FINAL REPORT

EIDER SURVEYS AT CD-5, GMT-1, AND FIORD WEST IN THE NORTHEAST NPRA, ALASKA, 2009

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EXECUTIVE SUMMARY

Aerial and ground surveys for eiders were conducted in the northeast National Petroleum Reserve–Alaska (NE NPRA) in 2009 to gather information on eiders in support of permit applications of the Alpine Satellite Development Project (ASDP) for ConocoPhillips Alaska, Inc. The eider surveys continued long-term data acquisition begun in 1992 on the Colville Delta and in 1999 in the NE NPRA. Surveys focused on the abundance, distribution, and habitat use of 2 species of eiders that are listed as threatened under the Endangered Species Act of 1973: Spectacled Eider (*Somateria fischeri*) and Steller's Eider (*Polysticta stelleri*). Two other eider species, the King Eider (*Somateria spectabilis*) and Common Eider (*Somateria mollissima*), were recorded incidentally.

In 2009, ASDP comprised 4 drill sites (CD-1 and CD-2 at Alpine and the CD-3 and CD-4 satellites). This study focused on eiders near proposed drill sites and road routes in NE NPRA and the western extreme of the Colville Delta. The 3 proposed drill sites—CD-5, GMT-1 (formerly CD-6), and Fiord West—were located in NE NPRA. Pre-nesting surveys were conducted in fixed-wing aircraft during 8–13 June 2009. Nesting surveys were conducted on foot by 3–10 researchers in search areas around proposed pads and road routes during 29 June–5 July. Search areas were bounded by a 400-m wide buffer around the CD-5, GMT-1, and the 3 alternative pad locations within Fiord West (FW West, FW East, and FW South); and a 200-m wide buffer along the proposed road routes, but nest searches were conducted only in habitats identified during previous studies as used by nesting eiders.

Spring conditions were relatively warm in May and early June 2009. Snow disappeared from the tundra by the second week of June, break up on the Colville River occurred on 26 May, and White-fronted Goose broods were first recorded on 26 June, all early dates for these seasonal events. By the third week of June, however, colder temperatures and wind dominated the weather conditions.

During the pre-nesting survey in 2009, 1 Spectacled and 2 King eider groups were sighted within the proposed road and pad area buffers. Two Spectacled Eider groups were seen adjacent to the road buffers. In 9 years of pre-nesting eider surveys in NE NPRA and 16 years of surveys on the Colville Delta, 7 Spectacled Eider groups have been recorded in the buffers around the proposed roads and pads. The largest number of Spectacled Eiders recorded in the road and pad buffers was 4 adults in 2006.

During the nesting season in 2009, we found 1 Spectacled Eider and 12 King Eider nests in the road and pad buffers. A small portion of the buffers were included in nest searches during previous years. Although 6 Spectacled Eider nests have been found on nest searches in NE NPRA in previous years, only 1 nest from 2003 occurred within the road and pad buffers around the current alternative locations. The density of Spectacled Eider nests (0.12 nests/km^2) in 2009 was relatively low compared with the density of King Eider (1.39 nests/km^2).

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ACKNOWLEDGMENTS

Many people contributed their time and talent to making this research safe, enjoyable, and productive. On the tundra, Lauren Attanas, Jenna Boisvert, Jeremy Maguire, Tim Obritschkewitsch, Julie Parrett, John Rose, Aaron Wells, Ann Wildman, and Mark Winterstein collected pre-nesting and nesting data. Helicopter pilots Roland Bergamyer and Don Brand of Air Logistics safely transported crews to and from our survey site. At the Alpine oilfield, Kara Prather and Amie Benedict of Weston Solutions kept track of our daily maneuvers, ensuring our safe return at the end of the work day. Allison Zusi–Cobb, Dorte Dissing, and Chris Swingley provided expert GIS and database support, and Pam Odom transformed text documents into an attractive publication. Field gear was prepared by our tireless expeditors, Tony LaCortiglia and Davya Flaharty. This study was conceived and supported by Caryn Rea, Senior Staff Biologist and Environmental Studies Coordinator for ConocoPhillips Alaska, Inc. (CPAI). We appreciate the reviews and comments made by Caryn Rea and Bob Burgess, Research Coordinator for ABR. Finally, we thank all of the CPAI staff and contractors in the Alpine oilfield for assistance in making 2009 a successful field season.

INTRODUCTION

ConocoPhillips Alaska, Inc., (CPAI) is proposing to build 3 new drill pads and supporting infrastructure in the northeast National Petroleum Reserve–Alaska (NE NPRA). The proposed drill pads—CD-5 (Colville Delta-5), GMT-1 (Greater Moose's Tooth-1), and FW (Fiord West)—are satellite pads of the Alpine development located on the central Colville River delta (henceforth, Colville Delta). The Alpine oilfield was constructed from 1998 to 2001. CPAI had presented plans for developing 3 well pads (CD-5, CD-6, and CD-7) in NE NPRA in 2004 (BLM 2004, Johnson et al. 2004b). Those plans were modified in 2009 with altered pad, road, and bridge locations, and the addition of the new drill site named Fiord West. In 2009, CPAI contracted ABR, Inc., to collect data on eiders in the areas of the proposed development in support of permit applications.

Four eider species breed on the Arctic Coastal Plain of Alaska. Two species, the King Eider (*Somateria spectabilis*) and Common Eider (*Somateria mollissima*), are relatively common and are presently under no specific regulatory protection. The 2 remaining species, Spectacled Eider (*Somateria fischeri*) and Steller's Eider (*Polysticta stelleri*), are listed as threatened under the Endangered Species Act (ESA) of 1973, as amended. Both eider species occur in the NE NPRA area, although their densities vary widely across the region (see Larned et al. 2009). The Spectacled Eider occurs regularly but is an uncommon (Johnson et al. 2004b) to common breeder (Derksen et. al. 1981) in the NE NPRA. The Steller's Eider is rarely observed in NE NPRA (Burgess et al. 2002b, Noel et al. 2002, Johnson et al. 2004b) and is more common in the Barrow area where it breeds intermittently (Quakenbush et al. 2002, 2004).

In 2009, ABR conducted pre-nesting aerial surveys and ground-based nest searches for eiders around 3 Alpine satellites: CD-5, GMT-1 (formerly CD-6), and FW. Aerial surveys were conducted as part of a broader study of the Colville Delta and NE NPRA (Johnson et al. 2010), but the ground-based work was designed specifically to support the permit process for the 3 proposed Alpine satellites. Nest-search areas included proposed pads, proposed road routes, and their alternatives. In this report, we summarize the results of aerial and ground surveys conducted in 2009, and present data collected previously in the project area. Our focus is the Spectacled Eider because of its threatened status, but other nesting birds recorded incidentally in 2009 are included in summaries.

ABR has conducted aerial surveys for pre-nesting eiders in portions of the NE NPRA during 1999–2006 and 2008 and ground-based nest searches in proposed drilling areas for several years during 1999–2004 (Anderson and Johnson 1999; Murphy and Stickney 2000; Johnson and Stickney 2001; Burgess et al. 2002b, 2003b; Johnson et al. 2004a, 2005, 2006b, 2007b, 2009). Data collection for eiders on the Colville Delta began in 1992 (Smith et al. 1993, 1994; Johnson 1995; Johnson et al. 1996, 1997, 1998, 1999a, 1999b, 2000a, 2000b, 2001, 2002, 2003a, 2003b, 2004a, 2005, 2006a, 2006b, 2007a, 2007b, 2008a, 2008b, 2009; Burgess et al. 2000, 2002a, 2003a). Data collected through 2003 were summarized in an environmental impact statement (BLM 2004) and in a Biological Assessment of eiders for the Alpine Satellites development (Johnson et al. 2004b) as part of a formal Section 7 consultation under the ESA.

COMMUNITY MEETINGS

To keep the community of Nuiqsut aware of field activities during the summer field season in 2009, CPAI posted weekly updates on bulletin boards in the post office, store, and community center in Nuiqsut. Updates were also emailed to key representatives of the Kuukpik Subsistence Oversight Panel (KSOP), Kuukpik Corporation, and the Department of Wildlife of the North Slope Borough. The updates reported on surveys (for example, location of surveys, type of transportation used, altitude of aircraft, and species enumerated) conducted the previous week and the schedule of surveys for the upcoming week.

We reported on CPAI wildlife studies at a community meeting in 2009. Annual informational meetings on CPAI-funded science studies are held each year in Nuiqsut to allow residents to visit with biologists and other scientists, to share information, and to discuss concerns for resources

in the NE NPRA and Colville Delta areas. On 13 October 2009, biologists attended a science fair at the school during the day, followed by an open community meeting in the evening where they presented findings of recent research. The open house was attended by approximately 35 people from the village of Nuiqsut.

The open house meetings and weekly updates served to keep local residents informed on the progress and results of studies conducted by CPAI in the area near Nuiqsut. In addition, CPAI flew Joeb Woods and Lydia Sovalik, 2 elders from Nuiqsut, and James Taallak as facilitator, to meet with biologists in the study site near Fiord West on 3 July 2009. The elders reviewed the boundaries of their native allotments and described their family's history in the area. The locations of 2 grave sites in the area were discussed, and our study plans were adjusted to stay a respectful distance away from those locations.

STUDY AREA

The place names used throughout this report are those depicted on U.S. Geological Survey (USGS) 1:63,360-scale topographic maps, because they are the most widely available published maps of the region. The corresponding local Iñupiaq names for drainages (and wildlife species) are provided in parentheses at the first usage in text and on the study area map (Figure 1). Iñupiaq names are presented out of respect for local residents, to facilitate clear communication with Iñupiaq speakers, and because they pre-date the English names used on USGS maps. We acknowledge that the Iñupiaq names presented are not comprehensive, and we understand that the published USGS names for some streams (notably the Ublutuoch and Tingmeachsiovik rivers) do not correctly reflect local usage. The Iñupiaq names we use for Fish and Judy creeks in NE NPRA are taken from the *Iñupiat–English Map of the North Slope Borough* (NSB Planning Department, Barrow, Alaska, May 1997). Additional information was supplied to CPAI in recent years by Nuiqsut elders. Even in cases where USGS attempted to use the correct Iñupiaq names, the anglicized spellings are outdated and so have been corrected to the modern Iñupiaq spellings through consultation with Emily Ipalook Wilson and Dr. Lawrence Kaplan of the Alaska Native Language Center (ANLC) at the University of Alaska Fairbanks. Marjorie Kasak Ahnupkanna and Archie Ahkiviana were consulted to confirm the names of other channels on the Colville River Delta (E. Wilson, ANLC, pers. comm.).

The study area spans the western edge of the Colville Delta and the northeastern section of the NPRA, northwest of the village of Nuiqsut and west of the Alpine Facility (Figure 1). The study area encompasses 3 proposed development sites that are part of the ASDP: CD-5, GMT-1, and FW. A proposed road connects the 3 well pads to the Alpine Facility at CD-4 on the Colville Delta.

Two major streams flow through the NE NPRA study area (Figure 1). On USGS topographic maps (Harrison Bay 1:63,360 series, 1955) these drainages are labeled as Fish Creek and the Ublutuoch River, but they are commonly known by other names among Iñupiat residents: Fish Creek is called Uvlutuuq, and the Ublutuoch River is Tiŋmiaqsiuġvik (Figure 1).

Landforms, vegetation, and wildlife habitats in the Colville Delta and NE NPRA were described in ecological land surveys (Jorgenson et al. 1997, 2003, 2004). Coastal plain and riverine landforms dominate the NE NPRA (Figure 2). Coastal landforms also are present but limited to the northeast corner of the study area (i.e., the Fish Creek Delta). On the coastal plain, lacustrine processes, basin drainage, and ice aggradation are the primary geomorphic factors that modify the landscape. In riverine areas along Fish Creek, fluvial processes predominate, although eolian and ice-aggradation processes also contribute to ecological development (Jorgenson et al. 2003).

Thirty-one wildlife habitats have been identified in the greater NE NPRA area (Johnson et al. 2009). Three habitats dominate the NE NPRA landscape: Moist Tussock Tundra (25% of area), Moist Sedge–Shrub Meadow (21%), and Patterned Wet Meadow (11%). Aquatic habitats comprise 23% of the study area. Although the NE NPRA study area includes some coastal habitats in the Fish Creek Delta, they are much less abundant than in the adjacent Colville Delta. Riparian habitats also are much less common in the NE NPRA than they are on the Colville Delta.

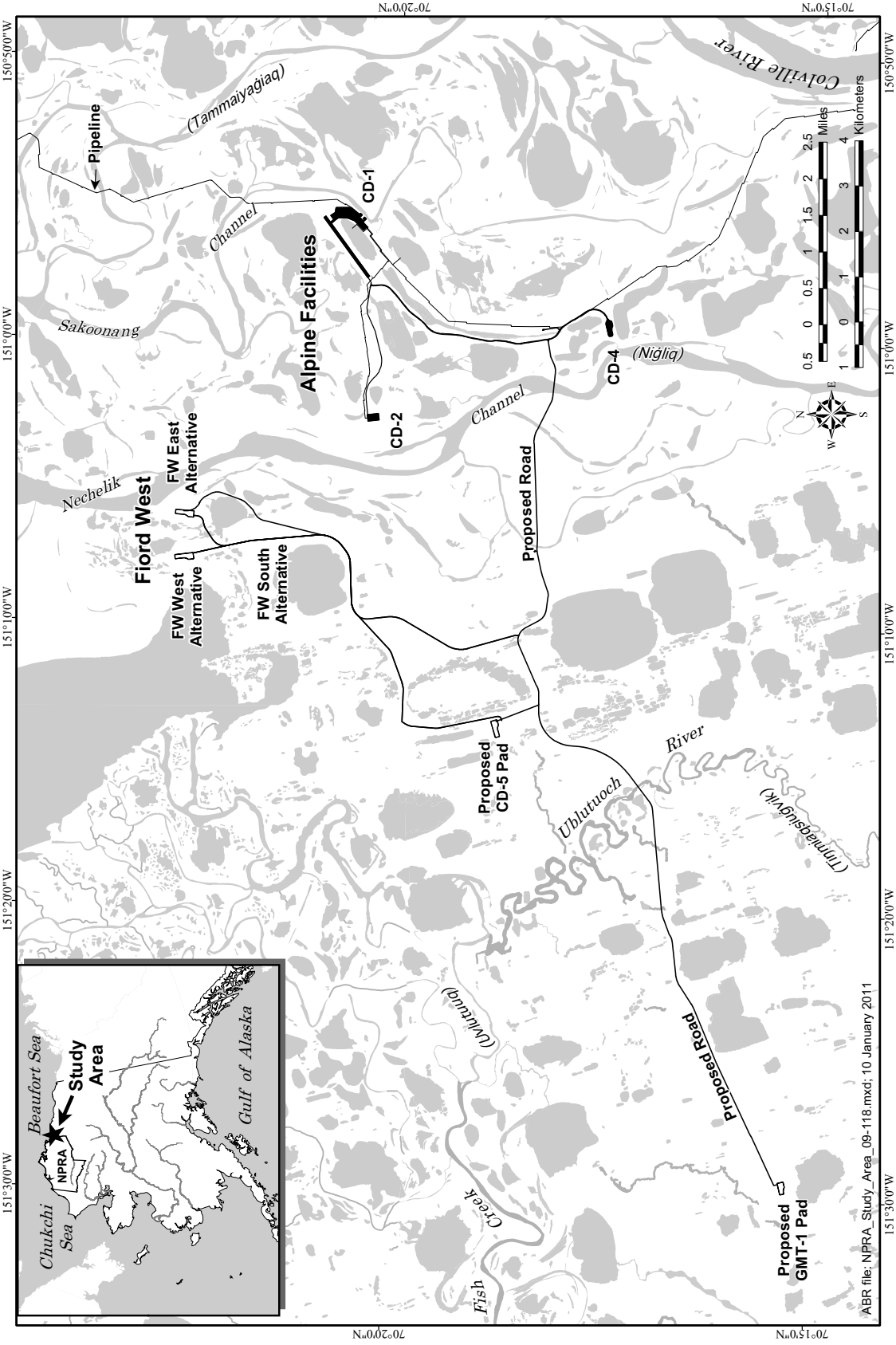

Figure 1. Alternative pad locations and road routes proposed for CD-5, GMT-1, and Fiord West in the northeast NPRA and Colville River delta, Alaska, 2009.

The NE NPRA is an important area for wildlife and for subsistence harvest. It supports a wide array of wildlife, providing breeding habitat for geese (Niġliq), swans (Qugruk), passerines, shorebirds, gulls, and predatory birds, such as jaegers and owls. The Fish Creek and Judy Creek drainages in the NE NPRA study area are a regionally important nesting area for Yellow-billed Loons (Tuullik) (Burgess et al. 2003b, Johnson 2009). The NE NPRA area is used by caribou (Tuttu) from 2 adjacent herds: the Teshekpuk Herd, primarily, and the Central Arctic Herd, secondarily (BLM 1998, Prichard et al. 2001).

METHODS

PRE-NESTING AERIAL SURVEYS

Regional abundance and distribution of eiders were estimated with data collected on aerial surveys flown during the pre-nesting period, while male eiders (the more visible of the 2 sexes in breeding plumage) were still present on the breeding grounds. The pre-nesting survey in 2009 was conducted for an ongoing study of birds in the Alpine Satellite Development Project area, which includes the Colville Delta and the NE NPRA (Johnson et al. 2010). The pre-nesting survey was conducted 8–13 June using the same methods that were used in previous years. Surveys were flown in a Cessna 185 airplane at 30–35 m above ground level (agl) and approximately 145 km/h. A Global Positioning System (GPS) receiver was used to navigate pre-determined east–west transect lines that were spaced 800 m apart (50% coverage) in the NE NPRA and 400 m apart (100% coverage) over the Colville Delta (see Johnson et al. 2010). An observer on each side of the airplane (in addition to the pilot) counted eiders in a 200-m-wide transect (delimited by tape on windows and wing struts, see Pennycuick and Western 1972). Eider locations were recorded on color photomosaic maps (1:63,360-scale) and tape recorders were used to record species, number of identifiable pairs and individuals of each sex, and location (flying or on the ground). Eider locations on survey maps were digitized into a geographic information system (GIS) database.

NEST SEARCHES

We conducted intensive ground-based nest searches for eiders in a selection of nesting habitats within 400 m of the CD-5, GMT-1, the 3 alternative pad locations within Fiord West (FW West, FW East, and FW South), and within 200 m of the proposed road routes (Figure 3). The roads routes were partitioned into 10 segments (labeled A–J) to allow summary of nests for different alternatives. We searched habitats that were identified as nesting habitats by Johnson et al. (2008a): Brackish Water, Salt-killed Tundra, Salt Marsh, Deep Water (both with and without islands), Shallow Water (both with and without islands), Deep Polygon Complex, Sedge Marsh, Grass Marsh, Wetland Complex (both Young and Old), Patterned Wet Meadow, and Nonpatterned Wet Meadow. Large areas of tussock tundra, shrub tundra, and barrens have low potential as nesting habitat for Spectacled Eiders (Johnson et al. 2008a). However, all shorelines bordering aquatic habitats within 200 m of the road routes were searched, regardless of habitat type.

During 29 June–5 July, crews of 3 to 10 people searched for nests by walking a regular search pattern with 10–20 m between searchers, which provided total coverage of the tundra within search boundaries. Each nest location was recorded with a handheld GPS and on photomosaic maps. Each nest was recorded as active if occupied, or inactive if empty.

DATA MANAGEMENT

All data collected during surveys for CPAI were compiled into a centralized database following CPAI's GPS/GIS Data Management Protocols, North Slope, Alaska, Version 4 (CPAI 2009). Individual nest, bird, or bird group locations were recorded with decimal-degree coordinates in the WGS 84 map datum and later transferred into the NAD 83 map datum. Uniform attribute data were recorded for all observations and proofed after data collection and proofed again during data entry. Survey data were submitted in GIS-ready format with corresponding metadata. Historical data from long-term surveys also were submitted using the same protocol and standards as in 2008, to maintain consistency and make it possible to

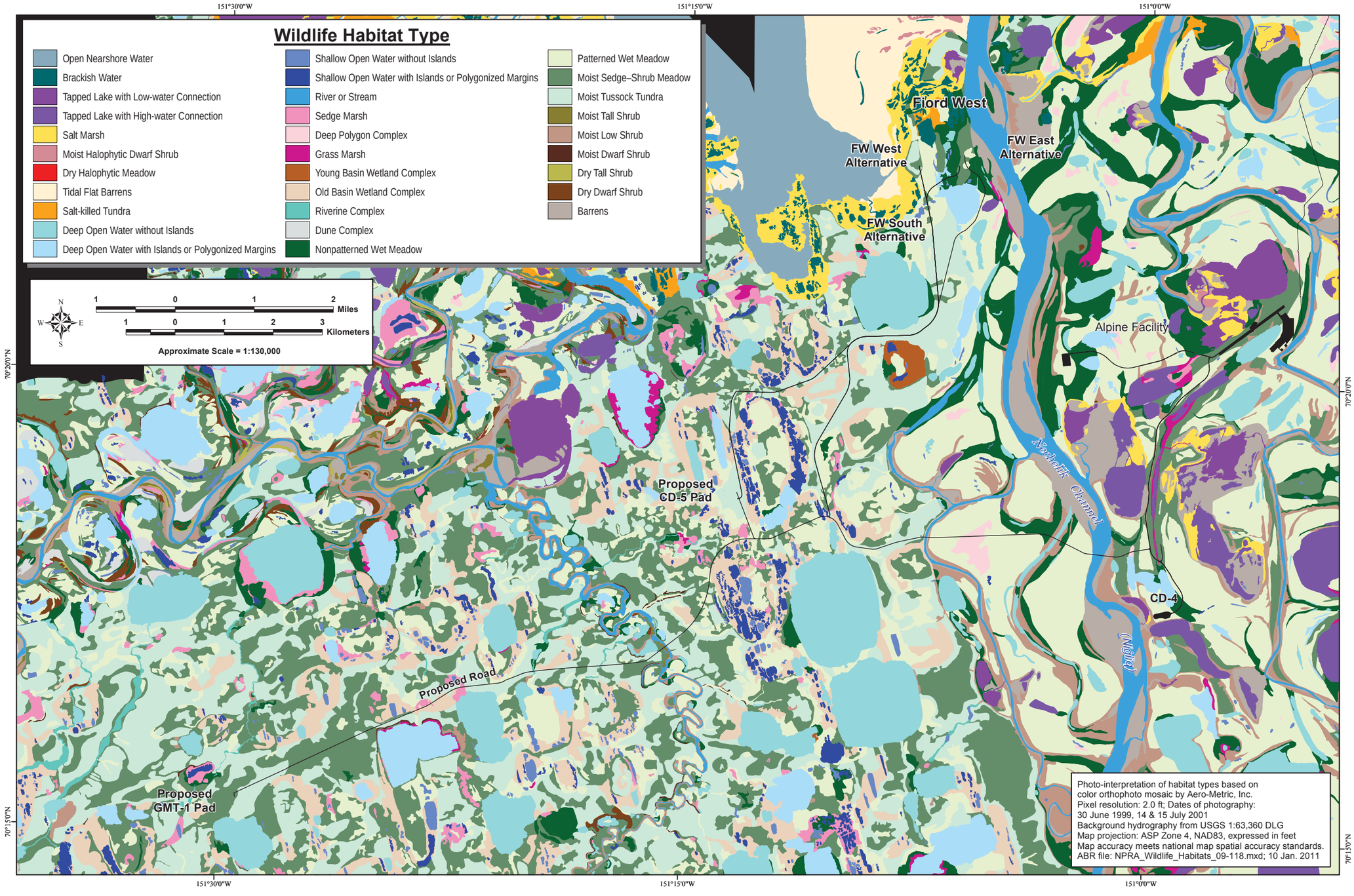

Figure 2. Wildlife habitats in the northeast NPRA and Colville River delta, Alaska.

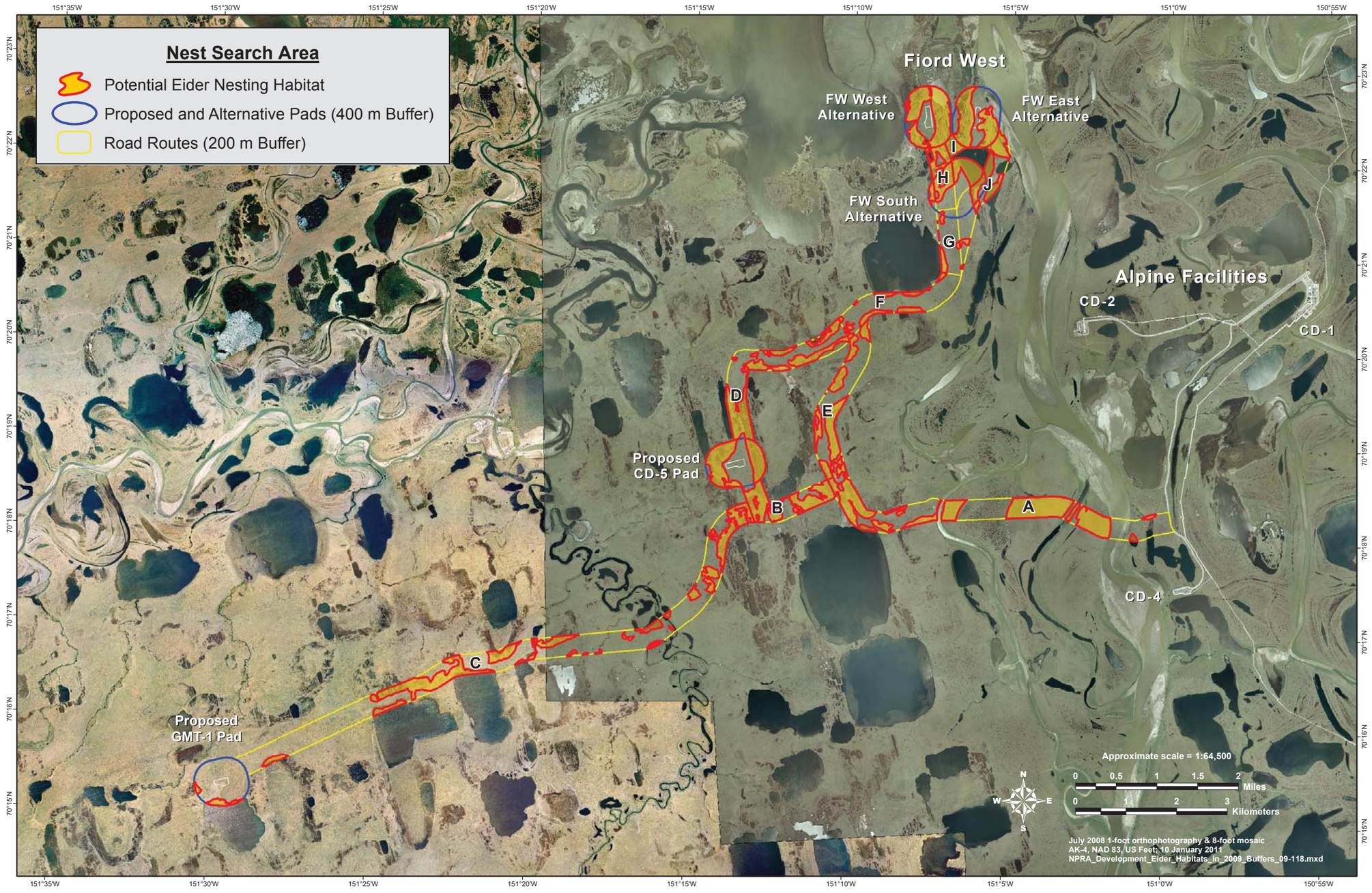

Figure 3. Potential eider nesting habitat searched at alternative pad locations and routes proposed in the northeast NPRA and Colville River delta, Alaska, 2009.

join multi-year datasets into a single archival database, maintained by CPAI.

RESULTS

CONDITIONS IN THE STUDY AREA

The summer nesting season in 2009 was advanced and relatively warm, particularly in early June. In 2009, break-up of the Colville River occurred on 26 May, about 8 days earlier than the mean date over 23 years (Michael Baker 2009). During the period of waterfowl arrival and peak nest initiation (15 May–15 June), 62 cumulative thawing degree-days were recorded at Colville Village, well above the 13-year average of 39 thawing degree-days (Figure 4). Mean monthly temperatures were slightly higher in May 2009 (-3.9 ± 3.9° C [mean ± SD]) than the 13-yr mean (-5.6 ± 5.2° C) and slightly lower in June 2009 (2.9 ± 1.7° C) than its 13-yr mean (3.6 ± 3.9° C). Snow cover was gone by the last week of May at the Kuparuk airport (due east of Alpine), but remained patchy on open tundra until the second week of June (A. Prichard, ABR, pers. comm.). The first week of June was unseasonably warm, but was followed by 3 weeks that were cooler and windier than normal (Figure 5). This cold, windy period occurred during the incubation period for Spectacled Eiders (Qavaasuk). Despite the cool period in late June, conditions in 2009 were suitable for early nest initiation for most waterfowl. The presence of Greater White Fronted Goose (Niġliviq) broods on 26 June, our first day in the field, was evidence of early nest initiation in 2009. We also observed Spectacled Eider eggs pipping on 3 July (indicating the nest was hatching that day or the next) and a King Eider brood on 5 July.

PRE-NESTING AERIAL SURVEY

In early June, we found 3 pre-nesting groups within the proposed road and pad area buffers—1 group of Spectacled Eiders and 2 groups of King Eiders (Qiŋalik) (Figure 6, Table 1). The Spectacled Eider group was a breeding pair located in road segment A in Patterned Wet Meadow

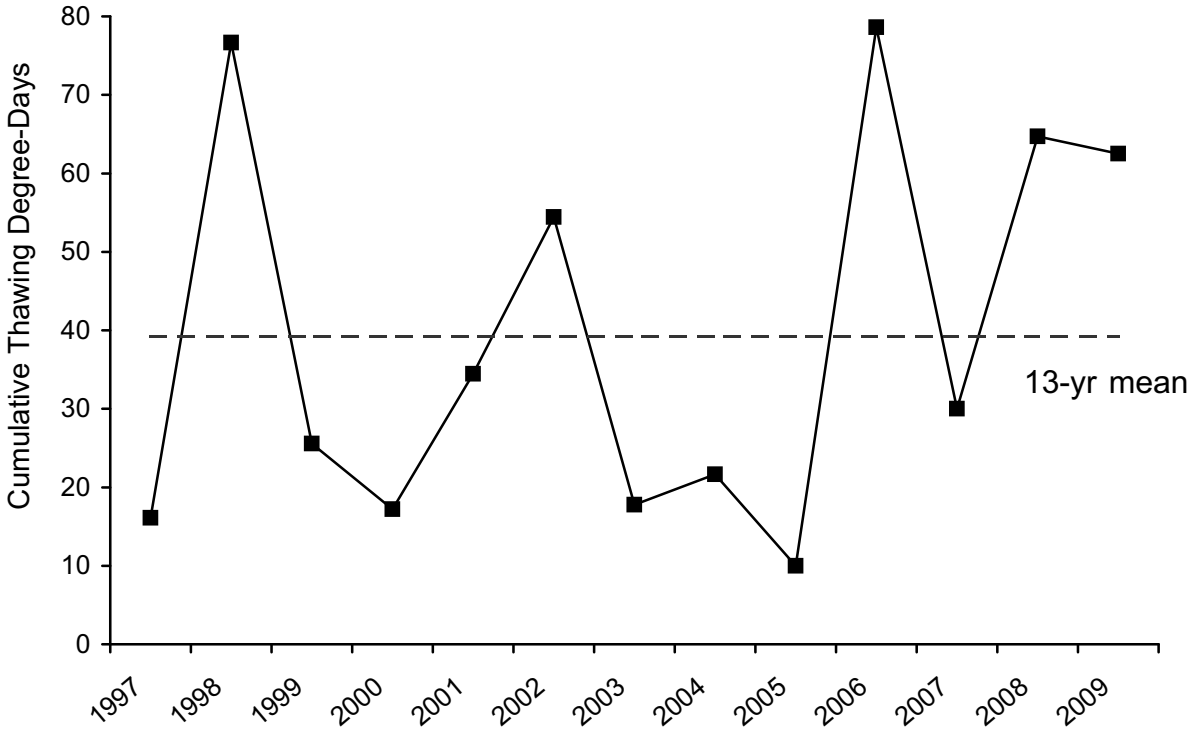

Figure 4. Cumulative number of thawing degree-days recorded for 15 May–15 June, Colville River delta, Alaska, 1997–2009.

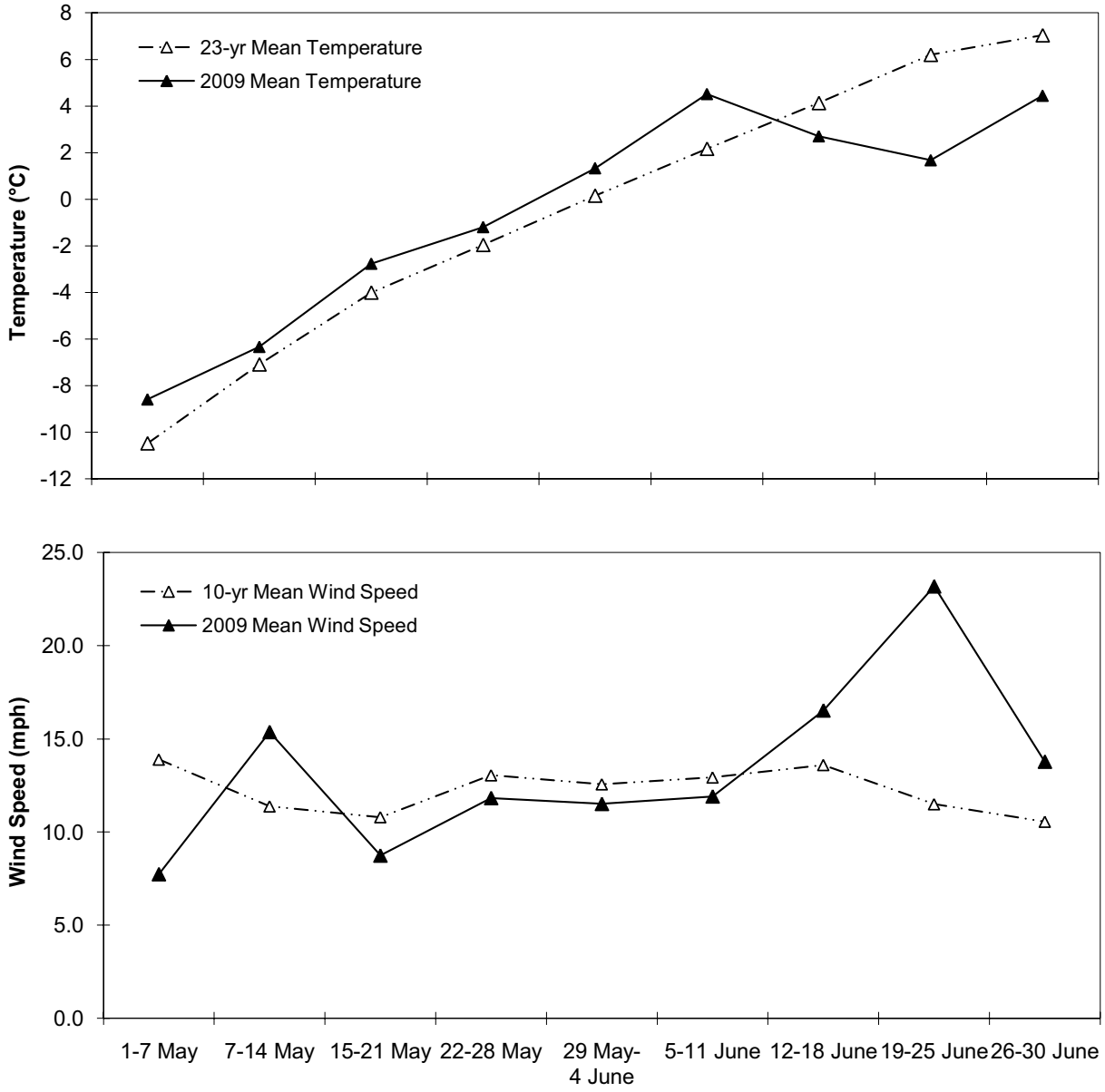

Figure 5. Weekly temperatures (centigrade) and wind speeds (mph) in May and June measured over 23 years (temperature) and 10 years (wind speed), Deadhorse, Alaska, 2009.

habitat (Table 2). A single group of 2 pairs of King Eiders was also located in road segment A in Shallow Open Water with Islands or Polygonized Margins. The second group of King Eiders, a single pair, was sighted in Deep Open Water without Islands in the GMT-1 pad area. Outside the road and pad buffers, 1 Spectacled Eider group was located west of road segment H and another was just north of road segment A (Figure 6).

NEST SEARCH

In 2009, we found 13 eider nests within buffers around proposed roads and pads (Figure 7, Table 1). One Spectacled Eider nest was located in the FW East pad buffer, the pad alternative nearest the Niġliq channel. Twelve King Eider nests were found in the CD-5 pad buffer and road segments A, C, D, and F. Two additional eider nests (one Spectacled Eider and one unidentified eider nest) were located just outside the buffer for road segment H. No Steller's Eiders (Igniqauqtuq) or

Figure 6. Distribution of Spectacled, King, and unidentified eider groups during pre-nesting aerial surveys in the northeast NPRA and Colville River delta, Alaska, 2009.

Figure 7. Distribution of eider nests found in and near search areas around alternative pad locations and road routes proposed for CD-5, GMT-1, and Fiord West in the northeast NPRA and Colville River delta, Alaska, 2009.

Table 1. Number and density of prenesting eiders and eider nests found within 400 m of alternative pad locations and within 200 m of road routes proposed for CD-5, GMT-1, and Fiord West in the northeast NPRA and Colville River delta, Alaska, 2009.

			Prenesting Birds		Nests		
Search Area	Buffer Area[1] (km^2)	Search Area[1] (km^2)	Spectacled Eider	King Eider	Spectacled Eider	King Eider	Unidentified eider
PROPOSED PADS AND ALTERNATIVES							
FW West Alternative	0.95	0.69	0	0	0	0	0
FW East Alternative	0.95	0.53	0	0	1	0	0
FW South Alternative	0.97	0.52	0	0	0	0	0
CD-5	0.92	0.54	0	0	0	2	1
GMT-1	0.83	0.07	0	2	0	0	0
PROPOSED ROAD AND ALTERNATIVE SEGMENTS							
A (C-4 to NPRA)	2.90	1.97	2	4	0	3	0
B (C-5 Access)	0.83	0.55	0	0	0	0	0
C (GMT-1 access)	4.77	1.43	0	0	0	2	2
D (CD-5 north)	1.53	0.77	0	0	0	0	1
E (CD-5 bypass)	1.29	0.60	0	0	0	0	0
F (FW access)	1.05	0.21	0	0	0	1	0
G (FW South access)	0.52	0.33	0	0	0	0	0
H (FW West access)	0.51	0.07	0	0	0	0	0
I (FW East access)	0.10	0.10	0	0	0	0	0
J (East alternative to FW East)	0.90	0.54	0	0	0	0	0
Total[1]	18.43	8.64	2	6	1	8	4
Density (adults/km^2 or nests/km^2)[2]			0.23	0.69	0.12	0.93	0.47

[1] Total of eider nesting habitats searched. Total does not include overlap of FW South with road segments G, H, and J. Overlapping areas are displayed in Figure 3.

[2] Density of prenesting adults (observed total) calculated for total buffer area (18.43 km2) and density of nests were calculated for the sum on nesting habitat within the search area (8.64 km^2).

Common Eiders (Amauligruaq) were recorded in 2009 on ground or aerial surveys. In addition to eider nests, 189 nests of other large waterbird species were recorded in the 2009 study area (Appendices A and B).

The ratio of King Eider to Spectacled Eider nests found in 2009 is not unusual for this area in the NE NPRA. During 6 years of nest searches in NE NPRA, we have found a ratio of 9 King Eider nests to every Spectacled Eider nest (ABR, Inc., unpublished data). By contrast, the ratio of King to Spectacled eider nests is 1:11 on the Colville Delta (ABR, Inc., unpublished data).

The density of Spectacled Eider nests (0.12 nests/km^2) was relatively low in the road and pad buffers. Nest density was calculated for the area of suitable nesting habitats actually searched, rather than the entire area within road and pad buffers

Table 2. Habitat use by eiders during the pre-nesting and nesting seasons within 400 m of alternative pad locations and within 200 m of road routes proposed for CD-5, GMT-1, and Fiord West in the northeast NPRA and Colville River delta, Alaska, 2009.

	Number of Pre-nesting Groups or Nests	
SEASON Habitat[1]	Spectacled Eider	King Eider
PRENESTING		
Deep Open Water without Islands	–	1
Shallow Open Water with Islands or Polygonized Margins	–	1
Patterned Wet Meadow	1	–
Total Groups	1	2
NESTING		
Shallow Open Water with Islands or Polygonized Margins	–	2
Sedge Marsh	–	1
Deep Polygon Complex	–	3
Young Basin Wetland Complex	–	1
Old Basin Wetland Complex	–	4
Nonpatterned Wet Meadow	1	–
Patterned Wet Meadow	–	1
Total Nests	1	12

[1] Prenesting aerial surveys include all habitat types in buffers, while ground searches for nest were restricted to wet and aquatic habitats in buffers.

(Table 1). The density of King Eider nests (1.38 nests/km^2) was markedly higher than the density of Spectacled Eider nests (Table 1). The Spectacled Eider nest density was similar in 2003 for the same general area (0.19 nests/km^2; Johnson et al. 2004a). In contrast, the density of Spectacled Eider nests in the CD-3 area on the outer Colville Delta averaged 0.82 nests/km^2 over 8 years of nest searches (ABR, unpubl. data).

HABITAT USE

The buffer area around road and pad segments (18.4 km^2) included 26 mapped habitat types. However, only 47% of the buffer area contained potential eider nesting habitat that was searched (Figure 3, Tables 3 and 4). The resulting nest search area (8.6 km^2) was a patchwork of 13 nesting habitats (Table 4). The major habitats within the search area were Patterned Wet Meadow (41% of area), Old Basin Wetland Complex (22%), and Nonpatterned Wet Meadow (10%); the other habitats in the search area each occupied <6% of the area (Table 4).

Spectacled Eiders use similar habitats during pre-nesting and nesting (Johnson et al. 2004b). In NE NPRA, Spectacled Eiders have been observed using 12 different aquatic and wet habitat types during pre-nesting aerial surveys (Johnson et al. 2009). During the pre-nesting survey in 2009, 1 group of Spectacled Eiders was sighted in the road buffer in Patterned Wet Meadow (Table 2). The 2 Spectacled Eider groups adjacent to the buffers were in Old Basin Wetland Complex and Salt Marsh. Two groups of King Eider were sighted in the buffers in Shallow Open Water with Islands or Polygonized Margins (4 birds) and Deep Open Water without Islands habitats (2 birds) (Table 2).

The Spectacled Eider nest found the FW East pad buffer was located in Nonpatterned Wet Meadow (Table 2). The 12 King Eider nests were in 6 different habitat types: Old Basin Wetland Complex (4 nests), Deep Polygon Complex (3 nests), Shallow Open Water with Islands or Polygonized Margins (2 nests), Sedge Marsh (1 nest), Young Basin Wetland Complex (1 nest), and Patterned Wet Meadow (1 nest).

Table 3. Habitat availability (km²) within 400 m of alternative pad locations and within 200 m of road routes proposed for CD-5, GMT-1, and Fiord West in the northeast NPRA and Colville River delta, Alaska, 2009.

Habitat	Proposed Pads and Alternatives (km²)					Proposed Road and Alternative Segments (km²)											Availability (%)
	FW-West	FW-East	FW-South	CD-5	GMT-1	A	B	C	D	E	F	G	H	I	J	Total[1]	
Open Nearshore Water	0.01	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.01	0.0
Brackish Water	0.12	–	–	–	–	–	–	–	–	–	–	0.02	–	–	–	0.14	0.7
Tapped Lake with High-water Connection	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.04	0.04	0.2
Salt Marsh	0.26	–	–	–	–	–	–	–	–	–	–	0.02	–	–	–	0.27	1.5
Tidal Flat Barrens	0.05	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.05	0.3
Salt-killed Tundra	0.01	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.01	0.0
Deep Open Water without Islands	–	0.05	<0.01	0.01	0.05	0.12	–	0.10	–	–	0.05	–	<0.01	–	0.07	0.46	2.5
Deep Open Water with Islands or Polygonized Margins	<0.01	0.03	0.20	–	–	0.02	0.01	0.05	0.03	–	–	<0.01	–	0.04	0.12	0.47	2.5
Shallow Open Water without Islands	0.01	0.01	<0.01	0.02	–	–	–	0.05	0.03	<0.01	–	0.02	–	<0.01	–	0.15	0.8
Shallow Open Water with Islands or Polygonized Margins	–	–	–	0.11	–	0.06	0.02	0.04	0.15	0.01	0.02	–	–	–	–	0.42	2.3
River or Stream	–	0.02	–	–	–	0.12	–	0.01	–	–	–	–	–	–	–	0.15	0.8
Sedge Marsh	–	–	–	–	–	0.01	0.04	0.14	0.02	0.01	–	–	–	–	–	0.21	1.2
Deep Polygon Complex	–	–	–	–	–	0.18	–	–	–	–	–	–	–	–	–	0.18	1.0
Grass Marsh	–	–	–	–	–	–	–	0.02	–	–	–	–	–	–	0.01	0.03	0.1
Young Basin Wetland Complex	–	–	–	–	–	–	–	–	–	–	0.04	–	–	–	–	0.04	0.2
Old Basin Wetland Complex	–	–	–	0.18	0.01	0.23	0.10	0.64	0.43	0.21	0.06	–	–	–	–	1.87	10.1
Riverine Complex	–	–	–	–	–	–	–	0.02	–	–	–	–	–	–	–	0.02	0.1
Nonpatterned Wet Meadow	–	0.39	–	–	–	0.24	–	0.02	–	0.04	0.02	–	0.05	0.03	0.11	0.88	4.8
Patterned Wet Meadow	0.30	0.05	0.31	0.22	<0.01	1.10	0.39	0.38	0.10	0.33	0.02	0.27	0.03	0.02	0.23	3.52	19.1
Moist Sedge-Shrub Meadow	0.10	0.30	0.03	<0.01	0.40	0.31	0.23	1.60	0.27	0.15	0.10	0.06	0.05	<0.01	0.01	3.59	19.5

Table 3. Continued.

Habitat	Proposed Pads and Alternatives (km^2)					Proposed Road and Alternative Segments (km^2)											Availability (%)
	FW-West	FW-East	FW-South	CD-5	GMT-1	A	B	C	D	E	F	G	H	I	J	Total[1]	
Moist Tussock Tundra	0.11	–	0.43	0.38	0.36	0.35	0.05	1.64	0.49	0.54	0.74	0.13	0.38	–	0.31	5.60	30.4
Moist Tall Shrub	–	–	–	–	–	–	–	0.02	–	–	–	–	–	–	–	0.02	0.1
Moist Low Shrub	–	–	–	–	–	0.11	–	0.02	–	–	–	–	–	–	–	0.13	0.7
Moist Dwarf Shrub	–	–	–	–	–	–	–	0.03	–	–	–	–	–	–	–	0.03	0.2
Barrens	–	0.11	–	–	–	0.05	–	–	–	–	–	–	–	–	<0.01	0.16	0.9
Human Modified	–	–	–	–	–	<0.01	–	–	–	–	–	–	–	–	–	0.00	0.0
Total	0.95	0.95	0.97	0.92	0.83	2.90	0.83	4.77	1.53	1.29	1.05	0.52	0.51	0.10	0.90	18.43	100.0

[1] Total does not include 0.59 km^2 of FW-South buffer that overlaps with road segments G, H, and J. This overlap is displayed in Figure 3.

Table 4. Habitat availability (km^2) in nest search areas (excluding habitats not used by nesting eiders and not searched) within 400 m of alternative pad locations and within 200 m of road routes proposed for CD-5, GMT-1, and Fiord West in the northeast NPRA and Colville River delta, Alaska, 2009.

	Proposed Pads and Alternatives (km^2)					Proposed Road and Alternative Segments (km^2)										Search Area[1]	
Habitat	FW-West	FW- East	FW-South	CD-5	GMT-1	A	B	C	D	E	F	G	H	I	J	Total (km^2)	Availability (%)
Brackish Water	0.12	–	–	–	–	–	–	–	–	–	–	0.02	–	–	–	0.14	1.6
Salt Marsh	0.26	–	–	–	–	–	–	–	–	–	–	0.02	–	–	–	0.27	3.2
Salt-killed Tundra	0.01	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.01	0.1
Deep Open Water without Islands	–	0.05	<0.01	0.01	0.05	0.12	–	0.10	–	–	0.05	–	<0.01	–	0.07	0.46	5.3
Deep Open Water with Islands or Polygonized Margins	<0.01	0.03	0.20	–	–	0.02	0.01	0.05	0.03	–	–	<0.01	–	0.04	0.12	0.47	5.4
Shallow Open Water without Islands	0.01	0.01	<0.01	0.02	–	–	–	0.05	0.03	<0.01	–	0.02	–	<0.01	–	0.15	1.8
Shallow Open Water with Islands or Polygonized Margins	–	–	–	0.11	–	0.06	0.02	0.04	0.15	0.01	0.02	–	–	–	–	0.42	4.9
Sedge Marsh	–	–	–	–	–	0.01	0.04	0.14	0.02	0.01	–	–	–	–	–	0.21	2.5
Deep Polygon Complex	–	–	–	–	–	0.18	–	–	–	–	–	–	–	–	–	0.18	2.1
Grass Marsh	–	–	–	–	–	–	–	0.02	–	–	–	–	–	–	0.01	0.03	0.3
Young Basin Wetland Complex	–	–	–	–	–	–	–	–	–	–	0.04	–	–	–	–	0.04	0.5
Old Basin Wetland Complex	–	–	–	0.18	0.01	0.23	0.10	0.64	0.43	0.21	0.06	–	–	–	–	1.87	21.6
Nonpatterned Wet Meadow	–	0.39	–	–	–	0.24	–	0.02	–	0.04	0.02	–	0.05	0.03	0.11	0.88	10.2
Patterned Wet Meadow	0.30	0.05	0.31	0.22	<0.01	1.10	0.39	0.38	0.10	0.33	0.02	0.27	0.03	0.02	0.23	3.52	40.7
Total	0.69	0.53	0.52	0.54	0.07	1.97	0.55	1.43	0.77	0.60	0.21	0.33	0.07	0.10	0.54	8.64	100

[1] Total does not include 0.27 km^2 of potential eider nesting habitat in FW-South buffer that overlaps with road segments G, H, and J. This overlap is displayed in Figure 3.

EIDER LOCATIONS FROM PREVIOUS YEARS

PRE-NESTING

Pre-nesting Spectacled Eiders were recorded within the road and pad buffers in 6 years out of 9 years of surveys conducted in NE NPRA and 16 years of surveys conducted on the Colville Delta (Figure 8). Typically only one group (usually a pair) was recorded during the years when Spectacled Eiders were present in the buffer areas (2006 being the exception with 2 groups). The total number of pre-nesting Spectacled Eiders in any year was ≤4 adults. Five of 7 locations of Spectacled Eider groups sighted in buffers were in the Fiord West area (i.e., FW West, FW East, and road segments H and I). Pre-nesting eiders also were located in the buffers along road segments A and C (Figure 8).

Spectacled Eider use of road and pad buffers in 2009 appears similar to the pattern found in 2008, when pre-nesting Spectacled Eider density was low (0.05 birds/km²; Johnson et al. 2009). In 2008, pre-nesting Spectacled Eiders in NE NPRA preferred Brackish Water and both Deep and Shallow Open Water with Islands or Polygonized Margins (Johnson et al. 2009). On the Colville Delta study area, 4 additional habitats were preferred by pre-nesting Spectacled Eiders: Salt Marsh, Salt-killed Tundra, Grass Marsh, and Deep Polygon Complex (Johnson et al. 2009).

NESTING

Data on locations of Spectacled Eider nests in previous years were collected from ground-based nest searches conducted in multiple locations in NE NPRA in 1958 (M.T. Myres, unpubl. data), and 1999–2004 (Anderson and Johnson 1999, Murphy and Stickney 2000, Johnson and Stickney 2001, Burgess et al. 2002b, Burgess et al. 2003, Johnson et al. 2004a). Six Spectacled Eider nests have been found on nest searches in NE NPRA in previous years; however, only 1 nest was within the road and pad buffers around the current alternatives (Figure 9). That Spectacled Eider nest was found in 2003 within the buffer around road segment E. On the Colville Delta, nest searches were conducted for 2 years near CD-4 (Burgess et al. 2000, 2002a). One Spectacled Eider nest was found in 2000 near the junction of segment A with the CD-4 access road (Figure 9).

Figure 8. Distribution of Spectacled and King eider groups during pre-nesting aerial surveys, in northeast NPRA and the Colville River delta, Alaska, 1993–2009.

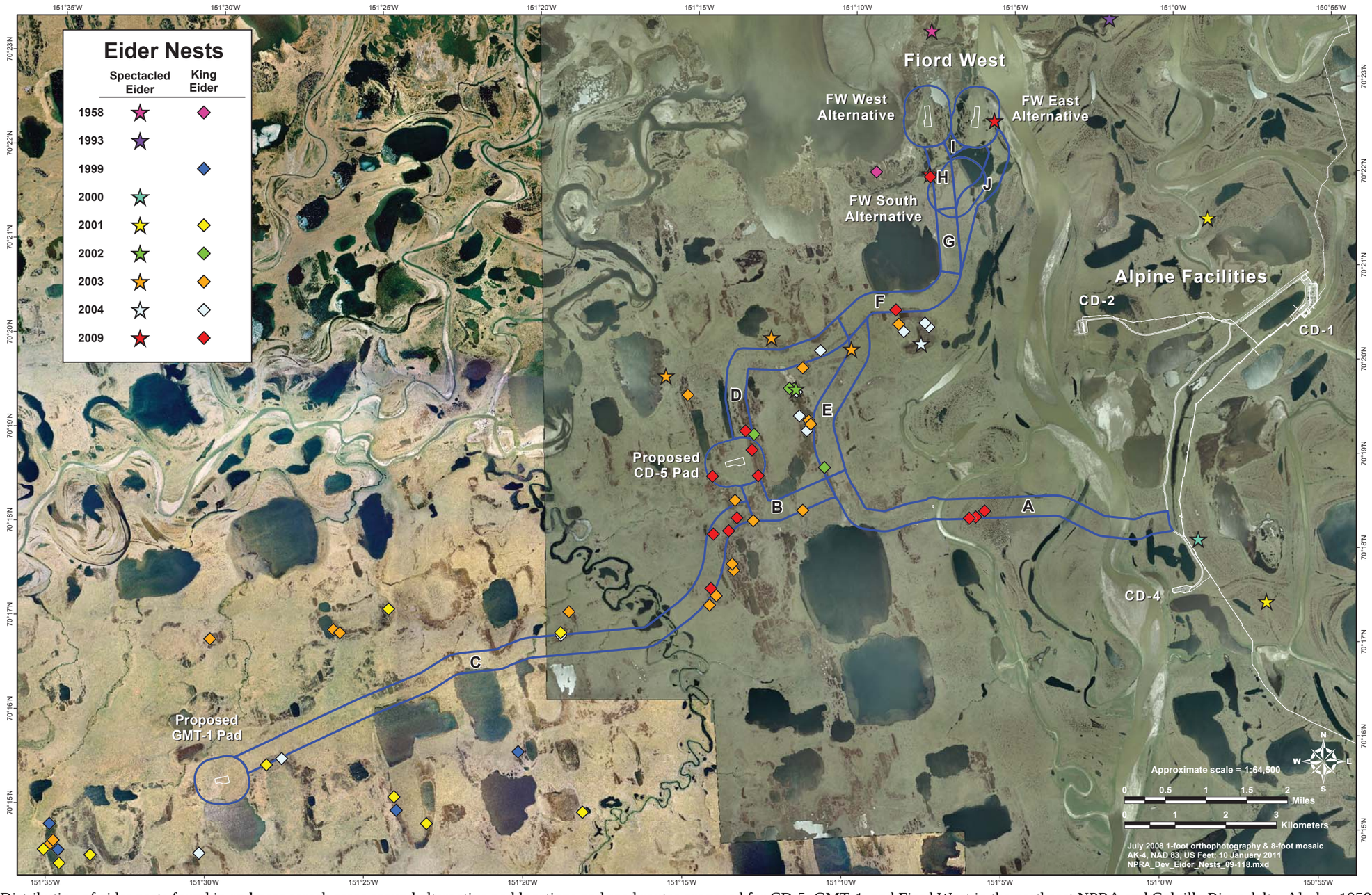

Figure 9. Distribution of eider nests found in and near search areas around alternative pad locations and road routes proposed for CD-5, GMT-1, and Fiord West in the northeast NPRA and Colville River delta, Alaska, 1958, 1959, 1993, 1999–2004, and 2009. Locations from M. T. Myres (1958, 1959, unpubl data); Smith et al. (1994), Anderson and Johnson (1999), Murphy and Stickney (2000), Johnson and Stickney (2001), Burgess et al. (2002), Burgess et al. (2003), and Johnson et al. (2004a). Nest locations and search areas do not represent all nesting areas for eiders.

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Nest Locations 2009

- Greater White-fronted Goose
- Brant
- Unidentified Cackling or Canada Goose
- Unidentified Goose
- Tundra Swan
- Northern Shoveler
- Northern Pintail
- Unidentified Scaup
- Long-tailed Duck
- Unidentified Duck
- Willow Ptarmigan
- Unidentified Ptarmigan
- Red-throated Loon
- Pacific Loon
- Bar-tailed Godwit
- Glaucous Gull
- Arctic Tern
- Parasitic Jaeger
- Long-tailed Jaeger

Fiord West
FW West Alternative
FW East Alternative
FW South Alternative
Alpine Facilities
CD-2
CD-1
CD-4
Proposed CD-5 Pad
Proposed GMT-1 Pad
A
B
C
D
E
F
G
H
I
J
151°35'W
151°30'W
151°25'W
151°20'W
151°15'W
151°10'W
151°5'W
151°0'W
150°55'W
70°23'N
70°22'N
70°21'N
70°20'N
70°19'N
70°18'N
70°17'N
70°16'N
70°15'N
N
W
E
S
Approximate scale = 1:64,500
0 0.5 1 1.5 2 Miles
0 1 2 3 Kilometers
July 2008 1-foot orthophotography & 8-foot mosaic
AK-4, NAD 83, US Feet; 29 October 2009
NPRA_Development_Non_Eider_Nests_09-118.mxd

Appendix A. Distribution of nests of large waterbirds found in search areas around alternative pad locations and road routes for CD-5, GMT-1, and Fiord West in the northeast NPRA and Colville River delta, Alaska, 2009.

Appendix B. Number of nests of large waterbirds found in search areas within 400 m of alternative pad locations and within 200 m of road routes proposed for CD-5, GMT-1, and Fiord West in the NPRA and Colville River delta, Alaska, 2009.

Search Area[1]	Greater White-fronted Goose	Brant	Canada Goose	Unidentified goose	Northern Shoveler	Northern Pintail	Scaup Species	Long-tailed Duck	Unidentified duck	Ptarmigan Species	Red-throated Loon	Pacific Loon	Bar-tailed Godwit	Glaucous Gull	Arctic Tern	Parasitic Jaeger	Total
Proposed Pads and Alternatives																	
FW West Alternative	1	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	14
FW East Alternative	8	0	1	0	0	0	0	0	0	1	3	0	0	0	0	1	14
FW South Alternative	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
CD-5	8	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	11
GMT-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proposed Road and Alternative Segments																	
A (C-4 to NPRA)	40	1	1	0	0	1	1	2	1	6	2	2	2	0	0	2	61
B (C-5 Access)	5	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	7
C (GMT-1 access)	10	0	0	2	1	0	0	1	0	0	0	1	0	0	0	1	16
D (CD-5 north)	17	1	1	0	0	0	0	1	0	0	0	2	0	2	0	0	24
E (CD-5 bypass)	10	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	11
F (FW access)	6	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	7
G (FW South access)	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
H (FW West access)	6	0	1	2	0	0	0	1	1	0	1	0	0	0	0	0	12
I (FW East access)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
J (East alternative to FW East)	5	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	8
TOTAL	130	2	4	8	1	2	2	7	2	10	6	6	2	2	1	4	189

[1] See Figure 1 for map of the search areas.