different habitats to migrating waterfowl. A few surveys were conducted in summer when waterfowl rear young and molt (Eldridge 1995, 1997), including one that included the coastal area of the Diamond Chuitna Project (Dugan and North 1994).

SUMMARY OF FINDINGS

BREEDING AND BROOD-REARING

Based on the range maps in Armstrong (1980), it was thought that 32 species of waterfowl could occur in the Beluga area and that as many as 22 waterfowl species were likely to breed in the area (ERT 1983–1984). Ultimately, 21 waterfowl species were documented in the Diamond Chuitna Project area. Although flanked by important breeding areas on the south and northeast (Trading Bay and Susitna Flats State Game Refuges), the project area was reported to have relatively poor breeding habitat for ducks and geese (EPA 1990). Significant breeding areas for ducks were identified northeast of Congahbuna Lake, west of the Beluga Power Station, and small ponds above timberline west of Lone Ridge, all areas outside of the currently proposed project

footprint (see ERT 1983–1984: Figure 2–1). Geese occurred during summer breeding-bird surveys only in wetlands west and north of the Beluga power station. Within the currently proposed project footprint, the Tukallah Lake area was found to support moderate numbers of waterfowl during summer months, attracting more diving ducks than other areas, including Common Merganser, scaup, Northern Shoveler, Bufflehead, goldeneyes, Gadwall, American Wigeon, and Mallard. Although no broods were observed in this area, it was reported that Mallard, Green-winged Teal, Common Merganser, and Bufflehead likely nested there.

In low-elevation wetlands, the breeding densities of ducks and Canada Geese were reported to be 7.3 birds/km² and 0.3 birds/km², respectively (see ERT 1983–1984: Table 3-8). Breeding ducks in low-elevation wetlands were predominantly Northern Pintail and Mallard. In open mixed forest and woodland, the dominant vegetation type in the proposed project footprint (Diamond Alaska Coal Company 1985), the breeding density of ducks was 1.4 birds/km² and no geese were observed. Unfortunately, 33% of birds in open mixed forest were not identified to species, but Mallard was the most common among identified species, followed by Northern Pintail and Green-winged Teal. Scaup, goldeneye, American Wigeon, Northern Shoveler, and Bufflehead also occurred in woodland habitats. In open tundra habitats, the breeding density of ducks was 5.4 birds/km² and no geese were observed. Long-tailed Duck and Common Scoter were the most common species observed in tundra habitats, although it was suggested that these probably were migrants and were unlikely to be local breeders. The next most common ducks in tundra habitats were Northern Pintails and Mallards, both of which were considered likely breeders.

Baseline studies (ERT 1983–1984) reported that Common Mergansers were the most common species of breeding waterfowl in the project area, regularly occurring along the Chuitna River from its mouth to treeline, and large groups were observed in September, particularly in tributary streams (Lone Creek and tributary #2004) where they were feeding on dolly varden. In contrast, the permit application (Diamond Alaska Coal Company 1985) reported that Green-winged Teal were the most common breeding duck, being common along tributaries above treeline, particularly along tributary #2003 and Lone Creek. Harlequin Ducks also were common during early June along the upper Chuitna River and on the lower ends of main tributaries of the Chuitna; adults and young also were common in the Chuitna in August and early September. The Chuitna River drainage supported an estimated >12 pairs of Harlequin Ducks within a main breeding area between tributary #2004 and treeline on Chuit Creek and Wolverine Fork.

Green-winged Teal was the only other duck species regarded as a common breeder in the project area, occurring mainly along tributaries of the Chuitna River above treeline. Mallards were the only other dabbling ducks documented as breeding in the project area, although they were reportedly uncommon, as were diving ducks, mainly goldeneyes and Buffleheads.

The breeding densities of geese and ducks calculated from the waterfowl breeding population survey conducted in 1982 are not representative of what the current waterfowl densities might be in the Chuitna project area. During the last 24 years, the Alaska populations of several duck species have increased (Conant and Groves 2005), including most of the species that were predominant during the 1982 surveys (Mallard, American Wigeon, Green-winged Teal, and Northern Shoveler).

Baseline studies collected no information on brood-rearing geese and ducks. Most of the proposed project area is open, mixed forest and woodland interspersed with muskeg, and many waterfowl are likely to use the abundant wetland areas and waterbodies to rear their broods. As brood-rearing habitats are critical to successful waterfowl reproduction, this lack of information is a significant omission.

A broad band of Trumpeter Swan nesting habitat was reported stretching from the Beluga River to Nikolai Creek and inland approximately 8 km (EPA 1990). This area included about half of the swan nests located during baseline investigations. Additional nesting areas for swans occurred west of Felt Lake (just north of the proposed mine site), south of Beluga Lake, and in northern Trading Bay State Game Refuge along Chuitkilnachna Creek. Records on swan nest locations reported between 1975 and 1983 in the Beluga region were summarized in the baseline studies report (see ERT 1983–1984: Table 3-10 and Figures 3-6 and 3-7). An August 1980 USFWS survey counted 12 swan pairs in the Beluga region, 4 pairs were with young. The data summary in the baseline studies report is unclear and the total area surveyed is not described (see ERT 1983–1984: Table 3-10), but it appears that 4 swan pairs were observed in the survey area during June 1982 and 22 swans (12 pairs, 2 groups of 3, and 4 single adults) were observed in the survey area in June 1983. The June 1983 survey identified five swan nests and two pairs with broods (5 cygnets each), indicating that at least seven of the swan pairs that were observed were breeding in the survey area. Surveys in 1987 identified additional swan nest areas near Tukallah Lake and along the proposed North Road corridor (east of Threemile Creek). Baseline studies reported that the ice-free season may be too short to support breeding by swans at higher

elevations of the study area and suggested that opportunities for breeding by swans may be limited above 500 ft elevation (ERT 1983–1984). Surveys during 1982–1983 determined that nesting habitat quality for swans was higher south of the Chuitna River (Diamond Alaska Coal Company 1985). The permit application indicated that the permit area did not provide nesting habitat for swans (Diamond Alaska Coal Company 1985).

Surveys for nesting Trumpeter Swans were conducted only in the Beluga region of the project area (actual survey area unknown) and the survey method was not systematic. With the increase in the Trumpeter Swan population over the past 25 years (USFWS 2001), the number of nesting swans counted during the 1982 and 1983 surveys would likely not be representative of the current number of swans nesting in the area. Site-specific information is lacking on important waterbodies currently used by swans for nesting.

Surveys for brood-rearing swans were not conducted in 1982 and 1983; only opportunistic sightings of adult swans with young were recorded during other field activities. In 1987, known nests within a limited survey area were checked for hatching and fledging success, but the entire project area was not surveyed for broods. Without systematic surveys for swan broods, productivity cannot be determined and site-specific information is lacking for which waterbodies are preferred for brood-rearing.

MIGRATION

Although the adjacent Trading Bay and Susitna Flats State Game Refuges provide important waterfowl staging habitat, the project area was reported to have relatively poor habitat for staging waterfowl (EPA 1990). Migratory waterfowl, primarily Mallard, Green-winged Teal, and Northern Pintail, were found to concentrate in numbers at the mouth of the Chuitna River and on mudflats east of the Beluga Airstrip. The Tukallah Lake area was used by waterfowl during fall migration, but the lake remained frozen longer in spring than other waterbodies in the Beluga Flats region to the north and was not used during spring migration. Baseline studies reported that no waterfowl concentration areas occurred in the project area (ERT 1983–1984). However, waterfowl were reportedly “very common” in freshwater ponds adjacent to and northwest of the Granite Point airstrip, particularly non-breeding and early migrating Green-winged Teal and Northern Pintail in mid-August. During an early October survey in 1983, when about a third of ponds were frozen, 10 ducks were observed in the mine lease area (Bufflehead, goldeneye,

Northern Shoveler, Green-winged Teal, and Harlequin Duck), and 10 ducks were observed in lakes near Congahbuna Lake (Bufflehead, goldeneye, and Ring-necked Duck). Waterfowl use of the project area reportedly was low between 1 September and freeze-up in October, except for the Chuitna River and major tributaries, where Common Mergansers were common until late September.

Large numbers of three waterfowl species (Mallard, Northern Pintail, and Green-winged Teal) were reported in coastal areas south of the project area in northern Trading Bay between 23 September and 26 October 1983 (ERT 1983–1984), mostly feeding or resting along the tide line in saltwater. Concentration areas appeared to fluctuate with tide and weather conditions. Waterfowl also were abundant in freshwater habitats between Granite Point and Nikolai Creek during a survey on 2 October 1983, when 400 Mallard, 400 Northern Pintail, 25 Canada Geese, and Gadwalls (reported only as present) were observed. The number of waterfowl observed in the northern Trading Bay area varied between 0 and 1600 birds, appearing to drop off suddenly between 21 and 26 October, when most dabblers apparently had left the area and only 2 Northern Pintail, 3 goldeneye, and 6 White-winged Scoters were observed.

Surveys of the Ladd landing area in 1986 and 1987 identified spring and fall migratory waterfowl concentration areas at the mouth of the Chuitna River and mudflats adjacent to the Beluga Landing Area (ERT 1987). The complex of streams and lakes in the Tukallah Lake/Threemile Creek area also was identified as a relatively important waterfowl area, attracting more diving ducks than other areas, including Common Merganser, scaup, Bufflehead, and goldeneye; dabbling ducks including Northern Shoveler, Gadwall, American Wigeon, and Mallard also occurred. The lake and stream complex also was considered important as spring and fall resting and feeding areas for migrant waterfowl.

The project area was reported to be of minor importance to swans during migration (EPA 1990), although the project area is bordered by important resting and feeding areas for migrant swans.

Migration surveys conducted in association with the Diamond Chuitna Project in the 1980s were patchy, both in the timing of the surveys and the areas surveyed. Surveys of the entire project area were never conducted during both spring and fall within the same year. With notable changes in some waterfowl populations during the past 25 years, current knowledge on the distribution and abundance of birds using Upper Cook Inlet is needed.

LOONS

BACKGROUND AND STATUS

Four species of loons may occur in the Chuitna Coal Project area: Yellow-billed Loon, Common Loon, Pacific Loon, and Red-throated Loon. Yellow-billed Loons are likely to occur only during migration in the marine waters off the coast. For this reason, they are addressed in the *Marine Birds* section below. Common, Pacific, and Red-throated loons are probable breeders in the project area. All three of these loon species nest and raise their young on ponds or lakes and feed on fish and invertebrates, either from the nest lake or from other freshwater or marine areas. The behavior and reproductive success of loons can be adversely affected by contaminants present in the aquatic systems where they feed (McIntyre and Barr 1997, Barr et al. 2000, Russell 2002). Because loons return to the same nesting territory annually, they serve as key indicators of habitat change, either natural or human-caused (Bergman and Derksen 1977). Common Loon and Pacific Loon populations in Alaska are stable but Red-throated Loon populations have declined by 47% during the past 30 years and the species is recognized by the USFWS as a species of special concern (Conant and Groves 2005).

BASELINE SURVEYS AND OTHER DATA SOURCES

Observations of loons in the Diamond Chuitna Project area were made opportunistically during different types of field activities in 1983. No surveys were conducted that focused specifically on breeding or brood-rearing loons. Apparently, few loons were observed during surveys for the Diamond Chuitna Project in 1983 and 1987. A couple of unidentified loons were recorded in 1983 during the spring shorebird survey that covered the coastal area near the proposed Granite Point port site (ERT 1983–1984). In 1987, Common and Pacific loons were observed on lakes during spring and summer surveys along the proposed North Road alignment and were suspected to be breeding in the area (ERT 1987). The data collected, however, were not adequate to assess the distribution and breeding status of loons in the project area.

SUMMARY OF FINDINGS

The permit application indicated that Common Loons and Arctic Loons were fairly common breeders on larger ponds and lakes in the study area (Diamond Alaska Coal Company 1985).

(Arctic Loon was split taxonomically into 2 species, Pacific and Arctic Loon, in 1985 after the initial baseline studies; all loons in the Chuitna Coal Project area are Pacific Loons.) The Tukallah Lake area was identified as a nesting area for Pacific Loons, Common Loons, and Red-necked Grebes.

MARINE BIRDS

BACKGROUND AND STATUS

Marine-oriented birds comprise a diverse suite of species that use marine waters for a significant portion of the breeding and/or non-breeding periods. In Cook Inlet, this group includes waterfowl (primarily seaducks), loons and grebes, tubenoses (albatrosses, shearwaters, and storm-petrels), cormorants, sea eagles (i.e., Bald Eagles), shorebirds (in this case, only phalaropes will be found in marine waters), larids (jaegers, gulls, and terns), and alcids (puffins and related species). These marine birds breed in, migrate through, stage in, and/or winter in Cook Inlet at some point each year. All forage there at some time, and they collectively occupy a variety of marine habitats; however, not all will occur in upper Cook Inlet.

With the exceptions of the Bald Eagle, which is protected by special statute (the Bald and Golden Eagle Protection Act), and endangered species, which are discussed below, all of these species are protected primarily or exclusively by the Migratory Bird Treaty Act (MBTA) of 1918 (including amendments), which falls under the jurisdiction of the USFWS. This act prohibits pursuing, hunting, taking, capturing, killing, etc., any migratory bird or any part, nest, or egg of any such bird, unless explicitly permitted by law (e.g., sport or subsistence hunting). In the context of this project and these species, the obvious area of concern involves the release of oil or fuel into the marine environment, possibly causing the death of birds protected under the MBTA. The MBTA is one of the statutes under which Exxon was prosecuted for the death of birds after the *Exxon Valdez* oil spill; additional prosecution occurred under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, which falls under the jurisdiction of the Environmental Protection Agency.

Three bird species that occur in Cook Inlet are either federally threatened (Steller's Eider; USFWS 2002b) or are considered species of conservation concern: Kittlitz's Murrelet (a Candidate species under ESA), and Yellow-billed Loon (an uncommon and sensitive species;

Earnst 2004). None of these species was protected or being considered for protection under the ESA when the Diamond Chuitna Coal Project studies were conducted in 1982–1983. Although all three of these species occur in Lower Cook Inlet (Agler et al. 1995; ABR, unpubl. data), all would be expected to be absent from, or occur only casually (i.e., in low numbers and not even annually) in Upper Cook Inlet.

BASELINE SURVEYS AND OTHER DATA SOURCES

During the previous studies for the Diamond Chuitna Coal Project (1982–1983), essentially no data were collected on marine-oriented birds. In the latter half of the 1970s, however, Arneson (1981) conducted a few surveys on migratory birds along shorelines in Lower Cook Inlet. Nysewander and Trapp (1985) surveyed colonies of colonial waterbirds (primarily larids) in Upper Cook Inlet, from Anchorage to the Susitna Flats and inland to the Palmer Hayflats, in 1983. More recently, Piatt (1994) studied the at-sea distribution and feeding ecology of seabirds in Lower Cook Inlet in 1992 and Agler et al. (1995) surveyed the winter distribution and abundance of marine birds in Lower Cook Inlet, south of Kalgin Island, in 1993. Perhaps the most thorough study was conducted by Eldridge (1995, 1997), who surveyed waterfowl and other waterbirds in Upper Cook Inlet, including the previously proposed North Forelands Coal Loading Facilities, in 1995 and 1996. Gill and Tibbitts (1999) studied the seasonal distribution and abundance of shorebirds in Upper Cook Inlet, from Tuxedni Bay to Knik Arm (i.e., including the proposed dock area), in 1997–1999.

Recently, William Larned (USFWS, Soldotna, AK, unpubl. data) has conducted aerial surveys for Steller's Eiders along both sides of Lower Cook Inlet (currently, this research has not been released as publicly available reports). Previous data on Kittlitz's Murrelets were collected as part of multi-species surveys of the marine-bird community in Lower Cook Inlet (Agler et al. 1995). Data on Yellow-billed Loons also were collected during these studies (Agler et al. 1995). No data have been collected on these species in Upper Cook Inlet, probably because of their rarity in that area.

In our preliminary examination of the literature and agency reports, we found little information on marine-oriented birds in Upper Cook Inlet. The research on Upper Cook Inlet consists of the few coastal colony surveys of Nysewander and Trapp (1985), the aerial surveys of Eldridge (1995, 1997) at Redoubt Bay, Trading Bay, the Susitna Flats, and Chickaloon Bay from

spring to fall (i.e., none of the data were from the specific vicinity of the proposed dock area), and Gill and Tibbitts' work on the seasonal abundance of shorebirds in the northwest portion of Upper Cook Inlet (and those surveys omitted the proposed dock area). In addition, other unpublished information on seabird colony sizes in this area is available from the USFWS "Beringian Seabird Colony Catalog" database of seabird colonies throughout Alaska and northeastern Russia (USFWS 2006).

Slightly more information is available on marine-oriented birds in Lower Cook Inlet. The research from Lower Cook Inlet includes information on the seasonal distribution and abundance of seabirds (Arneson 1981; Piatt 1994; Agler et al. 1995; W. Larned, USFWS, unpubl. data). Unfortunately, with the exceptions of Larned's recent work, none of these studies is recent (most >10 years old).

SUMMARY OF FINDINGS

During baseline studies, a small colony of about 30 pairs of Glaucous-winged Gulls was reported 0.8 km north of the Ladd port site (ERT 1987). More recently, seabird colonies (USFWS 2006) were found primarily to the south and northeast of the project area. South of the project area, approximately 1000 Mew Gulls nest on the coastal edge of Trading Bay. Northeast of the project area, colonies include approximately 2100 Mew Gulls and 8 Glaucous-winged Gulls nest on the coastal edge of the Susitna Flats, approximately 2625 Glaucous-winged Gulls nest on several islands in the mouth of the Susitna River, and approximately 5000 Mew Gulls, 4 Glaucous-winged Gulls, and 27 Arctic Terns nest on the coastal edge of the Susitna Flats east of the mouth of the Susitna River.

The estuarine habitat of Upper Cook Inlet is characterized by high turbidity and suspended sediment, extreme tides and currents, highly variable salinity, and seasonal ice formation (EPA 1990). Although often considered unproductive, massive quantities of organic detritus are deposited in the upper inlet by the many tributary rivers and the area supports an abundance of epibenthic invertebrate detritivores, including mysids, crangonid shrimp, and amphipods (Dames & Moore 1983). Although infaunal communities likely are limited to *Macoma balthica* (a small clam) and polychaetes, the mudflats of Upper Cook Inlet also provide important feeding habitats for shorebirds and other avian species. The Dames & Moore (1983) report cited in the 1990 EIS indicated that most beaches, mud flats, and nearshore waters of Upper Cook Inlet are not heavily

used by waterfowl or marine birds and that feeding opportunities for birds in nearshore waters were reported to be limited by the high turbidity (EPA 1990). These reports, however, are at least somewhat refuted by the large number of gulls nesting along the coastal edge of the Trading Bay Flats and Susitna Flats.

WOOD FROGS

BACKGROUND AND STATUS

Amphibians are good indicators of environmental health. They contribute significant biomass to aquatic ecosystems, play important roles in the ecological dynamics of wetlands, and are early indicators of ecosystem changes because of their sensitivity to climate change and environmental contaminants (Wyman 1990, Blaustein 1993). Conservation concern for amphibians is prevalent because many species appear to be declining worldwide (DAPTF 2004). In Alaska, the wood frog is the only amphibian species ranging north of southeast Alaska (Hodge 1976) and is the most common amphibian in the state (Gotthardt 2004). The general consensus is that population declines have not occurred to a great degree in the wood frog populations in Alaska because water quality and amphibian habitats in the state are generally in good condition. Gotthardt (2004) found the species to be widespread and abundant in recent surveys in the developed areas of Cook Inlet.

BASELINE SURVEYS AND OTHER DATA SOURCES

Although no baseline surveys were conducted for wood frogs in the Diamond Chuitna Project area in 1982 and 1983, incidental observations by various field investigators documented their presence in the project area and the species was thought to be common in moist tundra habitats near streams from sea level to Lone Ridge during the summer months (ERT 1983–1984). Other information, although limited, also documents more recent observations of wood frogs in the Upper Cook Inlet and Tyonek regions (Gotthardt 2004; S. MacDonald, Alaska Department of Fish and Game, pers. comm. 2005). Habitat investigations indicate that wood frogs in the Cook Inlet region primarily breed in lakes and ponds where no fish are present (Gotthardt 2004).

SUMMARY OF FINDINGS

Although information is limited, baseline studies and more recent reports verify the occurrence of wood frogs at all elevation ranges in the project area and suggest that they may breed primarily in small waterbodies without fish (ERT 1983–1984, Gotthardt 2004). The population status of wood frogs in the region is unknown.

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