AVIAN STUDIES FOR THE ALPINE SATELLITE DEVELOPMENT PROJECT, 2007

FIFTH ANNUAL REPORT

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ANCHORAGE, ALASKA

AND

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EXECUTIVE SUMMARY

Avian aerial surveys were conducted in the Colville Delta in 2007 in support of the Alpine Satellite Development Project (ASDP) for ConocoPhillips Alaska, Inc., and Anadarko Petroleum Corporation. The surveys continued long-term data acquisition begun in 1992 on the Colville Delta. Surveys focused on the abundance, distribution, and habitat use of 5 focal species: Spectacled Eider, King Eider, Tundra Swan, Yellow-billed Loon, and Brant. These five species were selected because of 1) threatened or sensitive status, 2) indications of declining populations, 3) restricted breeding range, or 4) concern of regulatory agencies for development impacts. Monitoring a collection of focal species with differing habitat requirements provides both in-depth data on species trends and responses to a changing environment and a general view of ecosystem health. Aerial surveys for eiders, swans, and Brant were conducted from fixed-wing airplanes. Surveys for loons were conducted from a helicopter. In 2007, the ASDP comprised 5 satellite drill sites (2 completed, 3 proposed) that would send oil for processing to the existing Alpine Facility on the Colville Delta.

The Colville Delta study area (552 km²) encompassed the entire delta from the East Channel of the Colville River to the westernmost distributary of the Niġliq Channel. The Alpine Facility began oil production on the Colville Delta in 2000. Two ASDP satellite drill sites were built in the winter of 2005: CD-3 was built as a roadless drill site to reduce its gravel footprint in eider breeding habitat on the outer delta, and CD-4 was connected by a road on the south side of the Alpine Facility. The CD-3 site began producing oil in August 2006, and CD-4 began producing in November 2006. The NE NPRA study area (1,571 km²) abutted the western edge of the Colville Delta and encompassed 4 proposed development sites that are part of the ASDP: drill sites CD-5, CD-6, and CD-7, and the Clover A gravel mine site. No surveys were conducted in NE NPRA because of delays in permitting the CD-5 drill site. In 2007, avian surveys for ASDP were conducted in the Colville Delta study area only.

Each spring, open houses were held in Nuiqsut to allow residents to visit with CPAI biologists and other scientists to discuss information on and concerns for resources in the Colville Delta and NPRA areas. In 2007, a meeting was scheduled with the Kuukpik Subsistence Oversight Panel and slide shows were presented on current studies at an open house on 19 June 2007. The open house was attended by approximately 40 people from the village of Nuiqsut. During the summer field season in 2007, CPAI posted weekly updates on bulletin boards in the post office, store, and community center in Nuiqsut. The updates reported on surveys (for example, type of aircraft used, altitude of aircraft, and species enumerated) conducted the previous week and the schedule of surveys for the upcoming week. 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.

Results of aerial surveys for focal bird species indicated that 2007 was a relatively good year for large birds in the Colville Delta study area. Numbers of birds, nests, and broods were generally above long-term averages and in several cases were records or near records.

Spectacled Eiders were more numerous (52 eiders) on the Colville Delta during the pre-nesting aerial survey in 2007 than during similar surveys in the previous 7 years—a reversal in the decline that began in 2000. As in previous years, Spectacled Eiders were found primarily in the CD North subarea.

King Eiders were about half as numerous as Spectacled Eiders on the Colville Delta during the pre-nesting aerial survey in 2007 and most of the King Eiders were in the Northeast Delta subarea. The density of King Eiders on the Colville Delta study area in 2007 was just above the long-term average. One pair of Steller's Eiders was seen flying over the Colville Delta and a pair of Common Eiders was seen just outside the study area in marine waters.

Yellow-billed Loons had one of their most productive years since surveys on the Colville Delta began in 1993. We found the second highest number of Yellow-billed Loon nests (25) and the highest number of Yellow-billed Loon broods (17) recorded in 13 years of aerial surveys in the Colville Delta study area. As in previous years, Yellow-billed Loon nests and broods were

concentrated in the central part of the delta in 2007, and all nests were on lakes where Yellow-billed Loons have nested previously.

Yellow-billed loon nesting success was the highest recorded in the 3 years that we have conducted weekly nest monitoring. Overall, 22 of 31 nesting pairs of Yellow-billed Loons in the Colville Delta study area in 2007 were observed with young for an apparent nesting success of 71%. Hatch began between nest visits on 10 and 17 July. Four of the 22 broods observed during weekly monitoring surveys in 2007 were lost by the time of the brood-rearing aerial survey (20–21 August). The presence of egg membranes and numerous (≥30) eggshell fragments were good indicators of nest success and coincided with the presence of broods.

Forty-three nests and 6 broods of Pacific Loons were counted opportunistically in the Colville Delta study area in 2007. One brood of Red-throated Loons but no nests were seen during aerial surveys. In the CD-3 area, 12 additional Pacific Loon and 9 additional Red-throated Loon nests were found during ground searches conducted as part of another study. Two Pacific Loon broods and 1 Red-throated Loon brood also were found during ground searches in July.

Forty-two Tundra Swan nests were found in the Colville Delta study area in 2007, the fourth highest count over 14 years of aerial surveys. The brood count of 33 swan broods in the Colville Delta study area also was the fourth-highest since 1992. Apparent nesting success was 79%. The mean brood size in 2007 was 2.6 young; 86 swan young were counted on the delta, and only 3 previous years produced more young swans.

Brant and Snow Geese were numerous in the Colville Delta study area in 2007. The brood-rearing aerial survey recorded 980 Brant (446 adults and 534 young) in 6 brood-rearing groups. The total count was slightly below average for coastal area surveys that have been conducted intermittently over a 17-year period. On the same survey in 2007, 1,154 Snow Geese (596 adults and 558 young) in 13 brood-rearing groups were counted in the Colville Delta study area. The previous high count was 997 Snow Geese in 2006.

Forty-one Glaucous Gull nests and at least 22 broods were counted in the Colville Delta study area during aerial surveys in 2007. Three additional Glaucous Gull broods were found during ground searches during July. Nest counts for Glaucous Gulls in the Colville Delta study area have ranged from 18 to 46 nests during 9 years of surveys. No Sabine's Gull colonies were observed during the aerial survey for nesting loons in 2007, however, 2 Sabine's Gull nests were found during ground searches.

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ACKNOWLEDGMENTS

The 2007 avian studies in the Colville Delta study area involved the combined efforts of a number of people. The ABR biologists and technicians who contributed to this project include Jim King, Pam Seiser, and Alice Stickney. Pilots Bill Saathoff, Pat Coyle, and Wes Gager of Maritime Helicopters safely conducted the helicopter surveys. We thank our airplane pilots, Sandy Hamilton and Bob Mumford of Arctic Air Alaska, for keeping aerial surveys safely on course. On the ground, Mary Mae Aschoff and Justin Blank coordinated the helicopter flights. In our Fairbanks office, Allison Zusi-Cobb, Will Lentz, Matt Macander, Dorte Dissing, and Pam Odom provided expert support in data analysis, figure production, and report preparation. In all phases of this study, we were assisted by our tireless expeditors, Tony LaCortiglia and Davya Flaharty. This study was funded by ConocoPhillips Alaska, Inc., and Anadarko Petroleum Corporation and was administered by Caryn Rea, Senior Staff Biologist and Environmental Studies Coordinator. We especially thank Caryn Rea for supporting the continuation of these long-term monitoring studies, the benefits of which are being realized in other biological studies, in past and future National Environmental Protection Act (NEPA) documents, in species status reviews and Section 7 consultations, and in permit applications. We appreciate the review and comments on this report made by Caryn Rea and Bob Burgess. We thank all the other ConocoPhillips Alaska staff and contractors in the Alpine and Kuparuk oilfields for their assistance in making 2007 a successful field season.

INTRODUCTION

During 2007, ABR, Inc., conducted wildlife surveys for selected birds and mammals in the Colville River Delta in support of the Alpine Satellite Development Project (ASDP) of ConocoPhillips Alaska, Inc. (CPAI). The wildlife studies in 2007 were a continuation of work initiated by CPAI's predecessors, ARCO Alaska, Inc., and Phillips Alaska, Inc., in the Colville River Delta in 1992 (Smith et al. 1993, 1994; Johnson 1995; Johnson et al. 1996, 1997, 1998, 1999a, 1999b, 2000a, 2000b, 2001, 2002, 2003a, 2003b, 2004, 2005, 2006a, 2006b, 2007a, 2007b; Burgess et al. 2000, 2002a, 2003a) and in the northeastern National Petroleum Reserve–Alaska (NE NPRA) in 1999 (Anderson and Johnson 1999; Murphy and Stickney 2000; Johnson and Stickney 2001; Burgess et al. 2002b, 2003b; Johnson et al. 2004, 2005, 2006b). Avian surveys were discontinued in the NE NPRA in 2007 due to delays in permitting for the CD-5 drill site, but CPAI anticipates these surveys will resume again in 2008. The ASDP studies augment long-term wildlife monitoring programs that have been conducted by CPAI (and its predecessors) across large areas of the central Arctic Coastal Plain since the early 1980s (see Murphy and Anderson 1993, Stickney et al. 1993, Anderson et al. 2008, Lawhead et al. 2008).

The primary goal of wildlife investigations in the region since 1992 has been to describe the distribution and abundance of selected species before, during, and after construction of oil development projects. We report here the results of avian surveys in 2007 that were conducted in the Colville River Delta. CPAI began producing oil on the Colville River Delta in 2000 with the Alpine Development's CD-1 and CD-2 drill sites, and augmented oil production in 2006 with the CD-3 and CD-4 drill sites. CPAI plans additional oil and gas development sites in NE NPRA as part of the Alpine Satellite Development Project (BLM 2004): CD-5 (Alpine West), CD-6 (Lookout), and CD-7 (Spark) (Figure 1). Readers are directed to prior reports for wildlife information from previous years.

Surveys in the Colville River Delta in 2007 were designed to provide data on the distribution, abundance, and habitat use of 5 focal species (common names followed by Iñupiaq names): Spectacled Eider (Qavaasuk), King Eider (Qiŋalik), Tundra Swan (Qugruk), Brant (Niġliŋġaq), and Yellow-billed Loon (Tuullik) (scientific names and Iñupiaq names listed in Appendix A). These five species were selected because of 1) threatened or sensitive status, 2) indications of declining populations, 3) restricted breeding range, or 4) concern of regulatory agencies for development impacts. Monitoring a collection of focal species provides both in-depth data on individual species trends and responses to a changing environment, as well as a general overview of ecosystem health. Data collection for a suite of indicator species with diverse life histories and habitat needs is an efficient way to monitor a multi-species system, obviating the need to study all species that breed in the study area. Habitat selection analyses will be presented in a later report; interested readers are referred to past summaries (see Johnson et al. 2005). Ground-based surveys for nesting birds were conducted only in the CD-3 area for a separate monitoring study of Spectacled Eiders in 2007 (Johnson et al. 2008). Required state and federal permits were obtained for authorized survey activities, including a Scientific or Educational Permit (Permit No. 07-069) from the State of Alaska and a Federal Fish and Wildlife Permit—Threatened and Endangered Species (Permit No. TE012155-0). Similar avian species were monitored in the Kuparuk Oilfield on the eastern border of the Colville River Delta in 2007 (Anderson et al. 2008). Studies of caribou (Tuttu) and other large mammals in the ASDP area in 2007 are reported in Lawhead et al. (2008). Additional studies on the use of the ASDP area by grizzly bears (Akłaq) were conducted by the Alaska Department of Fish and Game (ADFG) with support from CPAI in 2002–2006. CPAI also supported the Polar Bear (Nanuq) Conservation Program lead by the U.S. Geological Survey's Alaska Science Center, in its efforts to capture, mark, and monitor polar bears in the central Beaufort Sea.

Wildlife study objectives were developed and study progress was reported through a series of agency and community scoping and planning meetings beginning in 2001, and annual informational meetings continue to be held. Each spring, open houses are held in Nuiqsut to allow

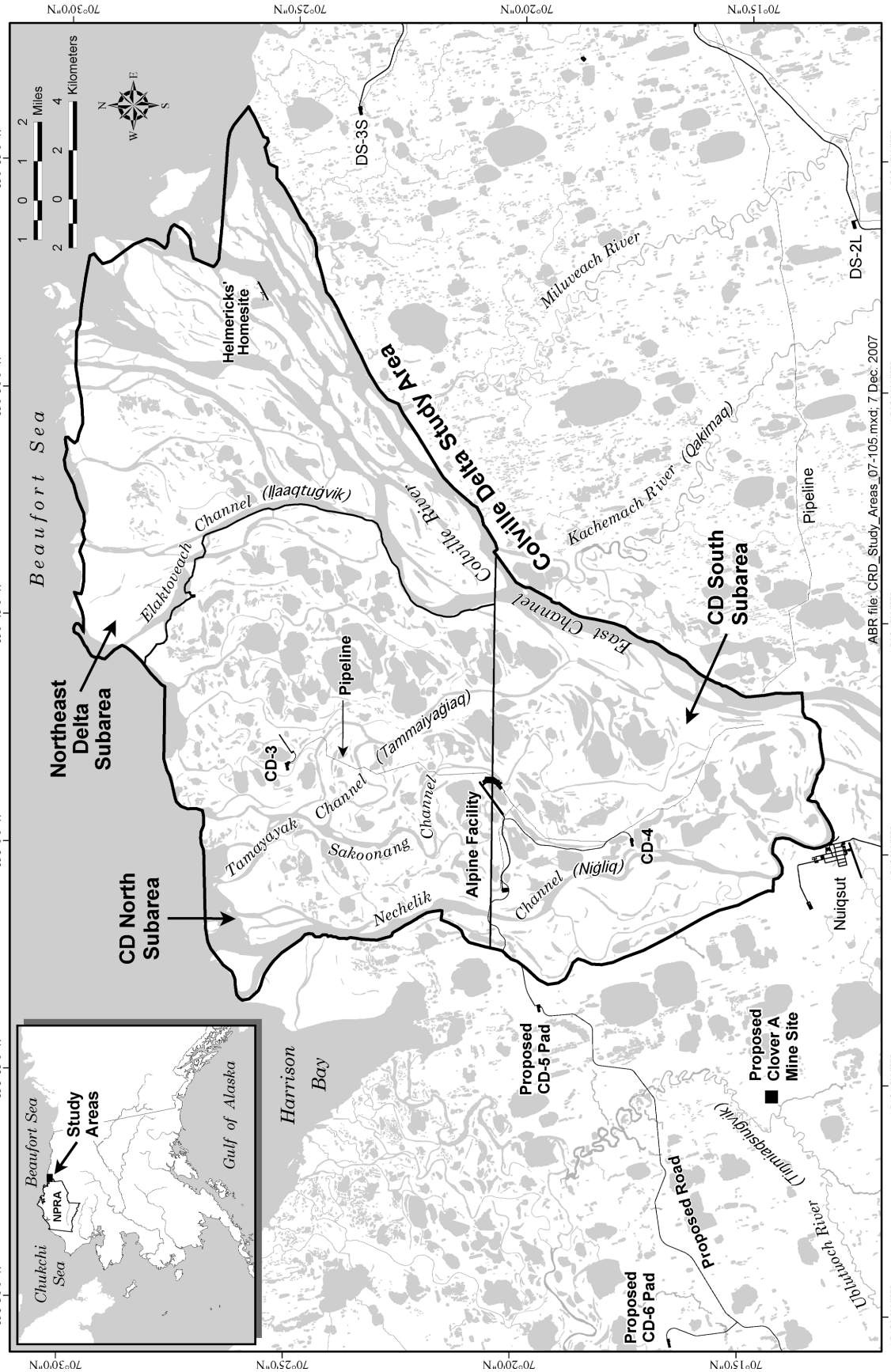

Figure 1. Wildlife study areas and subareas for the Alpine Satellite Development Project, northern Alaska, 2007.

residents to visit with CPAI biologists and other scientists to discuss information on and concerns for resources in the Colville Delta and NPRA areas. In 2007, a meeting was scheduled with the Kuukpik Subsistence Oversight Panel and slide shows were presented on current studies at an open house on 19 June 2007. The open house was attended by approximately 40 people from the village of Nuiqsut. During the summer field season in 2007, CPAI posted weekly updates on bulletin boards in the post office, store, and community center in Nuiqsut. The updates reported on surveys (for example, type of aircraft used, altitude of aircraft, and species enumerated) conducted the previous week and the schedule of surveys for the upcoming week. 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.

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) also 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 do not reflect local usage. The Iñupiaq names are taken from the *Iñupiat–English Map of the North Slope Borough* (NSB Planning Department, Barrow, Alaska, May 1997), with additional information 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 Colville River Delta (henceforth, Colville Delta) is one of the most prominent and important landscape features on the Arctic Coastal Plain of Alaska, both because of its large size and because of the concentrations of birds, mammals, and fish that are found there. Two permanent human settlements occur on the Colville Delta—the Iñupiat village of Nuiqsut (population ~400) established in 1974 and Helmericks' family homesite established in the 1950's, also known as "Colville Village".

Oil development on the Colville Delta began with construction in 1998 of the Alpine Facility (a full-production facility including a processing plant, camp, airstrip, and the CD-1 and CD-2 drill sites) (Figure 1). In 2005, construction began on 2 satellite drill sites, whose oil also would be processed at Alpine. The CD-3 satellite is a roadless drill site that is accessed by aircraft during the summer and fall and via ice roads during winter (Figure 1). The CD-4 satellite is connected to Alpine by an all-season road. Both the CD-3 and CD-4 drill sites began producing oil in 2006.

As used in this report, the Colville Delta study area (552 km²) comprises the CD North, CD South, and the Northeast Delta subareas (Figure 1). These subareas are useful in describing the distribution of birds on the delta, and together they encompass the entire delta from the east bank of the East Channel of the Colville River to the west bank of the westernmost distributary of the Nechelik (Niġliq) Channel and inland to the juncture of these channels.

METHODS

Aerial surveys are the primary means for collecting data on bird species using the Colville Delta because of the large size of the study area and the short periods of time that each species is at the optimum stage for data collection. A total of 4 aerial surveys were conducted using fixed-wing aircraft for Spectacled Eiders, Tundra Swans, and Brant. Eight aerial surveys (1 approximately every week) were conducted by helicopter for loons targeting specific lakes suitable to Yellow-billed Loons. Each survey was scheduled specifically

(see Table 1 for survey details) for the period when the species was most easily detected (for example, when Spectacled Eider males in breeding plumage were present) or when the species was at an important stage of its breeding cycle (nesting or raising broods). Concerns about disturbance to local residents and wildlife from survey flights have dictated that we conduct the fewest survey flights necessary and at the highest altitudes possible. Flight altitudes were set at the maximum level at which the target species could be adequately detected and counted. Survey flights specifically avoid the areas around the village of Nuiqsut and the Helmericks' homesite. All survey flights are reported to local residents the week before and after in weekly updates posted in Nuiqsut.

EIDER AERIAL SURVEYS

Regional abundance and distribution of eiders were evaluated with data collected on 1 aerial survey flown during the pre-nesting period (Table 1), 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 2007 (Figure 2) covered the same areas in the Colville Delta study area as in 2006 (Figure 1). The pre-nesting survey was conducted 13–14 June using the same methods that were used in previous years on the Colville Delta (1993–1998 and 2000–2006), although the survey areas and survey coverage differed among years (see Smith et al. 1993, 1994; Johnson 1995; Johnson et al. 1996, 1997, 1998, 1999a, 2000a, 2002, 2003b, 2004, 2005, 2006b, 2007b; Burgess et al. 2000, 2002a, 2003a). The survey was 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 400 m apart (100% coverage) over the Colville Delta study area (Figure 2). 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). Three areas were not surveyed on the Colville Delta: the extensive tidal flats and marine waters on the northernmost delta were not included because eiders rarely use those habitats, a 2.4-km radius circle around the Helmericks' home site was avoided to reduce disturbance to its residents, and similarly, the extreme southern delta was avoided to limit disturbance to Nuiqsut residents (Figure 2). 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 activity (flying or on the ground). Eider locations on survey maps were digitized into a geographic information system (GIS) database.

We recorded the observed number of birds and pairs and calculated the "indicated" number of birds and densities (number/km²). Following the USFWS (1987a) protocol, the total indicated number of birds excludes flying birds and is twice the number of males not in groups (groups are defined as >3 birds of mixed sex that cannot be separated into singles or pairs) plus the number of birds in groups (see USFWS 1987a for exceptions to the rule).

LOON AERIAL SURVEYS

Aerial surveys for nesting Yellow-billed Loons were conducted once on 25–26 June 2007 and once for brood-rearing loons on 20–21 August 2007 (Table 1). The surveys were flown in the CD North and CD South subareas of the Colville Delta study area (Figure 3), which have been surveyed consistently since 1993. Five additional large deep lakes in the Northeast Delta subarea also were surveyed, but these lakes have not been included every survey year. Both nesting and brood-rearing surveys were conducted in a helicopter flying at ~60 m agl in a lake-to-lake pattern covering most lakes ≥10 ha in size and immediately adjacent smaller lakes and aquatic habitats, which comprise the typical breeding habitats for nesting Yellow-billed Loons (Sjölander and Ågren 1976, North and Ryan 1989). Tapped Lakes with Low-water Connections (lakes whose levels fluctuate with river levels) were excluded because Yellow-billed Loons do not use such lakes for nesting (North 1986, Johnson et al. 2003b). Observations of Pacific and Red-throated loons were recorded incidentally. All locations of loons and their nests were recorded on color photomosaics (~1: 1,500 or 1:30,000 scale) and

Table 1. Avian surveys conducted in the Colville Delta study area, Alaska, 2007.

Survey Type Season	Number of Surveys	Survey Dates	Aircraft [a]	Transect Width (km)	Transect Spacing (km)	Aircraft Altitude (m)	Notes
Eider survey							
Pre-nesting	1	13–14 June	C185	0.4	0.4	30–35	100% coverage
Yellow-billed Loon surveys [b,c]							
Nesting	1	25–26 June	206L	–	–	60	All lakes ≥10 ha
Nest Status	6 (1 per week)	3 July–4 August	206L	–	–	60	Lakes with active Yellow-billed Loon Nests
Brood-rearing	1	20–21 August	206L	–	–	60	All lakes ≥10 ha
Tundra Swan surveys							
Nesting	1	19–21 June	C185	1.6	1.6	150	100% coverage
Brood-rearing	1	21–22 August	C206	1.6	1.6	150	100% coverage
Brant and Snow Goose survey							
Brood-rearing	1	30 July	PA-18	–	–	75–150	Coastal and lake-to- lake pattern

[a] C185 = Cessna 185 fixed-wing airplane; C206 = Cessna 206 fixed-wing airplane; PA-18 = Piper PA-18 "Super Cub" fixed-wing airplane; 206L = Bell "Long Ranger" helicopter

[b] Glaucous Gull nests were recorded during surveys for Yellow-billed Loons

[c] Pacific and Red-throated loons and colonies of Sabine's Gulls were recorded incidentally

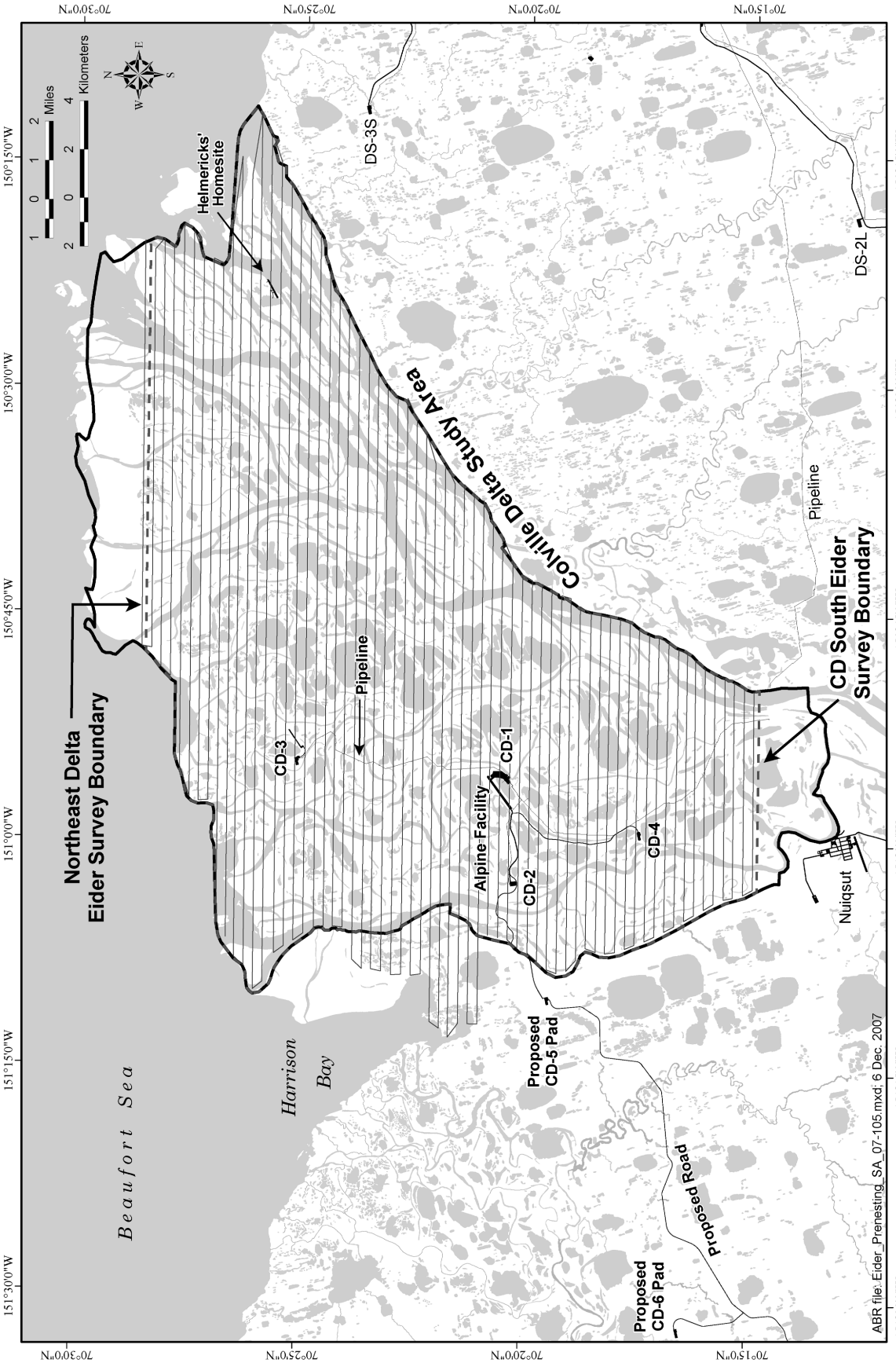

Figure 2. Transect lines and survey areas for aerial surveys of pre-nesting eiders, Colville Delta study area, Alaska, 2007.

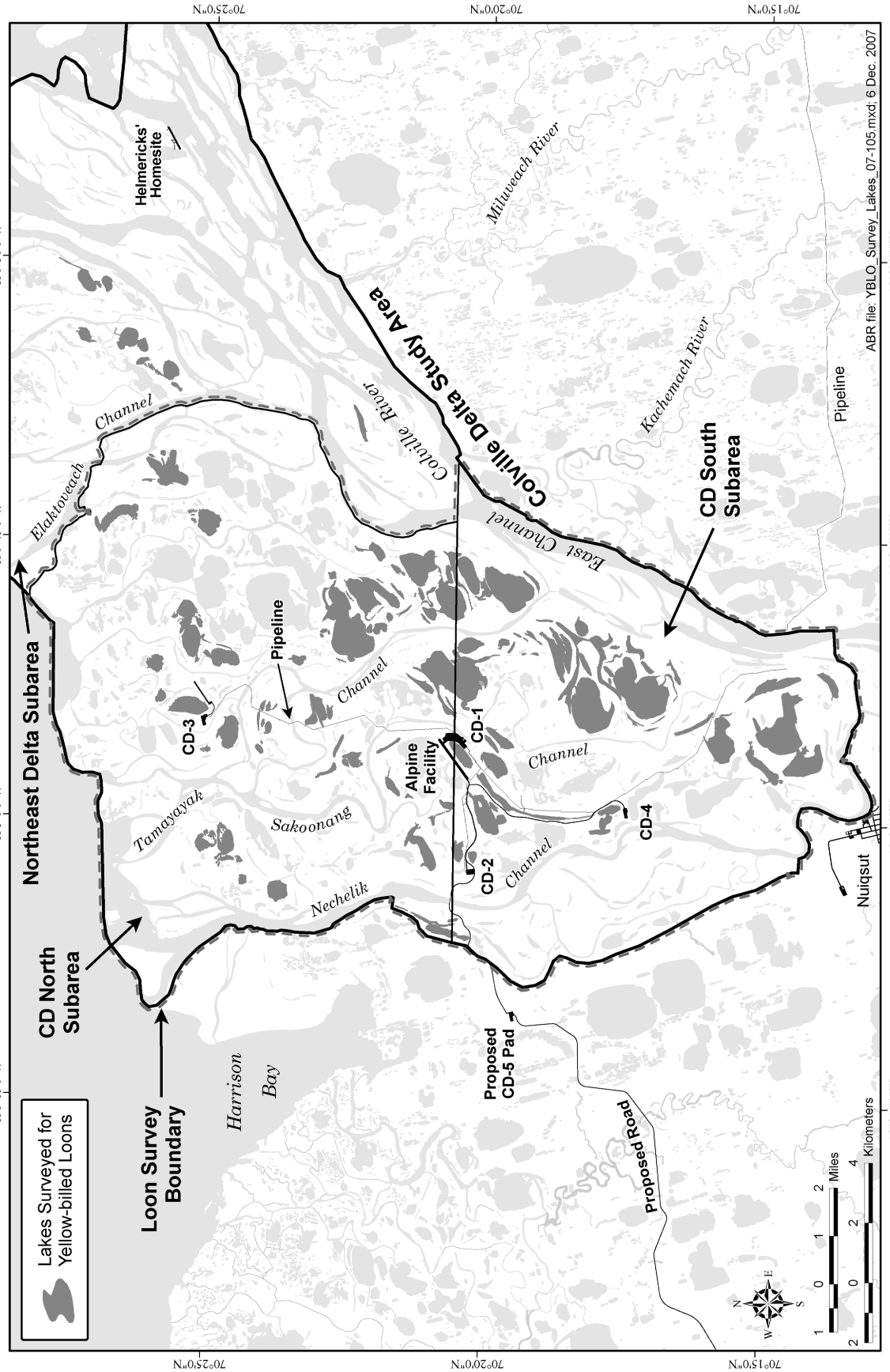

Figure 3. Lakes included in aerial surveys for nesting Yellow-billed Loons, Colville Delta study area, Alaska, 2007.

later digitized into a GIS database. The total numbers of adults, nests, broods, and young counted on aerial surveys were summarized for each species of loon. Densities of adults, nests, and broods were calculated only for Yellow-billed Loons because most smaller lakes that typically are used by Pacific and Red-throated loons were not included in the survey.

Weekly surveys, in addition to the nesting and brood-rearing surveys described above, were conducted to monitor the status of Yellow-billed Loon nests in the Colville Delta study area. Traditional nest lakes without an active nest during the nesting survey were revisited to search for nests for 2 weeks after the nesting survey if loons were present on the lake during the nesting survey and for one week if no loons were present. Each nest was surveyed weekly from a helicopter until the nest was noted as inactive. Active nests had an incubating adult or eggs were present. Inactive nests were either failed or hatched. Nests were assumed failed when adults were not incubating, eggs were not present, and a brood was not seen. Nests were assumed successful if a brood was present. When a nest appeared inactive, the nesting lake was immediately searched for broods by flying along the shoreline and scanning across the lake. Adjacent lakes known from previous surveys to be brood-rearing locations also were surveyed. Inactive nests were visited on the ground to inspect their contents. The nest and the surrounding area within 5 m, including the water around the nest, were examined for the presence of egg fragments and egg membranes. Loons may reuse nests from previous years, so only the current year's layer of loose vegetation on top of the nest was inspected, to avoid recording evidence from previous years. If egg fragments were found, they were counted and, based on the length of their longest side, placed into 7 approximate size categories in 5-mm increments from ≤5 mm to >30 mm. Egg membranes or pieces of membranes also were counted and measured.

TUNDRA SWAN AERIAL SURVEYS

One aerial survey for nesting and 1 aerial survey for brood-rearing Tundra Swans were flown during 19–21 June and 21–22 August 2007, respectively (Table 1). Each aerial survey covered the entire Colville Delta (Figure 4). The surveys were conducted in accordance with USFWS protocols (USFWS 1987b, 1991). East-west transects spaced 1.6 km apart were flown in a Cessna 206 fixed-wing airplane that was navigated with the aid of a GPS receiver. Flight speed was 145 km/h and altitude was 150 m agl. Two observers each searched 800-m-wide transects on opposite sides of the airplane while the pilot navigated and scanned for swans ahead of the airplane, providing 100% coverage of the surveyed area. Locations and counts of swans and their nests were recorded on color photomosaics (1:63,360-scale). Each nest on the Colville Delta was photographed with a 35-mm camera for site verification. Swan locations on survey maps were digitized into a GIS database.

Numbers of swans, nests, and broods were summarized and densities calculated for each subarea. Apparent nesting success was estimated from the ratio of broods to nests counted during aerial surveys only. The accuracy of these estimates can be affected by differential detection, predation, and movements of broods; therefore, the calculated estimates of nesting success should be considered relative indices.

BRANT AND SNOW GOOSE AERIAL SURVEYS

In 2007, 1 aerial survey was flown on 30 July for brood-rearing and molting Brant and Snow Geese in the coastal zone of the Colville Delta study area (Table 1). The survey was flown in a Piper PA-18 "Super Cub" aircraft at 75–150 m agl and approximately 100–120 km/h along the coast and in a lake-to-lake pattern (Figure 5). One pilot and 1 observer searched appropriate habitats (excluding tidal flats and marine water) along the coast, rivers, channels, and lakes. The numbers of adults and young were recorded and their locations were placed on USGS 1:250,000 or 1:63,360-scale maps and saved on a GPS receiver. Geese in small groups (<50) were counted from the airplane, whereas larger groups were counted on photographs taken with a 35-mm camera, 135-mm lens, and 200 ASA slide film. Goose locations on survey maps were digitized into a GIS database.

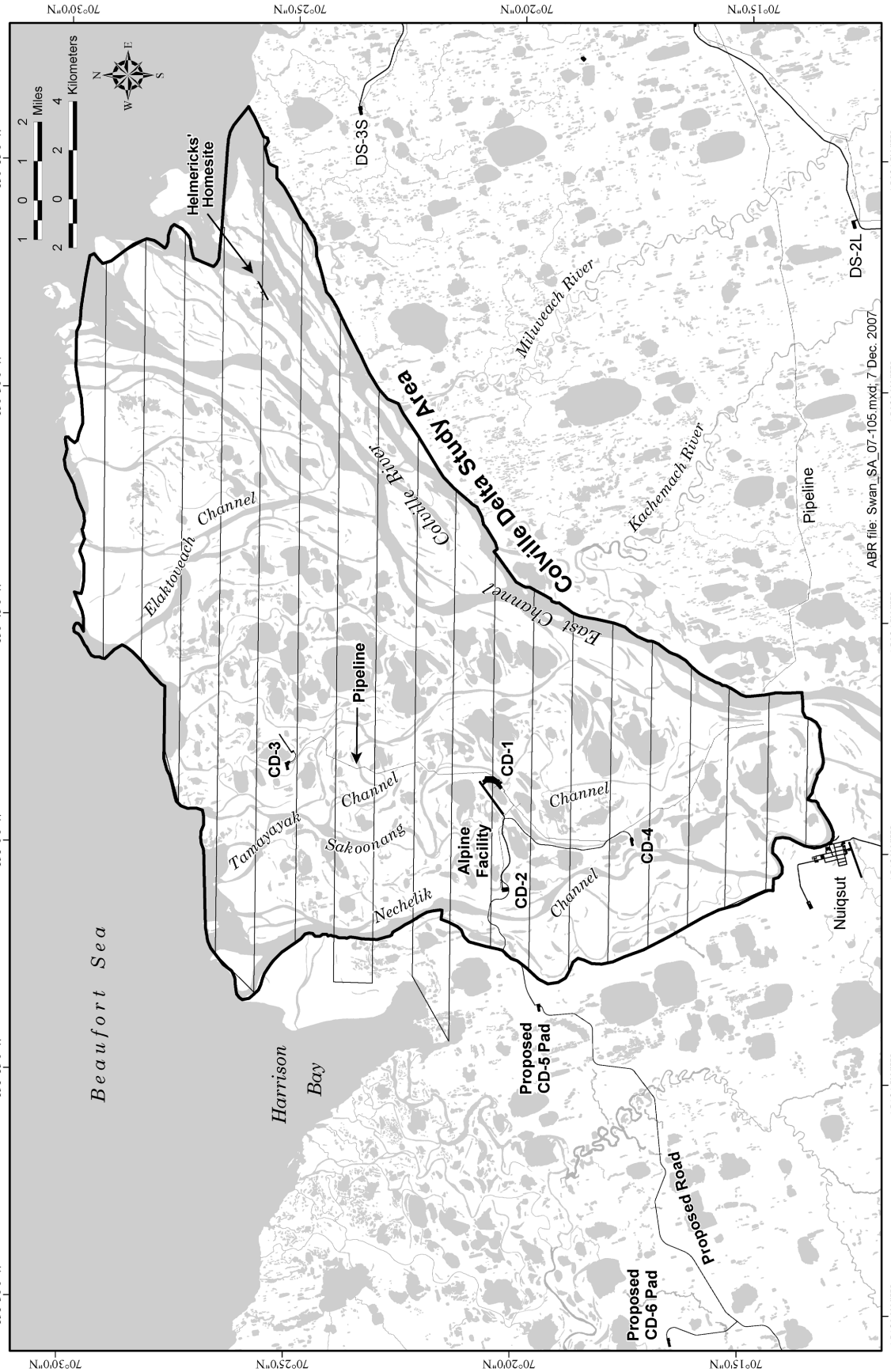

Figure 4. Transect lines and survey areas for aerial surveys of nesting and brood-rearing Tundra Swans, Colville Delta study area, Alaska, 2007.

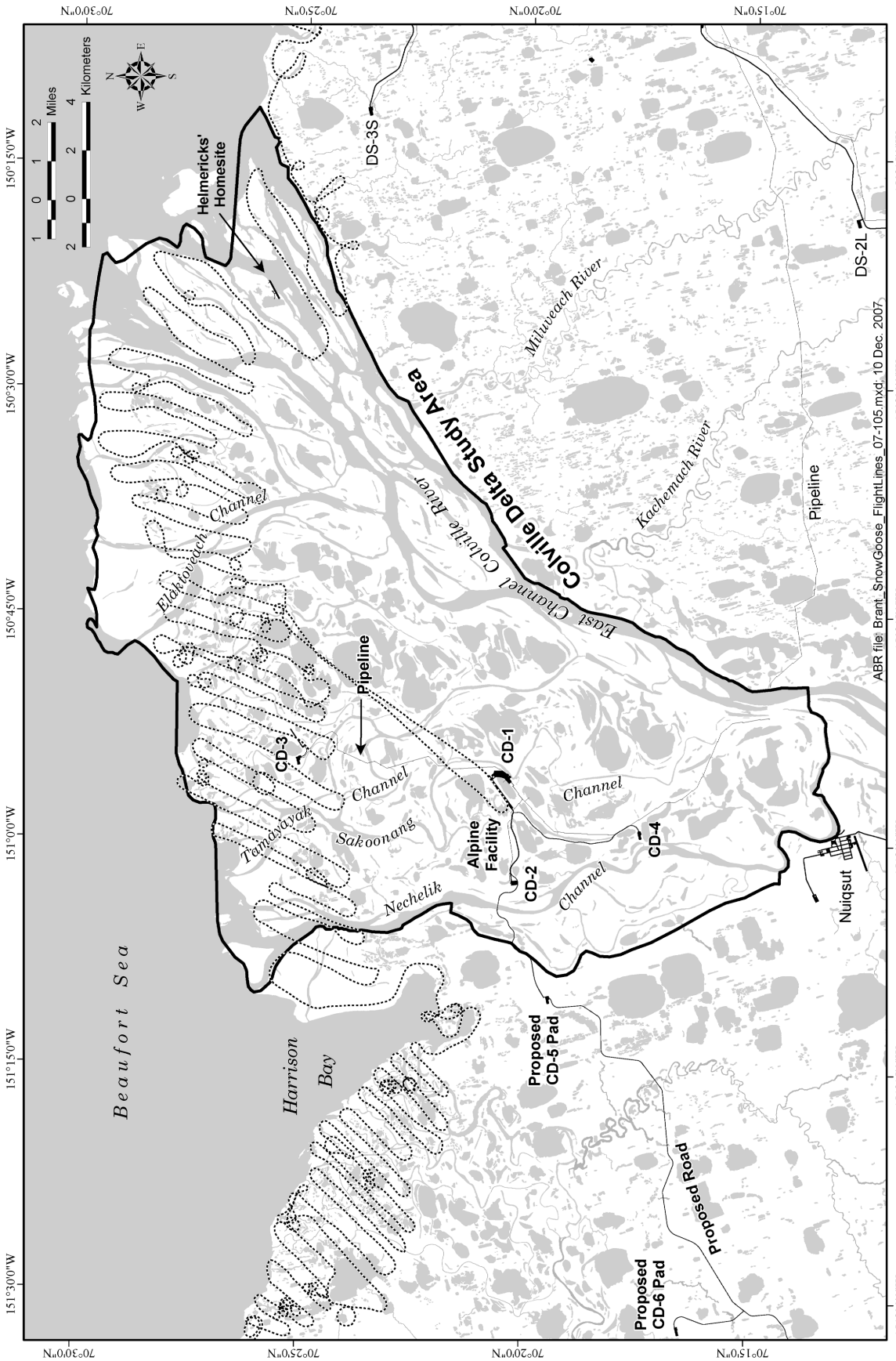

Figure 5. Flight lines for aerial surveys of brood-rearing Brant and Snow Geese, Colville Delta study area, Alaska, 2007.

GULL AERIAL SURVEYS

Glaucous Gulls nests and broods were recorded in the Colville Delta study area during the aerial surveys conducted for Yellow-billed Loons (see Loon Aerial Surveys, above, for methods). Colonies of Sabine's Gulls also were recorded on the same survey. All nest and brood observations were recorded on color photomosaics (1:30,000 scale) and later digitized into a GIS database.

DATA MANAGEMENT

All data collected during surveys for this study and others conducted for CPAI were compiled into a centralized database following CPAI's GPS/GIS Data Management Protocols, North Slope, Alaska, Version 3.4 (CPAI 2007). 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 collected 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 2007, to maintain consistency and make it possible to join multi-year datasets into a single archival database, maintained by CPAI.

RESULTS

CONDITIONS IN THE STUDY AREAS

Birds returning to the Colville Delta encountered slightly cooler than average spring conditions in May 2007. Mean monthly temperatures in the nearby Kuparuk Oilfield in 2007 were almost 3° C cooler for May than the long-term (19-year) mean for that month, whereas the mean temperature in June (4.2° C) was similar to the long-term mean (www.ncdc.noaa.gov/oa/ncdc.html). Temperatures for Colville Village (an island on the outer Colville Delta) in 2007 were >2° C cooler in May and 1° C cooler in June compared to the 11-year period for which data are available there. Breakup (peak stage) on the Colville River in 2007 was on 4 June, 3 days later than average, but within the historic 10-day period for peak water surface elevation. This breakup was considered a 3-year flood event (Jeff Baker, Michael Baker, Jr. Inc., pers. comm.). During the period of waterfowl arrival and peak initiation of nests (15 May–15 June), 46 cumulative thawing degree-days were recorded in the Kuparuk Oilfield, which was the average over 19 years (range = 19–128 thawing degree-days). Zero thawing degree-days were recorded in May (the lowest May except for 2000), but warmer temperatures in early June raised the cumulative thawing degree-days to the long-term average in June. At Colville Village, zero thawing degree-days also were recorded in May, and the total (30 thawing degree-days) recorded for the waterfowl arrival and peak nest initiation period was 5 thawing degree-days less than the 11-year average.

The outer Colville Delta contained about 75% snow cover at the end of May, but by 7 June only 5–10% cover remained. Deep lakes on the Colville Delta retained 95% ice cover on 7 June, ~80% ice cover through 19 June, and still had 25–35% ice cover on 25 June. Midges had a prolonged hatch from 20 to 25 June. A few mosquitos were first noted on the Colville Delta on 18 June, but large numbers did not emerge before early July. Small groups of caribou, presumably seeking refuge from higher concentrations of mosquitos to the south of the Colville Delta, were seen on 20, 21, 24, and 25 June. The first Lapland Longspur chicks were found on 18 June and the first shorebird chicks (Semipalmated Sandpipers) were seen on 28 June. Greater White-fronted Goose nests did not hatch before 2 July. Although these dates may be somewhat later than dates for the same events in other locations on the Arctic Coastal Plain, the outer Colville Delta, where the insect and hatch observations were made, remains cool with ice-choked deep lakes until early to mid-July in most years and conditions are rarely warm enough for mosquitos to emerge before the end of June. From these many indicators, we judge that the breeding season conditions were near average in terms of timing for the Colville Delta.

EIDERS

Of the 2 species of eiders that commonly occur in the Colville Delta and NPRA study areas, the Spectacled Eider has received the most attention because it was listed as "threatened"

under the Endangered Species Act in 1993 (58 FR 27474-27480). The Spectacled Eider nests at low densities across the outer Colville Delta and nests in even lower numbers in inland parts of the delta and in scattered wetland basins in the NPRA study area (Burgess et al. 2003a, 2003b; Johnson et al. 2004, 2005). The King Eider is more widespread and generally more numerous than the Spectacled Eider, although their relative abundance varies geographically. Steller's Eiders (also a threatened species, listed in 1997) and Common Eiders occur occasionally in the Colville Delta and NPRA study areas.

SPECTACLED EIDER

All sightings of Spectacled Eiders in the Colville Delta study area during the pre-nesting survey in 2007 were of groups of 1–4 birds, and all but 3 pairs of Spectacled Eiders were in the CD North subarea (Figure 6, Table 2). We counted 52 Spectacled Eiders, of which 41 were observed on the ground and 11 were in flight (Table 2). The count in 2007 was the highest in the Colville Delta study area since the 1990s and, when combined with the count in 2006, reversed the decline that began in 2000 (Johnson et al. 2005, 2006b, 2007b).

Nest and brood searches for Spectacled Eiders were conducted in 2007 as part of a monitoring study of construction and operation activities in the area of CD-3. Readers should see Johnson et al. (2008) for a report on nesting in that part of the delta.

OTHER EIDERS

In 2007, King Eiders (30 total birds) were approximately half as numerous as Spectacled Eiders (52 total birds) during the pre-nesting period in the Colville Delta study area (Table 2). The total density (counts adjusted for different areas surveyed) was similar to the 14-year mean. Most King Eiders (60%) were seen in the Northeast Delta subarea (Figure 6). The Northeast Delta subarea is highly dissected by distributary channels and in past years has been used by large flocks of King Eiders, probably in transit to other breeding areas (Johnson et al. 2003b).

In 2007, a male Steller's Eider was seen flying on the Colville Delta (Figure 6). Steller's Eiders have been seen infrequently in the vicinity of the Colville Delta. Single males or pairs have been seen in the CD-3 nest search area and the northeast NPRA (Johnson and Stickney 2001) during 2001, and in the Kuparuk Oilfield during 1995, 2000, 2001, and 2007 (not all sightings in the Kuparuk Oilfield were confirmed; see Anderson et al. 2008).

Common Eiders also are seen infrequently on the Colville Delta. One pair of Common Eiders was observed in 2007 in the nearshore marine water just northwest of the study area boundary (Figure 6). Pairs have been recorded during pre-nesting in 1992, 1998, and 2001, and a nest was found near the coastline in 1994 (Johnson 1995).

LOONS

YELLOW-BILLED LOON

Abundance and Distribution

Yellow-billed Loons had one of their most productive years in 2007 since specific surveys were first conducted for them on the Colville Delta in 1993. During the nesting survey in 2007, 61 Yellow-billed Loons were observed in the Colville Delta study area (CD North and CD South subareas combined, Table 3), which was the same number seen in 2006, and the most adults seen during nesting in 13 years of surveys (Burgess et al. 2003a; Johnson et al. 2003b, 2004, 2005, 2006b, 2007b). Twenty-five Yellow-billed Loon nests were found in the Colville Delta study area during the aerial survey in 2007, which was the second highest record (Figure 7, Table 3). An additional 6 nests were found that were not included in the study area total because they were found either in an area or with a method that was inconsistent with past surveys. Two nests and 4 adults were found in the Northeast Delta subarea, an area where survey effort has differed among years, and 4 nests were found during the weekly monitoring surveys in July, which were first flown in 2005. Three of these last 4 nests were found on lakes included in the nesting survey and likely were not active at the time of that survey. The fourth nest was thought to be a second nesting attempt by a pair whose first nest failed (details in Nest Fate, below). As in previous years, Yellow-billed Loon nests in 2007 were concentrated in the central part of the delta (Figure 7), and all nests were on lakes where Yellow-billed Loons have nested previously (Rothe

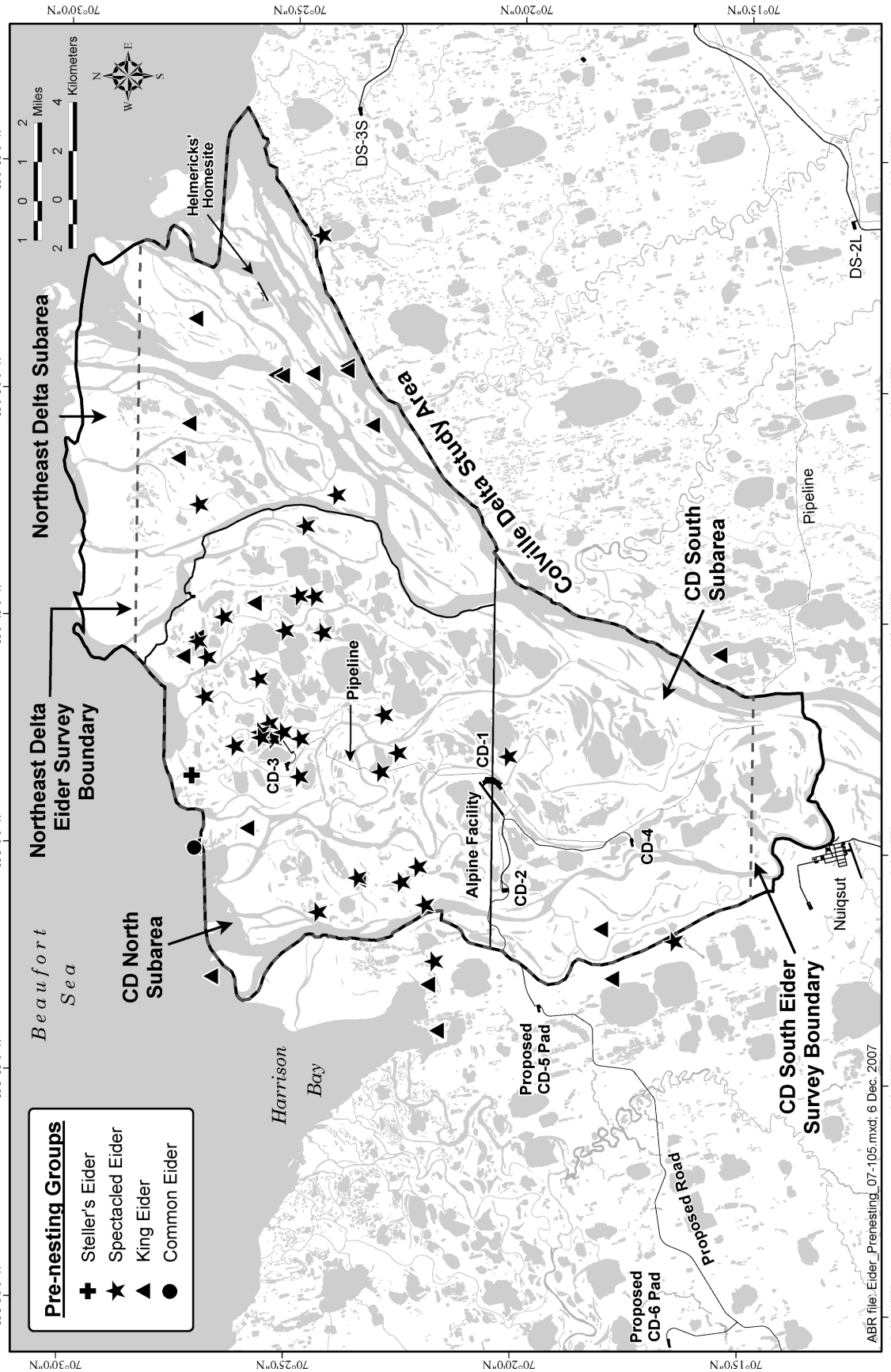

Figure 6. Spectacled, King, Common, and Steller's eider groups during pre-nesting, Colville Delta study area, Alaska, 2007.

Table 2. Number and density of eiders during pre-nesting aerial surveys, Colville Delta study area, Alaska, 2007.

SPECIES Subarea Location	Number of Eiders					Density (birds/km²) [a]	
	Observed				Indicated Total [b]	Observed Total	Indicated Total [b]
	Males	Females	Total	Pairs			
SPECTACLED EIDER							
CD North							
On ground	21	14	35	12	42	0.17	0.20
In flight	6	5	11	5	–	0.05	–
All birds	27	19	46	17	–	0.22	–
Northeast Delta							
On ground	2	2	4	2	4	0.03	0.03
In flight	0	0	0	0	–	0	–
All birds	2	2	4	2	–	0.03	–
CD South							
On ground	1	1	2	1	2	0.01	0.01
In flight	0	0	0	0	–	0	–
All birds	1	1	2	1	–	0.01	–
Total (subareas combined)							
On ground	24	17	41	15	48	0.08	0.10
In flight	6	5	11	5	–	0.02	–
All birds	30	22	52	20	–	0.10	–
KING EIDER							
CD North							
On ground	5	5	10	5	10	0.05	0.05
In flight	0	0	0	0	–	0	–
All birds	5	5	10	5	–	0.05	–
Northeast Delta							
On ground	8	8	16	8	16	0.10	0.10
In flight	1	1	2	1	–	0.01	–
All birds	9	9	18	9	–	0.11	–
CD South							
On ground	1	1	2	1	2	0.01	0.01
In flight	0	0	0	0	–	0	–
All birds	1	1	2	1	–	0.01	–
Total (subareas combined)							
On ground	14	14	28	14	28	0.06	0.06
In flight	1	1	2	1	–	<0.01	–
All birds	15	15	30	15	–	0.06	–

[a] Density based on 100% coverage of subareas: CD North = 206.7 km²; Northeast Delta = 157.6 km², CD South = 137.2 km², all subareas combined = 501.4 km²; numbers were not corrected for sightability

[b] Total indicated birds was calculated according to standard USFWS protocol (USFWS 1987a)

Table 3. Number and density of loons and their nests, broods, and young during aerial surveys, Colville Delta study area, Alaska, 2007.

	Yellow-billed Loons					Pacific Loons [a]			Red-throated Loons [a]		
	Number			Density (number/km²)		Number			Number		
Subarea [b] Survey Type	Adults	Nests/ Broods	Young	Adults	Nests/ Broods	Adults	Nests/ Broods	Young	Adults	Nests/ Broods	Young
CD North											
Nesting	36	15	–	0.17	0.07	44	21	–	4	0	–
Brood-rearing	28	12	14	0.14	0.06	11	3	3	0	0	0
CD South											
Nesting	25	10	–	0.16	0.06	64	26	–	10	0	–
Brood-rearing	25	5	6	0.16	0.03	32	3	4	1	1	2
Northeast Delta [c]											
Nesting	4	2	–	–	–	6	1	–	0	0	–
Brood-rearing	2	0 [e]	0	–	–	1	0	0	0	0	0
Subtotal (CD North and CD South subareas combined) [d]											
Nesting	61	25 [e]	–	0.17	0.07	108	47	–	14	0	–
Brood-rearing	53	17 [e]	20	0.15	0.05	43	6	7	1	1	2

[a] Densities of Pacific and Red-throated loons were not calculated because detectability differed from that of Yellow-billed Loons and surveys did not include smaller lakes (<10 ha) where those species commonly nest
[b] CD North = 206.7 km², CD South = 155.9 km²; see Figure 3
[c] Densities for Northeast Delta were not calculated because entire area was not surveyed
[d] Total number and density includes CD North and CD South (362.6 km² total)
[e] Totals do not include 4 nests or 5 broods found on weekly nest monitoring surveys conducted in July; 2 of these broods were found in the Northeast Delta

et al. 1983; North 1986; Burgess et al. 2003a; Johnson et al. 2003b, 2004, 2005, 2006b, 2007b).

In 2007, we recorded the highest count of Yellow-billed Loon broods (17) in 13 years of brood-rearing aerial surveys in the Colville Delta study area (CD North and CD South subareas combined) (Figure 7, Table 4). An additional 5 broods, including 2 broods found in the Northeast Delta subarea, were observed during the weekly monitoring surveys in July.

Nest Fate

In 2007, we recorded the highest nesting success since we began weekly nest monitoring in 2005. Overall, 22 of 31 nesting pairs of Yellow-billed Loons in the Colville Delta study area in 2007 were observed with young for an apparent nesting success of 71% (Table 4). Hatch began between nest visits on 10 and 17 July and was relatively synchronous. Of the 22 successful nests, 18 (82%) hatched during this week. Three more nests (14%) hatched by 23 July while the remaining nest (4%) hatched by 6 August (Table 4). This last nest to hatch was first found active on 10 July, a relatively late date. Four broods observed during weekly monitoring surveys in 2007 were lost by the time of the brood-rearing aerial survey (20–21 August).

Eight of 31 Yellow-billed Loon nests on the Colville Delta failed to hatch (Table 4). Two nests failed by 3 July, 4 failed by 10 July, and the remaining 2 nests failed by 17 July. One pair of loons was assumed to have renested after a nest failure. The pair's first nest was found on 25 June, but by July 3, the pair was swimming on the nest lake, the nest was empty, and no brood was observed. On 10 July, a loon was seen incubating at a second nest site about 40 m from the first nest site. By 17 July, this second nest failed and one loon was swimming on the lake. Renesting by

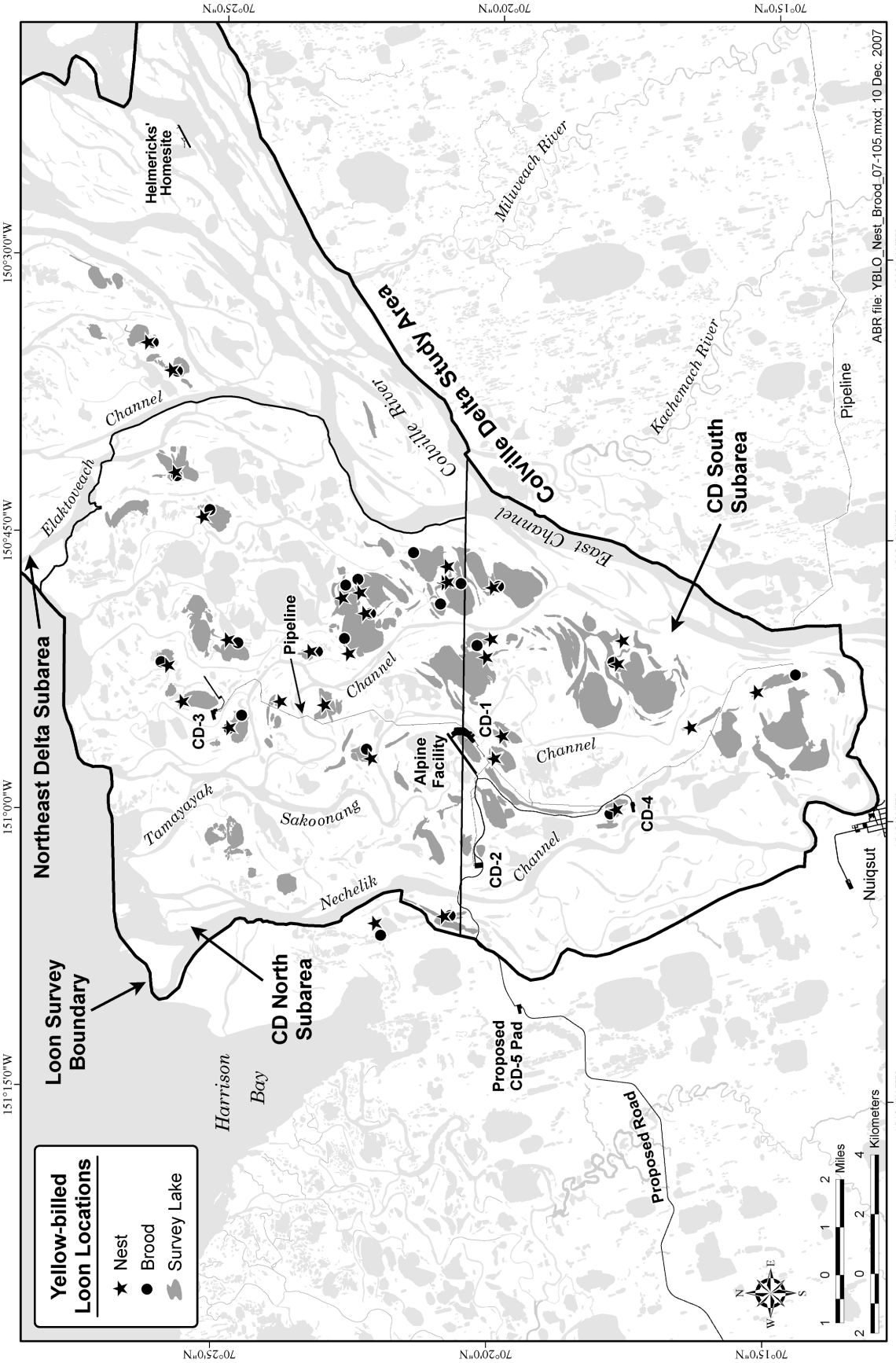

Figure 7. Yellow-billed Loon nests and broods, Colville Delta study area, Alaska, 2007.

Table 4. Weekly status and fate of Yellow-billed Loon nests, Colville Delta study area, Alaska, 2007.

	Visit Date							
Nest No.	25–26 Jun	3 Jul	10 Jul	17 Jul	23 Jul	30 Jul	6 Aug	Fate/Total
3	Active	Active	Active	Inactive				Hatched
11	Active	Active	Active	Inactive				Hatched
23	Active	Active	Active	Inactive				Hatched
31	Active	Active	Active	Inactive				Hatched
34	Active	Active	Active	Inactive				Hatched
44	Active	Active	Active	Active	Inactive			Hatched
46	Active	Active	Inactive					Failed
48	Active	Active	Active	Active	Inactive			Hatched
66	Active	Active	Active	Inactive				Hatched
67	Active	Active	Active	Inactive				Hatched
80	Active	Active	Active	Inactive				Hatched
82	Active	Active	Active	Inactive				Hatched
85	Active	Active	Active	Active	Inactive			Hatched
87	Active	Active	Active	Inactive				Hatched
102	Active	Active	Active	Inactive				Hatched
108	Active	Active	Active	Inactive				Hatched
110	Active	Active	Active	Inactive				Hatched
119	Active	Active	Active	Inactive				Hatched
120	Active	Active	Active	Inactive				Hatched
131	Active	Active	Active	Inactive				Failed
132	Active	Inactive						Failed
155	Active	Active	Active	Inactive				Hatched
157	Active	Inactive						Failed
161	Active	Active	Active	Inactive				Hatched
194	Active	Active	Inactive					Failed
196	Active	Active	Active	Inactive				Hatched
218	Active	Active	Inactive					Failed
615		Active	Active	Active	Active	Active	Inactive	Unknown
616		Active	Inactive					Failed
617			Active	Active	Active	Active	Inactive	Hatched
618[a]			Active	Inactive				Failed
No. Active	27	27	25	5	2	2	0	31
No. Hatched	0	0	0	18	3	0	1	22
No. Failed	0	2	4	2	0	0	0	8
No. Unknown	0	0	0	0	0	0	1	1

[a] Renest of the pair at nest 132

Yellow-billed Loons has been documented only twice (Parmalee et al. 1967, Sjölander and Ågren 1976). Renesting could be a rare occurrence or it might be that few studies have collected the type of detailed information necessary to identify renesting attempts by Yellow-billed Loons.

The contents of 30 of 31 Yellow-billed Loon nests were examined after nests were no longer active. Each of 22 successful nests (those associated with broods) contained small eggshell fragments inside the nest. Of 1,088 eggshell fragments found in successful nests, 73% were 5–10 mm in length. Seventeen of 22 successful nests also contained pieces of thickened egg membrane. Membranes were whole at 4 nests while the remainder had pieces ranging from 5–30 mm in length. The majority of egg membranes and eggshell fragments were found in nest bowls, but a total of 188 fragments were found in the water or on shore adjacent to successful nests. Of the 9 nests where broods were not seen, 8 were presumed failed and one was classified as having an unknown fate because the nest contents resembled a successfully hatched nest. Seven of the 8 failed nests contained no sign of egg membranes or eggshell fragments and the remaining nest contained 8 shell fragments less than 15 mm in length which were sticky with egg albumen. Causes of nest failure were unknown.

PACIFIC AND RED-THROATED LOON

One hundred eight adults and 47 nests of Pacific Loons were counted opportunistically in the Colville Delta study area (CD North and CD South subareas combined) during the Yellow-billed Loon nesting survey in 2007 (Figure 8, Table 3). Fourteen Red-throated Loons were seen during that survey. During the brood-rearing survey in 2007, 43 adult Pacific Loons and 6 broods were observed in the Colville Delta study area (Figure 8, Table 3). One Red-throated Loon brood was seen during that survey. In the CD-3 area, 12 additional Pacific Loon and 9 additional Red-throated Loon nests were found during ground searches conducted as part of another study (ABR, unpubl. data; Johnson et al. 2008). Two Pacific Loon broods and one Red-throated Loon brood were found during ground searches in July. Opportunistic counts of Pacific and Red-throated loons reflect their general distribution on the Colville Delta but are not indicative of the relative abundance of these species (due to differences in species detectability). Nests of Red-throated Loons are not easily detected from the air. Because the survey focused on lakes larger than those typically occupied by Pacific and Red-throated loons for nesting and brood-rearing, densities have not been calculated for these 2 species. Nonetheless, Pacific Loons were clearly the most abundant loon on the delta in 2007 and in previous years.

TUNDRA SWAN

During the 2007 nesting aerial survey, 467 swans, including 86 pairs, were counted in the Colville Delta study area (Figure 9). The count of swans in 2007 was the third-highest in 14 years of aerial surveys. Forty-two swan nests were found in the Colville Delta study area in 2007 (Table 5), the fourth-highest count recorded for the delta. Twenty-one nests were in the CD North subarea, 11 were in the CD South subarea, and 10 were in the Northeast Delta subarea. Not included in the aerial swan survey total (Table 5) were 20 additional swan nests (all swan nests are shown in Figure 9) discovered during helicopter-based loon surveys or during ground-searches conducted for another study in the CD-3 search area (ABR, unpubl. data; Johnson et al. 2008).

The 33 Tundra Swan broods counted across the entire Colville Delta study area was the fourth-highest brood count since aerial Tundra Swan surveys were initiated on the Colville Delta in 1992. Apparent nesting success was 79% (Table 5). The mean brood size of 2.6 young in 2007 was similar to the 14-year mean of 2.5 young; however, the total of 86 young counted on the delta has been exceeded in only 3 years since 1992.

BRANT AND SNOW GOOSE

During the aerial survey in 2007, we counted 980 Brant (446 adults and 534 young) in 6 groups in the Colville Delta study area (Figure 10, Table 6). All Brant groups included broods, and goslings comprised 54% of the total number of birds. Four Brant brood-rearing groups were located in the CD North subarea (791 total birds), and 2 were located in the Northeast Delta subarea (189 total birds). The total count was slightly below the mean recorded along the same survey route in the

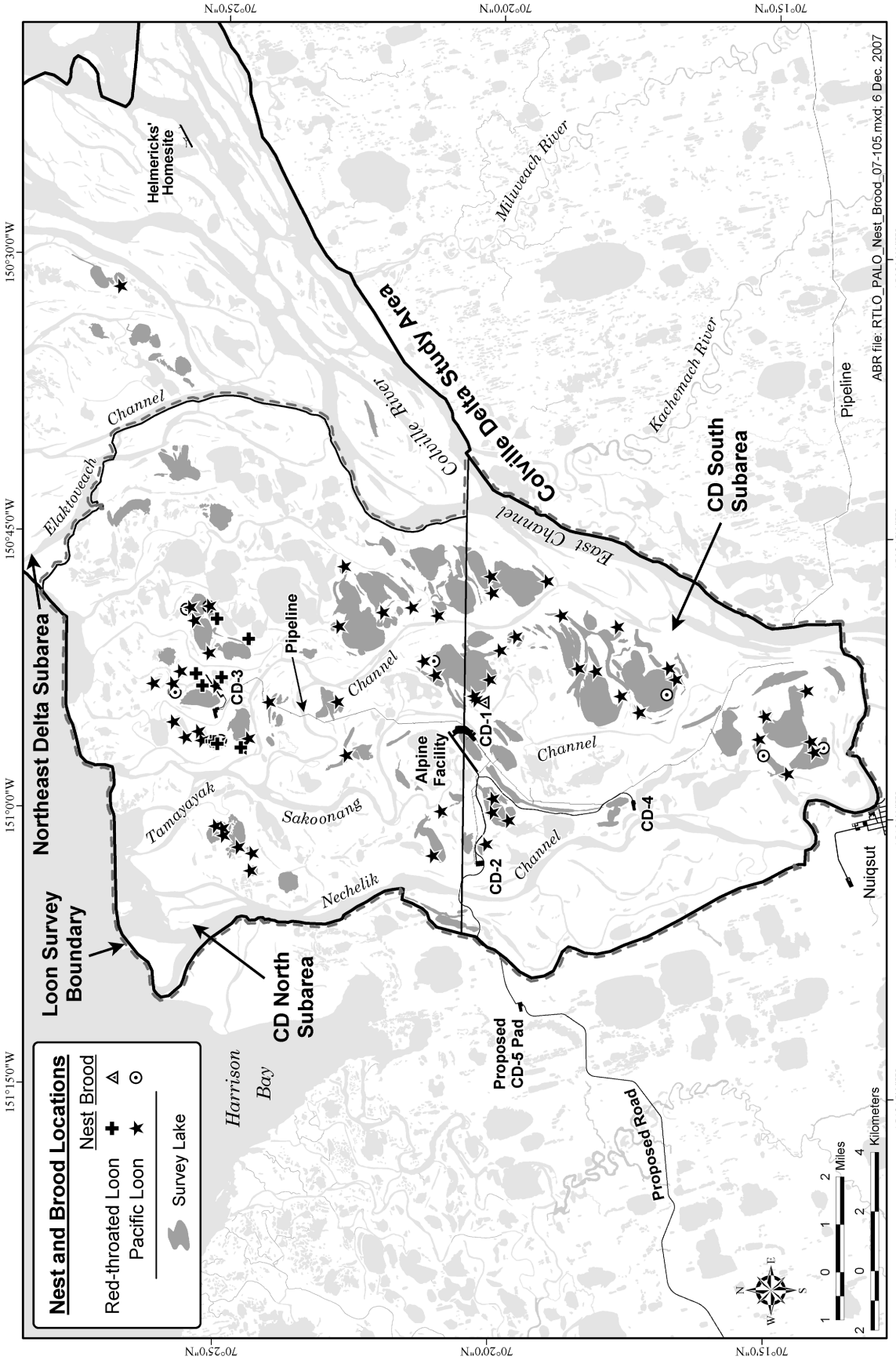

Figure 8. Pacific and Red-throated loon nests and broods, Colville Delta study area, Alaska, 2007.

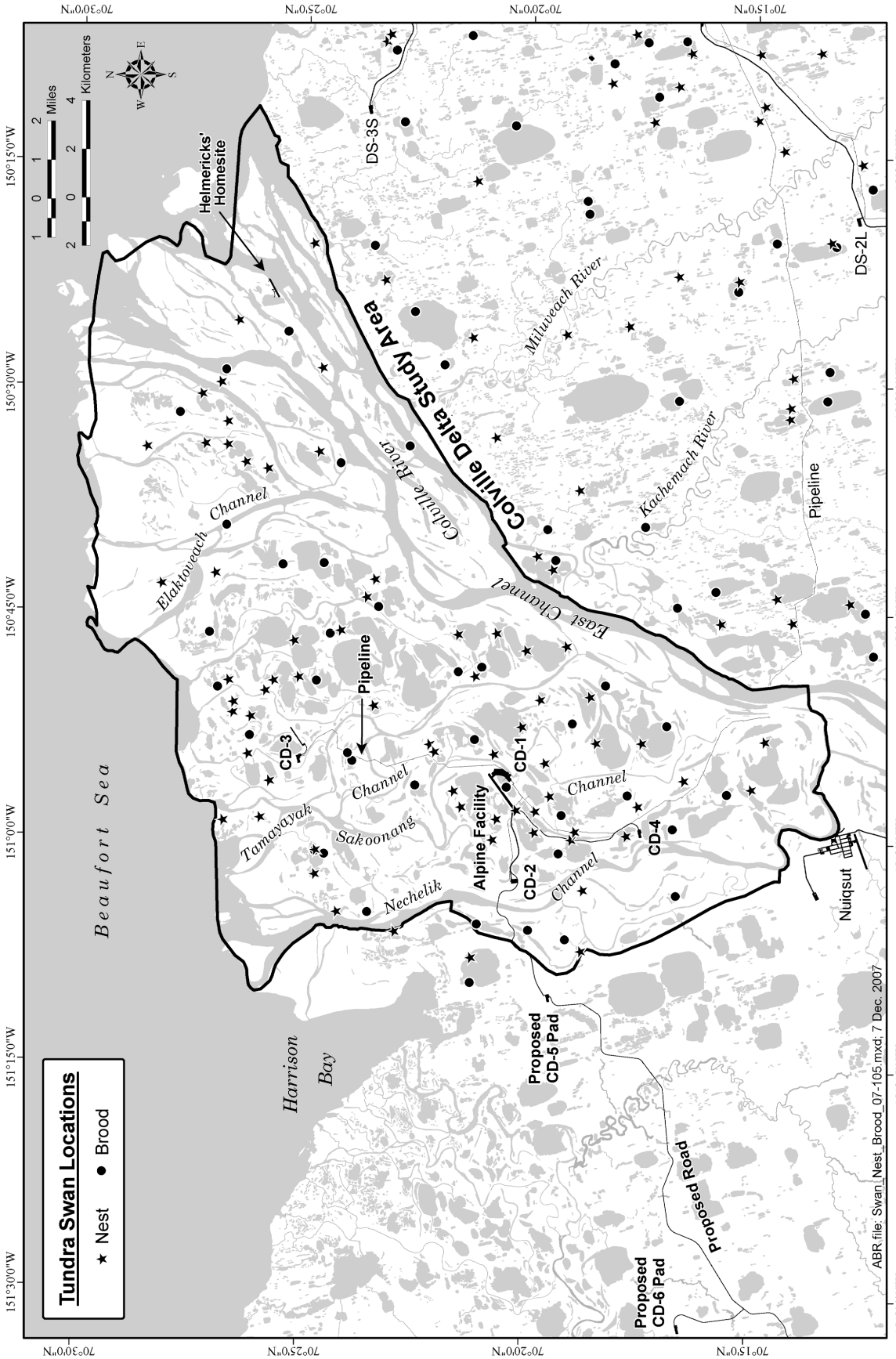

Figure 9. Tundra Swan nests and broods, Colville Delta study area, Alaska, 2007.

Table 5. Number and density of Tundra Swan nests and broods during aerial surveys, Colville Delta, Alaska, 2007.

Subarea	Nests		Apparent Nesting Success [a] (%)	Broods		Mean Brood Size
	Number	Density (nests/km²)		Number	Density (broods/km²)	
CD North[b]	21	0.10	71	15	0.07	2.6
CD South[c]	11	0.07	109	12	0.08	2.8
Northeast Delta[d]	10	0.05	60	6	0.03	2.2
Total (subareas combined)[e]	42	0.08	79	33	0.06	2.6

[a] Apparent nesting success = (broods / nests) × 100
[b] CD North subarea = 206.7 km²
[c] CD South subarea = 155.9 km²
[d] Northeast Delta subarea = 189.6 km²
[e] Colville Delta study area (subareas combined) = 552.2 km²

Table 6. Numbers of Brant and Snow Goose adults and young during brood-rearing aerial surveys, Colville Delta study area, Alaska, 2007.

SPECIES Subarea	Total Birds	Adults	Young	% Young	No. of Groups
BRANT					
CD North	791	369	422	53	4
Northeast Delta	189	77	112	59	2
Total (subareas combined) [a]	980	446	534	54	6
SNOW GEESE					
CD North	770	404	366	48	9
Northeast Delta	384	192	192	50	4
Total (subareas combined) [a]	1,154	596	558	48	13

[a] Only the CD North and Northeast Delta subareas were surveyed

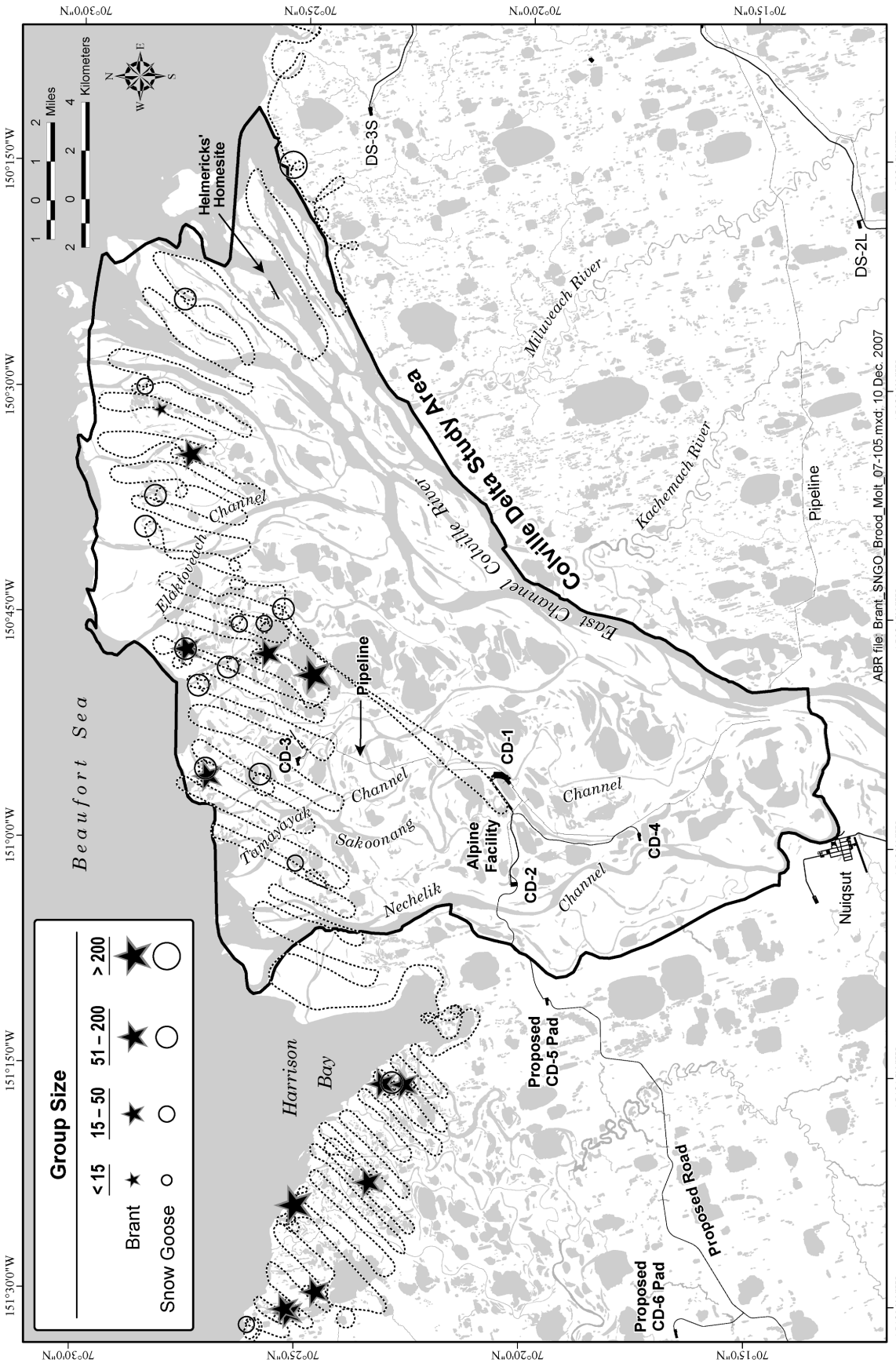

Figure 10. Brant and Snow Goose brood-rearing and molting groups, Colville study area, Alaska, 2007.

Colville Delta study area during 1988, 1990–1993, 1995, and 2005 (range = 45–3,847 Brant; Bayha et al. 1992; Johnson et al. 1999a, 2006b), when the same coastal survey method was used.

In 2007, 1,154 Snow Geese (596 adults and 558 young) in 13 brood-rearing groups were counted in the Colville Delta study area (Figure 10, Table 6). The previous high counts were 997 Snow Geese in 2006 and 972 in 2005 (Johnson et al. 1999a, 2006b, 2007b). All Snow Goose groups contained broods, and goslings comprised 48% of the total number of birds. Nine groups were located in the CD North subarea (770 total birds), and 4 were located in the Northeast Delta subarea (384 total birds).

GLAUCOUS AND SABINE'S GULL

Forty-one Glaucous Gull nests were counted in the Colville Delta study area (CD North and CD South subareas combined) during the aerial survey for nesting loons in 2007 (Figure 11, Table 7). Counts have ranged from 18 to 46 nests during 9 years of surveys (Burgess et al. 2003a, Johnson et al. 2004, 2005, 2006b, 2007b). Five of 19 nests in the CD North subarea in 2006 were located together in a colony, where 1–2 nests were observed in 2001–2003 and 4–7 nests were recorded in 2004–2006 (Johnson et al. 2005, 2006b, 2007b). Thirteen of 23 nests in the CD South subarea in 2007 were in a colony located ~5 km southeast of the Alpine Facility (Figure 11), where counts have ranged from 10 to 18 nests since that site was first surveyed in 1998 (Johnson et al. 2005, 2006b, 2007b). Because Glaucous Gulls were counted on aerial surveys designed to survey other species, some nests probably were missed in each year.

Glaucous Gull adults with young were recorded incidentally in 2007 during the aerial survey for brood-rearing loons. Thirty-six adults and 48 young in a minimum of 23 broods were recorded in the Colville Delta study area, of which 15 adults and 18 young (10 broods) were in the CD North subarea and 21 adults and 30 young (13 broods) were in the CD South subarea (Figure 11). Ten young were counted at the colony site in the CD North subarea and 22 young were recorded at the colony site in the CD South subarea. Three additional Glaucous Gull broods were found during ground searches in the CD-3 area during July.

No Sabine's Gull colonies were observed on the Colville Delta study area during the aerial survey for nesting loons. However, 2 Sabine's Gull nests were found during the CD-3 ground searches (Figure 11).

Table 7. Number and density of Glaucous Gull nests, Colville Delta study area, Alaska, 2007.

Subarea	Number of Nests [a]	Nest Density (nests/km²)
CD North[b]	19	0.09
CD South[c]	22	0.14
Northeast Delta[d]	2	–
Total (subareas combined)	41	0.12

[a] Data for Colville Delta study area was collected during aerial surveys for nesting Yellow-billed Loons
[b] CD North subarea = 206.7 km²; see Figure 3
[c] CD South subarea = 155.9 km²; see Figure 3
[d] Densities for Northeast Delta were not calculated because entire area was not surveyed

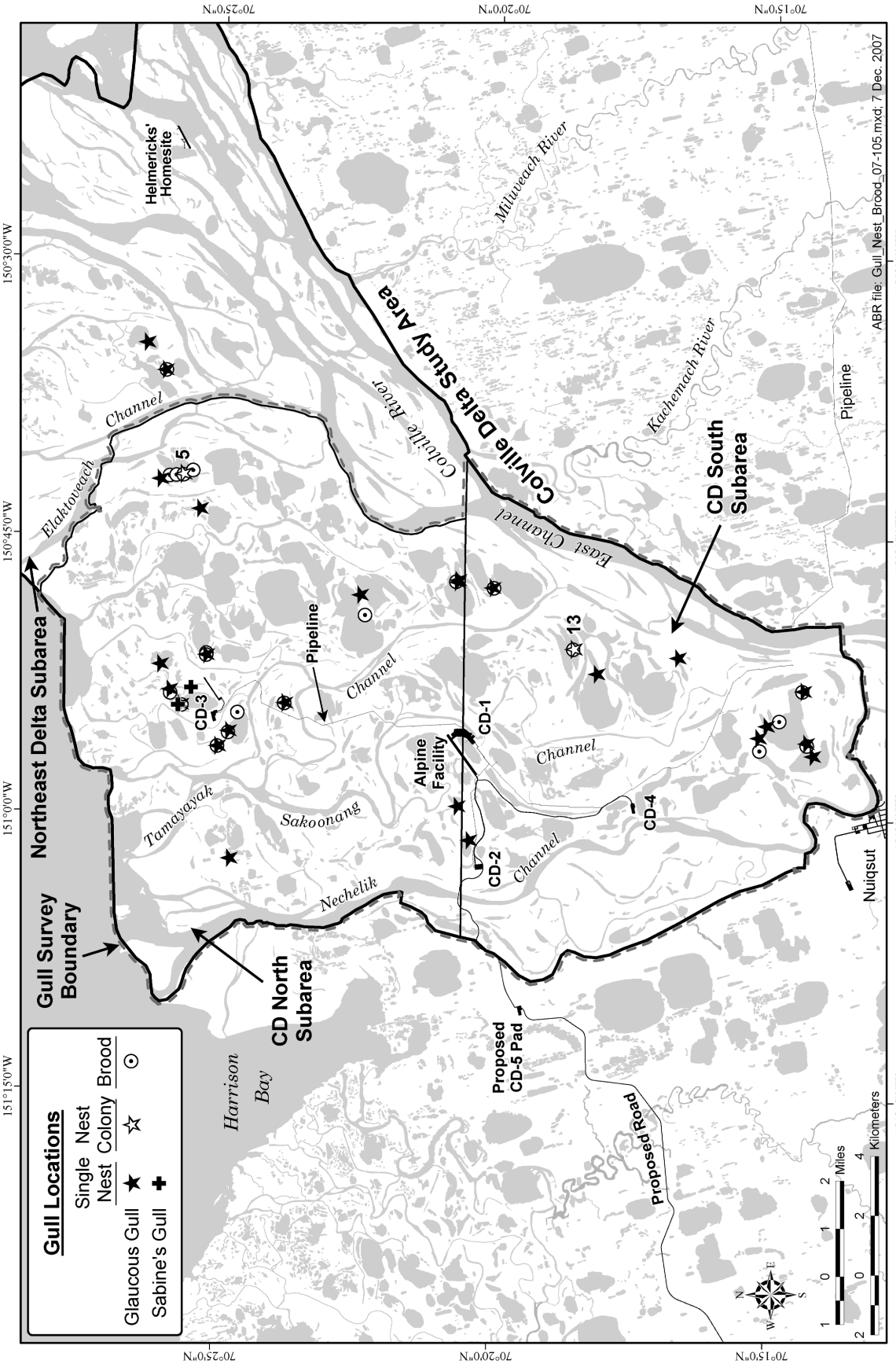

Figure 11. Glaucous and Sabine's gull nests and broods, Colville Delta study area, Alaska, 2007. Numbers of nests are listed for colony locations.

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Appendix A. Common, Iñupiaq, and scientific names of birds and mammals referenced in this report.

COMMON NAME	IÑUPIAQ NAME	SCIENTIFIC NAME
BIRDS		
Greater White-fronted Goose	Niġliviq	*Anser albifrons*
Snow Goose	Kaŋuq	*Chen caerulescens*
Brant	Niġliŋġaq	*Branta bernicla*
Tundra Swan	Qugruk	*Cygnus columbianus*
Steller's Eider	Igniqauqtuq	*Polysticta stelleri*
Spectacled Eider	Qavaasuk	*Somateria fischeri*
King Eider	Qiŋalik	*Somateria spectabilis*
Common Eider	Amauligruaq	*Somateria mollissima*
Red-throated Loon	Qaqsrauq	*Gavia stellata*
Pacific Loon	Malġi	*Gavia pacifica*
Yellow-billed Loon	Tuullik	*Gavia adamsii*
Pectoral Sandpiper	Puviaqtuuq	*Calidris melanotos*
Semipalmated Sandpiper	Livalivaq	*Calidris pusilla*
Glaucous Gull	Nauyavasrugruk	*Larus hyperboreus*
Sabine's Gull	Iqirgagiak	*Xema sabini*
Lapland Longspur	Kupaɬuk, Putukiuɬuk	*Calcarius lapponicus*
MAMMALS		
Brown (Grizzly) Bear	Akɬaq	*Ursus arctos*
Polar Bear	Nanuq	*Ursus maritimus*
Caribou	Tuttu	*Rangifer tarandus*