United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Fairbanks Fish and Wildlife Field Office
101 12th Avenue, Room 110
Fairbanks, Alaska 99701
March 4, 2014

MEMORANDUM

To: **Greg Balogh, Coordinator, Arctic LCC**

From: **Sarah C. Conn, Project Leader, FFWFO**

Subject: **BO for an Arctic LCC-funded interdisciplinary study in Barrow, Alaska**

Cc: **Rick Lanctot, Wildlife Biologist, Migratory Bird Management**
Philip Martin, Science Coordinator, Arctic LCC

This memorandum is in response to your request to initiate consultation on endangered and threatened species, and critical habitats pursuant to Section 7 of the Endangered Species Act of 1973, as amended (ESA). The Arctic Landscape Conservation Cooperative (LCC) is proposing to fund shorebird, hydrology, and invertebrate research to evaluate impacts of climate change on shorebird species near Barrow, Alaska. Some aspects of the shorebird research efforts described in the Proposed Action were described and evaluated in a previous biological opinion (BO; USFWS 2013). However, the Proposed Action now includes additional shorebird, hydrology, and invertebrate research. The LCC funded project is for 3 years, and the previous BO would expire before then. Thus, a new section 7 consultation is required.

Because the previously-described shorebird project (USFWS 2013) is the foundation for this new research effort, we rely on information in that BO for portions of this new BO. Specifically, we rely on descriptions of a portion of the *Proposed Action*, most of the *Action Area*, and all of the *Status of the Species* and *Environmental Baseline* for two species present in the Action Area: spectacled eiders (*Somateria fisheri*) and the Alaska-breeding population of the Steller's eiders (*Polysticta stelleri*). Polar bears are also present in the *Action Area,* but would be minimally affected by the *Proposed Action*. Thus, we briefly discuss effects to polar bears in the *Effects of the Action* section. No critical habitat is present in the *Action Area*.

THE PROPOSED ACTION

The proposed project includes 3 years of field work in the Barrow area of northern Alaska. The five study objectives with field components are described below.

Objective 1: Hydrology study

Understand through field observation and modeling how present-day climate affects the biophysical environment (e.g., water and sediment temperature) of Arctic Coastal Plain ponds and adjacent tundra, and project through heat and mass transfer modeling how a changing climate might alter the timing (with a focus on snowmelt) and nature of these biophysical conditions year-round.

Under this objective, researchers would intensively sample the Snow Net Site to collect snow measurements, and 2 additional sites, "Lanctot New Aquatic" (LTA) and "Lanctot New Terrestrial" (LNT; see Map 1), to collect hydrology data. Researchers propose to intensively instrument locations at the LNA and LNA sites to continuously monitor the hydrologic and thermal regime in the air, snow, ice, water, and soil continuum. Hydrology and invertebrate researchers (See Objective 2) would collaborate to co-locate satellite stations for continuous water and sediment temperature measurements, and manually measured ice and snow thickness.

Field work would occur from about 1 May to 10 May, then 20 May to 15 June, 1 day in late June, 7 days in mid-July, 5 days in early/mid-Sep and 5 days in late October. Researchers would likely visit the Snow Net site once per day from 1 May to 10 May and 20 May to 15 June; they would visit the LNA and LNA sites up to once daily during all field periods for an estimate of 50 visits/per site per year.

Objective 2: Invertebrate study

Experimentally relate the growth, development, and emergence timing of dominant insect taxa used by shorebirds to spring tundra and pond conditions.

Researchers would use simple rearing experiments on dominant invertebrates to test and quantify hypothesized thermal controls during insect emergence. Field work would occur from about 3 June to 24 July. Field crews would collect overwintering larvae of several insect species from 6 common source ponds (Butler Invertebrate Ponds; Map 1) place them in 5-6 "experimental" ponds with different thermal conditions (Lanctot Invertebrate Ponds and perhaps LNA site; Map 1). Experimental ponds would be visited about twice weekly. Hobo loggers would track hourly temperatures in each treatment pond.

Objectives 3: Shorebird gut analysis

Use gut analysis and DNA sequencing to document diet of shorebird adults and chicks.

Through employing the following 3 tasks, researchers aim to obtain an accurate assessment of the food consumed by adult and young shorebirds and to determine whether shorebirds can adjust their foraging according to the species of invertebrates emerging.

Task1. To generate a reference DNA barcode library, invertebrates would be collected in terrestrial and aquatic habitats near the proposed hydrology and invertebrate capture sites (Lanctot invertebrate ponds, Lanctot Terrestrial xeric sites, Lanctot Terrestrial mesic sites, LNA, LNA). Collection methods would include soil core sampling for larval or subterranean insects,

such as beetles and spiders. These activities would occur from about 3 June – 7 August about once every 3 days.

Task 2. Adult shorebird diet would be assessed for Dunlin (*Calidris alpine*), Semipalmated Sandpiper (*Calidris pusilla*), Red Phalarope (*Phalaropus fulicarius*), and Pectoral Sandpiper (*Calidris melanotos*) through collections. Three individuals of each species would be lethally collected during the pre- and post-incubation periods for gut analysis. Birds would be collected daily from about 25 May – 5 June and then from 20 July – 7 August for up to 28 days at locations outside but near plots, and likely near Plot 6 (Map 1). Birds would be shot with a pellet gun which is very quiet and unlikely to disturb eiders. Depending on their general habitat use, birds may be shot in terrestrial or aquatic habitats. Field crews would coordinate with the listed eider field crew avoid collecting birds near active listed eider nests and known brood locations. Researchers would check ponds with binoculars for listed eiders from >100 m distance prior to collecting shorebirds (e.g., for Red Phalarope).

Task 3. Field crews would also capture 10 - 20 adult shorebirds of each species during incubation from about 5 June and 1 August to collect fecal samples following methods described in USFWS (2013).

Chick diet would be assessed by tracking 30 broods each from 2 shorebird species during each study year. Researchers propose to follow Dunlin all 3 years; the second species would be either Red Phalarope or Pectoral Sandpipers depending on their abundance. Broods would be followed with radio transmitters for up to 3 weeks after hatching from nests previously located on study plots (see Objectives 4 and 5 for details on shorebird tracking and capture). Efforts would be made to sample feces from at least 1 chick per brood once every 3 days until they fledge (about 18 days). Chicks would be placed in holding cages to collect feces. Researchers would coordinate with the listed eider field crew to avoid areas with active listed eider nests and known brood ponds. Brood tracking would begin on plots, but researchers anticipate broods to move away from plots to variable and difficult to predict distances.

Objective 4: Relating shorebird egg-laying and hatching to invertebrate emergence

Evaluate a fundamental assumption of the climate match/mismatch hypothesis.

This objective would evaluate the assumption that shorebird young hatching and their invertebrate prey emergence dates are currently matched. Invertebrate field work would occur from about 3 June to 7 August and use techniques described in Objective 2. In addition to sites listed in Objective 2, researchers would also sample from the Lanctot Invertebrate Ponds, Lanctot Terrestrial xeric sites, Lanctot Terrestrial mesic sites, LNA site, and LNA site. Each site would be visited every third day. Aside from core sampling methods would be similar to those described in Objective 3, Task 1.

Shorebird researchers would locate nests on 7 long-term study plots (Map 1) following protocols and nest searching techniques described in USFWS (2013).

Objective 5: Snow removal study

Assess whether a trophic mismatch currently exists by relating shorebird egg-laying and hatching date phenology to invertebrate emergence patterns in aquatic and terrestrial habitats

Researchers propose to create mismatches in 2 shorebird species (Dunlin and either Red Phalarope or Pectoral Sandpiper each year). They would create scenarios in which young hatch earlier and later than naturally. Field work would take place from 16 May to 25 May on Shorebird Survey Plot 5 (Map 1).

To facilitate early hatching, researcher would use 1) opportunistic sites on the leeward side of existing structures where earlier snow melt and thus earlier nesting occurs (Saalfeld et al. in press); and 2) manipulated sites where the placement of about 400 x 400 meters of black shade fabric on snow facilitates earlier snowmelt. Fabric installation would occur from about 16 May to 19 May, followed by daily visits to make repairs, if needed. Field crews would install fabric over snow and secure it with stakes prior most birds arriving in Barrow. No snow would be physically removed but a black shade fabric would be laid down temporarily to enhance the rate of snow melt. Fabric would be removed on about 25 May. Once the fabric is removed, the area would be monitored similarly to other plots (as described in USFWS (2013)) but at lower intensity to locate at least 15 nests of each species. In study years 2 and 3, researchers may expand the area of black shade fabric within Plot 5 if the experiences in study year 1 indicate this is a viable technique.

To facilitate late hatching, researchers would remove eggs from nests built where snow melted naturally and replace them with artificial eggs. Removed eggs would be refrigerated for 10 days to halt development and then would be placed back in the nest for normal incubation to occur. Researcher would also monitor 10 natural nests initiated within 3 days of the peak initiation date for that year and species.

To assess the growth and survival of shorebird young, individual parents and their broods would be captured at nests, weighed and measured, and then tracked using radio transmitters and located with a FLIR P640 Thermal Imaging camera. Broods would be monitored every 3 days until death or 18 days of age. During each visit, researchers would attempt to capture, weigh, and measure 1 to 3 chicks of each brood. Feces samples would also be collected to ascertain invertebrate diet. Survival of young would be assessed by evaluating the behavior of adults and location and condition of dead and alive chicks, using radio telemetry when possible.

Objective 6: Trophic modeling study

Model observed effects of a trophic mismatch on two species of shorebirds at local level (i.e., Barrow) to a population level, and assess which shorebird features make species more tolerant to climate change.

This objective requires no field work, and thus this objective would have no effect on listed species.

Other Minimization Measures

In addition to measures listed under the objectives above, all project partners would follow the procedures outlined below to minimize impacts on spectacled and Alaska-breeding Steller's eiders.

Researchers from invertebrate and hydrology teams will use the following protocol sampling ponds when listed eider broods could be present (10 July and later).

- Researchers will view ponds with binoculars from 100+ meters to determine if an eider hen and chicks are present. If no eiders are seen, they will continue looking for listed eiders as they approach the pond for sampling.
- If listed eiders are seen, researchers will avoid sampling the pond on that day and sample a nearby pond that is at least 100 meters from the designated sampling pond. However, researchers will attempt to sample the designated pond 3 days later following this same protocol.
- If a listed eider hen and brood appear to be using one of the sampling ponds throughout the brood-rearing (hen and ducklings observed during 3 or more consecutive visits), researchers will change to a new pond for sampling invertebrates that is at least 100 meters from the designated pond.

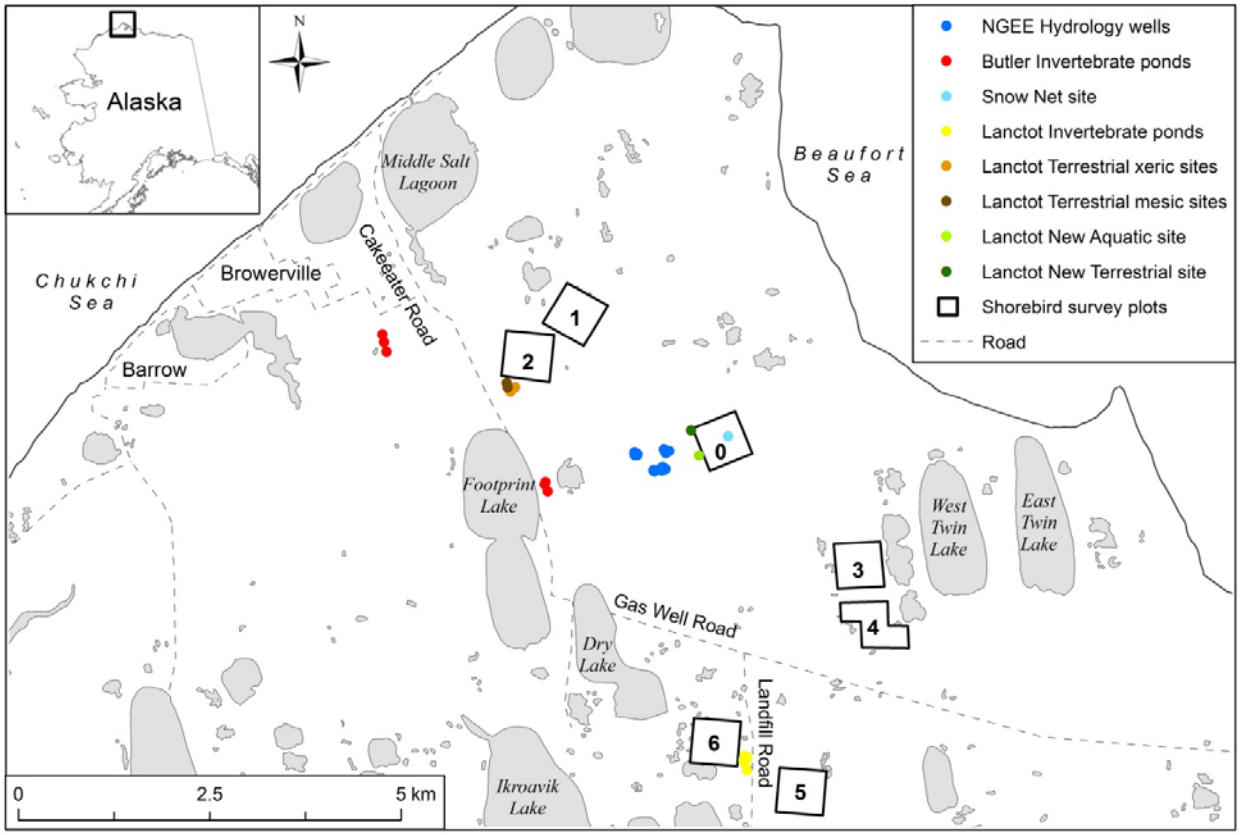
The shorebird activities will be the most invasive of all the objectives listed above because this work is over a large area and requires repeated visits that may interfere with nesting of threatened eiders. This is in contrast to the other field work which is limited to a small area. The following measures will be implemented in 2014 by the shorebird field crew:

- If a listed eider nest is found during shorebird ecology field activities, staff will record GPS coordinates and retreat to a distance of ≥100 m if the nest is found within a shorebird plot and ≥200 m if the nest is found outside the plots. Staff will report the nest observation to the USFWS eider program lead, David Safine, or his designee, as soon as practicable on the day the nest is found.
- The shorebird field crew will maintain a distance of ≥100 m of known active nests within a shorebird plot and ≥200 m of known active nests outside the plots. Within-plot activities may occur ≥100 m from nests located outside the plot. Nests will be considered active unless the USFWS eider crew confirms failure of the nest.
- The shorebird field crew will move to and maintain a ≥100-m distance from young eider broods that are detected during research activities to minimize the risk of fragmenting young broods or separating hens from ducklings, which would increase the predation risk to ducklings.
- The shorebird, invertebrate, and hydrology, and eider field crews will maintain communications regarding the status of eider nests in the Barrow area. Before the field work commences, the shorebird and eider crew leads will develop a procedure for exchanging information should the shorebird crew discover a listed eider nest. The teams will also maintain communications regarding the status and location of listed eider nests.

To minimize polar bear interactions should they occur, all field crews will follow the guidelines in Appendix A.

THE ACTION AREA

The project will occur near Barrow, Alaska and is identical to the action area described in USFWS (2013) with the addition new hydrology and invertebrate sites and Plot 5 as shown below in Map 1. Number of study ponds are as follows: Butler Invertebrate Ponds (6); Lanctot Mesic sites (3), Lanctot New Aquatic site (1), and Lanctot Invertebrate Ponds (5).



Map 1. Study sites for the 3-year shorebird, invertebrate, and hydrology study.

EFFECTS OF THE ACTION ON LISTED SPECIES

Project effects on polar bears

Transient polar bears (*Ursus maritimus*) from the Southern Beaufort Sea polar bear sub-population occur in low numbers the action area, and field crews could encounter these polar bears. To minimize the risk of negative human–bear interactions and respond to potential encounters with polar bears, MBM and partners will follow *Polar Bear Interaction Guidelines* (Appendix A) developed with the USFWS Alaska Region Marine Mammals Management Office. Implementation of these guidelines should reduce the risk of polar bear–human interactions. Based on the low probability of a human–polar bear interaction in the study area and the implementation of *Polar Bear Interaction Guidelines*, we expect that effects to polar bears will be insignificant and conclude the project is not likely to adversely affect polar bears.

Project effects on Alaska-breeding Steller's and spectacled eiders
The Service listed the spectacled eider (*Somateria fisheri*) on May 10, 1993 (58 FR 27474) and the Alaska-breeding population of the Steller's eider (*Polysticta stelleri*) as threatened on June 11, 1997 (62 FR 31748). The *Action Area* contains habitat that may be used by Alaska-breeding Steller's and spectacled eiders between May and September. Please see USFWS (2013) for a description of the *Status of the Species* and *Environmental Baseline* of these species.

Investigator Disturbance

Investigator disturbance during proposed field activities could adversely impact Steller's or spectacled eiders by: 1) displacing adults and/or broods from preferred habitats during pre-nesting, nesting, and brood rearing; 2) displacing females from nests, exposing eggs or small young to inclement weather or predators; and 3) interrupting normal behavior, possibly reducing foraging efficiency and feeding time. Please see USFWS (2013) for a discussion on potential effects of investigator disturbance of Alaska-breeding Steller's eiders and spectacled eiders.

Listed Eider Densities within Shorebird Plots

The *Proposed Action* would be most likely to adversely affect listed eiders through researcher disturbance within the 7 shorebird survey plots and the area immediately adjacent to the study plots (estimated as a 200 m wide area around each plot). Therefore, we estimated the density of nests within the plots and the 200 m areas surrounding then to assess the number of nests that could be potentially disturbed by research activities.

Alaska-breeding Steller's iders

Given observed extreme interannual variation in the abundance and distribution of Alaska-breeding Steller's eider nests near Barrow, it is difficult to predict the number of Steller's eiders that may nest within the shorebird plots in a given year. To provide a rough estimate of the number of Steller's eiders within the study plots, we multiplied the mean historical density of breeding pairs (representing number of females and therefore nests) in the Barrow eider ecology study area by the combined area of the 7 plots and associated zone of influence in which eiders may be disturbed:

$0.32 \text{ nests/km}^2 \times 6.76 \text{ km}^2 = 2.2 \text{ nests/year}$

Thus, we estimated about 2 Alaska-breeding Steller's eider nests annually may be within the 7 plots and their associated zones of influence. Using density calculated as an average over many years could substantially underestimate the actual number of Alaska-breeding Steller's eider nests in the action area in some locations in some years due to their patchy, variable distribution and considerable interannual variation in nesting effort.

Spectacled eiders

Spectacled eider density polygons constructed from the 2007–2010 waterfowl breeding population survey of the Arctic Coastal Plain, Alaska (Larned et al. 2011) provide our best estimates of spectacled eider nesting in the project area. We used the median of the spectacled

eider density the Barrow area (0.9785 birds/km^2) and divided this density by 2 to estimate the density of breeding females and thus potential nests (0.49 nests). We estimated the potential number of spectacled eider nests lost by multiplying the estimated number of breeding pairs by the extent of the affected area. Activities in the 7 nest plots would affect eiders nesting in 0.97 km^2 per plot for a total of 6.97 km^2 (0.97 km^2 x 7 plots = 6.97 km^2).

6.97 km^2 x 0.48925 nests/km^2 = 3.42 nests

Thus, we estimated about 3 spectacled eider nests annually may be within the 7 study plots and their zone of influence.

Effect of Minimization Measures

The frequency of investigator activity in the *Action Area* during nest searching, return visits to shorebird nests, and other field activities within plots may result in adverse effects to listed eiders in terms of loss of production through abandonment of the nest; full or partial depredation of an unattended nest; or depredation of ducklings associated with fragmented broods. While about 2 Steller's and 3 spectacled eiders may nest within the shorebird study plots and the area immediately surrounding them, we expect that minimization measures described in the *Proposed Action,* including a requirement for field crews to remain ≥100 m from active listed eider nests within and near shorebird study plots, would greatly reduce the risk of adverse effects. While we do not have data to quantitatively estimate this reduction in nest failures, we anticipate that annually no more than 1 nest of each species will fail due to investigator disturbance (or 3 for each species for the three-year project), provided all field crew members follow minimization protocols and eider and shorebird crews communicate locations of known nests.

Loss of Production

To calculate the number of Alaska-breeding Steller's eider eggs lost from nests, we multiplied the number of potentially lost nests (3) by 5.4, an estimated mean clutch size at Barrow (range = 1–8; Quakenbush et al. 2004) for Alaska-breeding Steller's eiders. Thus, we estimate a potential loss of up to 16 Alaska-breeding Steller's eider eggs (3 nests x 5.4 eggs/nest = 16.2 eggs) due to research disturbance on plots during the three-year project.

To calculate the number of spectacled eider eggs lost from nests, we multiplied the number of potentially lost nests (3) by 4.9, a maximum estimate of average (range: about 3-7 eggs) clutch size near Barrow (Safine 2011 and 2012, USFWS unpublished data) clutch size for spectacled eiders at hatch. Thus, we estimate a potential loss of up to 15 spectacled eider eggs (3 nests x 4.9 eggs/nest = 14.7 eggs) due to research disturbance on plots during the three-year project.

Off-plot Activities

Although research activities would also occur outside shorebird plots, the field crews have more flexibility in the locations where these activities would occur. Because field crews would incorporate minimization measures during all activities that could affect active nests and broods, we do not anticipate incidental take of listed eiders during off-plot research activities.

Indirect Effects

Indirect effects of the action are defined as "those effects that are caused by or would result from the Proposed Action and are later in time, but are still reasonably certain to occur" (50 CFR §402.02). While the activities that may be authorized could lead to additional research in the future, they cannot be said to be reasonably expected to occur. Therefore, no indirect effects to listed eiders are anticipated to result from the proposed activities.

Interrelated and Interdependent Actions

Interdependent actions are defined as "actions having no independent utility apart for the Proposed Action," while interrelated actions are defined as "actions that are part of a larger action and depend upon the larger action for their justification" (50 CFR §402.02). The Service has not identified any actions that are interrelated or interdependent to the Proposed Action.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the Action Area considered in this biological opinion. Future Federal actions that are unrelated to the Proposed Action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. When analyzing cumulative effects of a Proposed Action, it is important to define both the spatial (geographic), and temporal (time) boundaries. Within these boundaries, the types of actions that are reasonably foreseeable are considered.

Under the ESA, cumulative effects are the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this BO. Future Federal actions that are unrelated to the Proposed Action are not considered because they require separate consultation under the ESA.

Additional scientific research is likely to occur in the *Action Area*. We anticipate that most research would involve a Federal action agency through funding or permitting of those activities. While there is the possibility future scientific research may occur in the action area that does not require consultation under the ESA, we have determined that such research is not reasonably certain to occur.

CONCLUSION

Regulations (51 CFR 19958) that implement section 7(a)(2) of the ESA define "jeopardize the continued existence of" as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species."

In evaluating the impacts of the proposed project to listed eiders, the Service identified direct and indirect adverse effects that could result from habitat loss and disturbance. Using methods and

logic explained in the Effects of the Action section, the Service estimates 16 Steller's eider and 15 spectacled eider eggs may be lost through investigator disturbance during the three-year project. Loss of nests would result in loss of eggs. Loss of eggs is of much lower significance for survival and recovery of the species than the death of an adult bird.

Using survival estimates for nests and several age classes near Barrow (unless specified elsewhere), we can estimate the number of adult birds that could be produced in the Action Area, and thus the potential loss of adult recruitment into the breeding population. Spectacled eider nest success recorded near Barrow ranged from 32-72% (data from 2010-2012; Safine 2011 and 2012, USFWS unpublished data). From the nests that survived to hatch, spectacled eider brood survival to 50 days (fledging) near Barrow ranged from 54-86% (data from 2011-2012; Safine 2012, USFWS unpublished data). Average spectacled eider brood size near fledging (≥ 38 days old) ranged from about 3 to 3.5 birds (data from 2011-2012; Safine 2012, USFWS unpublished data). Because no estimate is available for first-year survival of spectacled eiders, we use king eiders from the North Slope (Kuparuk Oilfield and near Teshekpuk Lake) as a surrogate (Oppel and Powell 2010). Juvenile survival (from fledging to one year of age) of king eiders was estimate at 0.67 (Oppel and Powell 2010). Annual survival of adults (females captured on nests from the Y-K Delta) was estimated at 78% (Grand et al. 1998). Adult survival is generally thought to remain constant after two years of age. Spectacled eider females generally become part of the breeding population at three years of age (Petersen et al. 2000). Given the information presented above, we expect that only a small proportion of spectacled eider eggs or ducklings near Barrow would eventually survive to maturity. Using the information above, we generated a constant to convert nests to an estimated maximum number of adult birds (at three years of age) produced:

> 0.72 nest survival x 0.86 brood survival x 3.5 fledglings per brood x 0.67 juvenile survival x 0.78 adult annual survival (2 years) x 0.78 adult annual survival (3 years) = 0.88, a constant

To calculate the lost productivity resulting from the loss of eggs, we multiplied the number of nests lost by the constant 0.88, likely a significant over estimate of the number of eggs reaching adult breeding status (i.e., the proportion of eggs that survive to adulthood is likely much lower). We conservatively estimate loss productivity of 3 spectacled eider adults (3 nests x 0.88 = 2.64) during the three-year project. This amount of lost production is unlikely to cause population-level declines, and, stated previously, is likely a significant overestimate of potential effects. *Accordingly, it is the Services' biological opinion that the Proposed Action is <u>not</u> likely to jeopardize the continued existence of spectacled eiders.*

We do not have survival estimates for age classes after fledging for Alaska-breeding Steller's eiders. But, information from spectacled eiders, conservatively estimate loss productivity of 3. This amount of lost production is unlikely to cause population-level declines, and, stated previously, is likely a significant overestimate of potential effects. *Accordingly, it is the Services' biological opinion that the Proposed Action is <u>not</u> likely to jeopardize the continued existence of Alaska-breeding Steller's eiders.*

This BO's determination of non-jeopardy is based on the assumption that 1) all field crews will adhere to minimization measures; and 2) the LCC will consult with the USFWS Endangered Species Program on any future activities related to the Proposed Action that are not evaluated in this document. Thus, should the project description change, the LCC should contact the Fairbanks Field Office to ensure that potential impacts have been evaluated and authorized.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, but not the purpose of, carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS).

Adverse effects to listed eiders have been substantially reduced through implementation of conservation measures by field crews. However, the Service still anticipates some adverse effects to listed eiders. As described in the *Effects of the Action*, activities described and assessed in this BO may adversely affect Alaska-breeding Steller's eiders and spectacled eiders through investigator disturbance. Methods used to estimate loss of eider production resulting from investigator disturbance are described in the *Effects of the Action* section. Based on these estimates of loss of production, the Service anticipates that 16 Alaska-breeding Steller's eider eggs and 15 spectacled eider eggs are likely to be taken over three years as a result of the *Proposed Action* through the effects of disturbance (harm).

While this ITS satisfies the requirements of the ESA, it does not constitute an exemption from the prohibitions of take of listed migratory birds under the more restrictive provisions of the Migratory Bird Treaty Act. However, the Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions specified herein.

The measures described below are non-discretionary, and must be undertaken/required by all researchers receiving LCC funding so that they become binding conditions of any contract, as appropriate, for the exemption in section 7(o)(2) to apply. The LCC has a continuing duty to regulate the activity covered by this ITS. If the LCC should (1) fail to assume and implement the terms and conditions or (2) fail to require any applicant to adhere to the terms and conditions of

the ITS through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse.

REASONABLE AND PRUDENT MEASURES

Reasonable and prudent measures (RPMs) and their implementing terms and conditions (T&Cs) aim to minimize the incidental take anticipated from activities described in this BO. USFWS has not identified RPMs for listed eiders; however, we anticipate conservation measures identified in the Proposed Action section above will be fully implemented by field crews and will serve to effectively minimize potential individual-level effects of the *Proposed Action* to Alaska-breeding Steller's and spectacled eiders. Field procedures related to listed eiders will be developed cooperatively by the shorebird, hydrology, invertebrate, and eider ecology program leads before each field season commences. Additionally, field crews will remain in communication regarding locations of known active nests and broods of listed eiders to minimize take from disturbance. Because the fate of listed eider nests found within plots will be monitored by the eider crew to determine their fate, the effectiveness of the minimization measures can be assessed and adjusted if take is exceeded.

If injured or dead Steller's or spectacled eiders are encountered during field activities, please contact David Safine (Fairbanks, 907-456-0354; Barrow, 907-367-3761), Neesha Stellrecht (907-456-0297), or Angela Matz at (907-456-0442) with the Fairbanks Fish and Wildlife Field Office, Endangered Species Branch, Fairbanks, Alaska for instructions on the handling and disposal of the injured or dead bird.

REINITIATION NOTICE

This concludes formal consultation for this project. Re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if:

1. The amount or extent of incidental take is exceeded;
2. New information reveals effects of the action agency that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion;
3. The Proposed Action is subsequently modified in a manner that causes an effect to listed species or critical habitat not considered in this opinion; or
4. A new species is listed or critical habitat is designated that may be affected by the action.

Please note this BO satisfies the LCC's obligations under the ESA for 3 field seasons. We understand that lapses in funding may delay a project year. *Please contact our office prior to each field season to inform us regarding certainty of field work.*

Thank you for your concern for endangered species and for your cooperation in the development of this biological opinion. If you have any comments or require additional information, please contact Shannon Torrence at (907) 455-1871.

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APPENDIX A:

POLAR BEAR INTERACTION GUIDELINES

These Polar Bear Interaction Guidelines (Guidelines) were developed to ensure that activities are conducted in a manner that avoids conflicts between humans and polar bears. Polar bears are protected under the Marine Mammal Protection Act (MMPA), and were listed as a threatened species under the Endangered Species Act (ESA) in 2008. The MMPA and ESA both prohibit the "take" of polar bears without authorization. Take includes disturbance/harassment, as well as physical injury and killing of individuals.

In addition to sea ice, polar bears use marine waters and lands in northern Alaska for resting, feeding, denning, and seasonal movements. They are most likely to be encountered within 25 miles of the coastline, especially along barrier islands during July-October. Polar bears may also be encountered farther inland, especially females during the denning period (October-April). Polar bears may react differently to noise and human presence. The general methods for minimizing human-bear conflicts are to: 1) avoid detection and close encounters; 2) minimize attractants; and 3) recognize and respond appropriately to polar bear behaviors. These Guidelines provide information for avoiding conflicts with polar bears during air, land, or water-based activities.

Unusual sightings or questions/concerns can be referred to: Susanne Miller or Craig Perham, Marine Mammals Management Office (MMM Office), 1-800-362-5148; or to Sarah Conn (907) 456-0499 of the Fairbanks Fish & Wildlife Field Office (FFWFO).

When operating aircraft:

- If a polar bear(s) is encountered, divert flight path to a minimum of 2,000 feet above ground level or ½ mile horizontal distance away from observed bear(s) whenever possible.

When traveling on land, ice, or water:

- Avoid surprising a bear. Be vigilant—especially on barrier islands, in river drainages, along bluff habitat, near whale or other marine mammal carcasses, or in the vicinity of fresh tracks.

- Between October and April special care is needed to avoid disturbance of denning bears. If activities are to take place in that time period the MMM Office should be contacted to determine if any additional mitigation is required. In general, activities are not permitted within one mile of known den sites.

- Avoid carrying bear attractants (such as strongly scented snacks, fish, meat, or dog food) while away from camp; if you must carry attractants away from camp, store foods in air-tight containers or bags to minimize odor transmission until you return them to "bear-resistant" containers.*

- If a polar bear(s) is encountered, remain calm and avoid making sudden movements. Stay downwind if possible to avoid allowing the bear to smell you. Do not approach polar bears. Allow bears to continue what they were doing before you encountered them. Slowly leave the vicinity if you see signs that you've been detected. Be aware that safe viewing distances will vary with each bear and individual situation. Remember that the closer you are to the animal, the more likely you are to disturb it.

- If a bear detects you, observe its behavior and react appropriately. Polar bears that stop what they are doing to turn their head or sniff the air in your direction have likely become aware of your presence. These animals may exhibit various behaviors:

    - *Curious* polar bears typically move slowly, stopping frequently to sniff the air, moving their heads around to catch a scent, or holding their heads high with ears forward. They may also stand up.

    - *A threatened or agitated* polar bear may huff, snap its jaws together, stare at you (or the object of threat) and lower its head to below shoulder level, pressing its ears back and swaying from side to side. These are signals for you to begin immediate withdrawal by backing away from the bear. If this behavior is ignored, the polar bear may charge. Threatened animals may also retreat.

    - In rare instances you may encounter a *predatory* bear. It may sneak or crawl up on an object it considers prey. It may also approach in a straight line at constant speed without exhibiting curious or threatened behavior. This behavior suggests the bear is about to attack. Standing your ground, grouping together, shouting, and waving your hands may halt the bear's approach.

- If a polar bear approaches and you are in the bear's path—or between a mother and her cubs—get out of the way (without running). If the animal continues to approach, stand your ground. Gather people together in a group and/or hold a jacket over your head to look bigger. Shout or make noise to discourage the approach.

- If a single polar bear attacks, defend yourself by using any deterrents available. If the attack is by a surprised female defending her cubs, remove yourself as a threat to the cubs.

When camping:

- Avoid camping or lingering in bear high-use areas such as river drainages, coastal bluffs and barrier islands.

- Store food and other attractants in "bear-resistant" containers*. Consider the use of an electric fence as additional protection. Do not allow the bear to receive food as a reward in your camp. A food-rewarded bear is likely to become a problem bear for you or someone else in the future.

- Maintain a clean camp. Plan carefully to: minimize excess food; fly unnecessary attractants out on a regular basis (i.e. garbage, animal carcasses, excess anti-freeze or petroleum products); locate latrines at least ¼ mile from camp; and wash kitchen equipment after every use.

- If a polar bear approaches you in camp, defend your space by gathering people into a large group, making noise and waving jackets or tarps. Continue to discourage the bear until it moves off. Have people watch the surrounding area in case it returns later, keeping in mind that polar bears are known to be more active at night. Additional measures to protect your camp, such as electric fences or motion sensors can be used.

Harassment of polar bears is not permissible, unless such taking (as defined under the MMPA) is imminently necessary in defense of life, and such taking is reported to FWS within 48 hours.

*Containers must be approved and certified by the Interagency Grizzly Bear Committee as "bear-resistant." Information about certified containers can be found at http://www.igbconline.org/html/container.html.

FOR DEPARTMENT OF INTERIOR EMPLOYEES ONLY

Use of Deterrents

In addition to following the Guidelines above, all U.S. Fish and Wildlife Service (Service) employees must have completed the Department of the Interior's (DOI) Bear and Firearm Safety Training course and be current in certification before engaging in field activities. Service staff must practice with and know how to use deterrents prior to conducting field work. If working in bear habitat, Service staff must anticipate and plan for possible scenarios of encountering polar bears, and identify appropriate responses, prior to initiating field work. Use of non-lethal polar bear deterrents by Service staff is only permissible if it is done in a humane manner and is for the purposes of protection or welfare of the bear or the public. Service staff has the right to use lethal methods to protect the public from polar bears in defense of life situations, and may do so when all reasonable steps to avoid killing the bear(s) have been taken.

Notification of Use of Deterrents

The Department of the Interior Bear Incident Report Form will be used to record and report polar bear-human interactions *that require use of deterrents*. These incidents will be reported to the MMM Office. This information will be used to track interactions over time and improve polar bear conservation and management.