



**EIDER NEST SEARCHES IN THE ALPINE AREA, ALASKA, 2018**

**Pam E. Seiser  
Charles B. Johnson**

**Prepared for  
CONOCOPHILLIPS ALASKA, INC.  
Anchorage, Alaska**

**Prepared by  
ABR, INC.—ENVIRONMENTAL RESEARCH & SERVICES  
Fairbanks, Alaska**





**EIDER NEST SEARCHES IN THE  
ALPINE OILFIELD AREA, ALASKA, 2018**

FINAL REPORT

Prepared for

**ConocoPhillips Alaska, Inc.**

P.O. Box 100360

Anchorage, Alaska 99510-0360

Prepared by

Pam E. Seiser and Charles B. Johnson

**ABR, Inc.—Environmental Research & Services**

P.O. Box 80410

Fairbanks, Alaska 99708

November 2018



*Printed on recycled paper.*



## TABLE OF CONTENTS

List of Figures.....	iii
List of Tables.....	iii
Acknowledgments.....	iv
Introduction.....	1
Objectives.....	4
Methods.....	4
Results.....	12
Spill-Response Sites.....	12
Hydrotest, Water-Source Lake, and Pipeline Junction Surveys.....	12
CD-3 Airstrip and Scaffolding Area.....	12
Summary.....	14
Literature Cited.....	16

## LIST OF FIGURES

Figure 1.	Study area for eider nest searches conducted prior to off-pad activities on the Colville River delta and Kachemach River, in the Alpine Oilfield area, Alaska, 2009–2018.....	2
Figure 2.	Study area for eider nest searches conducted prior to off-pad activities near CD-2 to CD-5, Alpine Oilfield area, Alaska, 2009–2018.....	3
Figure 3.	A time-lapse camera recorded the behavior of an incubating Spectacled Eider and aircraft traffic on the CD-3 airstrip.....	14
Figure 4.	A time-lapse camera captured this image of a brown bear, a potential nest predator, passing within 200 m of a Spectacled Eider nest.....	15
Figure 5.	A female Spectacled Eider leads her young away from her nest site as recorded by a time-lapse camera at a nest located 75 m from the CD-3 airstrip, Alpine oilfield, Alaska, 17 July 2018.....	15

## LIST OF TABLES

Table 1.	Site descriptions for 27 spill-response equipment sites and 3 pipeline bridge sites in the Alpine Oilfield and adjacent areas, Alaska, 2009–2018.....	5
Table 2.	Numbers of nests found in search areas at 13 spill-response equipment sites, the CD-3 airstrip and scaffolding location, GMT-1 hydrotest site, lake M0353, and 2 pipeline junctions in the Alpine Oilfield area, Alaska, 19–26 June 2018.....	13

## ACKNOWLEDGMENTS

Nest searches in the Alpine area were conducted by biologists Katie Hayden, Kristen Rozell, and the 2 co-authors. Pam Odom provided travel and publication support. Will Lentz and Tony LaCortiglia supplied equipment and technical assistance. Bob Burgess reviewed the report. In the field, our pilots were Cody Pruden and Solomon Loop, with Zac Hobbs and Krista Kenney, coordinating helicopter transportation, Ari Haunschild and Lynn DeGeorge assisted with oilfield support, and Tim Hilliard and Jeanie Shifflett assisted with schedules and locations of spill-response activities. We would like to thank the Alpine staff and personnel for providing our crew a safe and welcoming work environment. This work was directed by Robyn McGhee, Senior Environmental Scientist at ConocoPhillips Alaska, Inc.; we appreciate Robyn's continued support.

## INTRODUCTION

The Alpine Satellite Development Project (Alpine Oilfield) is within the current or historic ranges of 2 species of eiders 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 the Steller's Eider (*Polysticta stelleri*). The Alpine Oilfield, operated by ConocoPhillips Alaska, Inc., (CPAI) consists of 4 drill sites located on the Colville River delta, 1 drill site (CD-5) in the northeastern National Petroleum Reserve-Alaska (NE NPR-A), and 1 drill site under construction at the time of this report, Greater Mooses Tooth 1 (GMT-1) in NE NPR-A. To comply with the Terms and Conditions issued in the Biological Opinions for the Alpine satellites, CD-5, and GMT-1 (USFWS 2004, 2011, 2014, 2015) and to reduce potential disturbance to breeding eiders, CPAI Operations requires documentation of the presence or absence of eider nests prior to initiating off-pad activities during the nesting season. If threatened eider nests are found, CPAI then modifies those activities to avoid disturbance, after consultation with U.S. Fish and Wildlife Service (USFWS). CPAI contracted ABR, Inc.—Environmental Research & Services (ABR) to conduct nest searches for eiders on the Colville River delta and adjacent areas where off-pad activities were scheduled during the 2018 breeding season. In this report, we document the presence or absence of eider nests in 19 small search areas: 13 Alaska Clean Seas (ACS) spill-response equipment sites, the CD-3 airstrip, CD-3 scaffolding site, and 4 sites associated with the GMT-1 pipeline (hydrotest, water-source lake M0383, and 2 pipeline junctions; Figure 1 and 2).

Spectacled Eiders are common breeders on the Colville River delta and NE NPR-A. However, Spectacled Eider nests are not distributed uniformly in the Alpine area (Johnson et al. 2015). Spectacled Eider nests are relatively common on the outer Colville delta where the CD-3 drill site is operated as a roadless satellite to the Alpine Oilfield, less common in the areas around CD-1, CD-2, CD-4, and CD-5 (for eider distribution see Figure 4 in Johnson et al. 2018).

In contrast, Steller's Eiders are extremely rare along the central Beaufort Sea coast, where the

Alpine Oilfield is located. Their breeding distribution in Alaska is primarily centered to the northwest of the Alpine area, near Utqiagvik (Barrow), although their historic range included all of the Arctic Coastal Plain of Alaska (Quakenbush et al. 2002). Evidence of nesting by Steller's Eiders east of Barrow has been reported only 3 times in the last 30 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. Deering, USFWS, 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 22 years, Steller's Eiders have been sighted only 3 times on the Colville delta (1995 [J. Bart, Boise State University, pers. comm.], and 2001 and 2007 [Johnson et al. 2002, 2008a]), and only 5 times in the Greater Kuparuk Area (1995, 2000, 2001, 2007, and 2014 [Anderson et al. 2008; CPAI, unpubl. data]). There are no records of Steller's Eider nests or broods from the Colville River delta or adjacent areas.

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 the Alpine satellites (CD-3, CD-4, and CD-5), the USFWS stipulated terms and conditions in the Incidental Take Statement that restrict human activity to existing gravel fill within 200 m of occupied Spectacled Eider nests during 1 June–1 August (USFWS 2004, 2011). Where summer support or construction activities must occur off existing gravel fill during that restricted period, USFWS-approved nest surveys for Spectacled Eiders must be conducted during the nesting period prior to those activities so that active nests can be identified and avoided (USFWS 2004). CPAI conducts off-pad activities necessary for regulatory compliance and operational needs (e.g., tundra clean-up after the ice-road season, spill-response equipment deployment, hydrological monitoring, water access, civil surveys) on the tundra in portions of the nesting habitat of the

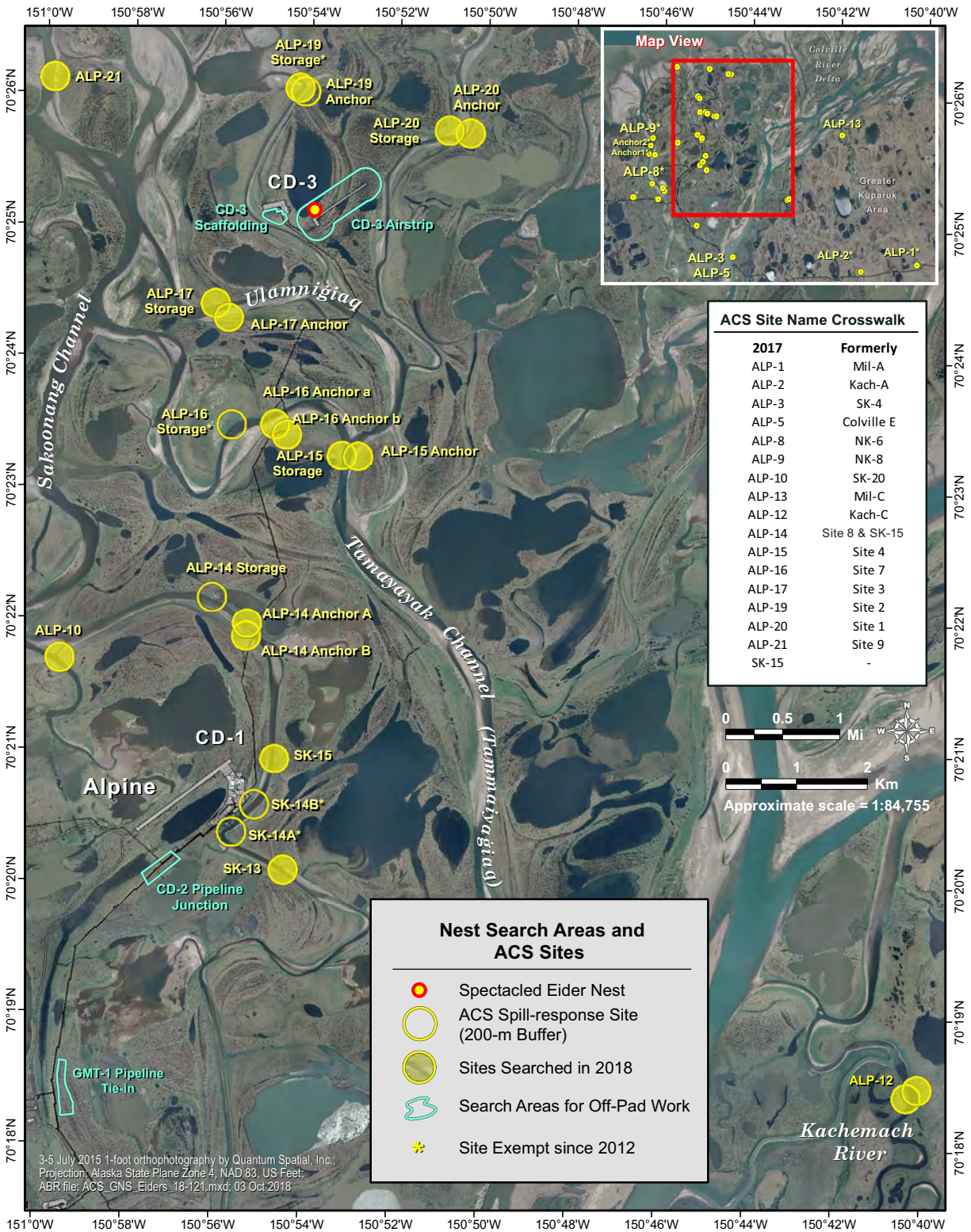


Figure 1. Study area for eider nest searches conducted prior to off-pad activities on the Colville River delta and Kachemach River, in the Alpine Oilfield area, Alaska, 2009–2018.



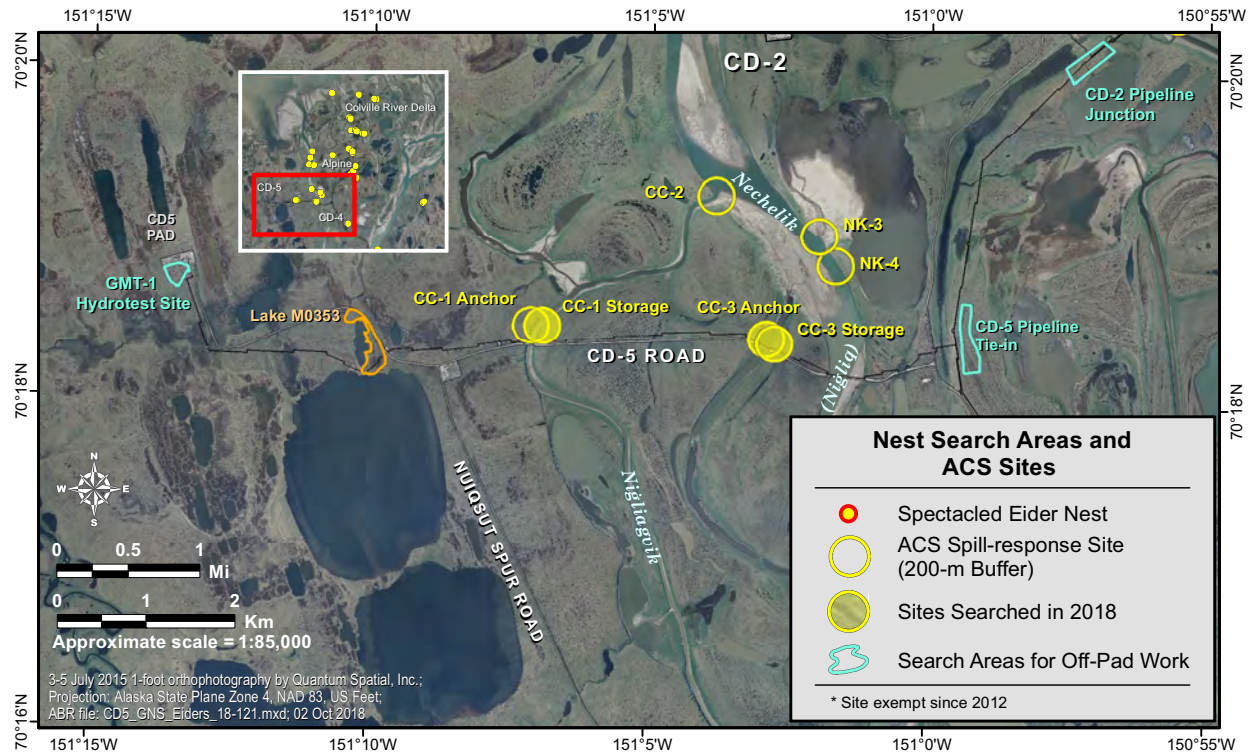


Figure 2. Study area for eider nest searches conducted prior to off-pad activities near CD-2 to CD-5, Alpine Oilfield area, Alaska, 2009–2018.

Spectacled Eider annually during the breeding season (June and July). Eider nests are difficult to avoid, because female eiders are cryptic and the females of 4 eider species (Steller's, Spectacled, King [*S. spectabilis*], and Common eiders [*S. mollissima*]) are hard to distinguish with the untrained eye. Without prior knowledge of nest locations, workers could accidentally damage eggs or unintentionally flush birds from their nests, leaving eggs exposed to predators.

CPAI has a regulatory obligation in its Oil Discharge Prevention and Contingency Plan for the Alpine Oilfield to stage or deploy spill-response 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 ABR reviewed the data available on nest initiation dates for Spectacled Eiders 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 postpone the earliest date when nest searches would be required for

off-pad activity from 1 June to 9 June. Any off-pad work, including spill-response equipment deployment, from 9 June to 1 August would require nest searches if it occurred in areas where potential nesting habitat of Spectacled Eiders existed.

The summer of 2018 is the tenth season that eider nest searches have been conducted in advance of off-pad work in the Alpine Oilfield (Seiser and Johnson 2010; 2011a, b; 2012; 2014a, b; 2015; 2016; 2018a, b). Over the last 10 years in the Alpine Oilfield, the number of spill-response sites has expanded from 23 sites to 27. The number of sites increased when the CD-5 drill site came on line in 2016, extending the range of sites from Colville River delta as far as the Nigliagvik Channel. Not all ACS sites require nest searches prior to off-pad activities. Ten sites were exempted from nest searches after joint reviews by USFWS, CPAI, and ABR (letters from Caryn Rea, CPAI, to Sarah Conn, USFWS, dated June 2011 and March 2012) because they either lack of appropriate eider nesting habitat, contained nesting habitat in

insufficient quantity or quality, or had degraded and unusable nesting habitat (for example, the flare site at SK-14A and persistent snow berms at SK-14B). In the cases of ALP-16 and ALP-19, the storage sites, but not the anchor sites, were exempted. South of CD-4, the ALP-5 and ALP-3 response sites are in low density areas for pre-nesting eiders. Three new Nigliq response sites not on the list, NK-3, NK-4, and CD-2, also lack nesting habitat.

Currently, 12 ACS sites, plus the anchor locations for ALP-16 and ALP-19 and 3 pipeline bridge crossings (between CD-1 and CD-3) remain on the list for nest searches if maintenance activities are planned during the eider breeding season (Table 1). A summary of the habitat composition and nest search histories at 27 spill-response equipment sites and 3 pipeline bridge sites is presented in Table 1.

## **OBJECTIVES**

The primary objective of nest searching in 2018 was to document the presence or absence of nesting Spectacled and Steller's eiders prior to off-pad activities. If active nests of Spectacled or Steller's eiders were found, their locations would be transmitted to CPAI field environmental staff. Documentation of nest locations allowed CPAI to modify planned activities occurring near nests, as needed. ABR searched for eider nests in designated off-pad work areas and transmitted information on presence or absence of active Spectacled Eider nests to CPAI field environmental staff within 24 hours of the completion of the search in each work area.

## **METHODS**

Methods have been similar since USFWS-approved nest searches for off-pad work were initiated in 2009. Eider nest searches were conducted only in the subset of ACS sites that contain suitable nesting habitat and that are scheduled for work visits between 9 June and 1 August. In 2018, 13 ACS sites, the CD-3 airstrip and a scaffolding location, 1 hydrotest site, 1 water-source lake, and 2 pipeline junctions, were scheduled for work activities between 9 June and 1 August, and consequently, were searched for eider nests.

We conducted intensive ground-based nest searches for Spectacled Eiders where off-pad work was proposed to occur on the Colville River delta during the breeding season. Search areas included a 200 m buffer around work sites located within potential eider nesting habitat. The 200 m buffer around work sites is based on terms and conditions in the Incidental Take Statement (ITS) issued in the Biological Opinions for the Alpine Satellite Development Project (USFWS 2004) and for CD-5 (USFWS 2011) that prohibit off-pad human activity within 200 m of active nests. While regulatory guidelines have not been issued on the area around human activity that should be monitored for nesting activity, or conversely, the area around nests in which human activity should be avoided, the 200 m buffer has been applied in ITSs for specific projects as a zone outside of which there is a reduced probability for off-pad human activity to cause severe disturbance to nesting and brood-rearing Spectacled Eiders. 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).

A crew of 2–4 people experienced in eider identification 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 truck when possible, otherwise a helicopter or boat was used to access sites. All nest locations were recorded using a custom application on an Android smartphone. Eider nests were recorded as active if occupied or inactive if empty. Biologists avoided disturbing incubating Spectacled Eiders, once they were discovered, by approaching nests no closer than needed to identify to species. If Spectacled Eider hens flushed from nests inadvertently, we floated the eggs to estimate hatch dates and installed in the nest an artificial temperature-sensing egg. Time-lapse cameras were set >25 m from nest sites at the CD-3 airstrip to monitor responses to aircraft landings. Photos from time-lapse cameras and temperature data recorded by artificial eggs were used to determine nest fate (success or failure), the timing of hatch or nest failure, and incubation constancy as described in Johnson et al. 2008b. Research activities were

Table 1. Site descriptions for 27 spill-response equipment sites and 3 pipeline bridge sites in the Alpine Oilfield and adjacent areas, Alaska, 2009–2018. Sites that were renamed in 2015 have prior names listed in parentheses.

Site Name	Location	Site Description	Wildlife Habitat <sup>a</sup>	Habitat Description	Nesting Habitat Present <sup>b</sup>	Search History/ Nesting Records	Years Searched	Search in Future Years?	Comments
ALP-1 (Mil-A)	N 70.24403 W 150.29674	Miluveach River, just north of TransAlpine pipeline.	PWM MSSM TLDS	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, contains marginal nesting habitat.
ALP-2 (Kach-A)	N 70.23750 W 150.45838	Kachemach River, just north of TransAlpine pipeline.	MSSM MTT NWM TLDS	Small pocket of wet meadow surrounded by drier habitat	No	No/No	2011	No	Unsuitable habitat because NWM is <10% of the total area, and the surrounding area is occupied by shrubs.
ALP-3 (Colville E)	N 70.25062 W -150.82796	East bank of the Colville River, 0.7 km north pipeline.	PWM NWM TLDS BAR		–	No/No	None	No	No Site Visit. Pre-nesting aerial surveys in adjacent areas suggest lack of use by eiders.
ALP-5 (SK-4)	N 70.280721 W 150.93346	Sakoonang Channel, ~6.6 km south of CD-1.	PWM NWM TLDS BAR		–	No/No	None	No	No site visit. Pre-nesting aerial surveys indicate lack of use by eiders.
ALP-8 (NK-6)	N 70.36017 W 151.05275	Eastern bank of the Nighiq 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. In 2018, it was mapped opposite of Anchor 1.
ALP-9 (NK-8)	N 70.36606 W 151.06483	Eastern bank of the Nighiq Channel.	PWM, MSSM	Low willow shrubs with some polygons, river bank with polygon troughs	Yes	No/No	2009– 2011	No	Marginal nesting habitat due to prevalence of shrubs; contains some polygonal areas.

Table 1. Continued.

Site Name	Location	Site Description	Wildlife Habitat <sup>a</sup>	Habitat Description	Nesting Habitat Present <sup>b</sup>	Search History/ Nesting Records	Years Searched	Search in Future Years?	Comments
ALP-10 (SK-20)	Storage: N 70.36154 W 150.99201	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, 2015–2016, 2018	Yes	Nesting habitat on both sides of the channel in areas of PWM, but not on willow covered island. Container location shifted between 2014 and 2015.
ALP-12 (Kach-C)	Storage: N 70.306921 W 150.67197 Anchor: N 70.307904 W 150.66798	Alpine Pipeline site, Kachemach River, ~12 km east of CD-4.	PWM, NWM, TLDS, BAR	Low shrubs 50-100 m from river banks. West side NWM, and the east side is PWM	Yes	No/No	2018	Yes	East of the Colville delta. Booms span ~100 m wide channel. Potential nesting habitat beyond shrub lined banks. Location updated in 2018.
ALP-13 (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 and subject to frequent flooding.
ALP-14 (Site 8 & SK-15 <sup>c</sup> )	Storage: N 70.369519 W 150.93522; Anchor a: N 70.366204 W 150.92193; Anchor b: N 70.364615 W 150.92218	Storage: Conex on the northern bank of the Sakoonang Channel; anchors adjacent to Sakoonang pipeline bridge, ~2.5 km north of CD-1.	TLLWC, PWM, NWM, MSSM TLDS, BAR	Storage: ~50% PWM, and ~50% MSSM and TLDS. Anchor a in PWM surrounded by shrub habitats. Anchor b: NWM with narrow band of PWM	Yes	No/No	Storage: 2009–2011, 2013–2016 Anchors: 1998, 1999, 2009–2018	Yes	Nesting habitat at storage site limited to area of PWM north of container. Shoreline of channel and tapped lake are unsuitable because of abundance of low shrubs. Potential nesting habitat present at both anchor sites. Anchor a has high relief PWM and Anchor b has a 125 m band of PWM and NWM. Two female Spectacled Eiders observed flying over the site in 2010.



Table 1. Continued.

Site Name	Location	Site Description	Wildlife Habitat <sup>a</sup>	Habitat Description	Nesting Habitat Present <sup>b</sup>	Search History/ Nesting Records	Years Searched	Search in Future Years?	Comments
ALP-15 (Site 4)	Storage: N 70.38775 W 150.88718 Anchor : N 70.38767 W 150.88104	Container on western bank of the Tamayayak; boom anchor opposite bank slightly down stream.	PWM, MSSM, DOWIP, BAR	~70% low-relief PWM; ~10% high-relief PWM; ~10% DOWIP; ~10% BAR	Yes	No/No	2009– 2018	Yes	Suitable habitat on container side in low-relief areas and along lake. Marginal nesting habitat in the high-relief area. Eider nesting habitat is also present on the anchor side of the channel.
ALP-16 (Site 7)	Storage: N 70.39152 W 150.92881 Anchor a: N 70.39261 W 150.91657 Anchor b: N 70.39130 W 150.91208	Container on NW bank of Tamayayak; anchors adjacent to Tamayayak pipeline bridge.	PWM, NWM, TLDS, BAR	Storage: Well-drained NWM with low shrubs. Anchor a: PWM edged with low shrubs. Anchor b: NWM with narrow band of PWM	Yes	No/No	Storage: 2009, 2011, 2016 Anchors: 2017– 2018	Yes, at Anchor sites only	No suitable nesting habitat near storage unit, the area is dry, shrubby and lacks ponds. Anchors a and b have suitable habitat inland from the shrub lined banks.
ALP-17 (Site 3)	Storage: N 70.40692 W 150.93549 Anchor: N 70.40507 W 150.93047	Container on northern bank of Ulamnigtaq; anchor on opposite bank.	NWM, PWM, BAR	Vegetated areas ~50% NWM and ~50% PWM	Yes	Yes <sup>d</sup> /Yes	2009– 2018	Yes	Eider nesting habitat near spill-response container and anchor; a Spectacled Eider nested 160 m from the container in 2011 and 207 m from the container in 2009. Two female Spectacled Eiders observed flying in 2012.
ALP-19 (Site 2)	Storage: N 70.43417 W 150.90533 Anchor: N 70.43387 W 150.90261	Container on western bank; anchor on the opposite bank of the West Ulamnigtaq.	MSSM, DPC, NWM, BAR, SM, SKT	Half of site is vegetated. MSSM, NWM, and BAR is on the west bank, the east bank has BAR, and SM grading into NWM and PWM.	Yes	Yes <sup>d</sup> /No	2009– 2011, 2014, 2017, Anchor 2018	Yes	On the anchor side there is eider nesting habitat consisting of polygon ponds. Otherwise marginal nesting habitat bordering ~60 m wide channel. On the storage unit side driftwood lines indicate flooding is common at this site.

Table 1. Continued.

Site Name	Location	Site Description	Wildlife Habitat <sup>a</sup>	Habitat Description	Nesting Habitat Present <sup>b</sup>	Search History/ Nesting Records	Years Searched	Search in Future Years?	Comments
ALP-20 (Site 1)	Storage: N 70.429162 W 150.84817 Anchor: N 70.42885 W 150.84019	Container on west bank of the Tamayayak; boom anchored downstream where the channel narrows.	NWM, PWM, DPC BAR, SOW	Vegetated areas on west side of channel are predominately NWM and PWM; east side includes DPC and BAR.	Yes	Yes <sup>d</sup> /Yes	2009–2011, 2013–2015, 2017–2018	Yes	Eider nesting habitat consists of polygon ponds 100 m inland from the container and deep polygon ponds on east side. One Spectacled Eider nest present in 2013 and 2014.
ALP-21 (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, 2018	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.
Anchor 1	N 70.35003 W 151.07447	Western bank of the Nigliq 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 Nigliq Channel.	PWM, DOWIP	Shrubs, low-relief low-center polygons	Yes	No/No	2009–2011	Yes	Large and small ponds are suitable habitat. Non-shoreline nesting habitat diminished by shrubs.
CC-1 (CD-5 Site 3)	N 70.30756 W 151.11541	Nigliqvik Channel, ~200 m from bridge.	TLDS, BAR MTT, MSSM	TLDS along banks with MTT on the west side and MSSM in polygonal area on the east side of channel	No	Yes <sup>f</sup> /No	2009, 2015–2016, East side: 2018	Yes, east side.	Potential nesting habitat on the east bank in an area of low center polygons. Willow cover is prevalent along the river bank. Road access.

Table 1. Continued.

Site Name	Location	Site Description	Wildlife Habitat <sup>a</sup>	Habitat Description	Nesting Habitat Present <sup>b</sup>	Search History/ Nesting Records	Years Searched	Search in Future Years?	Comments
CC-2 (CD-5 Site 1)	N 70.32093 W 151.06402	Mouth of the Nigliagvik Channel.	TLDS, DPC, MSSM, BAR	Narrow band of TLDS with MSSM high relief low centered polygons on the north side and willow covered low centered polygons on the south side	No	No/No	2015	No	Low value to no nesting habitat for eiders; in areas where the tundra is patterned the vegetation tends to be MSSM with abundant willow cover.
CC-3 (CD-5 Site 2)	Storage: N 70.30608 W 151.0460 Anchor: N 70.30652 W 151.04845	Lake L9341, ~100m from bridge.	TLDS, NWM, TLHWC, HUMO	Mostly TLDS with a narrow band of NWM on top of old river bank.	Yes	Yes/No	2009, 2014– 2015, 2017– 2018	Yes	The site spans an old river channel and a roadway. NWM occurs in patches, which may support eider nesting.
NK-3	N 70.31924 W 150.03083	Overflow waterway between Nigliq Channel and large tap lake.	BAR TLDS		No	No/No	None	No	Excluded from Spectacled Eider nest searches because it is mostly unvegetated with willows covered banks
NK-4 (CD-5 Site 4)	N 70.31697 W 151. 033072	Nigliq Channel, ~1.3 km north of Bridge #2.	BAR, TLDS	East bank TLDS and silt covered polygons. Barrens on west bank	No	No/No	2015	No	Polygonal area present at the site but the abundance of willows and silt deposited by floods made habitat unsuitable for nesting eiders.
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 <sup>c</sup> /No	1998– 2000, 2009, 2011– 2018	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.

Table 1. Continued.

Site Name	Location	Site Description	Wildlife Habitat <sup>a</sup>	Habitat Description	Nesting Habitat Present <sup>b</sup>	Search History/ Nesting Records	Years Searched	Search in Future Years?	Comments
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 <sup>c</sup> / No	1996–2001, 2009	No	Marginal nesting habitat because of shrubs and habitat modification. The NW side bank habitat is modified by the gravel pad and flare; the 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 <sup>c</sup> /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. Snowbanks on the pad edge may delay availability. Previous searches have not found eider nests.
SK-15 <sup>c</sup> (new site)	N 70.349086 W 150.910916	Near CD-1, on the Sakoonang.	PWM, NWM, TLDS	Willow and barrens along channel banks grading into NWM east side into low and high-relief polygons	Yes	Yes <sup>c</sup> /No	1996–2001, 2017–2018	Yes	Potential eider nesting habitat in 50-m band of NWM on west side and a wider band of PWM and shallow lake on the east side of the channel.
Sakoonang Pipeline Bridge	N 70.36444 W 150.91888	First channel-crossing north of Alpine	PWM, NWM, TLDS, BAR	PWM on NE bank, SW bank is shrubs with low-centered polygons in PWM	Yes	Yes <sup>c</sup> /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 channel-crossing north of Alpine..	PWM, NWM, TLDS, BAR	PWM and NWM on north bank, south bank is BAR, shrub, and NWM	Yes	No/No	2010	Yes	Willows along channel margins, suitable nesting habitat away from channels.



Table 1. Continued.

Site Name	Location	Site Description	Wildlife Habitat <sup>a</sup>	Habitat Description	Nesting Habitat Present <sup>b</sup>	Search History/ Nesting Records	Years Searched	Search in Future Years?	Comments
Ulamniġiaq Pipeline Bridge	N 70.39277 W 150.90805	Third channel-crossing north of Alpine.	PWM, NWM, BAR	PWM and NWM on north bank, south bank is NWM	Yes	Yes <sup>d</sup>	2000–2007, 2010	Yes	The majority of this site contains suitable nesting habitat.

<sup>a</sup> Wildlife Habitats = Salt Marsh (SM), Salt-killed Tundra (SKT), Tapped Lake with Low-water Connection (TLLWC), Tapped Lake with High-water Connection (TLHWC), Deep Open Water without Islands (DOW), Deep Open Water with Islands or Polygonized Margins (DOWIP), Shallow Open Water without Islands (SOW), Deep Polygon Complex (DPC), Nonpatterned Wet Meadow (NWM), Patterned Wet Meadow (PWM), Moist Sedge-Shrub Meadow (MSSM), Moist Tussock Tundra (MTT), Tall, Low, Dwarf Shrub (TLDS), Barrens (BAR), and Human Modified (HUMO).

<sup>b</sup> Areas containing SM, SKT, DOWIP, DOW, SOW, NWM, PWM, or DPC (Deep Polygon Complex).

<sup>c</sup> SK-15 was reassigned to a new site near CD-1. Prior to 2017, ALP-14 anchors, a and b, next to Sakoonang Pipeline Bridge, were known as SK-15 anchors, a and b.

<sup>d</sup> CD-3 nest searches conducted during 2000–2007; Spectacled Eider and unidentified eider nests were found at these sites during some years (Johnson et al. 2008b).

<sup>e</sup> Alpine nest searches conducted in 1995–2001 (Johnson et al. 2003).

<sup>f</sup> CD-5 eider nest searches conducted in 2009, 2014–2017 (Seiser and Johnson 2011, 2014, 2016, 2018; Johnson and Seiser 2015).

approved under USFWS Federal Fish and Wildlife Permit TE012155-7 and Alaska Department of Fish and Game Scientific Permit 18-169.

ACS sites included spill-response equipment storage containers and/or anchor points for floating boom. Some ACS sites may have as many as 3 search areas centered on storage containers or anchor points for booms (Figure 1, Table 1). At sites where spill-response equipment storage containers are pre-staged year-round, we searched within a 200 m radius of the container; otherwise we searched a 200 m radius around the coordinates provided by ACS. In 2018, ACS had installed anchor posts at several of the sites, which were used as center points for the 200 m search area. Where anchor posts were not present, we based anchor position on aerial photos of the boom locations in 2015 (ConocoPhillips 2017).

Lake M0353 was selected by CPAI for water withdrawals for hydrotesting the GMT-1 pipeline. The access point for water withdrawal was on the east side of lake M0353. Human activity occurred along a foot path between the road and the shoreline. Therefore, we searched a 200 m buffer on each side of the line between the road and the access point.

We searched habitats that were preferred or frequently used by nesting and pre-nesting Spectacled Eiders, as determined by previous studies in the area (Johnson et al. 2008b, 2015, 2016): 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, Patterned Wet Meadow, and lake shorelines. We inventoried habitat within search areas at each site by visual inspection and by overlaying each site on a wildlife habitat map of the Colville River delta and the Alpine Transportation Corridor (Johnson et al. 1997; Jorgenson et al. 1997, 2002). Sites where habitat had been modified so that nesting was unlikely (i.e., gas flares or snow dumps), were re-classified as having insufficient nesting habitat. Between 2009 and 2017, we have conducted habitat evaluations at 23 spill-response sites and 3 bridge sites (Table 1).

## RESULTS

### SPILL-RESPONSE SITES

No Spectacled Eider or Steller's Eider nests were found within 200 m of the 13 spill-response sites that we searched on 19–26 June 2018. During searches of the spill-response sites, we located 80 large waterbird nests of 11 species (Table 2). Most noteworthy was a nest belonging to Rough-legged Hawk (*Buteo lagopus*) on the bridge over Cody Creek (Lake L9341), the first nesting attempt of this raptor documented on the Colville River delta.

We evaluated eider nesting habitat at ALP-12 (the Kachemach River ACS site) and updated the location ~250 m down river from the previous site (Figure 1). On both sides of the river, we found potential eider nesting habitat, thus this site may warrant nest searches in the future for any tundra work scheduled during the eider nesting period (Table 1).

### HYDROTEST, WATER-SOURCE LAKE, AND PIPELINE JUNCTION SURVEYS

We did not find Spectacled Eider or Steller's Eider nests or adults at the hydrotest site adjacent to the CD-5 drill pad, water-source lake M0353, nor the 2 pipeline junction areas (GMT-1 tie-in and CD-2 junction) during nest searches (Figures 1 and 2). At lake M0353, our search found no nesting eiders in the specific area used for water withdrawal. While searching for eider nests, we found no nests of large waterbirds species at the hydrotest site and  $\leq 5$  nests of large waterbirds species at each of the other 3 sites (Table 2).

### CD-3 AIRSTRIP AND SCAFFOLDING AREA

One Spectacled Eider nest with 4 eggs and 1 female and 1 male Spectacled Eider were recorded within 200 m of the CD-3 airstrip on 25 June 2018. No Spectacled Eider nests or eiders were found within 200 m of the CD-3 scaffolding area on 19 June. During the eider nest search at the CD-3 airstrip, we located 51 large waterbird nests belonging to 6 species. The majority of those nests belonged to Greater White-fronted and Canada geese (Table 2).

We placed a time-lapse camera and a temperature sensing egg at the nest site located ~75 m from the airstrip (Figure 3). The eider

Table 2. Numbers of nests found in search areas at 13 spill-response equipment sites, the CD-3 airstrip and scaffolding location, GMT-1 hydrotest site, lake M0353, and 2 pipeline junctions in the Alpine Oilfield area, Alaska, 19–26 June 2018. No Steller's Eider nests were found in 2018.

Search Area (Former Names) <sup>a</sup>	Spectacled Eider	Greater White-fronted Goose	Snow Goose	Cackling/Canada Goose <sup>b</sup>	Unidentified Goose	Northern Pintail	Green-winged Teal	Long-tailed Duck	Willow Ptarmigan	Parasitic Jaeger	Arctic Tern	Red-throated Loon	Rough-legged Hawk	Total
<b>ACS Spill Response Sites</b>														
ALP-10 Storage (SK-20)	–	3	–	–	–	–	–	–	1	–	–	–	–	4
ALP-12 Storage and Anchor (Kach-C)	–	3	–	–	–	–	–	–	2	–	–	–	–	5
ALP-14 Anchor a, Anchor b (SK-15)	–	9	–	1	–	1	–	1	–	–	–	–	–	12
ALP-15 Storage and Anchor (Site 4)	–	2	–	–	–	–	–	–	–	–	–	–	–	2
ALP-16 Anchor a and Anchor b	–	8	–	–	–	–	–	–	–	–	–	–	–	8
ALP-17 Storage and Anchor (Site 3)	–	5	–	–	–	–	–	1	–	1	1	–	–	8
ALP-19 Anchor (Site 2)	–	4	–	–	–	–	–	–	–	–	–	–	–	4
ALP-20 Storage and Anchor (Site 1)	–	15	2	–	–	–	–	–	–	–	–	–	–	17
ALP-21 Storage (Site 9)	–	1	–	–	–	–	–	–	–	–	–	–	–	1
CC-1 Storage	–	3	–	–	–	–	–	–	–	–	–	–	–	3
CC-3 Anchor and Storage	–	9	–	1	–	–	–	–	–	–	–	1	1	12
SK-13	–	–	–	–	–	–	1	–	–	–	–	–	–	1
SK-15 (location near CD-1)	–	2	–	–	–	–	–	–	–	–	–	–	–	2
Subtotal	0	65	2	2	0	1	1	2	3	1	1	1	1	80
CD-3 Airstrip	1	38	–	9	1	–	–	–	1	–	1	–	–	51
Lake M0353	–	2	–	1	–	–	–	–	–	–	–	–	–	3
CD-2 Pipeline Junction	–	4	–	1	–	–	–	–	–	–	–	–	–	5
GMT-1 Pipeline Tie-in	–	1	–	–	–	–	–	–	–	–	–	–	–	1
<b>Total Nests</b>	<b>1</b>	<b>110</b>	<b>2</b>	<b>13</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>140</b>

<sup>a</sup> No nests were found within 200 m of the CD-3 scaffolding area or the hydrotest site adjacent to CD-5drill pad. See Figures 1 and 2 for location of 2018 search areas.

<sup>b</sup> Nests belonging to either Cackling Goose or Canada Goose.

returned within 12 minutes of our departure from the area. The nest hatched 4 chicks on 16 July. Estimated hatch dates for eiders on the Colville delta range from 3 to 18 July ( $n = 43$  nests; ABR, unpublished data). The late hatch date and the presence of the male eider suggest that the nesting season for Spectacled Eiders may have occurred later in 2018 than in most years. During the 20 days of camera monitoring (the day of setup and

day of hatch were not included), the hen had an incubation constancy of 97.2%, averaged 1.2 recesses per day, and recess length averaged  $33 \pm 14$  minutes (mean  $\pm$  standard error;  $n = 24$  recesses). This incubation constancy is within the range of values reported in the CD-3 eider monitoring studies (Johnson et al. 2006, 2007, 2008b). One recess was cut short when the eider returned after a 3 minute absence to defend her nest



Figure 3. A time-lapse camera recorded the behavior of an incubating Spectacled Eider and aircraft traffic on the CD-3 airstrip. In the foreground is a female Spectacled Eider (nesting 75 m from the airstrip) displaying normal incubation posture, while in the background a CASA aircraft is landing on the CD-3 airstrip, Alpine oilfield, Alaska, 25 June 2018.

from a Glaucous Gull. There was no evidence that other predators visited the nest site before hatch although a brown bear passed within 200 m of the nest 4 hours before the hen departed with her brood (Figures 4 and 5).

Although about 80% of the 0.9 km-long CD-3 airstrip was visible in the background of the time-lapse images of the eider, we had a second time-lapse camera aimed at the airstrip to verify air traffic. Images were recorded every 30 seconds, which was frequent enough to capture all landings and takeoffs. There were 45 airplane events (each event was 1 landing or take off by a twin-engine turboprop Casa or Otter) on the CD-3 airstrip while the eider was on the nest. In 2018 the incubating eider did not display reactions (i.e., alert posture, concealment posture, or departures from the nest) to these 45 airplane events.

## SUMMARY

One Spectacled Eider nest was found at the CD-3 airstrip, and no Spectacled Eider nests were found in the other search areas in 2018. Of the 15 spill-response sites with suitable eider nesting habitat, 13 were searched in 2018, and no eider nests were found. No Steller's Eider nests have ever been observed in any of the spill-response, hydrotest, water-source lake, or pipeline search areas. The only sighting of a Steller's Eider at CD-3 occurred in 2001. Long-term surveys, including annual aerial surveys and ground-based searches of the last 28 years, verify the rarity of Steller's Eiders on the Colville delta, NE NPR-A, and in the Greater Kuparuk Area (ABR, unpubl. data).

Identification of active Spectacled Eider nests through nest searches prior to off-pad human activity reduces the potential for unintended disturbance to nesting Spectacled Eiders and ensures compliance with the terms and conditions





Figure 4. A time-lapse camera captured this image of a brown bear, a potential nest predator, passing within 200 m of a Spectacled Eider nest. In the foreground is the female eider on her nest brooding her newly hatched young and in the background is the CD-3 airstrip, Alpine oilfield, Alaska, 17 July 2018.



Figure 5. A female Spectacled Eider leads her young away from her nest site as recorded by a time-lapse camera at a nest located 75 m from the CD-3 airstrip, Alpine oilfield, Alaska, 17 July 2018.

listed in the Biological Opinions for Alpine and CD-5. Cooperation between the USFWS and CPAI on the details, locations, and timing of required nest searches has allowed critical oilfield operations, such as spill-response preparation and shutdown operations, to be completed with minimal modifications.

#### LITERATURE CITED

- Anderson, B. A., A. A. Stickney, T. Obritschkewitsch, and J. E. Shook. 2008. Avian studies in the Kuparuk Oilfield, Alaska, 2007. Data summary report for ConocoPhillips Alaska, Inc., and the Kuparuk River Unit, Anchorage, AK, by ABR, Inc., Fairbanks, AK. 38 pp.
- ConocoPhillips Alaska. 2017. Alaska Clean Seas equipment sites 2015 photo atlas. Unpublished report by Alpine Field and Satellites and Alpine Pipeline System, Western North Slope, Alaska. 21 pp.
- Johnson, C. B., and P. E. Seiser. 2015. CD-5 pipeline Spectacled Eider nest search, 2015. Report for ConocoPhillips Alaska, Inc., Anchorage, AK, by ABR, Inc., Fairbanks, AK. 7 pp.
- Johnson, C. B., B. E. Lawhead, J. R. Rose, A. A. Stickney, and A. M. Wildman. 1997. Wildlife studies on the Colville River delta, Alaska, 1996. Fifth annual report for ARCO Alaska, Inc., and Kuukpik Unit Owners, Anchorage, AK, by ABR, Inc., Fairbanks, AK. 139 pp.
- Johnson, C. B., R. M. Burgess, B. E. Lawhead, J. R. Rose, A. A. Stickney, and A. M. Wildman. 2002. Wildlife studies in the CD North study area, 2001. Second annual report for PHILLIPS Alaska, Inc., Anchorage, AK, by ABR, Inc., Fairbanks, AK. 114 pp.
- Johnson, C. B., R. M. Burgess, B. E. Lawhead, J. A. Neville, J. P. Parrett, A. K. Prichard, J. R. Rose, A. A. Stickney, and A. M. Wildman. 2003. Alpine Avian Monitoring Program, 2001. Fourth annual and synthesis report for ConocoPhillips Alaska, Inc., and Anadarko Petroleum Corporation, Anchorage, AK, by ABR, Inc., Fairbanks, AK. 194 pp.
- Johnson, C. B., J. P. Parrett, and P. E. Seiser. 2006. Spectacled Eider monitoring at the CD-3 development, 2005. Report for ConocoPhillips Alaska, Inc., and Anadarko Petroleum Corporation, Anchorage, AK, by ABR, Inc., Fairbanks, AK. 35 pp.
- Johnson, C. B., J. P. Parrett, and P. E. Seiser. 2007. Spectacled Eider monitoring at the CD-3 development, 2006. Report for ConocoPhillips Alaska, Inc., and Anadarko Petroleum Corporation, Anchorage, AK, by ABR, Inc., Fairbanks, AK. 39 pp.
- Johnson, C. B., A. M. Wildman, J. P. Parrett, J. R. Rose, T. Obritschkewitsch, and J. E. Shook. 2008a. Avian studies for the Alpine Satellite Development Project, 2007. Fifth annual report for ConocoPhillips Alaska, Inc., and Anadarko Petroleum Corporation, Anchorage, AK, by ABR, Inc., Fairbanks, AK. 28 pp.
- Johnson, C. B., J. P. Parrett, and P. E. Seiser. 2008b. Spectacled Eider monitoring at the CD-3 development, 2007. Report for ConocoPhillips Alaska, Inc., and Anadarko Petroleum Corporation, Anchorage, AK, by ABR, Inc., Fairbanks, AK. 43 pp.
- Johnson, C. B., J. P. Parrett, T. Obritschkewitsch, J. R. Rose, K. B. Rozell, and P.E. Seiser. 2015. Avian studies for the Alpine Satellite Development Project, 2014. Twelfth annual report for ConocoPhillips Alaska, Inc., and Anadarko Petroleum Corporation, Anchorage, AK, by ABR, Inc., Fairbanks, AK. 115 pp.
- Johnson, C. B., J. P. Parrett, J. R. Rose, and P.E. Seiser. 2016. Avian studies for the Alpine Satellite Development Project, 2015. Thirteenth annual report for ConocoPhillips Alaska, Inc., and Anadarko Petroleum Corporation, Anchorage, AK, by ABR, Inc., Fairbanks, AK. 47 pp.
- Johnson, C. B., J. P. Parrett, and P.E. Seiser. 2018. Avian studies for the Alpine Satellite Development Project, 2017. Fifteenth annual report for ConocoPhillips Alaska, Inc., and Anadarko Petroleum Corporation, Anchorage, AK, by ABR, Inc., Fairbanks, AK. 33 pp.

- Jorgenson, M. T., J. E. Roth, E. R. Pullman, R. M. Burgess, M. Reynolds, A. A. Stickney, M. D. Smith, and T. Zimmer. 1997. An ecological land survey for the Colville River delta, Alaska, 1996. Report for ARCO Alaska, Inc., Anchorage, AK, by ABR, Inc., Fairbanks, AK. 160 pp.
- Jorgenson, M. T., E. R. Pullman, and Y. Shur. 2002. Geomorphology of the NPRA study area, northern Alaska. Report by ABR, Inc., Fairbanks, AK, and University of Alaska Fairbanks, Dept. of Civil Engineering, Fairbanks, AK, for PHILLIPS Alaska, Inc., Anchorage, AK. 50 pp.
- King, J., and C. Dau. 1997. Expanded aerial searches for Steller's Eiders on the Arctic Coastal Plain of Alaska, 1997. Unpublished report by U.S. Fish and Wildlife Service, Fairbanks, AK. 4 pp.
- Quakenbush, L. T., R. H. Day, B. A. Anderson, F. A. Pitelka, and B. J. McCaffery. 2002. Historical and present breeding season distribution of Steller's Eiders in Alaska. *Western Birds* 33: 99–120.
- Seiser, P. E., and C. B. Johnson. 2010. Eider nest searches at the CD-3 pad, ice road, and spill-response sites on the Colville River delta, 2009. Report for ConocoPhillips Alaska, Inc., Anchorage, AK, by ABR, Inc., Fairbanks, AK. 13 pp.
- Seiser, P. E., and C. B. Johnson. 2011a. Eider nest searches at the CD-3 pad, ice road, and spill-response sites on the Colville River delta, 2010. Report for ConocoPhillips Alaska, Inc., Anchorage, AK, by ABR, Inc., Fairbanks, AK. 15 pp.
- Seiser, P. E., and C. B. Johnson. 2011b. Eider nest searches at the CD-3 pad, ice road, and spill-response sites on the Colville River delta, 2011. Report for ConocoPhillips Alaska, Inc., Anchorage, AK, by ABR, Inc., Fairbanks, AK. 14 pp.
- Seiser, P. E., and C. B. Johnson. 2012. Eider nest searches at the CD-3 pad, ice road, and spill-response sites on the Colville River delta, 2012. Report for ConocoPhillips Alaska, Inc., Anchorage, AK, by ABR, Inc., Fairbanks, AK. 14 pp.
- Seiser, P. E., and C. B. Johnson. 2014a. Eider nest searches at the CD3 pad, ice road, and spill-response sites on the Colville River delta, 2013. Report for ConocoPhillips Alaska, Inc., Anchorage, AK, by ABR, Inc., Fairbanks, AK. 13 pp.
- Seiser, P. E., and C. B. Johnson. 2014b. Eider nest searches at CD3, spill-response sites, and the CD3 and CD5 ice roads, in the Alpine Oilfield, 2014. Report for ConocoPhillips Alaska, Inc., Anchorage, AK, by ABR, Inc., Fairbanks, AK. 16 pp.
- Seiser, P. E., and C. B. Johnson. 2015. Eider nest searches at CD3 and spill-response sites in the Alpine Oilfield, 2015. Report for ConocoPhillips Alaska, Inc., Anchorage, AK, by ABR, Inc., Fairbanks, AK. 13 pp.
- Seiser, P. E., and C. B. Johnson. 2016. Eider nest searches in the Alpine Oilfield, 2016. Report for ConocoPhillips Alaska, Inc., Anchorage, AK, by ABR, Inc., Fairbanks, AK. 17 pp.
- Seiser, P. E., and C. B. Johnson. 2018a. Eider nest searches in the Alpine area, 2017. Report for ConocoPhillips Alaska, Inc., Anchorage, AK, by ABR, Inc., Fairbanks, AK.
- Seiser, P. E., and C. B. Johnson. 2018b. Eider nest searches in the GMT-1 area, 2017. Report for ConocoPhillips Alaska, Inc., Anchorage, AK, by ABR, Inc., Fairbanks, AK.
- USFWS (U.S. Fish and Wildlife Service). 2004. Final biological opinion for the Alpine Satellite Development Project. Fairbanks Fish and Wildlife Field Office, U.S. Fish and Wildlife Service, Fairbanks, AK. 62 pp.
- USFWS. 2011. Biological opinion for the CD-5 Alpine Satellite Facility, ConocoPhillips Alaska, Inc. Fairbanks Fish and Wildlife Field Office, U.S. Fish and Wildlife Service, Fairbanks, AK. 140 pp.

*Literature Cited*

- USFWS. 2014. Biological Opinion for Effects of Greater Moose's Tooth 1 oil and gas development in the National Petroleum Reserve-Alaska on the polar bear, Spectacled Eider, and the Alaska-breeding Steller's Eider. Fairbanks Fish and Wildlife Field Office, U.S. Fish and Wildlife Service, Fairbanks, AK. 38 pp.
- USFWS. 2015. Amendment to the biological opinion regarding the permitting, construction, and operation of GMT1. Fairbanks Fish and Wildlife Field Office, U.S. Fish and Wildlife Service, Fairbanks, AK. 7 pp.