EIDER NEST SEARCHES AT CD3, SPILL-RESPONSE SITES, AND THE CD3 AND CD5 ICE ROADS, IN THE ALPINE OILFIELD, 2014

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FINAL REPORT

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November 2014

Printed on recycled paper.

EXECUTIVE SUMMARY

Spectacled Eiders (*Somateria fischeri*) and Steller's Eiders (*Polysticta stelleri*) occur on the Colville River delta (Colville Delta) and are listed as threatened species under the Endangered Species Act (ESA). ConocoPhillips Alaska, Inc., (CPAI) operates the Alpine Satellite Development Project (Alpine Oilfield), an oil and gas development on the Colville Delta, in areas of potential breeding habitat for these 2 species of eiders. The Spectacled Eider is the focus of this report because they commonly nest in the northern parts of the Colville Delta, whereas the Steller's Eider is extremely rare along the central Beaufort Sea coast. No record exists of a Steller's Eider nest or brood from the Colville Delta or adjacent areas. To comply with the ESA and to avoid disturbance of Spectacled Eiders during the nesting season, CPAI documents the location of Spectacled Eider nests in areas slated for off-pad activities (e.g., tundra clean-up, surveying, spill prevention). When active nests are identified, CPAI delays scheduled work activities near the nest locations until after the nesting season.

This is the sixth year CPAI has contracted ABR, Inc., to conduct nest searches for eiders in areas where off-pad work was scheduled during the eider nesting season. From 2009 to 2014, our search areas have included the CD3 pad and airstrip, the ice road from CD2 to CD3, 3 bridge crossing sites, and from 4 to 19 Alaska Clean Seas (ACS) spill-response equipment sites. In 2014, only 7 of these spill-response sites required nest searches and a new ice-road route to CD5 was added to the list of nest search areas.

Nineteen ACS sites were evaluated for suitable eider nesting habitat during the 2009–2014 nesting seasons, but 10 of these have been excluded from nest searches because eider nesting habitat was insufficient in quantity of quality at individual sites. No maintenance activity was planned at 2 of the 9 ACS sites in 2014, leaving 7 that required nest searches. Search areas were delineated as 200 m buffers around identified work sites. The search area for the ice roads was a 200 m buffer on each side of the ice-road centerline and around adjacent ice pads.

A record number of eider nests were found in 2014. Ten Spectacled Eider, 6 King Eider, and 1 unidentified eider nests were discovered within nest search areas, and 1 Spectacled Eider nest was discovered outside a spill-response site search area. Nine of the 11 Spectacled Eider nests were active at the time of our June nest search. In 3 of these active Spectacled Eider nests, we installed temperature-sensing eggs to monitor incubation.

Six Spectacled Eider nests and 1 unidentified eider nest were found in the CD3 pad and airstrip search areas. Four Spectacled Eider nests and 2 King Eider nests were found within 200 m of the CD3 ice road. Four King Eider nests were located within 200 m of the CD5 ice road. No eider nests were located within the 7 spill-response sites searched in 2014: Site 1, Site 2, Site 3, Site 4, Site 8, SK-15 and SK-13. However, we did find a Spectacled Eider nest 9 m outside the 200 m buffer around Site 1. We found no Steller's Eiders or their nests in any of the areas searched in 2014.

ABR provided CPAI environmental compliance staff with the coordinates of 9 active Spectacled Eider nests. CPAI staff then instructed the helicopter pilots and off-pad workers of the areas to avoid. Data from the 3 temperature-sensing eggs indicated 1 nest failed 16 days after installation. One of the nests failed on the same day as the installation of the temperature-sensing egg. The third nest hatched 17 days after installation. We measured high incubation constancies (98.1% and 98.8%) at the 2 nests that were monitored. Four of the 11 Spectacled Eider nests hatched young, producing an apparent nesting success of 36% for all Spectacled Eider nests located in 2014.

Since 2009, we have reviewed nesting records and made assessments of nesting habitat available at 19 ACS sites and 3 pipeline-bridge sites. Based on this review and assessment, we have determined there is adequate habitat for Spectacled Eiders to nest within 200 m of the CD3 pad and airstrip, the CD3 and CD5 ice roads, 9 ACS spill-response sites, and 3 pipeline bridge sites.

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This project was funded by ConocoPhillips Alaska, Inc., and was administered by Caryn Rea, Senior Staff Biologist for ConocoPhillips Alaska, Inc. We appreciate the review and comments on this report made by Robyn McGhee and ABR's Bob Burgess.

In the field, the ABR staff that contributed to this project included: Kristen Bartecchi-Rozell, Liz Miner, Leslie Rodman-Jaramillo, John Rose, Jill Seymour, James Smith, and Joe Welch. In the office, Will Lentz, Dorte Dissing, and Pam Odom provided assistance with data analysis, figure production, and report production, and Tony LaCortiglia provided logistical support. We thank all the ConocoPhillips Alaska staff and contractors at the Alpine Oilfield for providing a safe and welcoming work environment: field coordinators, Shellie Colegrove and Jodi Smith; environmental coordinators, Rebecca Aungst and Nathan Visser; helicopter coordinators, Erik Burney and Mary Lacey; and our pilots, Ben Neal, Dave McKnight, and Mike Brandau.

INTRODUCTION

The Alpine Oilfield is within the current or historic ranges of 2 species of eider ducks that are listed as threatened under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.): the Spectacled Eider (*Somateria fischeri*) and Steller's Eider (*Polysticta stelleri*). The Alpine Oilfield is located on the Colville River delta (henceforth, Colville Delta), with a satellite drill site (CD5) in the northeastern National Petroleum Reserve-Alaska (NE NPR-A), and a pipeline connecting to the Trans Alaska Pipeline through the Greater Kuparuk Area (GKA) (Figure 1). Spectacled Eiders are common breeders on the Colville Delta and occur at relatively high densities on the outer portions of the delta. In contrast, Steller's Eiders in Alaska breed primarily near Barrow, and although their historic range included all of the Arctic Coastal Plain of Alaska, they are extremely rare along the central Beaufort Sea coast (Quakenbush et al. 2002).

Evidence of nesting by Steller's Eiders east of Barrow has been reported only 3 times in the last 25 years: a single brood was seen inland along the Colville River in 1987 (T. Swem, USFWS, unpubl. data), 1 brood was seen near Prudhoe Bay in 1993 (M. M. Johnson, pers. comm.), and another brood was seen near the upper Chipp River, approximately 80 km inland from the Dease Inlet/Admiralty Bay area in 1997 (King and Dau 1997). In the last 19 years, Steller's Eiders have been sighted only 3 times on the Colville Delta (1995, 2001, and 2007) (J. Bart, Boise State University, pers. comm.; Johnson et al. 2002, 2008a). Three other sightings were recorded within ~20 km of CD5 during U.S. Fish and Wildlife Service (USFWS) North Slope Eider Surveys in 1997, 1998, and 1999 (Unpubl. data from USFWS, Migratory Bird Management). No record exists of a Steller's Eider nest or brood from the Colville Delta or adjacent areas.

During the breeding season, the distribution of Spectacled Eiders varies across the Colville Delta and adjacent areas (Johnson et al. 2014). Spectacled Eider nests are relatively common on the outer Colville Delta where ConocoPhillips Alaska, Inc., (CPAI) operates the roadless CD3 drill site. Spectacled Eider nests are uncommon on the southern portion of the Colville Delta where CPAI is constructing an access road to the CD5 drill site in NPR-A (Figure 1). Section 9 of the ESA prohibits harming, harassing, and disrupting normal activities of threatened and endangered species, without special exemption. However, under section 7(b)(4) and 7(o)(2) of the ESA, Incidental Take Statements can be issued to allow actions that are prohibited under Section 9 if they comply with specific terms and conditions. In the Biological Opinions issued prior to construction of CD3 and CD5 (both part of the Alpine Satellites Development Project [ASDP]), the USFWS stipulated terms and conditions in the Incidental Take Statement for the project that restrict human activity to existing gravel fill within 200 m of occupied Spectacled Eider nests during 1 June–1 August (USFWS 2004, USFWS 2011). Where minimal summer support or construction activities must occur off existing gravel fill during the restricted period, USFWS-approved nest surveys for Spectacled Eiders must be conducted each year during the nesting period prior to those activities so that active nests can be identified and avoided (USFWS 2004). CPAI conducts off-pad activities (e.g., tundra clean-up after the ice-road season, pipeline inspections, spill-response equipment deployment, and civil surveys) on the tundra in portions of the nesting habitat of the Spectacled Eider annually during the breeding season (June and July). These off-pad activities have the potential to disturb nesting Spectacled Eiders, because the cryptic female eiders are difficult to detect and avoid from a distance and female eiders are difficult to identify to species. Without prior knowledge of nest locations, workers could unintentionally flush birds from their nests, leaving the nest exposed to predators. In particular, helicopter landings and clean-up crews picking up debris from the tundra near gravel pads and along ice-road routes could inadvertently disturb nesting Spectacled Eiders. Similarly, seasonal mobilization at spill-response sites and pipeline-bridge inspections may affect eiders nesting near work sites.

CPAI has a regulatory obligation in its Oil Discharge Prevention and Contingency Plan for ASDP to deploy spill-prevention equipment as soon as ice leaves the river channels, which typically overlaps with the eider nesting season. In a meeting on 2 May 2011, USFWS, CPAI, and

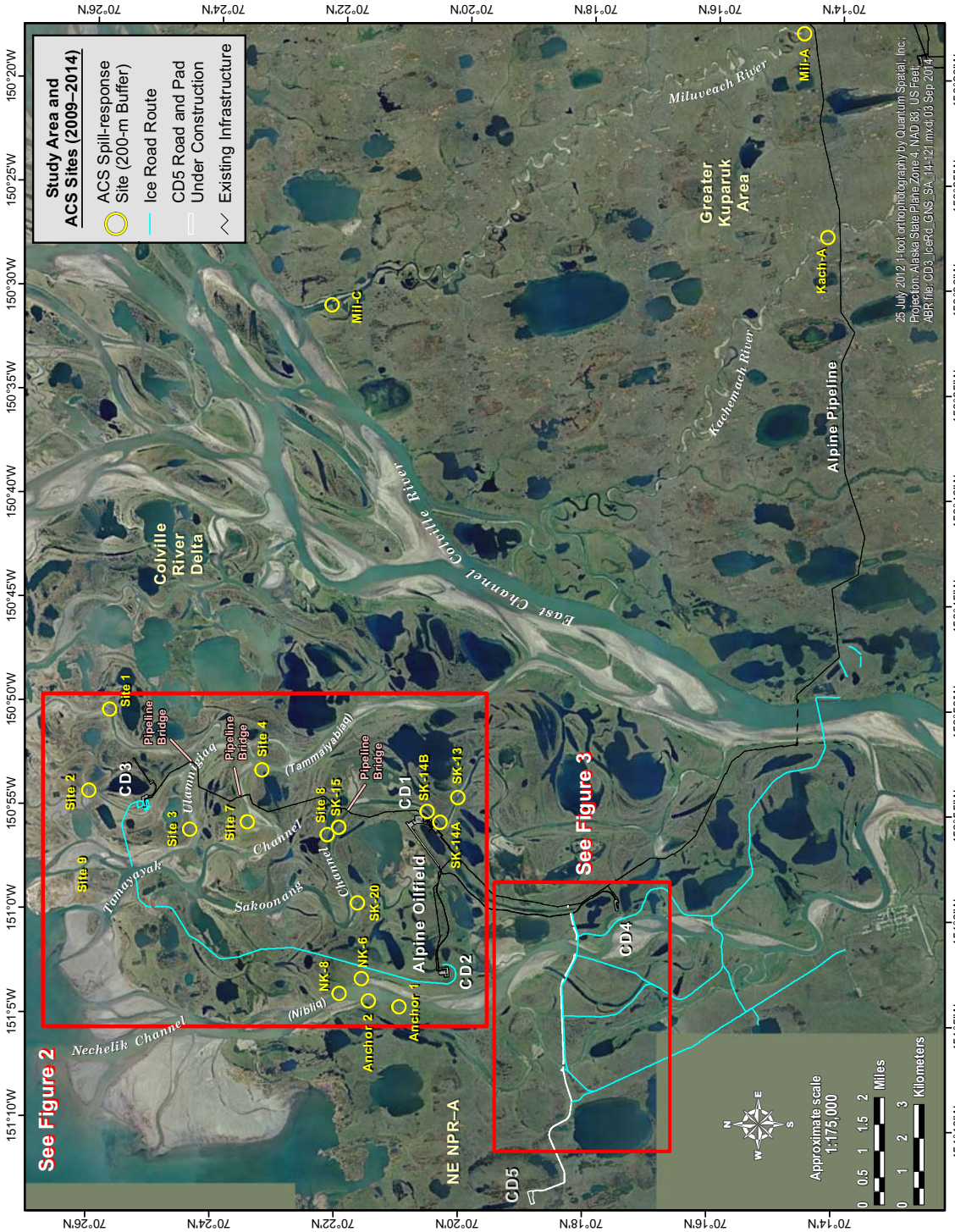

Figure 1. Study area for eider nest searches conducted prior to tundra clean-up and spill-response activities in NE NPR-A, the Colville Delta, and Greater Kuparuk Area, Alaska, 2009–2014.

ABR reviewed the data available on nest initiation dates for Spectacled Eiders on the Colville Delta and identified 9 June as the earliest known record of nest initiation for Spectacled Eiders on the Colville Delta (ABR, unpubl. data). As a result of this meeting, USFWS agreed to alter the date when off-pad activity would begin requiring nest searches from 1 June to 9 June. Any off-pad work from 9 June to 1 August would require nest searches if it occurred in areas where Spectacled Eider nesting was likely.

To comply with the Incidental Take Statement issued in the Biological Opinions for ASDP and CD5 (USFWS 2004, 2011) and to reduce inadvertent disturbance to breeding Spectacled Eiders, CPAI Operations requires documentation of the presence or absence of Spectacled Eider nests prior to initiating off-pad activities and then modifies those activities to avoid disturbance if nests are found. Consequently, CPAI contracted ABR, Inc., to conduct nest searches for eiders on the Colville Delta and adjacent areas where off-pad activities were scheduled during the 2014 breeding season. In this report, we document eider nest locations within search areas around the CD3 pad and airstrip, the CD3 ice road (from CD2 to CD3), CD5 ice road (from CD4 to CD5), and 7 Alaska Clean Seas (ACS) spill-response equipment sites in the NE NPR-A, Colville Delta, and GKA (Figure 1).

During 2014, we conducted our first nest search of the CD5 ice-road route. The CD5 ice road was built during the winter construction season of 2013–2014 to support the construction of the CD5 drill site and the gravel road linking the drill site to the processing facilities at CD1 by way of the CD4 access road (Figure 1). Four other north–south ice roads intersected the CD5 ice road, but these intersecting ice roads were south of the primary nesting area for Spectacled Eiders. Therefore, only the CD5 ice road, which crossed the Colville Delta to the eastern edge of NPR-A (Figure 1) overlapped potential eider nesting habitat and required eider nest searches before tundra clean-up activities commenced.

This is the sixth year that eider nest searches have been conducted in advance of off-pad work within Alpine Oilfields. Included in this report is a summary of nesting habitat and results of prior nest searches for 19 spill-response equipment sites and 3 pipeline-bridge sites visited during 2009–2014 (Seiser and Johnson 2010, 2011a, 2011b, 2012, 2014).

OBJECTIVES

The primary objective of nest searching in 2014 was to identify the locations of nesting Spectacled and Steller's eiders prior to off-pad activities in eider nesting habitat. Documentation of nest locations allowed CPAI to modify planned activities occurring near nests, either by delaying activities until after the nesting season or by maintaining a 200 m zone of no activity around nests. On the completion of nest searches, ABR transmitted a list of active eider nest locations to CPAI field environmental compliance staff, who then informed helicopter pilots and off-pad workers of areas to avoid.

METHODS

We conducted intensive ground-based nest searches for eiders on the Colville Delta and nearby areas where tundra clean-up, mobilization and maintenance of spill-response equipment, or other tundra-based activities were proposed to occur during the breeding season (Figure 1). Search areas included a 200 m buffer around work sites within potential eider nesting habitat. The 200 m buffer around work sites is based on terms and conditions in the Incidental Take Statement issued in the Biological Opinion for the Alpine Satellite Development Project (USFWS 2004). While regulatory guidelines have not been issued on the extent of area around human activity that should be monitored for nesting activity, or conversely, the area around nests in which human activity should be avoided, we have applied the 200 m buffer as a zone outside of which human activity is not likely to cause severe disturbance. Data on flushing distances for nesting Spectacled Eiders over the last 20 years of nest searching suggest that this species rarely flushes from a nest when people are greater than 25 m away (ABR, unpublished data).

Crews of 4–8 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. Crews were transported by helicopter to search sites, except for a few sites near Alpine that were reached by

vehicle or by walking. All eider nest locations were recorded with handheld GPS units and on aerial photo maps. Each nest was recorded as active if occupied, or inactive if empty. Inactive eider nests were identified to species based on the color pattern of contour feathers collected from the nest (Anderson and Cooper 1994). We tried to avoid disturbing incubating Spectacled Eiders, but when a female Spectacled Eider was flushed inadvertently, we floated the eggs to estimate hatch dates. A float schedule for estimating incubation age from float angles was provided by USFWS (T. Bowman, unpublished data). We placed artificial temperature-sensing eggs in a sample of those Spectacled Eider nests where the hen was flushed inadvertently. Temperature data recorded with these sensors hidden in hollow duck eggs allowed us to determine nest fate (success or failure), the timing of hatch or nest failure, and incubation constancy. Calculation of incubation constancy followed that of Johnson et al (2008b) with the number of days or minutes of monitoring calculated after excluding the day of set-up, hatch, or failure. After hatch, we returned to retrieve the instrumented eggs and record the fate (hatch or failure) of nests based on physical evidence at the nest site. Research activities were permitted under USFWS Federal Fish and Wildlife Permit TE012155-2, and Alaska Department of Fish and Game Scientific Permit 14-130.

The CD3 pad, airstrip, and CD3 ice road areas are scheduled annually for summer tundra clean-up. At CD3, we searched the area within 200 m of the drill pad, airstrip, and connecting road (Figure 2). For the ice road, we searched the entire length from CD3 to CD2 within 200 m of each side of the road centerline. At 4 ice pads associated with the ice road (Figure 2) we searched the pad sites and 200 m buffers around each pad perimeter.

The CD5 ice road constructed during winter 2013–2014 was also scheduled for tundra clean-up activities during the summer of 2014 (Figure 3). We searched the most commonly used eider nesting habitats (see list below) within 200 m of each side of the ice road centerline. We also searched all shorelines bordering aquatic habitats within 200 m of the ice road centerline, regardless of habitat type. Moist habitats such as tussock tundra and shrub tundra, and barrens have low potential as nesting habitat for Spectacled Eiders (Johnson et al. 2008a) and were not searched unless bordering aquatic areas. The habitat map used for the CD5 ice road extends from the Colville Delta into NE NPR-A (Johnson et al. 1997, Jorgenson et al. 1997, Jorgenson et al.2003, Jorgenson et al. 2004).

In 2014, we searched 7 spill-response equipment sites (Figure 2), where maintenance and inspection activities were planned during the nesting season. At sites where spill-response storage containers were already in place, we searched within a 200 m radius of the container, otherwise we searched a 200 m radius around the coordinates provided by ACS. Eider nest searches were conducted only in the subset of ACS sites that contain suitable nesting habitat that were identified by CPAI staff as areas scheduled for site visits between 9 June and 1 August. We had previously evaluated habitat quality for nesting Spectacled Eiders at 19 spill-response sites and 3 pipeline-bridge sites during our nest searches in 2009–2013 (Seiser and Johnson 2014). We inventoried habitat within 200 m of each site by visual inspection and by overlapping wildlife habitat maps of the Colville Delta and the Alpine Transportation Corridor (Johnson et al. 1997, Jorgenson et al. 1997) on each site. For sites outside the mapped areas, we visually assessed habitat quality during the nest search. We considered habitats that were preferred or frequently used by nesting and pre-nesting Spectacled Eiders (Johnson et al. 2008a, 2008b, 2014) to have the highest potential for nesting: 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, and Patterned Wet Meadow.

Of the 22 total sites, including 3 pipeline-bridge crossings, 10 were considered to have insufficient nesting habitat to merit nest searching for eiders (Table 1). Spill-response sites south of Alpine on the Colville Delta were deleted from the list of sites to search because previous studies had shown Spectacled Eiders rarely occurred there (Johnson et al. 2004b). In a meeting on 2 May 2011, the USFWS, CPAI, and ABR agreed to conduct nest searches at a reduced list of spill-response sites based on assessments of nesting habitat (letter from Caryn Rea to Sarah Conn, dated June 2011). As a result of this

Figure 2. Eider nest locations at CD3, the CD3 ice-road route, and spill-response equipment sites on the Colville Delta, Alaska, June 2014.

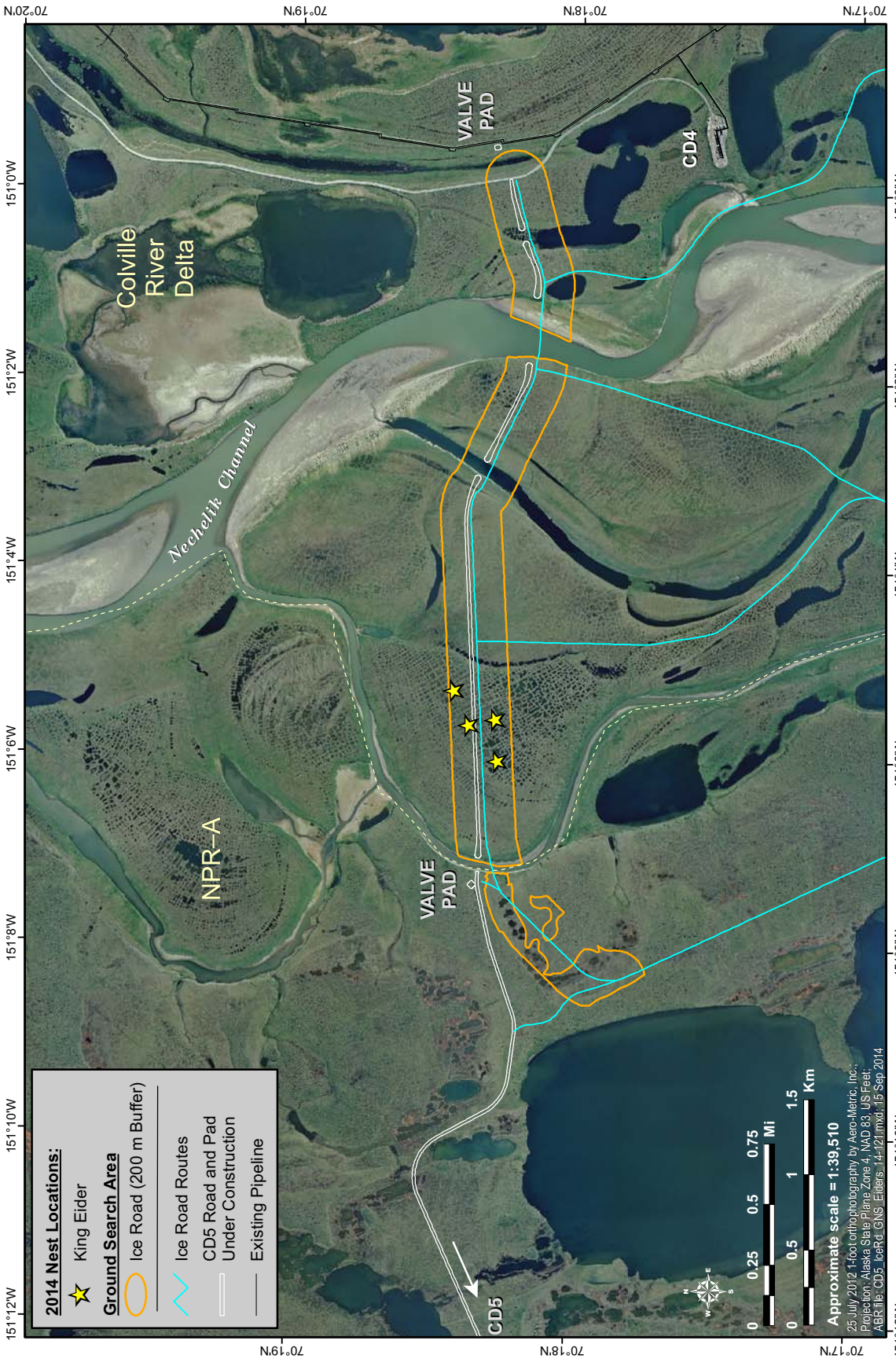

Figure 3. Eider nest locations along the CD5 ice-road route on the Colville Delta and NE NPR-A, Alaska, June 2014.

Table 1. Site descriptions and eider habitat assessments for 19 spill-response equipment sites and 3 pipeline bridge sites, Colville Delta and Greater Kuparuk Area, Alaska, 2009–2014.

Site Name	Location	Site Description	Wildlife Habitat[a]	Habitat Description	Nesting Habitat Present[b]	Search History/ Nesting Records	Years Searched	Search in Future Years?	Comments
Anchor 1	N 70.35003 W 151.07447	Western bank of the Nechelik Channel	NWM, MSSM, PWM	Shrubs, low-relief low-center polygons	Yes	No/No	2009–2011	No	Marginal nesting habitat because of prevalence of shrubs. Few ponds.
Anchor 2	N 70.35828 W 150.07022	Western bank of the Nechelik Channel	PWM, DOWIP	Shrubs, low-relief low-center polygons	Yes	No/No	2009–2011	Yes	Marginal nesting habitat because of prevalence of shrubs. Large and small ponds are suitable habitat.
Kach-A	N 70.23750 W 150.45838	Kachemach River, just north of the pipeline	MSSM MTTU NWM TLDS	Small pocket of wet meadow surrounded by drier habitat	No	No/No	2011	No	Poor habitat because NWM is <10% of the total area, and the surrounding area is occupied by shrubs.
Mil-A	N 70.24403 W 150.29674	Miluveach River, just north of the pipeline	PWM MSSM TLDS	Diverse site, west side well drained, east side is MSSM grading to PWM	Yes	No/No	2011	No	Conexes are located on a well-drained bluff. Search area on the opposite bank, near boom anchor point, contained marginal nesting habitat.
Mil-C	N 70.37038 W 150.51505	Shoreline and islands ~800 m upstream of Miluveach River mouth	NWM, BAR, SKT	NWM on river banks, BAR and SKT on islands	Yes	No/No	2010	No	No habitat mapping available for this site. Field appraisal in 2010 concluded only marginal nesting habitat existed on banks and islands.
NK-6	N 70.36017 W 151.05275	Eastern bank of the Nechelik Channel	TLDS, MSSM	Low willow shrubs and non-patterned grass/sedge	No	No/No	2009	No	No nesting habitat at this site for eiders or most other species of waterfowl.

Table 1. Continued.

Site Name	Location	Site Description	Wildlife Habitat[a]	Habitat Description	Nesting Habitat Present[b]	Search History/ Nesting Records	Years Searched	Search in Future Years?	Comments
NK-8	N 70.36606 W 151.06483	NW bank of the Nechelik Channel	PWM, MSSM	Low willow shrubs with some polygons, river bank with polygon troughs	Yes	No/No	2009–2011	No	Marginal nesting habitat because of prevalence of shrubs; contains some polygonal areas.
Site 1	N 70.42874 W 150.85064	Container on western bank, site includes both sides of the Tamayayak	NWM, PWM, BAR, SOW	Vegetated areas on west side are predominately NWM and PWM; opposite bank is mostly barren.	Yes	Yes[c]/Yes	2009–2011 2013–2014	Yes	Eider nesting habitat consists of polygon ponds 100 m inland from the container; nesting habitat is easily delineated from the rest of the site by distinct rise in elevation above the current river bank and container location. One Spectacled Eider nest present in 2013 and 2014.
Site 2	N 70.43417 W 150.90533	Container on western bank, site includes both sides of the of the West Ulamniġiaq	MSSM, PWM, NWM, BAR, SM, SKT	Half of site is vegetated. MSSM is on the west bank and on the east bank SM with NWM grades into PWM	Yes	Yes[c]/No	2009–2011 2014	No	Marginal nesting habitat; site borders better nesting habitat; driftwood lines indicate flooding is common at this site; in future, search only east side.
Site 3	N 70.40692 W 150.93553	Container on northern bank of Ulamniġiaq; site spans the channel and mud flats on south bank	NWM, PWM, BAR	North bank is 50% NWM and 50% PWM	Yes	Yes[c]/Yes	2009–2014	Yes	Eider nesting habitat on the north side; a Spectacled Eider nested 160 m from the spill response conex in 2011 and 207 m from the conex in 2009. Two female Spectacled Eiders observed flying in 2012.

Table 1. Continued.

Site Name	Location	Site Description	Wildlife Habitat[a]	Habitat Description	Nesting Habitat Present[b]	Search History/ Nesting Records	Years Searched	Search in Future Years?	Comments
Site 4	N 70.38775 W 150.88718	Container on western bank of the Tamayayak	PWM, MSSM, DOWIP, BAR	~30% dry, low-relief PWM; ~10% high-relief PWM; ~10% DOWIP; ~50% channel and mud bars	Yes	No/No	2009–2014	Yes	Suitable habitat in low-relief areas and along lake. Marginal nesting habitat in the high relief area.
Site 7	N 70.39152 W 150.92881	Container on NW bank of Tamayayak; site includes mud bar in the of middle channel	NWM, TLDS, BAR	Well-drained NWM and low shrubs along the river channel	No	No/No	2009 2011	No	No suitable nesting habitat; area dry and shrubby; no lakes within 200 m. Location has been updated to the 2011 location of conex.
Site 8	N 70.37003 W 150.93819	Predominately on the northern bank of the Sakoonang Channel; site barely spans the channel	PWM, TLDS, BAR	~20% low-relief PWM, ~30% high-relief PWM, and ~50% shrub habitats (MSSM & TLDS) on north bank, TLDS and BAR on south bank	Yes	No/No	2009–2011 2013–2014	Yes	Nesting habitat limited to PWM bordering the large deep lake NE of Site 8. Two female Spectacled Eiders observed flying over the site in 2010.
Site 9	N 70.43531 W 150.99748	Container on eastern side of Tamayayak	SM, SKT, BAR	Salt-affected vegetation and abundant drift wood on east bank, river channel and BAR	Yes	No/No	2009–2011	Yes	Suitable nesting habitat with sparse vegetation; better habitat ~250 m east of the container in low-center polygon area; area probably used extensively by molting/brood-rearing geese in late July and early–mid August.

Table 1. Continued.

Site Name	Location	Site Description	Wildlife Habitat[a]	Habitat Description	Nesting Habitat Present[b]	Search History/ Nesting Records	Years Searched	Search in Future Years?	Comments
SK-13	N 70.33506 W 150.90711	Both banks of Sakoonang just south of Alpine	PWM, NWM, TLDS, BAR	Low-relief PWM with narrow bands of TLDS, BAR, and NWM	Yes	Yes[d] /No	1998–2000 2009 2011–2014	Yes	Potential eider nesting habitat in areas of PWM. In 2011, a Spectacled Eider pair was sighted 550 m north of SK-13 and, in 2014, a female Spectacled Eider was observed flying by the site.
SK-14A	N 70.33975 W 50.92675	Site is adjacent to the Alpine flare pit; on the Sakoonang	PWM, NWM, TLDS, BAR	Gravel pad, high-relief polygons, and shrubs are on the NW bank. The east bank contains TLDS, NWM, and PWM.	Yes	Yes[d] / No	1996–2001 2009	No	Marginal nesting habitat because of shrubs and habitat modification. The NW bank habitat is modified by gravel pad and flare and SE bank is relatively dry. Previous searches have not found eider nests.
SK-14B	N 70.34325 W 150.91836	Site is NW of the Alpine boat ramp	PWM, NWM, TLDS, BAR	PWM, gravel pad and NWM on NE bank, TLDS and PWM on SW bank	Yes	Yes[d]/No	1996–2001 2009 2010	No	Eider nesting habitat adjacent to the Alpine gravel pad and to a lesser degree on the east side of the channel. Snow banks on the pad edge may delay availability. Previous searches have not found eider nests.
SK-15	N 70.36514 W 150.91869	~2.5 km north of Alpine and next to a pipeline bridge on the Sakoonang	PWM, NWM, MSSM, TLDS, BAR	TLDS, NWM, and BAR on NW bank, MSSM with aquatic centers on SE bank	Yes	No/No	1998 1999 2009–2014	Yes	Nesting habitat on both sides of the channel in areas of PWM and NWM.
SK-20	N 70.361156 W 150.99228	Near the intersection of channels on the Sakoonang	PWM, NWM, TLDS, BAR	10% PWM, 50% low relief MSSM, 40% riverine habitats	Yes	No/No	2009 2013	Yes	Nesting habitat on both sides of the channel in areas of PWM, but not in the willows on the island.

Table 1. Continued.

Site Name	Location	Site Description	Wildlife Habitat[a]	Habitat Description	Nesting Habitat Present[b]	Search History/ Nesting Records	Years Searched	Search in Future Years?	Comments
Sakoonang Pipeline Bridge	N 70.36444 W 150.91888	First Colville River channel-crossing north of Alpine, adjacent to SK-15	PWM, NWM, TLDS, BAR	PWM on NE bank, SW bank is shrubs with low-centered polygons in PWM	Yes	Yes[d]/No	1998 1999 2010	Yes	Potential nesting habitat in polygons in the southwest end of the site. Marginal nesting habitat on the NE side because of prevalence of shrubs.
Tamayayak Pipeline Bridge	N 70.39277 W 150.90805	Second Colville River channel-crossing north of Alpine	PWM, NWM, TLDS BAR	PWM and NWM on north bank, south bank is barrens, shrub, and NWM	Yes	No/No	2010	Yes	Willows along channel margins, suitable nesting habitat away from channels.
Ulamniġiaq Pipeline Bridge	N 70.39277 W 150.90805	Third Colville River channel-crossing north of Alpine	PWM, NWM, BAR	PWM and NWM on north bank, south bank is NWM	Yes	Yes[c]	2000–2007 2010	Yes	The majority of this site contains suitable nesting habitat.

[a] Wildlife Habitats = Salt Marsh (SM), Salt-killed Tundra (SKT), Deep Open Water without Islands (DOW), Deep Open Water with Islands or Polygonized Margins (DOWIP), Shallow Open Water without Islands (SOW), Nonpatterned Wet Meadow (NWM), Patterned Wet Meadow (PWM), Moist Sedge–Shrub Meadow (MSSM), Moist Tussock Tundra (MTTU), Tall, Low, Dwarf Shrub (TLDS), and Barrens (BAR)

[b] Areas containing SM, SKT, DOWIP, DOW, SOW, NWM, PWM, or DPC (Deep Polygon Complex)

[c] CD3 nest searches conducted during 2000–2007; Spectacled Eider and unidentified eider nests were found at these sites during some years (Johnson et al. 2008b)

[d] Alpine nest searches conducted in 1995–2001 (Johnson et al. 2003)

meeting, 4 sites (NK-6, Site 7, SK-14A, and SK-14B) were dropped from the list of sites requiring nest searches because they lacked sufficient nesting habitat or because their location was south of Alpine. The same justification was used to drop another 6 sites (Anchor 1, Kach-A, Mil-A, Mil-C, NK-8, and Site 2) from the list after the nest search in 2011 (letter from Caryn Rea to Sarah Conn, dated 14 March 2012). Thus, 9 ACS sites (searched annually) and 3 pipeline-bridge crossings (searched every 3 years) remain on the list for nest searches when maintenance activities are planned during the eider breeding season. In 2014, only 7 of these ACS sites were scheduled for spill-response activities after 9 June and consequently required nest searches.

RESULTS

CD3 PAD AREA

We searched 103.8 ha within 200 m of the CD3 pad, airstrip, and access road to the airstrip on 20, 21, and 27 June (Figure 2, Table 2). We found 6 Spectacled Eider nests (4 active and 2 inactive nests) and 1 unidentified eider nest belonging to either a Spectacled Eider or King Eider (*Somateria spectabilis*). Six is the highest number of Spectacled Eider nests we have found in 6 years of nest searching the perimeter of the CD3 pad and airstrip; typically we find 1–4 Spectacled Eider nests in this area. Spectacled Eider nests in 2014 were located 10 to 140 m from gravel pads and roads. We placed temperature-sensing eggs in 2 of the Spectacled Eider nests (see Nest Attendance below for details). When we returned for post-hatch visits on 18 July and 23 July, we found evidence of hatch at 1 of the 6 Spectacled Eider nests.

No Steller's Eider adults or nests were sighted in the CD3 or ice road search areas in 2014. While searching for eider nests, we found 40 nests of other large waterbirds in the CD3 search area (Table 2).

CD3 ICE ROAD

During 21–26 June, we searched the area within 200 m of each side of the centerline of the CD3 ice road (13.8 km in length) and around 4 ice pads adjacent to the ice road (Figure 2). We found 4 active Spectacled Eider nests and 2 active King Eider nests within the 619 ha search area (Figure 2, Table 2). We placed a temperature-sensing egg in 1 Spectacled Eider nest and collected data on incubation attendance (see Nest Attendance below for details). On 17 July, we found 3 of the 4 Spectacled Eider nests and 1 King Eider nest had hatched. In addition to the eider nests, we recorded 171 nests of other large waterbirds within the ice-road search area (Table 2).

SPILL-RESPONSE SITES

No Spectacled Eider nests were found within 200 m of 7 spill-response sites that we searched on 19–20 June. However, we did discover 1 Spectacled Eider nest just 9 m outside the 12.5 ha search area for Site 1 (Figure 2). On our post-hatch visit to the nest, we determined the nest had failed. We have searched Site 1 in 5 of the last 6 years, and only in 2013 did we find a Spectacled Eider nest within 200 m of Site 1. During our nest searches of the 7 spill-response sites, we also found 27 nests of other large waterbirds (Table 2).

CD5 ICE ROAD

During 27–29 June, we searched eider nesting habitat within 200 m of each side of the centerline of the CD5 ice road (5.6 km in length). No Spectacled Eider adults or nests were found in the CD5 ice-road search area (213 ha) in 2014 (Figure 3). We did find 4 King Eider nests (3 active and 1 inactive) and 40 nests of other waterbird species (Table 2). Pre-nesting aerial surveys and past nest searches indicate low use of the area by breeding Spectacled Eiders in comparison with the CD3 area (Burgess et al 2002; Johnson et al 2004a, 2004b, 2014; Seiser and Johnson 2011c). In 2009, a nest search along the proposed CD5 gravel road also found no Spectacled Eider nests in the present CD5 ice-road search area (Seiser and Johnson 2011c).

Nest Attendance

We installed temperature-sensing eggs in 3 Spectacled Eider nests. According to the temperature patterns recorded at these nests, only 2 of the 3 females resumed incubation after the egg was installed. One nest was located 10 m from the CD3 airstrip access road and the clutch was estimated to be 4 days old. This female returned 41 minutes after she flushed from the nest and she

Table 2. Numbers of nests of Spectacled Eiders and other large waterbirds found in search areas at CD3, the CD3 ice road, CD5 ice road, and 7 spill-response equipment sites, Colville Delta and NE NPR-A, Alaska, 19–29 June 2014.

	Eider Species			Other Waterbirds															
Search Area	Spectacled Eider	King Eider	Unidentified Eider	Greater White-fronted Goose	Snow Goose	Brant	Cackling/Canada Goose [a]	Tundra Swan	Northern Pintail	Green-winged Teal	Long-tailed Duck	Willow Ptarmigan	Red-throated Loon	Pacific Loon	Bar-tailed Godwit	Arctic Tern	Parasitic Jaeger	Long-tailed Jaeger	Total
CD3 Pad and Airstrip	6[b]	–	1	32	0	–	6	–	–	–	–	–	–	1	–	1	–	–	47
CD3 Ice Road	4	2	–	137	2	11	11	1	–	–	2	1	1	3	–	1	1	–	177
ACS Spill-response Sites																			
Site 1	–	–	–	11	6	–	–	–	–	–	–	–	–	–	–	–	–	–	17
Site 2	–	–	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Site 3	–	–	–	6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6
Site 4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
Site 8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
SK-13	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
SK-15	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
Subtotal of Spill-response Sites	–	–	–	20	7	–	–	–	–	–	–	–	–	–	–	–	–	–	27
Incidental Nests[c]	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
CD5 Ice Road	–	4[b]	–	24	–	–	–	–	5	1	2	–	2	–	4	–	1	1	44
Total Nests	11	6	1	233	16	11	17	1	5	1	4	1	3	4	4	2	2	1	323

[a] Nest belonging to either Cackling Goose or Canada Goose.
[b] Two inactive Spectacled Eider nests and 1 inactive King Eider nest identified by contour feathers.
[c] See Figure 2 for location of nest, 209 m from Site 1.

maintained a 98.1% daily incubation constancy (*n* = 4,320 five-minute temperature records) for the next 15 days. On 6 July, 4 days before the estimated hatch date of 10 July (±1 day, based on a 24-day incubation period) the female stopped incubating, When we retrieved the instrumented egg on 17 July, we found no sign of shell remains from the 5-egg clutch at the nest site.

Another Spectacled Eider nest that had a temperature-sensing egg was located along the CD3 ice-road route, roughly 4.3 km from the CD3 pad. The female resumed incubating her clutch 52 minutes after she was flushed and maintained a 98.8% incubation constancy (*n* = 4, 608 five-minute temperature records) over the following 16 days. The float angle of the eggs indicated the clutch was approximately 7 days into the 24-day incubation period, and indicated hatch would occur 11 July (±1 day). On 11 July, incubation constancy dropped to 91.0% (*n* = 288 five-minute temperature records) and the following day the nest temperature dropped to ambient levels, signaling that the nest hatched on 11 July. We sighted the female in the vicinity of the nest pond on 17 July and suspected a brood was present. We returned on 23 July and found evidence at the nest site that confirmed hatch.

We assume the third nest with a temperature-sensing egg failed on the day of installation because the temperature pattern for this nest was consistent with ambient temperatures. This nest was located 140 m from the CD3 airstrip. We saw the female depart her nest on 27 June. Her 2-egg clutch was in the fourth day of incubation and we estimated that hatch would occur 17 July (±1 day). On 23 July, we found that 2 eggs had been destroyed by avian predators. At this nest and the other 2 nests with temperature-sensing eggs, we found the artificial eggs had peck holes indicating avian predation or scavenging of unprotected eggs. The apparent success rate of the instrumented nests (30%) was similar to overall success rate of Spectacled Eider nests in 2014. At the end of the nesting season, we found evidence that 4 of 11 Spectacled Eider nests hatched young (apparent success = 36%).

SUMMARY

We found 10 Spectacled Eider nests, 6 King Eider nests, and 1 unidentified eider nest in the CD3, ice road, and spill-response sites searched in 2014. An additional Spectacled Eider nest was found 9 m outside the 200 m search area for ACS Site 1, bringing the total Spectacled Eider nest count to 11 nests. Nine of the 11 nests found in 2014 were active in late June, when the nest search was conducted. Six Spectacled Eider nests (4 active and 2 inactive nests) and 1 unidentified eider nests were within 200 m of the CD3 pad, airstrip, and connecting road. Four Spectacled Eider nests (active) and 2 King Eider nests (active) were within 200 m of the CD3 ice road. No Spectacled Eider nests were found within 200 m of 7 spill-response sites that were searched in 2014, but 1 nest was found 209 m from a spill-response site. Four King Eider nests (3 active and 1 inactive) occurred in the search area around the CD5 ice road, but Spectacled Eider nests were absent from this area.

No Steller's Eiders or their nests were seen in any of the areas searched in 2014, which is consistent with data collected over 2 decades on the Colville Delta, in NE NPR-A, and the GKA. Nests of Steller's Eiders have not been documented on the Colville Delta, in the most eastern portion of NPR-A (in the CD5 and Greater Mooses Tooth areas), or in the GKA despite nearly annual aerial surveys and nest search efforts.

Between 2009 and 2014, we have visited a total of 19 spill-response sites and 3 pipeline-bridge sites and found eider nesting habitat varied in quality and abundance among the sites (Table 1; Seiser and Johnson 2010, 2011a, 2011b, 2012, 2014). We found that 10 of these 22 sites either lacked eider nesting habitat (Site 7, NK-6, Kach-A), contained nesting habitat low in quantity or quality (Anchor 1, Mil-A, Mil-C, NK-8, Site 2), or had degraded and unusable nesting habitat (e.g., flare at SK-14A, remnant snow berms at SK-14B). The USFWS, CPAI, and ABR agreed to omit these 10 sites, reducing to 12 the number of sites that would require ground searches prior to off-pad activities during the nesting season. The remaining 9 spill-response sites and 3 pipeline-bridge sites contain habitat that could potentially attract nesting Spectacled Eiders (Table 1).

Over the last 6 years of nest searches, we have found Spectacled Eider nests consistently within 200 m of the CD3 pad, and we have found Spectacled Eider nests in 4 of 6 years within 200 m of the ice road centerline (Seiser and Johnson 2010, 2011a, 2011b, 2012, 2014). Identification of active Spectacled Eider nests in areas with off-pad human activity through nest searches continues to be an important method of avoiding unintended disturbance to nesting eiders, while allowing important oilfield operations (for example spill-response preparation) to continue.

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