PART 517—SPECIAL CONTRACTING METHODS

■ 2. Amend section 517.207 by revising the introductory text and paragraph (a) to read as follows:

517.207 Exercise of options.

In addition to the requirements of FAR 17.207, the contracting officer shall:

(a) Document the contract file with the rationale for exercising the contract option to extend the period of performance if the contractor's performance under the contract is less than satisfactory.

* * * * *

PART 538—FEDERAL SUPPLY SCHEDULE CONTRACTING

■ 3. Revise section 538.270 heading to read as follows:

538.270 Solicitation, evaluation, and award of Federal Supply Schedule (FSS) contracts.

■ 4. Amend section 538.273 by adding paragraphs (d)(36) and (e) to read as follows:

538.273 FSS solicitation provisions and contract clauses.

* * * * *

(d) * * *

(36) 552.238–116, Option to Extend the Term of the FSS Contract. Use in all FSS solicitations and contracts.

(e) Insert the following fill-in information within the blank of paragraph (d) of FAR clause 52.216–22, Indefinite Quantity: ''the completion of customer order, including options, 60 months following the expiration of the FSS contract ordering period''.

PART 552—SOLICITATION PROVISIONS AND CONTRACT CLAUSES

■ 5. Add section 552.238–116 to read as follows:

552.238–116 Option to Extend the Term of the FSS Contract.

As prescribed in 538.273(d)(36), insert the following clause:

Option To Extend the Term of the FSS Contract (Date)

(a) The Government may require continued performance of this contract for an additional 5 year period. This option may be exercised up to three times.

(b) The Contracting Officer may exercise the option by providing written notice to the Contractor 30 days before the contract expires.

(End of clause)

[FR Doc. 2021–18517 Filed 8–30–21; 8:45 am]

BILLING CODE 6820–61–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–HQ–ES–2019–0014; 4500030113]

RIN 1018–BD03

Endangered and Threatened Wildlife and Plants; Threatened Status With Section 4(d) Rule for the Dolphin and Union Caribou and 12-Month Finding for the Peary Caribou

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; 12-month finding.

SUMMARY: We, the U.S. Fish and Wildlife Service, announce a 12-month finding on a petition to list the Peary caribou (*Rangifer tarandus pearyi*) (a caribou subspecies) and the Dolphin and Union caribou (*Rangifer tarandus groenlandicus x peary*) as endangered or threatened subspecies under the Endangered Species Act of 1973, as amended (Act). Both Peary caribou and Dolphin and Union caribou are native only to Canada. After a review of the best available scientific and commercial information, we find that it is not warranted at this time to add the Peary caribou to the List of Endangered and Threatened Wildlife. We find that listing the Dolphin and Union caribou as a Distinct Population Segment (DPS) of the barren-ground caribou subspecies (*Rangifer tarandus groenlandicus*) is warranted. Accordingly, we propose to list this DPS with a rule issued under section 4(d) of the Act (''4(d) rule''). To ensure that subsequent rulemaking resulting from this proposed rule is as accurate and effective as possible, we are soliciting information from the public, other governmental agencies, the Government of Canada and its provincial governments, the scientific community, industry, and any other interested parties.

DATES: We will accept comments received or postmarked on or before November 1, 2021. Comments submitted electronically using the Federal eRulemaking Portal (see **ADDRESSES**, below) must be received by 11:59 p.m. Eastern Time on the closing date. We must receive requests for public hearings, in writing, at the address shown in **FOR FURTHER INFORMATION CONTACT** by October 15, 2021

ADDRESSES: You may submit comments by one of the following methods:

(1) *Electronically:* Go to the Federal eRulemaking Portal: *http://www.regulations.gov.* In the Search box, enter the docket number or RIN for this rulemaking (presented above in the document headings). For best results, do not copy and paste either number; instead, type the docket number or RIN into the Search box using hyphens. Then, click on the Search button. On the resulting page, in the panel on the left side of the screen, under the Document Type heading, check the Proposed Rule box to locate this document. You may submit a comment by clicking on ''Comment.''

(2) *By hard copy:* Submit by U.S. mail to: Public Comments Processing, Attn: FWS–HQ–ES–2019–0014; U.S. Fish and Wildlife Service; MS: JAO/3W; 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We request that you send comments only by the methods described above. We will post all comments on *http://www.regulations.gov.* This generally means that we will post any personal information you provide us (see *Public Comments,* below, for more information).

FOR FURTHER INFORMATION CONTACT: Elizabeth Maclin, Branch of Delisting and Foreign Species, Ecological Services Program, U.S. Fish and Wildlife Service, 5275 Leesburg Pike, MS: ES, Falls Church, VA 22041; telephone 703–358–2646. If you use a telecommunications device for the deaf, call the Federal Relay Service at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Endangered Species Act of 1973, as amended (''Act,'' 16 U.S.C. 1531 *et seq.*), if we determine that a species warrants listing as an endangered or threatened species, we are required to promptly publish a proposal in the **Federal Register** and make a determination on our proposal within 1 year.

What this document does. We find that listing the Peary caribou subspecies is not warranted, and we propose to list the Dolphin and Union caribou DPS as a threatened species with a rule under section 4(d) of the Act.

The basis for our action. Under the Act, we may determine that a species is an endangered or threatened species because of any of five factors, alone or in combination: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued

existence. We have determined that the Peary caribou is not in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. We have determined that the Dolphin and Union caribou DPS is likely to become endangered in the foreseeable future throughout all of its range, meeting the definition of a threatened species.

Both caribou subspecies exist in harsh environments to which they have adapted over millennia. These harsh environmental conditions combined with the fact that they live on islands from which they make seasonal migrations across sea ice in order to find adequate nutrition combine to exert pressure on both the Peary caribou subspecies and Dolphin and Union caribou DPS. The major threats that impacted both the Peary caribou and Dolphin and Union caribou are the cumulative effects of climate change and other changes brought about by climate change. While these two subspecies face similar threats, the magnitude of threats they face is different between the two subspecies, including with respect to the following threats:

- Long-term decline in sea ice;
- Increase in icing events on land;
- Hunting;
- Outbreaks of parasites or disease;
- Disturbance due to development, oil and gas exploration, and shipping; and
- Increases in shipping traffic.

The Peary caribou is found farther to the north of the Canadian Arctic while the Dolphin and Union caribou is located to the south. Certain activities, such as shipping and oil and gas exploration, are more concentrated in the southern portion of the Canadian Arctic, thus affecting the Dolphin and Union caribou more strongly than the Peary caribou. Furthermore, models of sea-ice loss projected that the decline in sea ice in the lower Canadian Arctic will occur earlier and faster than the high Arctic. The differences in degree of threats result in the population trends for these two subspecies moving in opposite directions. Although the Peary caribou has experienced wide fluctuation in its population, the subspecies has experienced an increase of about 150 percent within the past two decades (COSEWIC 2015, pp. 42–43). In contrast, after reaching a high in 1997, the Dolphin and Union caribou population has steadily declined.

We are also proposing a section 4(d) rule. When we list a species as threatened, section 4(d) of the Act (16 U.S.C. 1533(d)) allows us to issue regulations that are necessary and advisable to provide for the conservation of the species. Accordingly, we are proposing a 4(d) rule for the Dolphin and Union caribou that would, among other things, prohibit import, export, interstate or foreign commerce in the course of commercial activity, sale or offer for sale, or to attempt to engage in any such conduct. Exceptions are provided for import of personal sport-hunted trophies legally hunted in and exported from Canada. We may issue permits to carry out otherwise prohibited activities, including those described above, involving threatened wildlife under certain circumstances, such as for scientific purposes, or the enhancement of propagation or survival of the subspecies in the wild.

Peer review. In accordance with our joint policy on peer review published in the **Federal Register** on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act, we solicited the expert opinion of five appropriate and independent specialists for peer review of the Species Status Assessment that provides the biological basis for this proposed listing determination. The purpose of peer review is to ensure that our listing determinations are based on scientifically sound data, assumptions, and analyses. Their comments and suggestions can be found at *https://www.fws.gov/endangered/improving_ESA/peer_review_process.html.*

Because we will consider all comments and information received during the comment period, our final determination may differ from this proposal. After considering comments and information we receive, we may conclude that the species is endangered instead of threatened, or we may conclude that the species does not warrant listing as either an endangered species or a threatened species. Such final decisions would be a logical outgrowth of this proposal, as long as we: (1) Base the decisions on the best scientific and commercial data available after considering all of the relevant factors; (2) do not rely on factors Congress has not intended us to consider; and (3) articulate a rational connection between the facts found and the conclusions made, including why we changed our conclusion.

Information Requested

We intend that any final action resulting from this proposed rule will be based on the best scientific and commercial data available and be as accurate and as effective as possible. Therefore, we request comments or information from other concerned governmental agencies, including Canadian national and provincial governments, local indigenous people of Canada, the scientific community, industry, and any other interested parties concerning this proposed rule. We particularly seek comments concerning:

(1) The species' biology, range, and population trends, including:

(a) Biological or ecological requirements of the species, including habitat requirements for feeding, breeding, and sheltering;

(b) Genetics and taxonomy of the two caribou entities; specifically, any genetic information that would help inform the taxonomic status of the Dolphin and Union caribou;

(c) Historical and current range including distribution patterns, particularly regarding their seasonal migrations;

(d) Historical and current population levels, and current and projected population trends; and

(e) Past and ongoing conservation measures for these species and/or their habitat.

(2) Factors that may affect the continued existence of the species, which may include habitat destruction, modification, or curtailment, overutilization, disease, predation, the inadequacy of existing regulatory mechanisms, or other natural or manmade factors.

(3) Biological, commercial, trade, or other relevant data concerning any threats (or lack thereof) to this species and existing regulations that may be addressing those threats.

(4) Additional information concerning the historical and current status, range, distribution, and population size of this species, including the locations of any additional populations of this species.

(5) Information on regulations that are necessary and advisable to provide for the conservation of the Dolphin and Union caribou and that the Service can consider in developing a 4(d) rule for the species, particularly, information concerning the extent to which the 4(d) rule should prohibit any act prohibited by section 9(a)(1) or whether any exceptions should be provided from the prohibitions in the 4(d) rule.

Please include sufficient information with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include.

Please note that submissions merely stating support for, or opposition to, the action under consideration without providing supporting information, although noted, will not be considered

in making a determination, as section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or a threatened species must be made ''solely on the basis of the best scientific and commercial data available.''

You may submit your comments and materials concerning this proposed rule by one of the methods listed in **ADDRESSES**. We request that you send comments only by the methods described in **ADDRESSES**.

If you submit information via *http://www.regulations.gov,* your entire submission—including any personal identifying information—will be posted on the website. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on *http://www.regulations.gov.*

Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on *http://www.regulations.gov*.

Public Hearing

Section 4(b)(5) of the Act provides for one or more public hearings on this proposal, if requested. Requests must be received by the date listed above in **DATES**. Such requests must be sent to the address shown in **FOR FURTHER INFORMATION CONTACT**. If requested, we will schedule any such public hearings, and announce the dates, times, and places of those hearings, as well as how to obtain reasonable accommodations, in the **Federal Register** at least 15 days before the hearing. For the immediate future, we will provide these public hearings using webinars that will be announced on the Service's website, in addition to the **Federal Register**. The use of these virtual public hearings is consistent with our regulation at 50 CFR 424.16(c)(3).

Previous Federal Actions

On September 15, 2009, we received a petition dated the same day from the International Fund for Animal Welfare (hereafter referred to as petitioner) requesting that two subspecies of caribou (*Rangifer tarandus*) be listed as endangered or threatened under the Act. These two subspecies are the Peary caribou (*R. t. pearyi*) and the Dolphin and Union caribou (*R. t. groenlandicus x pearyi*). On April 5, 2011, we published a ''positive'' 90-day finding that the petition presented substantial scientific or commercial information indicating that listing both the Peary caribou subspecies and Dolphin and Union caribou subspecies as endangered or threatened may be warranted (76 FR 18701), and we initiated a status review of these two subspecies.

This document summarizes the status reviews for these two species under section 4(b)(3)(B) of the Act and publishes our findings. The actual assessments of each species (also called a species report) are available at *http://www.regulations.gov* in Docket No. FWS–HQ–ES–2019–0014. This document also includes the proposed rule to list the Dolphin and Union caribou Distinct Population Segment (DPS) of the barren-ground caribou subspecies as a threatened species with a 4(d) rule.

Supporting Documents

A species report was prepared for each species. The species reports represent compilations of the best scientific and commercial data available concerning the status of each species, including the impacts of past, present, and future factors (both negative and beneficial) affecting the species. The Service sent the species reports to five independent peer reviewers and received five responses.

I. Proposed Listing Determination—Peary Caribou

Background

Description

Peary caribou have relatively large, short hooves; square muzzles; short, rounded ears; and dense pale fur made of hollow hairs. Their fur is long and silky white in early winter and changes to a light brown/tan in the spring. In the summer, the coat is slate with a white stomach; legs are white with the flank having a pronounced frontal stripe. Both male and female caribou grow narrowly spreading antlers, although antlers may be absent in some females. Antler velvet is grey, and the antlers are bone-colored (COSEWIC 2004, pp. 9–10). Peary caribou have smaller bodies with shorter legs and faces when compared to the barren-ground caribou (*Rangifer tarandus groenlandicus*) on the North American mainland (COSEWIC 2015, p. 5).

Taxonomy

All caribou and reindeer worldwide are considered to be the same species (*Rangifer tarandus*) in the Order Artiodactyla (even-toed ungulates) and Family Cervidae (deer) (Integrated Taxonomic Information System (ITIS) 2013, unpaginated; Mountain Caribou Science Team 2005, p. 1; Smithsonian National Museum of Natural History 2013, npn; COSEWIC 2011, p. 11). Although caribou and reindeer are referred to by different names based on geography and whether or not they are bred in captivity, they are able to interbreed and produce offspring (COSEWIC 2002, p. 9; Hummel and Ray, 2008, p. 31). In Europe, the common name for *Rangifer tarandus* is reindeer. In North America, the common name for the species is caribou; only the individuals bred in captivity are called reindeer (Cichowski et al. 2004, p. 224). For consistency, the term caribou will be used to refer to the species *Rangifer tarandus* in this document. According to the American Society of Mammologists' checklist of mammal species of the world and ITIS, 14 subspecies of caribou are currently recognized worldwide, including the subspecies Peary caribou, *Rangifer tarandus pearyi* (ITIS 2017, unpaginated).

Peary caribou were first taxonomically described in 1902. The first widely accepted classification below the species level of caribou, *Rangifer tarandus,* in North America was in 1961 (COSEWIC 2015, p. 5; COSEWIC 2011, pp. 11–12; Shackleton 2010, p. 3; Banfield 1961, entire).

Since the 1960s, much has been learned about caribou ecology, distribution, and genetics that has revealed substantial diversity within the initial 1961 subspecies classifications (Miller et al. 2007, p. 16). Many have proposed alternative classifications to account for variability within and among the various subspecies of caribou. Populations were described with terms such as ''ecotypes'' based on migration patterns and calving strategies, and adaptations to a certain set of environmental conditions (Bergerud 1996, entire, as cited in COSEWIC 2011, p. 13). This later classification has caused confusion because there is no universally accepted list of caribou ecotypes or criteria to distinguish them (COSEWIC 2011, pp. 12–13).

In 1979, an independent advisory committee of wildlife experts, Committee on the Status of Endangered Wildlife in Canada (COSEWIC), assessed the status of Peary caribou, *Rangifer tarandus pearyi,* and what is now known as the Dolphin and Union caribou as a single subspecies for purposes of Canada's Species at Risk Act (SARA). Following the assessment, COSEWIC assigned the species a status of threatened under SARA. A threatened species under SARA is a wildlife species that is likely to become endangered if nothing is done to reverse

the factors leading to its extirpation or extinction (COSEWIC 2016, pp. 85–86). In 1991, this entity was split up and assessed as three separate populations: Banks Island (Endangered), High Arctic (Endangered), and Low Arctic (Threatened). In May 2004, these three populations were deactivated and combined into a single entity, the Peary caribou. The Peary caribou was then reassessed and given the status of endangered (COSEWIC 2016, p. 86).

In 2011, COSEWIC prepared to conduct a reassessment of all caribou in Canada; as a result, they published a document detailing the ''designatable units'' (DU) of caribou, which were geographically based areas created for management purposes. Peary caribou populations are considered one of the DUs, and as such, a review of the current science on the species was conducted. In this report, COSEWIC recognized Peary caribou as a subspecies (*R. t. pearyi)* distinct from the barren-ground caribou (*R. t. groenlandicus)* and distinct from the Dolphin and Union caribou subpopulation. Additionally, the report states that Peary caribou have ''no clear morphological differentiation within [the Peary populations] to support any subdivision'' (Gunn 2009, as cited in COSEWIC 2011, p. 23).

A new status report published in 2015 confirmed Peary caribou status as a subspecies (COSEWIC 2015, p. 13). At this time, both the northern and southern Peary caribou populations are considered the same subspecies (Taylor et al. 2012, p. 36746; Jenkins et al. 2011, p. 27; McFarlane et al. 2014, as cited in COSEWIC 2015, p. 6). We accept the characterization of the Peary caribou as a subspecies based on genotypic and phenotypic evidence, and we consider all Peary caribou to be one subspecies distinct from the barren-ground caribou and distinct from the Dolphin and Union caribou (COSEWIC 2015, p. 13; Peterson et al. 2010, p. 698; COSEWIC 2004, pp. 8, 11–17; McFarlane et al. 2009, pp. 105, 120–126).

Life History

Peary caribou have an average lifespan of 13–15 years, similar to other types of caribou. Males typically reach breeding age at around 4 years and females (cows) between 2–3 years (COSEWIC 2004, p. 28). Approximately 80 percent of females will calve annually; females will generally reproduce between the ages of 2 and 13 years and males between 4 and 13 years (Gunn et al. 2000, as cited in COSEWIC 2004, p. 28). The subspecies resides at a latitude that occurs at the edge of suitable areas for plant growth. This condition necessitates a mobile feeding strategy where the Peary caribou migrate from island to island to maximize forage (Miller and Barry 2009, pp. 179, 185). The annual rut (mating season of caribou) usually occurs in late autumn, and calving occurs in late spring with variation depending on the latitude and environmental conditions (COSEWIC 2011, p. 11; Gates et al. 1986, pp. 216–221). Caribou cows are known to be loyal to their calving grounds (COSEWIC 2004, p. 30). In free-ranging caribou populations, the proportion of caribou averages 40 males to 60 females (Miller et al. 2007, p. 25).

The fecundity (the reproductive rate of an organism) or calf production (the term often used in caribou research) and recruitment (when calves survive their first winter and become part of a population) of Peary caribou are highly dependent on the female's physical condition, specifically on fat reserves (Cameron et al. 1992, p. 480). The nutritional condition of the female is dependent on the prevailing environmental conditions; as a result, there is high variability in annual pregnancy rate, calf production, and calf recruitment. Depending on the environmental factors and the physical conditions of females, pregnancy rates can vary from 0 percent to 100 percent. In severe winters, recruitment of calves can drop to 0 percent (COSEWIC 2004, p. 28). Under favorable conditions, roughly 50 percent of calves survive their first winter (Miller et al. 2007, p. 25).

Diet and Nutrition

Peary caribou calving is closely related to plant phenology (timing of plant blooming based on daylight and temperature). Seasonal feeding is critical for various life stages such as lactation and growth during the spring, increasing fat reserves during the summer, and surviving during the winter (COSEWIC 2004, pp. 28–35). Summer and winter forage varies based on availability, but Peary caribou prefer willow *(Salix arctica),* sedges *(Carex* species), purple saxifrage *(Saxifraga oppositifolia),* grasses and forbs, and lichens (COSEWIC 2004, p. 23).

The diet of the Peary caribou varies depending on the season and availability of vegetation (Miller and Barry 2009, pp. 184–185; COSEWIC 2004, p. 34). Generally, caribou acquire most of their dietary protein during the summer and consume higher energy plants in the winter when their energy demands are higher (Joly et al 2010, p. 322). Additionally, willow has been found to be an important source of nutrition, especially in the summer, as caribou on a high willow diet seem to maintain a better reproductive condition (Parker 1978, as cited in COSEWIC 2004, pp. 32–33). Lichens are generally understood to contribute a relatively low proportion (~8 percent) of winter and summer diet, when compared to other caribou subspecies, for the Peary caribou on Bathurst, Melville, and Prince Patrick Islands (COSEWIC 2015, p. 22; Miller and Barry 2009, p. 184). While lichens provide easily digestible carbohydrates, they have fairly low protein content in comparison with the green foliage of vascular plants (Joly et al. 2010, p. 322; Chen et al. 2009a, pp. 8–9).

Under ideal conditions, caribou forage by pushing snow off vegetation with their noses, but when snowpack is deeper, they will dig small craters in the snow to reach the plants (COSEWIC 2004, p. 35). However, snow conditions can limit the accessibility of the vegetation. Early winter snow, especially in combination with rain in late September or early October, can cause icing conditions, which may prevent caribou from accessing the vegetation (COSEWIC 2004, pp. 33–34). Snowfall within the range of the Peary caribou varies, and the amount of snow is determined by several variables, such as the terrain, wind speed and direction, and air and ground temperatures (Sturm 2003, as cited in Maher 2012, p. 84). As a result, during the winter, caribou tend to forage in drier, more exposed areas, which have less snow or softer, less crusted snow.

Range

The Peary caribou is endemic to the Canadian Arctic Archipelago in northeastern Canada. The islands are located in the Territories of Nunavut and the Northwest Territories (NWT) in Canada in an ecozone described as the ''high arctic''

The terrestrial range of Peary caribou is vast, with its size being roughly 540,000 square kilometers (km^2) (208,495 mi^2) (Jenkins et al. 2011, p. 1). The subspecies' range extends from Queen Elizabeth Islands (QEI) in the north, Banks Island in the west, Somerset Island in the east, and the Boothia Peninsula in the southeast (Jenkins et al. 2011, p. 1; see map 1). In Nunavut, the subspecies' range includes approximately 25 large islands and 40 small islands, the majority of which are uninhabited by humans (Jenkins et al. 2011, p. 15). In the NWT, this subspecies occurs in an area consisting of over 237,022 km^2 (91,514 mi^2) (Governments of NWT and Nunavut 2011, p. 6). The Queen Elizabeth Archipelago consists of 35 islands that

are over 129 km² (49.8 mi²) in size (Hummel et al. 2008, p. 216).

Population Estimates and Migration

Due to ambiguity in taxonomy, older population surveys from the early 20th century may not be accurate in terms of which subspecies was documented in various island populations.

In Nunavut, a 2011 survey of Peary caribou reported the most current population estimates (Jenkins et al. 2011, p. ii; Jenkins 2008, 17 pp.). In the NWT, an aerial survey of Peary caribou was conducted in 2012 (Davison and Williams 2016, p. 3). For detailed information about the most recent surveys of Peary caribou, we refer readers to both documents and our species report, which are available at *www.regulations.gov,* Docket number FWS–HQ–ES–2019–0014. In this finding, we summarize this information.

Peary caribous occur in small groups consisting of three to five individuals; as a result, these caribou are referred to at the scale of 'subpopulations' or 'clusters' as opposed to herds, as seen in barren-ground caribou (Davison 2017, pers. comm.; Jenkins et al. 2011, p. 11). The size of these clusters will vary depending on the season; subpopulations will increase slightly prior to calving, then stabilize or decrease during calving, and increase in the ''post-calving aggregations'' as they migrate inland from coastal areas (COSEWIC 2004, p. 35). Peary caribou populations are often described as ''island group'' subpopulations as they are associated with a set of islands used regularly during their seasonal migrations (Jenkins et al. 2011, p. xiii; Gunn et al. 2011, pp. 41–44). That said, interbreeding between island groups does occur (Nagy 2011, p. 33).

Island groups are organized based on factors such as physical location and proximity of islands, management, observations of local communities, scientific observations, tracking of caribou herd migrations, and to some degree, genetic analyses. In 2015, COSEWIC divided the subspecies into four island groups (COSEWIC 2015, p. 8). For the purposes of this status review, we used the latest COSEWIC review to provide a map representing four island-complex regions (COSEWIC 2015, p. 8; Jenkins et al. 2011, p. 13; COSEWIC 2004, p. 12). See map, below.

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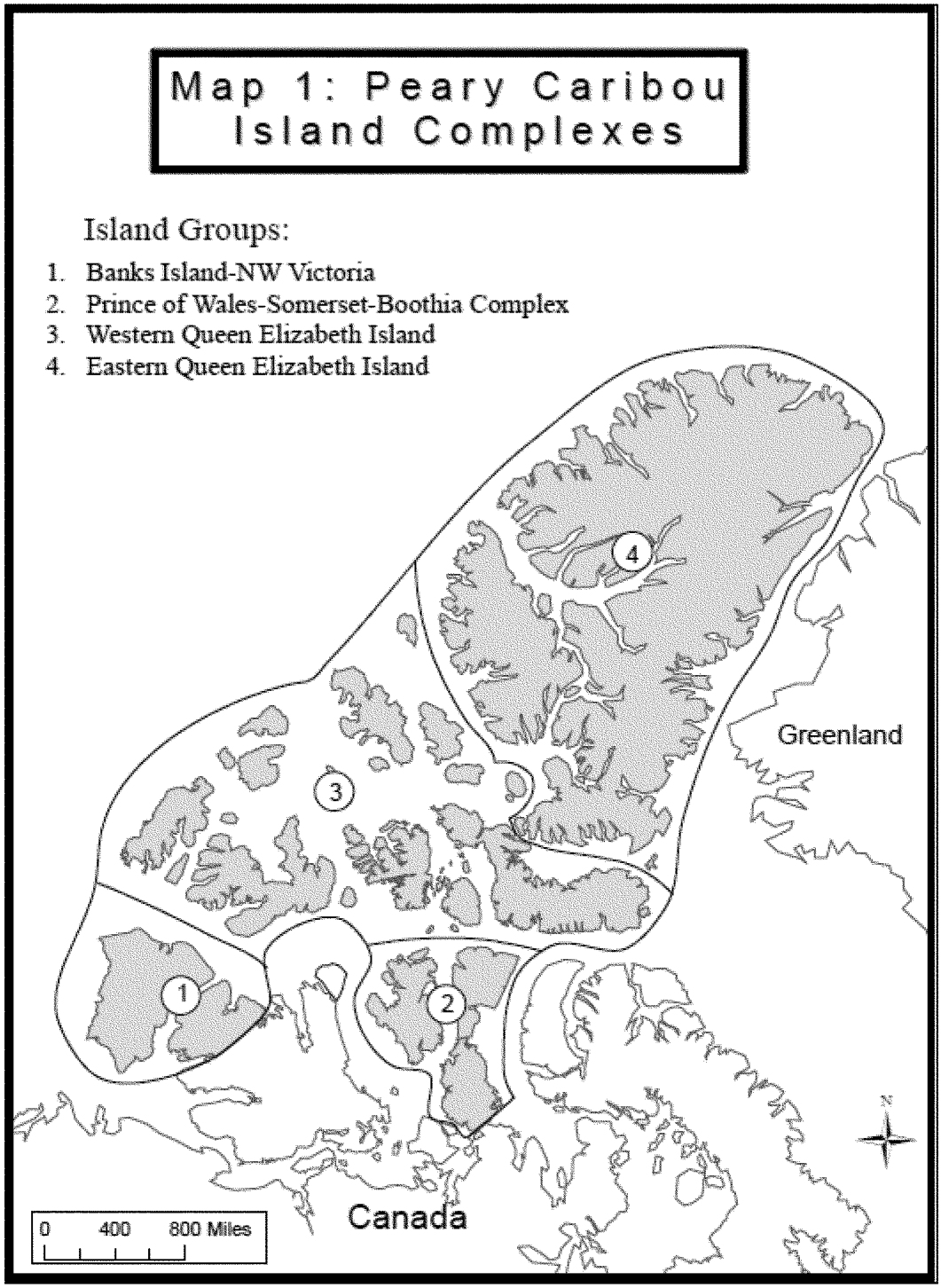

Figure 1—Map of the Canadian Arctic Archipelago where the Peary caribou exist. (Source: Adapted from COSEWIC 2015, p. 9 and Jenkins et al. 2011, p. 13.)

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As noted above, the island populations are not reproductively isolated from each other; caribou travel hundreds of kilometers and can move among the Arctic Islands due to the sea ice that persists for almost 10 months of the year (COSEWIC 2015, p. 12; COSEWIC 2011, p. 23; McFarlane et al. 2003, pp. 128–129). Thus, while we discuss these four island groups of Peary caribou, uncertainty regarding the genetic distribution and movement of these subpopulations remains (COSEWIC 2015, pp. 25–26; SARC 2012, pp. 20, 29).

As of 2018, the estimated populations are presented in table 1, below.

TABLE 1—ESTIMATES OF PEARY CARIBOU POPULATIONS IN 2018 BASED ON AERIAL SURVEYS

[Adapted from Jenkins et al. 2011, pp. 117–151,[1] Davison and Williams 2013, pp. 1–2,[2] COSEWIC 2015, pp. 33–34,[3] Anderson 2016, pp. iii, 14–19[4].]

Island complex	Islands	Estimated population	Year surveyed	Territory
Banks Island—NW Victoria	Banks Island[3]	2,248	2014	Northwest Territories.
	NW Victoria[3]	4	2015	Northwest Territories.
	Melville Island[3]	2,740	2012	Northwest Territories/Nunavut.
	Prince Patrick[3]	2,746	2012	Northwest Territories.
Western Queen Elizabeth Islands	Eglington Island[2]	181	2012	Northwest Territories.
	Byam Martin[3]	121	2012	Nunavut.
	Emerald Islands[2]	45	2012	Northwest Territories.
	McKenzie-King[3]	36	1997	Northwest Territories/Nunavut.
	Bordon Island[3]	16	1973	Northwest Territories/Nunavut.
	Brock Island[3]	0	1997	Northwest Territories.
	Bathurst Island[3]	1,463	2013	Nunavut.
	Cornwallis Island[1]	~1	2013	Nunavut.
	Ringnes Island[1]	282	2007	Nunavut.
	Lougheed Island[3]	103	2007	Nunavut.
	Devon Islands[4]	69	2008	Nunavut.
Eastern Queen Elizabeth Islands	Axel Heiberg Islands[3]	2,255	2007	Nunavut.
	Ellesmere Islands[3]	918	2015	Nunavut.
Prince of Wales-Somerset-Boothia Peninsula Island Complex.	Prince of Wales[3]	1	2004	Nunavut.
	Somerset[3]	4	2005	Nunavut.
	Boothia Peninsula[3]	1	2006	Nunavut.
Total estimated population in 2018: 13,234				

Population Trends

The trend in population estimates since the 1960s demonstrates that Peary caribou populations have generally decreased with a partial recovery in the populations from 2010 through 2015 (COSEWIC 2015, pp. 32–43; Gunn et al. 2010, pp. 40–44). In 1961, the first comprehensive survey of Peary caribou across the Queen Elizabeth Islands was completed (Tener 1963, as cited in Jenkins et al. 2011, p. 2). Surveys in 1961 estimated the population to be approximately 26,000 Peary caribou on Queen Elizabeth Islands and approximately 22,000 Peary caribou on the larger southern islands and the Boothia Peninsula (Gunn et al. 2011 p. 40). However, the survey was not comprehensive, nor was it quantitative (Miller *et al* 2005, pp. 65–66). The 1961 survey data were later reanalyzed, and the results were published in 2005. The new analysis determined the population estimate in 1961 for Peary caribou to be 28,288 with a range of 20,436–37,031 at a 95 percent confidence interval (Miller et al. 2005, p. 65).

While different methods and taxonomic changes affected the reliability of older surveys, recent surveys using consistent survey methods have provided additional clarity on the status of the subspecies. Between 1961 and 1973, an 83 percent reduction in the Peary caribou population is estimated to have occurred. Recent numbers are ~80 percent lower than the historical high population numbers seen 40–50 years ago (SARC 2012, p. xvi; Gunn et al. 2011, pp. 37, 40). The declines were attributed to deep snow layers and icing, which likely caused widespread mortality and resulted in little or no reproductive success (Miller et al. 1975; entire). However, stochastic, periodic die-off followed by a population rebound is a characteristic of the Peary caribou ecology (COSEWIC 2015, p. 32). Overall, the trend data suggest some populations have experienced significant declines while others have recovered. On Banks Island, the subpopulation declined from 1982 to 1992 but stabilized at low levels from 1992 through 2010. The population on Banks Island was estimated to be 2,351 in 1959, and declined to as low as 451 in 1998, before recovering to 1,142 in 2001, and 2,234 in 2014 (COSEWIC 2015, p. 35). While the subpopulation on Banks Island appears to have stabilized, the subpopulation on Victoria Island has suffered almost a 100 percent decline. The Peary caribou subpopulation on Victoria Island declined from 4,512 caribou in 1980 to 159 in 1993. Potential reasons for the decline include hunting and disease. A survey in 2015 recorded only two individuals (COSEWIC 2015, p. 36).

Similar to the conditions on Victoria Island, the Prince of Wales-Somerset-Boothia Island complex appears to have also suffered a total decline. The subpopulation of this island group reached a maximum number of 10,000 individuals between 1980 and 1985 before plummeting to a handful of individuals in the early 2000s (COSEWIC 2015, p. 36). The cause for this decline remains unknown, although a number of possible reasons such as extreme weather, wolf predation, hunting, disease, and competition with muskoxen were suggested (COSEWIC 2015, p. 37).

In contrast to the subpopulation on Victoria Island and the Prince of Wales-Somerset-Boothia Island complex, the Peary caribou subpopulation on Western Queen Elizabeth Island has stabilized and is increasing. While the subpopulation experienced two catastrophic die-offs (declines ranging from 72 percent to 92 percent) from weather extremes in 1974–1975 and 1996–1997, it appears to have recovered. In 2012–2013, the population was an estimated 7,300 adults, an increase from the 1986–1988 survey population of 2,500 individuals (which includes calves) (COSEWIC 2015, p. 38; Jenkins et al. 2011, p. 120).

Due to its location in the far northern part of the Peary caribou's range, partial surveys of the Eastern Queen Elizabeth Island group have been conducted over the years. A complete survey of the island group was not completed until 2007; that survey yielded 2,291 caribou (COSEWIC 2015, pp. 41–42). Recent surveys suggest the population is increasing. However, this higher number could simply be the result of the larger area covered by the more recently conducted surveys (COSEWIC 2015, p. 42)

As of 2015, the number of Peary caribou was estimated to be approximately 13,700 in Canada (COSEWIC 2015, p. 42). While some island groups have experienced a significant decline, others are more stable or increasing. One subpopulation (Prince of Wales-Somerset-Boothia island complex) had fewer than 10 individuals at the last count in 2005, with no evidence of any recovery. However, despite experiencing declines in the 2000s, the Banks Island population has returned to its 1959 numbers. The WQEI subpopulation, which now accounts for almost half of the extant population, has recovered from a catastrophic die-off in the 1990s and experienced increases for the 15-year period between 1997 and 2012. Overall, while the Peary caribou experienced population declines in the 1990s due to icing events and other factors, the subspecies has since experienced an increase of about 150 percent within the past two decades (COSEWIC 2015, pp. 42–43).

Conservation Status of the Peary Caribou

The Peary caribou subspecies was listed as endangered under Canada's Federal Species at Risk Act (SARA) in February 2011, due to a decline in its population size, and due to expected changes in long-term weather patterns (Giroux et al. 2012, p. 4; COSEWIC 2004, pp. 36–41, 51–58). Under SARA, an ''endangered species'' is defined as a species facing imminent extirpation or extinction (Statue of Canada (SC) 2002, c. 29). SARA makes it an offense to kill, harm, harass, capture, or take an individual of a listed species that is endangered, threatened, or extirpated; possess, collect, buy, sell, or trade an individual of a listed species that is extirpated, endangered, or threatened—or its part or derivative; or damage or destroy the residence of one or more individuals of a listed endangered or threatened species (or of a listed extirpated species, if a recovery strategy has recommended a reintroduction site). Subsistence hunting by indigenous communities is generally exempt from prohibitions under SARA (COSEWIC 2015, p. 52). Caribou are granted protections by various mechanisms in Canada such as land-claim agreements, and hunts are co-managed by boards such as the Nunavut Wildlife Management Board, the Wildlife Management Advisory Council in the Northwest Territory, and hunting and trapping associations (COSEWIC 2004, p. 61). Both a Federal recovery strategy and territorial management plan are currently being developed for this subspecies (Giroux et al. 2012, p. 4). Due to improvement in the subspecies condition, COSEWIC reassessed this subspecies as threatened in 2015 (COSEWIC 2015, p. 56). This reassessment does not change the subspecies' status under SARA, which requires an amendment to the SARA listing. The subspecies' status is currently being reviewed under SARA based on the COSEWIC 2015 reassessment (Carriere 2017, pers. comm.).

Caribou are recognized at the species level as ''vulnerable'' by the International Union for Conservation of Nature (IUCN) (the Peary caribou subspecies is not addressed by the IUCN) (Gunn 2016, unpaginated). The IUCN identifies and documents those species considered to be most in need of conservation attention if global extinction rates are to be reduced and is recognized as an approach for evaluating the conservation status of plant and animal species; however, designations by the IUCN convey no actual protections.

Regulatory Framework

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an ''endangered species'' or a ''threatened species.'' The Act defines an endangered species as a species that is ''in danger of extinction throughout all or a significant portion of its range,'' and a threatened species as a species that is ''likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' The Act requires that we determine whether any species is an ''endangered species'' or a ''threatened species'' because of any of the following factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could affect a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

We use the term ''threat'' to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term ''threat'' includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that indirectly affect individuals such as through alteration of their habitat or required resources (stressors). The term ''threat'' may encompass—either together or separately—the source of the action or condition, or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an ''endangered species'' or a ''threatened species.'' In determining whether a species meets either definition, we must evaluate all identified threats by considering the expected response by the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species—such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an ''endangered species'' or a ''threatened species'' only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future.

The Act does not define the term ''foreseeable future,'' which appears in the statutory definition of ''threatened species.'' Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term foreseeable future extends only so far into the future as the Services can reasonably determine that both the future threats and the species' responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. ''Reliable'' does not mean ''certain''; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions.

It is not always possible or necessary to define foreseeable future as a

particular number of years. Analysis of the foreseeable future uses the best scientific and commercial data available and should consider the timeframes applicable to the relevant threats and to the species' likely responses to those threats in view of its life-history characteristics. Data that are typically relevant to assessing the species' biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors.

Analytical Framework

The species reports document the results of our comprehensive biological status review for the two subspecies, including an assessment of the potential threats to the subspecies. The reports do not represent decisions by the Service on whether the species should be proposed for listing as endangered or threatened species under the Act. They do, however, provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies. The following is a summary of the key results and conclusions from the reports; the full reports can be found at [Docket FWS–HQ–ES–2019–0014 on *http://www.regulations.gov*].

Summary of Biological Status and Threats

In this section, we review the biological condition of the Peary caribou and its resources and factors that affect the species to assess the species' overall persistence. The Peary caribou lives in a harsh environment that is sparsely populated with people, and this subspecies is not consistently monitored in all locations where it exists. Caribou biologists have suggested a number of potential threats that are likely contributing to the decline of the Peary caribou. The primary threats will be discussed below. We also assessed other threats that we concluded to have minor effects on the species; those assessments can be found in our Species Report. The minor threats are disease, predation (primary by wolves), and competition with other species for food (including other caribou and muskox). The major threats that will be discussed below are:

- Effects of climate change;
- Inaccessibility of food due to snow and ice conditions;
- Hindered ability to seasonally migrate due to lack of sea ice;
- Disturbance due to development, oil and gas exploration, or shipping;
- Parasitic harassment by botflies; and
- Hunting

Climate Change

Changes in climate and weather patterns are suspected to be a major contributor to the decline of this subspecies (COSEWIC 2015, p. 44; Hansen et al. 2011, p. 1,922; Miller and Barry 2009, p. 175; Prowse et al. 2009a, p. 269; Tews et al. 2007, pp. 95–96; COSEWIC 2004, pp. viii, 55–58). Our analysis under the Act includes consideration of ongoing and projected changes in climate. The terms ''climate'' and ''climate change'' are defined by the Intergovernmental Panel on Climate Change (IPCC). The term ''climate change'' thus refers to a change in the mean or variability of one or more measures of climate (*e.g.,* temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2013, p. 1,450).

As noted above, to determine whether these species are threatened, we must evaluate threats and the species' response to threats over ''the foreseeable future.'' The demographic, ecological, and evolutionary responses of caribou to threats resulting from climate change are complicated to predict. The complexity stems from the species' habitat requirements and resilience to the effects of climate change. Current models for the Arctic predict deeper snow cover, increasing rainfall, more thawing–freezing cycles, and a higher risk of ice-layer formation on the soil within the snowpack during the winters of the coming decades (Steiner et al. 2013, p. xii; Hansen et al. 2011, p. 1,917; Turunen et al. 2009, pp. 813–814; Putkonen and Roe 2003, entire). Under these models, caribou populations will respond negatively to climate change due to the occurrence of more precipitation, greater snowfall, and subsequently more freezing-rain events, which will make access to food more difficult (COSEWIC 2015, pp. 44–46; Hummel and Ray 2008, pp. 137–141; Miller et al. 2007, p. 33). Reduced access to food would lead to increased starvation, die-offs, and reduced calf production and recruitment, which are highly dependent on the female's physical condition, specifically on fat reserves (Governments of the Northwest Territories and Nunavut 2018, p. 28). However, other models support a conclusion that Peary caribou may experience increases in population numbers if climate change results in a 50 percent increase of taller, denser vegetation and woody shrubs (Tews et al. 2007, pp. 95 96). As ecological systems are dynamic, it is complicated to predict how one change (such as a rise in temperature) will affect other elements within the ecosystem (such as the amount of precipitation that falls as freezing rain, rather than snow) (Green and Sadedin 2005, pp. 117–118; Burkett et al. 2005, entire). Given that caribou experts consider the primary threat to the Peary caribou to be climate-change related, we rely on climate projection models undertaken by the IPCC (IPCC 2014a, pp. 8–12). The models discuss future trends for precipitation and air and water temperature, which have an impact on the caribou's habitat.

Projections of sea-ice loss using RCP 4.5 and 8.5 scenarios and rain-on-snow events in the Canadian Arctic vary in their time scale (Mallory and Boyce 2018, p. 2,192; Jenkins et al. 2016, p. 4; Engler and Pelot 2013, p. 21; Stroeve et al. 2012, p. 1,012). While all climate models agree that sea-ice loss will occur in the Canadian Arctic, there is disagreement on when sea-ice loss will result in an ice-free period. Some models project the Canadian Arctic will experience ice-free periods as early as 2050 while others project that due to the influx of sea ice from the Arctic Ocean, sea ice in the Canadian Arctic will persist into the 2080s (Li et al. 2019, pp. 1 2; Derksen et al. 2018, p. 198; Mallory and Boyce 2018, pp. 2,194 2,195; Johnson et al. 2016, p. 16; Jenkins et al. 2016, p. 4). This uncertainty is due in part to the flow of sea ice from the Arctic to the east coast of the Canadian Arctic Archipelago (Derksen et al. 2018, p. 218).

In addition to sea-ice loss, the thinning of sea ice can also have an impact on the caribou. This is because if sea ice is too thin, it will not be able to support the caribou's weight. We thus take into consideration changes in ratio over time between the thinner first-year ice versus the thicker, multiyear ice (Li et al. 2019, p. 2). Additionally, as seen in the population trend above, Peary caribou subpopulations can fluctuate widely from year to year and mass die-off events can occur within a single season. We thus need to identify a timeframe long enough to observe changes in the subspecies.

Most models project that portions of the Canadian Arctic will be ice free by 2040–2060 (Derksen et al. 2018, pp. 198, 218; Johnson et al. 2016, p. 16; Lu et al. 2014, p. 61). Although we possess projections that go out to 2100, there is greater uncertainty between the climate model projections in the latter half of the 21st century and how the effects of climate change will affect species response when projected past mid-century. Accordingly, we determined that the foreseeable future extends only

to 2050 for the purpose of this analysis and we rely upon projections out to 2050 for predicting changes in the species conditions. This timeframe allows us to be more confident of assessing the impact of climate change on the species. Therefore, based on the available climate projection and information we have on the subspecies, we have determined 2050 as the foreseeable future timeframe for the Peary caribou.

One additional concept that adds to the uncertainty of what will occur in the Arctic ecosystem is ''sudden climate change,'' an amplified response that has been a concern to scientists for several years (Hansen et al. 2011, p. 1,917; Barber et al. 2008, p. 8). Surface temperature and albedo (reflection of sunlight) are two critical factors of the Arctic climate system (Wang et al. 2012, p. 2). An area that does not contain snow absorbs more heat than an area covered with snow (areas with snow reflect more heat), so the albedo effect is less in areas of the Arctic that lack snow and ice (Stroeve et al. 2012, p. 1,012). The Arctic climate both affects global-scale climate change and is affected by it through feedback mechanisms (Barber et al. 2008, p. 8). All combinations of models and emission scenarios yield increases in global temperature. Therefore, if there are large-scale changes in temperature, the weather patterns could change drastically, and the overall effect on the ecosystem is unknown.

We acknowledge that the climate is changing in the Arctic region, and based on the best scientific and commercial information available on Peary caribou, we reach reasonable conclusions about the likely impacts specific changes in climatic conditions may have on the species over the foreseeable future, which will be discussed below (IPCC 2014b, entire; Schiermeier 2011, p. 185; Olsen et al. 2011, entire; Liston and Hiemstra 2011, p. 5,691; Prowse et al. 2009b, entire; Turunen et al. 2009, p. 813; Barber et al. 2008, entire; Rinke and Kethloff 2008, p. 173).

Snowpack, Ice Events, and Food Availability

One of the major causes of catastrophic die-offs of caribou is the formation of hard, crusted snow or layers of ice on the ground, which restricts the animals' access to forage (COSEWIC 2015, p. 44; COSEWIC 2004, pp. 51–53; Miller and Gunn 2003, pp. 385–386). These layers of ice crust form in several ways. One way is repeated cycles of thawing and refreezing of the snowpack (Tyler et al. 2008, p. 1,679). Ice layers can also form due to freezing rains or rain-on-snow events (Miller and Barry 2009, p. 182; Putkonen and Roe 2003, pp. 37–1–37–2). A third way is when spring melt water trickles through the snow-pack and freezes as it comes into contact with the very cold ground beneath (Woo and Heron 1981, as cited in Tyler 2010, p. 198).

Layers of thick ice block access to food and influence caribou movement patterns by pushing herds to move to areas with less ice but poorer forage (Hansen et al. 2011, p. 1,921; Stien et al. 2010, p. 917). The decline of Peary caribou in four major die-offs in western Queen Elizabeth Islands between 1970 and 1998 coincided with extremely heavy snowfall, deep snow-packs, and heavy icing, which limited access to forage, increased energy expenditure, and led to extreme malnourishment and subsequent mass starvation events (Jenkins et al. 2011, p. 6; Miller and Barry 2009, p. 176; Gunn et al. 2006, p. 6; Adams and Dale 1998a, as cited in Tyler 2010, p. 198).

Climate change is expected to cause heavier and more frequent snowfall events, more variable weather patterns, freezing rain, and higher layers of snow during these winter events (Steiner et al. 2013, p. 83; Turunen et al. 2009, p. 813, COSEWIC 2004, pp. 51–53). Due to changes in temperature, air-circulation patterns, and ocean-circulation changes, precipitation is expected to increase strongly during the summer season. Some caribou researchers project that, as temperatures rise, more severe weather patterns will occur and will cause increased snow and ice cover over vegetation. Under this scenario, food availability is projected to decrease. If these conditions occur, Peary caribou could suffer additional widespread starvation events, thereby decreasing the resiliency of the subspecies (Miller and Gunn 2003, p. 386).

Loss of Sea Ice

Sea ice is a vital component of the seasonal migrations of the Peary caribou. Peary caribou use multiple islands throughout their annual migrations and require sea ice to cross between islands. Older, multiyear sea ice is becoming less prevalent. In Canada's Arctic Archipelago, sea ice can attain a thickness of 4 to 6 meters (13 to 20 ft) (Haas et al. 2006, as cited in Meier et al. 2011, p. 9–13). Within the range of the Peary caribou, these old layers of sea ice are vital for crossing between islands. The majority of the ice in the Arctic Ocean is now young, ''first-year'' sea ice, which is not only more susceptible to summer melt, but is also thinner and less able to support caribou during their seasonal migrations (COSEWIC 2015, p. 44; SARC 2012, p. 25; Meier et al. 2011, pp. 9–6–9–8; Prowse et al. 2009a, p. 266). Sea ice in the Arctic has been at extremely low summer levels in recent years. Most of the oldest typical forms of sea ice (which were usually more than 5 years old) no longer exist (Meier et al. 2011, p. 9–4).

Since the beginning of monitoring in 1979, record low levels of sea ice have occurred in recent years. From 1968 to 2015, sea ice declined at a rate of 6.1 percent per decade (Environment and Climate Change Canada 2016, p. 8). Multiyear ice, which is thick enough to support the caribou's weight, has been declining over time. In the mid-1980s, multiyear ice accounted for 75 percent of all ice in the Arctic. By 2011, it accounted for 45 percent of all ice (Li et al. 2019, p. 2). Additionally, landfast ice has also been decreasing. This is important to the Peary caribou as the Canadian Arctic Archipelago contains many narrow channels that the subspecies uses for its migration corridors. Over the 10-year intervals starting in 1976, the maximum extent of landfast ice was: 2.1×10^6 km^2 (1976–1985), 1.9×10^6 km^2 (1986–1995), 1.74×10^6 km^2 (1996–2005), and 1.66×10^6 km^2 (2006–2018) (Li et al. 2019, p. 5).

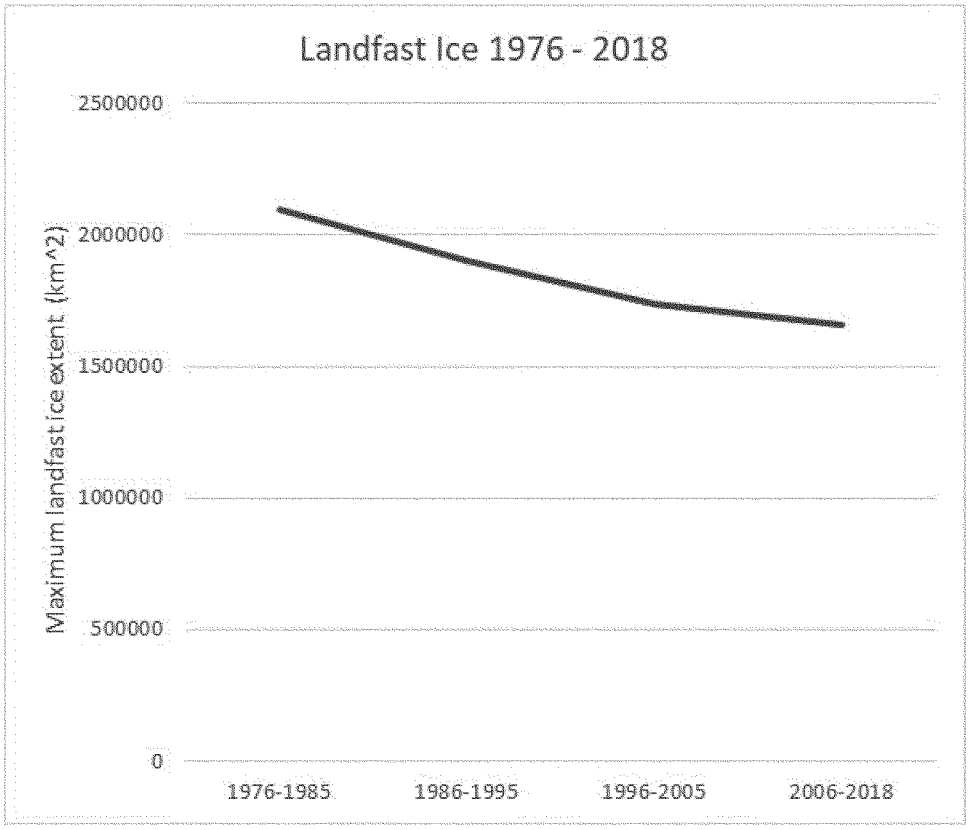

Figure 2—Landfast ice area in the Canadian Arctic Archipelago from 1976 to 2018. (Adapted from Li et al. 2019, p. 5.)

Sea-ice loss is likely to continue and accelerate throughout this century, and Arctic seas may be seasonally ice-free as early as 2040 (Engler and Pelot 2013, p. 21; Meier et al. 2011, p. 9–3; Olsen et al. 2011, p. 112; Wang and Overland 2009, p. 1; Boé et al. 2009, p. 1). Decreased ice concentrations during warmer summer temperatures result in significant heating of the ocean surface, which then further increases ice melt (Stroeve et al. 2012, p. 1,012; Meier et al. 2011, p. 9–16). As a consequence of earlier ice-break-up dates and later freeze-up dates, caribou would have to begin their spring migration earlier to ensure safe passage over large water bodies or possibly shift their distribution in search of food sources (COSEWIC 2015, p. 46; Post and Forchhammer 2008, as cited in Sharma et al. 2009, p. 2,559). Some researchers have theorized mass drownings have occurred during migrations when sea ice was too thin to support the weight of the caribou (SARC 2012, pp. 35, 47). Additionally, changes in sea ice may inhibit movement of populations, which could lead to certain subpopulations being geographically isolated and the potential for reduced genetic diversity within the subspecies (SARC 2012, p. xvii).

While the overall climate trend for the Canadian Arctic points toward a decreasing ice level over time, the condition in the Canadian Arctic Archipelago is likely to experience slower ice loss. Overall, the Canadian Arctic archipelago possesses the thickest Arctic sea ice (Li et al. 2019, p. 1). The growth of multiyear ice within the Peary caribou's range is the result of both first-year to multiyear ice conversion and the arrival of multiyear ice from the Arctic Ocean located to the west (Pizzolato 2015, p. 4). This Arctic Ocean sea ice wedges up against the western portions of the WQEI making the sea ice in the region the oldest and thickest in the world, with some ice potentially reaching 6–8 meters thick. The result is that the western Canadian Arctic multiyear ice makes up as much as 50 percent of all sea ice (Li et al. 2019, p. 7 Engler and Pelot 2013, p. 25).

In summary, while the increasing temperatures related to climate change have produced a marked decrease in sea ice throughout the Arctic that is projected to continue into the foreseeable future, sea-ice loss in Peary caribou habitat is not as pronounced due to the unique geography of the region. In situ formation of multiyear ice as well as new ice from the Canadian Basin creates a condition that allows multiyear ice to persist for a longer period. The persistence of multiyear ice in the region facilitates the continued existence of migration corridors for the Peary caribou. This is expected to allow the species to continue to have access to food resources, thereby maintaining the resiliency of the subspecies to future stochastic events.

Summary of Climate Change

As a subspecies native to Canada's far north, the Peary caribou is affected by climate change in multiple ways. Climate change increases the frequency of ice events, which limits access to forage, and has been linked to major die-offs (Hansen et al. 2011, p. 1,921; Jenkins et al. 2011, p. 6; Stien et al. 2010, p. 917). On the other hand, the effects of climate change on plant phenology and composition remain more uncertain. Potential effects of climate change include a delay in the emergence of green foliage during the spring and decreasing shrub cover with

an increase in the number of shrub species (Chen et al. 2009a, pp. 17–19; Miller and Gunn 2003, p. 386). However, an increase in shrub species does not translate to higher nutritional content for caribou (COSEWIC 2015, pp. 22, 25). Whether Peary caribou will be able to adapt to these changes remains unknown. While uncertainty remains about the effects of climate change on plant condition, the continued persistence of multiyear sea ice in the species' range facilitates the continued existence of migration corridors for the Peary caribou (Pizzolato 2015, p. 4; Engler and Pelot 2013, pp. iii, 25; Meier et al. 2011, p. 9–3; Boé et al. 2009, p. 1; Wang and Overland 2009, pp. 1–4). The Peary caribou is found in Canada's high Arctic, which comprises a number of islands. The Peary caribou subpopulation's continued ability to migrate between these islands in search of food will help maintain the resiliency of the species to future stochastic events.

Exploration, Shipping, and Other Developmental Activities

Peary caribou herds appear to be affected by human activities during the caribou's inter-island migrations and during calving season.

The projected decline of sea ice may lead to an increase of shipping traffic through the Northwest Passage. Between 1990 and 2011, shipping traffic increased by 75 percent (COSEWIC 2015, p. 49). Ships sailing through the Passage break up the ice impeding migration between islands. The Peary caribou then have to spend additional time waiting for the ice to reach sufficient thickness for crossing. Caribou have been observed at the water's edge waiting for the ice to re-freeze, even up to several days (Poole et al. 2010, p. 426). These events can cause significant decreases in body fitness if there is not adequate nutrition available for the herd while they are waiting to cross a body of water. Increased shipping is likely to affect island complexes farther to the south of the subspecies' range, including Prince of Wales and Somerset Island and the Bathurst-Cornwallis island group (COSEWIC 2015, p. 50). Islands farther to the north, such as Ellesmere, Axel Heiberg, or the Ringnes group, are likely to be less impacted due to the presence of pack ice and being far away from major trade lanes (COSEWIC 2015, p. 50; Engeler and Pelot 2013, p. 9). A high concentration of sea ice within the Queen Elizabeth Islands and difficult terrain will restrict ship traffic in this region (Pizzalato 2015, p. 4).

Movements of caribou indicate that they avoid seismic lines, roads, and other infrastructure (Nagy 2011, pp. 158–159; Latham 2011, p. 2,854). Seismic lines are vital components of oil and gas exploration and development (Nagy 2011, pp. 10–11). Although an earlier study suggested that caribou were not significantly disturbed by human presence (Slaney et al. 1975, as cited in COSEWIC 2004, p. 46), an abundance of information since then supports a conclusion that these activities do affect caribou behavior (Nagy 2011, pp. 158–159; Jenkins et al. 2011, p. 6; Hummel and Ray 2008, pp. 210, 219; Mahoney and Schaefer 2002, pp. 147, 151). In addition to scientific studies, anecdotal reports in Resolute Bay (Cornwallis Island, Nunavut) and Grise Fiord (Ellesmere Island, NWT) indicate that exploration activities for resources such as oil and gas are an additional threat for caribou (Jenkins et al. 2011, p. 6). Local Inuit communities also expressed concern that industrial activities can increase avoidance behavior and pollution and spills can adversely affect the health of the caribou (COSEWIC 2015, p. 54). Caribou biologists appear to generally be in agreement that these exploration and development activities have been observed to deter caribou from moving into areas that are vital for their survival (Nagy 2011, p. 158; Jenkins et al. 2011, p. 6).

While development has the potential to impact the Peary caribou by increasing energy expenditure, exploration and developmental activities have declined in recent years. Oil and gas exploration in the Peary caribou range peaked in the 1960s and 1970s (COSEWIC 2015, p. 54). Although exploration efforts have continued since then, it has not resulted in a large increase in mining or extraction sites (COSEWIC 2015, pp. 54–55). This is due to fluctuating market prices having a significant impact on extent and intensity of activities. In addition, environmental reviews undertaken by provincial governments have also slowed the rate of exploration and developmental activities (COSEWIC 2015, pp. 53–54). That said, there are currently active mining and extraction sites within the Peary caribou range. However, these sites remain localized and only impact nearby herds (COSEWIC 2015, p. 55). Overall, while current exploration and extraction efforts do result in negative effects to the Peary caribou, the effects on the overall subspecies are likely to be more limited.

In summary, the best available information supports that current levels of exploration, development, and shipping activities may have some negative effects on the Peary caribou resulting in behavioral changes in response to these activities. However, at present, these activities do not rise to the point where there is a significant impact to the subspecies (COSEWIC 2015, p. 55; Taylor 2005, as cited in Jenkins et al. 2011, pp. 6, 8, 118).

Parasitic Harassment by Botflies

Botflies, oestrids from the family Oestridae, have been identified as a potential threat that can affect Peary caribou in the future with a warming climate. Caribou species serve as host to two oestrid species: Warble flies (*Hypoderma tarandi*) and nose bot flies (*Cephenemyia trompe*). In the Arctic region, few hosts are available for parasites; warble flies and nose bot flies are particularly well adapted to survive in the Arctic climate using caribou as their host. Although these oestrids are widespread throughout the summer range of most caribou herds, they are considerably less prevalent in the high Arctic as they are at the latitudinal extreme of their range due to temperature, hours of daylight, and wind conditions (Gunn et al. 2011, pp. 13–14; Kutz et al. 2004, p. 114). However, some researchers have expressed concern that, should warming trends continue, the parasitic rate of development and infectivity timeframes could become altered, which may increase the energy expenditure of Peary caribou through avoidance behavior. Prolonged avoidance behavior increases the risk of the caribou succumbing to other illnesses, exposure to predation, and decreased survival rates of offspring (Kutz et al. 2004, p. 114; Kutz et al. 2001, as cited in Kutz et al. 2004, p. 112).

Warble Flies

Behavioral changes in response to insect harassment have commonly been observed in caribou. Warble flies trigger panic responses in caribou when they swarm around them. Warble flies live on the flesh underneath the skin of caribou. As many as 458 warble larvae have been documented on a single caribou (Hughes et al. 2008, p. 257). Adult females lay their eggs on caribou's body hair. After hatching, the larvae penetrate the skin and live subcutaneously over the winter until the next spring. The larvae spend the winter growing under the skin on the caribou's back, feeding on the flesh of the caribou. The larvae create a hole through the caribou's flesh and skin so the larvae can breathe. Between May and June, the larvae leave their host through the breathing pore in the skin, pupate on

the ground, and after a few weeks metamorphose inside a pupal case into adult flies (Nilssen 1997, p. 296). The peak emergence of these oestrids is in July.

Parasites deprive their hosts of energy that could be normally used for growth, maintenance, or reproduction (Cuyler et al. 2012, p. 251; Ballesteros et al. 2011, p. 34; Hughes et al. 2008, entire; Colman et al. 2003, p. 11; Hagemoen and Reimers 2002, pp. 883–884). The warble flies create an opening in the skin, and these open wounds make caribou more susceptible to blood loss and bacterial infections, which increase their energy expenditure (Scheer 2004, pp. 10–11). Severe insect harassment negatively affects growth rates and body size of caribou (Helle and Tarvainen 1984, as cited in Weladji et al. 2003, p. 80). When food availability is limited during the winter season, caribou lose body fat and catabolize protein (muscle) reserves (Miller 2003, as cited in Hughes et al. 2008, p. 253). Body mass is a fitness-related trait in caribou. Females need at least six percent body fat to reproduce (Jenkins 2012, personal communication). Heavier females are more likely to reproduce than lighter females, and increased weights prior to winter assist in preventing winter starvation (Ballesteros et al. 2011, p. 34).

Temperature and cloud cover are vital factors for harassment of caribou by warble flies as these two factors affect the flies' activity level (Weladji et al. 2003, p. 80; Nilssen 1997, p. 301). Warble flies are most active during warm, sunny days; warble fly activity increases as the temperature increases (Weladji et al. 2003, pp. 80–81). Within the Arctic, the annual mean surface temperature has increased at a rate of 0.34 °C (0.61 °F) per decade (Wang et al. 2012, p. 1). Throughout the Queen Elizabeth Islands, the mean average daily temperature from December to February is between −35 °C and −27 °C (−31.0 °F and −16.6 °F). In July, the mean average daily temperature is between −1 and 3 °C (33.8 and 37.4 °F) (Meteoblue 2017, unpaginated). General circulation models and other climate models indicate that average annual temperatures will increase 3–6 °C by 2080 (Meier et al. 2011, pp. 9–17–9–18; Olsen et al. 2011, p. 112). Based on these anticipated temperatures, we calculated the expected temperatures if the temperature was to increase by 3 °C (scenario 1) and by 6 °C (scenario 2). The climate models used in this table used a previous set of scenarios known as the Special Report on Emissions Scenarios (SRES) to project the low-emissions using scenario (SRES B1) and high-emissions scenario (SRES A2) (Marengo et al. 2011, p. 27). More recently, a newer set of scenarios (*i.e.,* RCPs) were prepared that include a wider range of future conditions and emissions. However, to compare the SRES and RCP scenarios, SRES B1 is roughly comparable to RCP 4.5 and SRES A2 is similar to RCP 8.5 (Melillo et al. 2014, p. 821). These similarities between specific RCP and SRES scenarios make it possible to compare the results from different modeling efforts over time (Melillo et al. 2014, p. 821). See table 2, below.

TABLE 2—QUEEN ELIZABETH ISLANDS: TEMPERATURE INCREASE SCENARIO UP TO 2080

[Adapted from Meier et al. 2011, p. 9–18; Olsen et al. 2011, p. 112.]

Month	Mean average daily temp.	Current conditions		Scenario 1 (temperature increase by 3 °C)		Scenario 2 (temperature increase by 6 °C)	
December	Low	−35 °C	−31 °F	−32 °C	−26 °F	−29 °C	−20 °F
	High	−27 °C	−16.6 °F	−24 °C	−11 °F	−21 °C	−5.8 °F
July	Low	−1 °C	30.2 °F	2 °C	35.6 °F	5 °C	41 °F
	High	3 °C	37.4 °F	6 °C	42.8 °F	10 °C	50 °F

The low temperature threshold for warble fly activity is around 10 °C (50 °F) (Vistness et al. 2008, p. 1,312; Weladji et al. 2003, p. 81; Nilssen 1997, pp. 296, 300; Breyev 1961, as cited in Nilssen and Anderson 1995, p. 1,236). Farther north, temperatures became low enough that the warble fly is not able to survive and reproduce. Because parasitic fly harassment is low below 13 °C (55.4 °F), and because no oestrids fly below 10 °C (50 °F), this temperature threshold is significant for caribou, particularly the Peary caribou with respect to warble fly harassment. While scenario 1 will not lead to a significant increase in fly activity, if the temperature increases to 10 °C, as is the case in scenario 2, there is potential for warble fly harassment to increase, resulting in decreasing fitness, which could lead to increasing mortality due to disease, predation, and stochastic weather events. However, given the fact that Peary caribou reside in the northernmost range of the warble flies, the impact from harassment may be more limited.

Nose Botflies

Caribou experts consider the potential negative effect of the nose bot fly on caribou to be less than that of the warble flies. While the type of effects are similar between the two species of flies, such as causing avoidance behavior in caribou, the magnitude of those effects are not as extreme for the nose botfly as that caused by the warble fly. This species enters the caribou through the caribou's nose and lives in the caribou's throat for part of its life cycle (Whitney 1999, p. 2). The caribou exhibit distress from this species—they have been observed to duck their heads under water to avoid nose botflies (Witter et al. 2012, p. 284; Fauchald et al. 2007, pp. 496–497). An increase in the temperature by more than 10 °C in July could increase harassment of nose bot flies on the Peary caribou resulting in elevated energy expenditure and reduced forage time, although the severity will not be as high as for warble flies.

Summary of Parasitic Harassment

We note that a threat to a species and the species' response to that threat are not in general equally predictable or foreseeable. The demographic, ecological, and evolutionary responses of Peary caribou to threats from a warming climate are very complicated to predict, even though future warming is highly likely to occur. Oestrid flies could expand their range, and they could possibly negatively affect the Peary caribou. The lower temperature threshold for warble fly activity has been determined to be around 10 °C (50 °F), which occurs in the most northern part of the Peary caribou's range. A warmer climate is very likely to affect the distribution and abundance of warble flies. However, the best available information indicates that, due to the very low temperatures in the Peary caribou's range, oestrid harassment will not significantly negatively affect the Peary caribou now or in the foreseeable future (Jenkins

2012, personal communication; Hummel and Ray 2008, p. 217).

Status of Existing Regulatory Mechanisms

Under the Act, we are required to evaluate whether the existing regulatory mechanisms are adequate. As previously explained, the Peary caribou subspecies was listed as endangered under Canada's SARA in February 2011, due to its apparent decline in population size and due to expected changes in long-term weather patterns (Giroux et al. 2012, p. 4). SARA makes it an offense to kill, harm, harass, capture, or take an individual of a listed species that is endangered, threatened, or extirpated; possess, collect, buy, sell, or trade an individual of a wildlife species that is listed as extirpated, endangered, or threatened, or any part or derivative of such an individual; damage or destroy the residence of one or more individuals of a listed endangered or threatened species or of a listed extirpated species if a recovery strategy has recommended its reintroduction (SC Ch. 32.1 § 32.2). However, exceptions to SARA prohibitions enable Indigenous peoples to exercise their harvesting rights (COSEWIC 2015, p. 52). Additionally, permits may be issued under certain conditions if the activity is conducted for scientific research, benefits the species or is required to enhance its chance of survival in the wild, or affecting the species is incidental to carrying out the activity (S.C. Ch 73).

In the NWT, the Species at Risk Committee (SARC) designated the Peary caribou as threatened within their Territory in 2012 (as 40–60 percent of the subspecies reside within the NWT) and Peary caribou were listed as threatened under the Species at Risk (NWT) Act in 2014 (SARC 2012, entire). Both the Federal recovery strategy and territorial recovery strategy management plan are currently being developed for this subspecies (Giroux et al. 2012, p. 4). For efficiency, the NWT Peary Caribou Recovery Strategy and the Federal Peary Caribou Recovery Strategy will be combined into a single document; although this plan was anticipated to be completed in February 2016, it has been extended to December 2021 due to the complex nature of caribou management (Species at Risk Act 2019, unpaginated SARC 2015, entire).

The Government of Canada may base a decision to list a species, assessed by COSEWIC at some level of endangerment, on social or economic factors (Festa-Bianchet et al. 2011, p. 422). Management must consider that subsistence hunting by indigenous people of all caribou is constitutionally guaranteed by treaty rights and land-claim agreements (Festa-Bianchet et al. 2011, pp. 423–424). In addition, subsistence hunting is not typically monitored by provincial wildlife management agencies, nor is reporting of barren-ground caribou harvest mandatory in Nunavut (Giroux et al. 2012, p. 12). They also note that a listing under SARA does not necessarily imply any additional conservation measures for lands directly under the control of the Federal Government (Festa-Bianchet et al. 2011, p. 423).

In Nunavut, the Department of Environment (DoE) is responsible for the management and conservation of caribou within its jurisdiction (Jenkins et al. 2011, p. 8). DoE shares management responsibility for Peary caribou with the Nunavut Wildlife Management Board and the Government of Canada. This responsibility is described in the Nunavut Land Claim Agreement 1993, Article 5 (Indian and Northern Affairs Canada 1993, as cited in Jenkins et al. 2011, p. 8).

In the NWT, the Government of NWT shares management responsibility for the Peary caribou with the Wildlife Management Advisory Council, the Inuvialuit Game Council, and the Government of Canada (AANDC 2012, p. 3). The relevant Canadian management authorities monitor aspects of caribou population health including body condition, diet, sex, and age, in part through harvest. Management and conservation actions are enforced through regulations under the Wildlife Act statutes of the Northwest Territories 2013 and through by-laws drafted at the community level by hunter and trapper committees and written into regulation. The Inuvialuit have taken a leadership role in the management of Peary caribou. For Banks Island, Peary caribou harvest quotas have been established for subsistence purposes (only hunting by Inuvialuit is allowed); quotas were implemented in 1991 and are reviewed annually. On NW Victoria Island, the Olokhaktomiut Hunters and Trappers Committee (Ulukhaktok) created specific zones that allow management actions such as enforcement of quotas (NWT 2016, p. 27; SARC 2012, pp. iii, xii; AANDC 2012, p. 3). In Resolute Bay, Nunavut, during the last decade, about 10–36 animals are hunted each year. Another 10–60 are hunted annually by residents on Ellesmere and Devon Island. In the Northwest Territory, annual harvest was reported to be 12 or fewer on Banks Island, and zero animals were taken from WQEI (COSEWIC 2015, p. 52). These numbers indicate that annual take of the Peary caribou by local hunters remains low. Additionally, local communities have voluntarily curtailed hunting when the Peary caribou population is in decline. For example, as a result of the mass die-off between 1995 and 1997, the Resolute Bay Hunters and Trappers Association prohibited hunting of Peary caribou on Bathurst Island. A similar ban was instituted by local communities at Sachs Harbor on Banks Island (COSEWIC 2015, p. 52).

Protection of habitat for Peary caribou has increased in the past few decades (Gunn et al. 2011, pp. 26–27). Since the early 1990s, three national parks have been established in areas that are important for Peary caribou (Government of Canada 2015, entire; Gunn et al. 2011, p. 27). In 1992, summer habitat for Peary caribou on northern Banks Island became a protected area as Aulavik National Park. In 2001, approximately one-fifth of Ellesmere Island became protected as Quttinirpaaq National Park (formerly Ellesmere Island National Park Reserve); this park is the second largest national park in Canada. The Qausuittuq National Park (formerly proposed as Tuktusiuqvialuk National Park) was created to provide protection for Peary caribou on northern Bathurst Island in 2015. However, despite designation as protected areas, the actual conservation measures that apply to these ''protected areas'' are unclear. These protected areas provide some protection for the Peary caribou through prohibiting land-use activities such as those for resource exploration and development. Hunting activities in the park is regulated through a permitting system. However, they do not prohibit other human activity such as tourism and aircraft flight (Gunn et al. 2011, pp. 26 27), nor do they address climate change. Some caribou researchers indicate that protection for migratory caribou calving grounds is still needed (Festa-Bianchet et al. 2011, p. 430).

In summary, the combined NWT/Federal Peary Caribou Recovery Strategy has not been completed; as a result, we are unable to evaluate whether this recovery plan will effectively mitigate the factors that are negatively impacting the Peary caribou. However, the development and enforcement of the harvest quota system in addition to other management efforts by the Wildlife Management Advisory Committee (Northwest Territories) on NW Victoria Island and Banks Island, both areas where the caribou populations seem to be stable, indicate that current regulatory mechanisms may be having a positive impact on the subspecies.

Synergistic and Cumulative Effects

Peary caribou live in a harsh environment, and their populations fluctuate in response to various factors. This subspecies is susceptible to abrupt changes in population size (Giroux et al. 2012, p. 4; Jenkins et al. 2011, pp. 9, 156). Population fluctuations are not the result necessarily of a single cause; they can occur due to a combination of environmental factors that are acting together.

Although the Peary caribou populations appear to have stabilized or slightly declined, the interactions within an ecosystem are complex, interrelated, and not linear and, therefore, complicated to predict (Tews et al. 2012, pp. 271, 275; Meier et al. 2011, p. 9–46). Subtle cumulative effects can occur when several factors act either singly at different times or in combination over the long term (Hovelsrud et al. 2011, p. 10–3; Miller et al. 2007, p. 33). The observed and the projected effects of a warming global climate are more extreme in northern high-latitude regions, in part due to the ice-albedo feedback mechanism in which melting of snow and sea ice lowers reflectivity and thereby further increases surface warming by absorption of solar radiation (Wang and Overland 2009, p. 1; IPCC 2007a, p. 30). A warmer climate will interact with other factors that are affecting the Peary caribou, and the combination of all of these factors acting together affects the subspecies more than if just one factor was adversely affecting the subspecies.

The most significant threat affecting this subspecies appears to be extreme weather events that cause massive starvation events and death among herds. Additionally, the predicted trends related to the effects of climate change (snowpack and ice events), the potential for changes in the composition of plant communities, the expected continuation of loss of sea ice (changing migratory routes and access to critical habitats), and the subspecies' tendency towards small and isolated populations are cumulatively affecting this subspecies now and are expected to continue into the foreseeable future (SARC 2012, p. xvii; Joly et al. 2010, p. 322; Chen et al. 2009a, entire; Chen et al. 2009b, entire; Post and Forchhammer 2008, as cited in Sharma et al. 2009, p. 2,559).

Determination of Peary Caribou Status

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of ''endangered species'' or ''threatened species.'' The Act defines an ''endangered species'' as a species that is ''in danger of extinction throughout all or a significant portion of its range,'' and a ''threatened species'' as a species that is ''likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' The Act requires that we determine whether a species meets the definition of ''endangered species'' or ''threatened species'' because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. For a more detailed discussion on the factors considered when determining whether a species meets the definition of ''endangered species'' or ''threatened species'' and our analysis on how we determine the foreseeable future in making these decisions, please see the *Regulatory Framework* section above.

Status Throughout All of Its Range

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the Peary caribou. As with all biota, there are many uncertainties about this subspecies, including how changes in climate will affect its ecosystem, in part due to the complexity of biological systems and processes, and we have made reasonable conclusions about the potential impacts these changes may have on the species based on the best scientific and commercial information available on Peary caribou. Extreme weather events (heavy snow and icing) affect plant phenology and the availability of nutrients within its ecosystem, which influence the caribou's annual life cycle, thus affecting the size of annual populations. The effects of weather events are particularly a threat with respect to some of the island populations that are extremely small. The threats likely to affect the Peary caribou are disruption of migration routes as a result of loss of sea ice (Factor A), reduced accessibility of vegetation resulting from extreme weather events and a changing climate (Factor A), changes in plant composition (Factor A), and synergistic and cumulative effects of all factors working in concert.

The vast majority of Peary caribou's habitat is covered by snow and ice for a significant portion of the year. Icing events are expected to increase (Steiner et al. *2013,* p. 83; Turunen et al. 2009, p. 813, COSEWIC 2004, pp. 51–54). This increase will reduce caribou access to food, and icing events in the past have historically been linked to major die-offs (Jenkins et al. 2011, p. 6). The loss of sea ice is very likely to occur due to warming temperatures throughout the Canadian Arctic (Shepherd et al. 2012, pp. 1,188–1,189; Sharp et al. 2011, pp. 1, 4). However, the northern range of the Peary caribou, the Queen Elizabeth Islands, contains some of the thickest sea ice in the world (Engler and Pelot 2013, p. 25). The best available information supports a conclusion that continued persistence of sea ice in the QEI is likely to continue to facilitate the subspecies' ability to migrate between the different islands up to the year 2080 (Jenkins et al. 2015, p. 4). The other extant subpopulation, the Banks Island group, now likely completes its life cycle on Banks Island. This subpopulation will not be as affected by long-term changes in sea ice. Overall, due to the continued persistence of sea ice in the QEI and the migration behavior of the caribou farther south, the effects of changes in sea ice on the Peary caribou will be limited.

The effects of climate change can also lead to changes in plant composition. The current trend suggests a decline in lichen availability and increase in vascular foliage (Chen *et a*l 2009a, pp. 19, 25–27). However, the increase in shrubs does not necessarily translate to an increase in the nutritional quality for the subspecies (COSEWIC 2015, p. 45).

As a subspecies listed as endangered under SARA, hunting of the Peary caribou is prohibited except when a permit is issued (Giroux et al. 2012, p. 4). For non-indigenous individuals, a permit can be issued if an activity is conducted for research, benefits the subspecies, or the subspecies affected is incidental to carrying out an activity (COSEWIC 2015, p. 52). Indigenous communities are excepted from this restriction for the purpose of exercising their harvesting rights, and coordination between these communities and provincial governments help set an annual quota. Additionally, local communities will sometimes ban hunting on certain years when the subspecies population is too low (COSEWIC 2015, p. 52). These continued collaborative efforts between national, provincial, and local communities in areas where the caribou populations seem to be stable suggest hunting of the Peary caribou is adequately regulated.

These factors (extreme weather events that cause mass starvation and death, changes in plant composition due to warming weather, loss of sea ice, small and isolated populations, synergistic and cumulative effects) affecting this subspecies are predicted to occur throughout its entire range with southern subpopulations experiencing a greater impact than subpopulations found farther north.

We evaluated all relevant threats, including any regulatory mechanisms and conservation measures addressing these threats. The primary threats are the effects of climate change on icing events and sea-ice loss. We find that overall sea-ice loss is projected to continue for the whole Canadian Arctic; however, this loss will not be as severe within the subspecies' range. Furthermore, recent presence and absence surveys have resulted in additional observations of the subspecies within its range.

In section 3(6), the Act defines an ''endangered species'' as any species that is ''in danger of extinction throughout all or a significant portion of its range'' and in section 3(20), defines a ''threatened species'' as any species that is ''likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' While the subspecies has experienced previous population decline due to icing events, the population was able to rebound within two generations (COSEWIC 2015, p. vi). Additionally, reliable climate change models for the High Arctic where the subspecies is found project the likely persistence of sea ice during the winter time ensuring connectivity between the islands throughout the subspecies range out to the foreseeable future of 2050, even under high emission scenarios (Mallory and Boyce 2018, p. 2,197; Jenkins et al. 2015, p. 4). Continued migration between islands will allow the subspecies access to food resources during the wintertime thereby allowing the subspecies to withstand stochastic events caused by icing events. In addition, the continued presence of thick sea ice will also limit shipping traffic through the subspecies habitat. Lastly, continued management by Canadian governmental authorities in cooperation with local indigenous communities have limited the effects of hunting on the species. Overall, the Peary caribou consists of sufficient currently robust populations such that threats currently acting on the subspecies do not put it in danger of extinction. In addition, we conclude that the threats will not within the foreseeable future rise to the level where the subspecies is likely to no longer have sufficient robust populations. In other words, the subspecies is not likely to become endangered within the foreseeable future.

After evaluating threats to the species and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we find that the effects of climate change and other potential threats, alone or in combination, do not rise to a level that causes this species to meet the definition of a threatened species or an endangered species throughout its entire range. Thus, after assessing the best available information, we conclude that Peary caribou is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range.

Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. Having determined that the Peary caribou is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, we now consider whether it may be in danger of extinction or likely to become so in the foreseeable future in a significant portion of its range—that is, whether there is any portion of the species' range for which it is true that both (1) the portion is significant; and, (2) the species is in danger of extinction now or likely to become so in the foreseeable future in that portion. Depending on the case, it might be more efficient for us to address the ''significance'' question or the ''status'' question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species' range.

In undertaking this analysis for Peary caribou, we choose to address the status question first—we consider information pertaining to the geographic distribution of both the species and the threats that the species faces to identify any portions of the range where the species is endangered or threatened. We examined the following threats: Icing events, loss of sea ice, changes in plant composition, parasitic harassment, and shipping, including cumulative effects. For the Peary caribou, regional variations in threats are related to the latitudinal differences with the effects of climate change (sea-ice loss, icing events, and parasitic harassment) being greater on the southern subpopulations than on the northern subpopulation. Additionally, shipping traffic is more concentrated in the southern portion of the Canadian Arctic Archipelago. The cumulative effects of these threats mean that the four subpopulations of Peary caribou (Banks-Victoria islands, WQEI, EQEI, and Prince of Wales-Somerset-Boothia Peninsula) are experiencing different population trends and threat responses.

After experiencing population crashes in the 1990s due to icing events, the WQEI and EQEI now have stable or increasing population trends and now comprise 82 percent of the subspecies total populations (COSEWIC 2015, p. 41). Additionally, the northern portion of the Canadian Arctic archipelago contains the thickest sea ice in the Arctic region and this ice is replenished by multi-year flowing in from the Arctic Ocean (Li et al. 2020, p. 1; Howell et al. 2015, p. 1,623). The thickness of the sea ice around the Queen Elizabeth Islands contributed to shipping lanes being primarily located farther to the south (Engler and Pelot 2013, p. 9). The persistence of sea ice in this region allows the WQEI and EQEI Peary caribou subpopulations to be able to migrate between different islands. The continued ability to migrate between different islands will ensure the subspecies have access to sufficient food resources and help it recover from population fluctuations due to stochastic events. Overall, the stability as well as the previously noted lesser impact from threats related to climate change and shipping traffic for these most populous northern subpopulations suggests that the threats acting on these subpopulations do not rise to the level where the species is in danger of extinction or likely to become in danger of extinction within the foreseeable future.

While the two QEI subpopulations now have stable population trends, the Banks-Victoria island subpopulation and the Prince of Wales-Somerset-Boothia Peninsula island complex was experiencing a declining population trend. The Banks-Victoria island subpopulation also experienced a decline in the 1980s due to icing events. While the subpopulation in Victoria Island has yet to recover, the subpopulation on Banks Island has stabilized since 1992 albeit at a lower level (COSEWIC 2015, p. VI). Unlike the Queen Elizabeth Islands subpopulation discussed above, which regularly migrates between the smaller islands of the QEI, the Banks Island subpopulation, as suggested by the lack of outward gene flow, might not migrate

as often as other Peary caribou subpopulations (COSEWIC 2015, p. 26). This means that fluctuations in sea-ice level may not affect this subpopulation to the degree of other subpopulations of the Peary caribou. Therefore, the biggest threat affecting this subpopulation is likely to be icing events.

While icing events have and will continue to play a role in dramatic population crashes for this subpopulation, the population trend as noted above has remained stable since 1992 (COSEWIC 2015, p. 35). This overall trend persists despite an extreme weather event that took place in the Canadian Arctic Archipelago in 1996–1997 that resulted in a population crash of the WQEI subpopulation (COSEWIC 2015, p. 38; Jenkins et al. 2011, p. 120). Going into the foreseeable future, while climate models do project increases in the frequency and severity of icing events for Banks Island, there is greater uncertainty of the effect this will have on the population trend of this subpopulation (COSEWIC 2015, p. 47). Increased icing events could increase mortality, but reduced snow depth as a result of increases in temperature could result in greater access to foliage. That said, based on historical population trends, we have observed this subpopulation's ability to persist and rebound after an icing event, suggesting that it possesses sufficient ability to recover from stochastic icing events. This long-term stability leads us to conclude that while the Banks Island subpopulation might not return to its historical level, the threats acting on the subpopulation do not rise to the level where the species is in danger of extinction or likely to become in danger of extinction within the foreseeable future.

While the Banks Island subpopulation has stabilized, the Prince of Wales-Somerset-Boothia Peninsula islands complex is suspected to be near zero and may be extirpated due to a number of possible factors including wolf predation, extreme weather, hunting, and disease. The potential extirpation of this subpopulation warranted further consideration due to its potential effects on the subspecies as a whole. We next evaluated whether this subpopulation may be significant to the Peary caribou. The Service's most-recent definition of ''significant'' has been invalidated by the courts (*Desert Survivors* v. *Dep't of the Interior,* No. 16–cv–01165–JCS (N.D. Cal. Aug. 24, 2018)). Therefore, we evaluated whether the Prince of Wales-Somerset-Boothia subpopulation could be significant under any reasonable definition of ''significant.'' To do this, we evaluated whether this subpopulation may be biologically important to the species.

The Prince of Wales-Somerset-Boothia subpopulation contains very few individuals and may be extirpated. The decline or potential loss of this subpopulation will reduce the overall abundance of the subspecies and reduce its range. We do not have information on the genetic uniqueness of this subpopulation. That said, while the subspecies' genetic diversity will be affected by the decline of this subpopulation, historical genetic exchanges between this subpopulation and the other subpopulations mean this subpopulation is likely not genetically unique. The loss of this subpopulation would likely have a limited effect on overall genetic diversity. Overall, while the loss of this subpopulation would have some effect on the subspecies as a whole, it would likely be minimal, and the Peary caribou has historically experienced wide fluctuation in its overall population. In the past, other subpopulations experienced catastrophic die-off of up to 80 to 90 percent due to icing events and were able to recover within a few decades. This could allow other subpopulations to recolonize the island complex in the future. Therefore, because of the high number of individuals and the stability of other subpopulations as well as the potential for recolonization by those subpopulations, we determined that the Prince of Wales-Somerset-Boothia subpopulation is not biologically significant to the Peary caribou.

In summary, the species is not in danger of extinction or likely to become so in the foreseeable future in any significant portion of its range. Our approach to analyzing SPR in this determination is consistent with the court's holding in *Desert Survivors* v. *Department of the Interior,* No. 16–cv–01165–JCS, 2018 WL 4053447 (N.D. Cal. Aug. 24, 2018).

Determination of Status

Our review of the best available scientific and commercial information indicates that the Peary caribou does not meet the definition of an endangered species or a threatened species in accordance with sections 3(6) and 3(20) of the Act. Therefore, we find that listing the Peary caribou is not warranted at this time.

II. Proposed Listing Determination—Dolphin and Union Caribou

Background

Description

The Dolphin and Union caribou is a medium-sized caribou that is larger than the Peary caribou and smaller than the larger mainland barren-ground caribou. The pelage of Dolphin and Union caribou is slightly darker than that of the Peary caribou and lighter than the barren-ground caribou. Its winter coat is a distinctive white with a light-brown back and white legs. In the summer, the coat becomes darker brown on the back. This entity does not display the pronounced flank stripe typical of barren-ground caribou. Additionally, its antlers are much like that of a Peary Caribou and the antler velvet is pale gray, which is distinct from the dark brown antler velvet of mainland barren-ground caribou (SARC 2013, p. vi).

Taxonomy

The Dolphin and Union caribou has had a particularly confusing taxonomic history (COSEWIC 2011, p. 25). Most of the early taxonomic history of the Dolphin and Union caribou is identical to the Peary caribou. Therefore, this history can be found in the above section (Peary Caribou: *Taxonomy*).

In 2003, participants in a workshop on caribou taxonomy considered the existing classification to be insufficient to demonstrate the level of diversity that exists between the subspecies of caribou (McFarlane et al. 2003, pp. 127–128). The workshop concluded that conservation units should reflect the biodiversity and preserve the uniqueness of each caribou population in the Canadian Arctic Archipelago. They recommended the establishment of conservation units below the subspecies level to preserve the caribou (*Rangifer tarandus*) of the Canadian Arctic Archipelago (McFarlane et al. 2009, p. 105).

Several studies have postulated that Dolphin and Union caribou are genetically distinct from either the Peary caribou or the barren-ground caribou (McFarlane et al. 2013, pp. 124–126; Nagy et al. 2011, pp. 190, 194; Poole et al. 2010, p. 415). Dolphin and Union caribou have a high level of genetic distinctness (COSEWIC 2009, p. 117). Additionally, the Dolphin and Union caribou are genetically more related to the mainland populations than to the Peary caribou that occur on Victoria Island. However, the Dolphin and Union caribou are still genetically distinguished from both barren-ground caribou and Peary caribou (McFarlane et al. 2009, as cited in COSEWIC 2011, p. 25; McFarlane et al. 2003, pp. 124–126).

In May 2004, COSEWIC reassessed the status of the three Peary caribou populations and reviewed the designation. The 2004 assessment defined the Dolphin and Union population as separate from the Peary

caribou and from the barren-ground caribou and recommended a taxonomic revision of the Dolphin and Union population as *R. t. groenlandicus x pearyi* to distinguish the population from the mainland barren-ground caribou, *R. t. groenlandicus,* and from the Peary caribou, *R. t. pearyi* (McFarlane et al. 2013, pp. 124–126; Nagy et al. 2011, pp. 184, 190, 194; Poole et al. 2010, p. 415). While the 2004 COSEWIC report recommended the reclassification of the Dolphin and Union caribou, questions remained over whether the entity should be considered as a subspecies or a geographically distinct population.

In 2011, COSEWIC prepared to conduct a reassessment of all caribou in Canada; in preparation for the assessment, they published a document detailing ''designatable units'' (DU), geographically based areas created for management purposes, of caribou. A DU can be a species, subspecies, variety, or geographically or genetically distinct population that may be assessed by COSEWIC, where such units are both discrete and evolutionarily significant. In this assessment, COSEWIC confirmed the status of the Dolphin and Union population as a DU (COSEWIC 2011, pp. 10, 25). The Committee noted that the process of designating DUs takes into account taxonomy, phylogenetics, genetics, morphology, life history, and behavior of the species, as well as biogeographical information such as range disjunction and the ecogeography in which the species is found.

In its 2011 report, COSEWIC discussed the changes in taxonomy for the Dolphin and Union population and included the scientific name *R. t. groenlandicus x pearyi,* as distinct from the barren-ground caribou (*R. t. groenlandicus)* and from the Peary caribou population (*R. t. pearyi)* (COSEWIC 2011, entire). This classification does not mean that the Dolphin and Union subpopulation is of hybrid origin but is due to taxonomical ambiguity. The current classification then is a way for researchers to distinguish the Dolphin and Union subpopulation from the barren-ground caribou and the Peary caribou (Ray 2017, pers. comm.). However, this reclassification has not yet been formalized and the Dolphin and Union herd is currently classified as being part of the barren-ground caribou subspecies. Given the established taxonomic classification of the Dolphin and Union herd as part of *R. t. groenlandicus,* we evaluated whether the Dolphin and Union caribou represent a distinct population segment (DPS).

Evaluation of the Dolphin and Union Caribou Subpopulation as a Distinct Population Segment

Under section 3(16) of the Act, we may consider for listing any species, including subspecies, of fish, wildlife, or plants, or any DPS of vertebrate fish or wildlife that interbreeds when mature (16 U.S.C. 1532(16)). Such entities are considered eligible for listing under the Act (and, therefore, are referred to as listable entities), should we determine that they meet the definition of an endangered or threatened species.

Under the Service's DPS Policy (61 FR 4722, February 7, 1996), three elements are considered in the decision concerning the determination and classification of a possible DPS as threatened or endangered. These elements include:

(1) The discreteness of a population in relation to the remainder of the species to which it belongs;

(2) The significance of the population segment to the species to which it belongs; and

(3) The population segment's conservation status in relation to the Act's standards for listing, delisting, or reclassification (*i.e.,* is the population segment endangered or threatened).

A population segment of a vertebrate taxon may be considered discrete under the DPS policy if it satisfies either one of the following conditions:

(1) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.

(2) It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

If a population segment is considered discrete under one or more of the conditions described in the Service's DPS policy, its biological and ecological significance will be considered in light of Congressional guidance that the authority to list DPSs be used ''sparingly'' (see Senate Report 151, 96th Congress, 1st Session). In making this determination, we consider available scientific evidence of the DPS's importance to the taxon to which it belongs. Since precise circumstances are likely to vary considerably from case to case, the DPS policy does not describe all the classes of information that might be used in determining the biological and ecological importance of a discrete population. However, the DPS policy describes four possible classes of information that provide evidence of a population segment's biological and ecological importance to the taxon to which it belongs. As specified in the DPS policy, this consideration of the population segment's significance may include, but is not limited to, the following:

(1) Persistence of the DPS in an ecological setting unusual or unique to the taxon;

(2) Evidence that loss of the DPS would result in a significant gap in the range of a taxon;

(3) Evidence that the DPS represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historical range; or

(4) Evidence that the DPS differs markedly from other populations of the species in its genetic characteristics.

To be considered significant, a population segment needs to satisfy only one of these criteria, or other classes of information that might bear on the biological and ecological importance of a discrete population segment, as described in the DPS policy. Below, we summarize discreteness and significance for the Dolphin and Union caribou.

Discreteness

The Dolphin and Union caribou are markedly separate from other populations of the barren-ground caribou (*Rangifer tarandus groenlandicus).* Behaviorally, the Dolphin and Union caribou is a migratory population that calves on Victoria Island in the summer and winter on coastal tundra on the mainland. In other words, the Dolphin and Union caribou spends part of its life cycle on the mainland and the other part on an island. This is in contrast to the remainder of the subspecies that either spend their entire life cycles on the mainland or on an island. Mainland barren-ground caribou subpopulations migrate between the tundra and boreal forest habitats. Meanwhile, other barren-ground subpopulations (such as the ones on Baffin Island and Southampton Island) spend their entire life on an island (McFarlane et al. 2016, p. 2). In addition to behavioral differences, the Dolphin and Union caribou is also geographically isolated from other members of the subspecies during part of its life cycle. Although the subpopulation's range overlaps with other barren-ground caribou subpopulation during the wintering months on the mainland, while on Victoria Island, the Dolphin and Union

caribou is geographically isolated from other subpopulations of the barren-ground caribou on the mainland (McFarlane et al. 2016, p. 16).

Morphological and genetic discontinuities between Dolphin and Union caribou and other subpopulations of the barren-ground caribou provide further evidence of this separation. Morphologically, the Dolphin and Union caribou are smaller and lighter in color than the mainland barren-ground caribou (McFarlane et al. 2009, p. 125). Genetically, the Dolphin and Union caribou is more closely related to the mainland barren-ground caribou than other island caribous it shares Victoria Island with (McFarlane et al. 2009, p. 125). On the other hand, despite being more closely related, the Dolphin and Union caribou also maintains genetic distinctness from mainland subpopulations (McFarlane et al. 2016, pp. 8, 14; McFarlane et al. 2009, p. 125, Zittlau 2004, p. 113). Phylogenetic analyses conducted on mitochondrial DNA reveals that during the caribou recolonization of the Arctic at the end of the last Ice Age, the Dolphin and Union caribou diverged from the other barren-ground caribou subpopulations around approximately 3000 years ago (McFarlane et al. 2016, pp. 15–16).

In summary, we determine that the Dolphin and Union caribou is markedly separated from neighboring caribou subpopulations. At different times of the year, the Dolphin and Union caribou is physically (geographically) and reproductively isolated from the mainland subpopulations. The Dolphin and Union caribou also exhibit unique migratory behavior and genetic data supports the separation of the subpopulation from the barren-ground caribou. Therefore, we consider the Dolphin and Union caribou subpopulation to be discrete per our DPS policy.

Significance

We found that the Dolphin and Union caribou is significant to the *Rangifer tarandus groenlandicus* taxon because it differs markedly from other members in the taxon in its genetic characteristics.

The barren-ground caribou comprises multiple subpopulations found in the Yukon, Northwest Territories, and Nunavut (which includes Baffin Island and the islands of the Hudson Bay) (McFarlane et al. 2016, p. 2). The Dolphin and Union caribou is one of the few populations of the barren-ground caribou subspecies that uses both the islands of the Canadian Arctic Archipelago and the mainland as part of its range (Nagy et al. 2011, p. 2,342). As mentioned above, barren-ground caribou have three genetic variants: The mainland subpopulations, the Southampton Island subpopulations, and the Dolphin and Union caribou subpopulations. A study of allelic frequency shows that each subpopulation forms a unique cluster (McFarlane et al. 2016, p. 9), with the Dolphin and Union caribou being closer genetically to the mainland subpopulations than the Southampton subpopulation. This conclusion is further supported by a comparison of the fixation index (F_{ST} value) between the multiple subpopulations including the Southampton, Dolphin and Union, and different mainland subpopulations that yielded similar conclusion (McFarlane et al. 2016, p. 9; McFarlane et al. 2014, p. 83). The F_{ST} value for the Southampton subpopulation varies between 0.436 to 0.527. For the Dolphin and Union caribou, values vary between 0.059 and 0.067. For the mainland subpopulations, values vary between −0.004 (a calculation output that can be considered to be a zero) and 0.038. An F_{ST} value of zero means that the two subpopulations being compared are genetically identical while a value of one suggests that it is possibly a different species. As can be seen here, the Southampton subpopulation has the highest level of genetic distinctness relative to the other two. While not as genetically distinct, the Dolphin and Union caribou still possess an F_{st} value that is greater than the mainland subpopulations, by a large enough margin suggesting genetic distinctness from the rest of the subspecies (McFarlane et al. 2016, p. 9). This conclusion is supported by other publications which also identified the Dolphin and Union caribou as being distinct from all other mainland barren-ground caribou subpopulations (McFarlane et al. 2014, p. 83; Zittlau et al. 2009, as cited in COSEWIC 2011, p. 25; Zittlau 2004, p. 113).

In addition to their allelic differences, a study of the gene flow of the Dolphin and Union caribou supports the genetic distinctness of the subpopulation. Gene flow of the Dolphin and Union caribou appears to flow in a southward direction. That is, there is an outward flow of the Dolphin and Union caribou gene into neighboring mainland barren-ground caribou subpopulation located to the south of Victoria Island. However, there is a slower gene flow of the mainland barren-ground caribou into the Dolphin and Union caribou subpopulation (McFarlane et al. 2014, p. 88). This phenomenon can be explained by the behavioral difference between male and female caribous. While female caribous display site fidelity, male caribous tend to wander farther afield. Because female Dolphin and Union calve exclusively on Victoria Island, they are geographically isolated from mainland barren-ground caribou subpopulation (Nagy et al. 2011, p. 2,335). On the other hand, there is greater detection of first- and second-generation male migrants among other subpopulations of caribou (McFarlane et al. 2016, pp. 11, 14). This result suggests that some male Dolphin and Union caribou may migrate to other barren-ground caribou subpopulations resulting in outward gene flow. Additionally, there are periods of multiple years where the dispersal rate is zero meaning that there was no gene flow out of the subpopulation (McFarlane et al. 2016, p. 14). Overall, the gene flow patterns reinforce the genetic data, demonstrating that while there is occasional genetic exchange between Dolphin and Union caribou and the mainland barren-ground caribou subpopulations, the Dolphin and Union caribou maintains its genetic uniqueness.

This conclusion is supported by other studies that identified the genetic distinctness of Dolphin and Union caribou from other caribou subpopulations (McFarlane et al. 2014, pp. 82–83; McFarlane et al. 2009, p. 125; Zittlau 2004, p. 113). Additionally, the Dolphin and Union caribou experience geographic isolation on Victoria Island during calving season which contributes to a limited outward gene flow between the Dolphin and Union caribou and other populations of *Rangifer tarandus groenlandicus* (Nagy et al. 2011, p. 2,335). Although there are some genetic exchanges with the mainland barren-ground caribou through the migration of male Dolphin and Union caribou, the subpopulation geographic and genetic isolation likely contributed to its genetic uniqueness. Thus, we find that the Dolphin and Union caribou differs markedly from other populations of the species in its genetic characteristics.

Summary

Given that both the discreteness and the significance elements of the DPS policy are met for the Dolphin and Union caribou, we find that the Dolphin and Union caribou constitutes a valid DPS of *Rangifer tarandus groenlandicus.* Because we find the Dolphin and Union caribou subpopulation to be both discrete and significant, we evaluate whether this DPS is endangered or threatened based on the Act's definitions of those terms and a review of the factors listed in section 4(a) of the Act.

Life History

Dolphin and Union caribou have an average lifespan of 13–15 years. Males typically reach breeding age at around 4 years and females between 2–3 years (COSEWIC 2004, p. 28). Approximately 80 percent of females will have one calf annually; females will generally reproduce between the ages of 2 and 13 years and males between 4 and 13 years (Gunn et al. 1998, as cited in COSEWIC 2004, p. 28). The annual rut usually occurs in late autumn, and calving occurs in late spring, with variation depending on the latitude and environmental conditions (COSEWIC 2011, p. 11; Gates et al. 1986, pp. 216–222).

Calf production and recruitment of Dolphin and Union caribou are highly dependent on the female's physical condition, specifically their fat reserves (Cameron et al. 1992, p. 480). The nutritional condition of the female is dependent on the prevailing environmental conditions. As a result, there is high variability in annual pregnancy rate, calf production, and calf recruitment. Depending on the environment, pregnancy rates can vary from 0 to 100 percent. In severe winters, recruitment of calves can drop to 0 percent (COSEWIC 2004, pp. vii, 28). Under favorable conditions, roughly 50 percent of calves survive (Bergerud 1978, as cited in Miller et al. 2007, p. 25). In free-ranging caribou populations, the proportion of males to females averages 40 to 60 respectively (Miller et al. 2007, p. 25).

Range and Migration

The range of the Dolphin and Union caribou consists of Victoria Island and the Canadian mainland, covering a surface area estimated to be 499,449 km^2 (192,838mi^2). That range crosses two Canadian territories: Nunavut and the NWT (SARC 2013, p. xiv; Governments of NWT and Nunavut 2011, p. 2; Poole et al. 2009, p. 415). Dolphin and Union caribou calve during the summer months on Victoria Island before moving south to the coast to rut. They then cross the sea ice of the Coronation Gulf, Dolphin and Union Strait, and Dease Strait to their wintering grounds on the mainland (SARC 2013, p. xiv; Nagy et al. 2011, p. 2,335; Poole et al. 2009, pp. 416–417). While seasonal migration between Victoria Island and mainland appears to be annual behavior of the Dolphin and Union caribou, historically, when their population was much smaller, the Dolphin and Union caribou was only observed on Victoria Island (Gunn et al. 2011, p. 37). Some caribou biologists suspect that the range of the Dolphin and Union population may be expanding southward, but any change in its range remains inconclusive (Governments of NWT and Nunavut 2011, p. 8). The Peary caribou and the Dolphin and Union range has the potential to overlap in the northwest part of Victoria Island, and the populations may make contact with each other as each population may occupy this habitat during the summer. Peary caribou use the region for wintering and summer grounds, while a few Dolphin and Union may use it during the summer. On the other hand, during the rutting season (generally occurring in October and November), Dolphin and Union caribou are geographically isolated from other caribou (Nagy et al. 2011, p. 2,345; Poole et al. 2010, p. 415; McFarlane 2009, p. 126).

Population Estimates and Trends

In contrast to the Peary caribou, which occur in small groups consisting of three to five individuals known as ''subpopulations'' or ''clusters'' (Jenkins et al. 2011, p. 11), the Dolphin and Union caribou consists of a single herd with an estimated population in 2015 of 18,413 (Leclerc et al., in litt. 2017).

The Dolphin and Union population was first recorded in 1852 and was observed moving south, crossing the Dolphin and Union Strait, a part of the Northwest Passage, from Victoria Island to the mainland of Canada to spend the winter, and was recorded returning again in the spring (Manning 1960, pp. 7–10). Using population densities as a proxy, the number of caribou on Victoria Island was extrapolated to 100,000 animals, which was likely an unrealistically high estimate (SARC 2013, p. 86; Jenness 1920, pp. 166–167 and Stefansson 1920, pp. 135–136, as cited in Manning 1960, p. 8). By the mid-1920s, estimates of caribou crossing the Dolphin and Union Strait during the fall migration dropped to fewer than 30 caribou, and the migration completely stopped in 1924. The decline in caribou numbers was found most likely to be related to the introduction of firearms and intense hunting of caribou in the region, possibly combined with effects from icing events (Gunn et al. 2011, p. 37; COSEWIC 2004, p. 41; Manning 1960, pp. 9–10). Since the 1920s, the Dolphin and Union caribou population has increased. By 1949, the population had increased to about 1,000, and by 1980, the population increased to approximately 3,424 ± 522 (this estimate likely included calves) (COSEWIC 2004, p. 41). In the 1990s, the Dolphin and Union caribou rebounded even further and resumed its historical winter migration crossing the strait to the mainland (COSEWIC 2004, p. 41; Gunn et al. 1997, entire). A 1994 survey of the Dolphin and Union calving ground estimated 14,500 ± 1,015 animals (Nishi and Buckland 2000, p. 42). However, this survey underestimated the number of caribou, as it failed to define the calving ground and radio-collared females were found in eastern Victoria Island, which was an area not included in the survey (Leclerc 2017, *in litt.*).

In 1997, a systematic aerial survey method was developed to count the Dolphin and Union caribou during the staging and rutting period on the south coast of Victoria Island (Nishi and Gunn 2004, pp. 4–9). The survey counted 5,087 caribou and estimated the herd total population to be 27,948 ± 3367 individuals (Nishi and Gunn 2004, p. iii). That methodology was consistently used in following surveys. In 2007, researchers found 21,753 ± 2,343 caribou within the survey area. This number was subsequently corrected to account for caribou that did not yet reach the coast during the survey. Therefore, the 2007 corrected Dolphin and Union population was estimated to be 27,787 ± 3,613, and this correction factor was also applied to the 1997 survey estimate, giving an estimate of 34,558 ± 4,283 caribou; these population estimates indicate that the population was at best stable or in a slight decline (Dumond and Lee 2013, p. 334). However, the 2015 Dolphin and Union population survey projected a decline with the population at that time estimated to be 18,413 caribou (Governments of the Northwest Territories and Nunavut 2018, p. 36; Leclerc et al. 2017, in litt.; McFarlane et al. 2016, pp. 2–3).

Diet and Nutrition

Calving is closely related to plant phenology (timing of plant blooming based on daylight and temperature) (COSEWIC 2004, p. vii). Seasonal feeding is critical for various life stages such as lactation and growth, increasing fat reserves during the summer, and survival during the winter (COSEWIC 2004, pp. vii, 28–35). Summer and winter forage varies based on availability and season, but Arctic caribou prefer willow *(Salix arctica),* sedges *(Carex* species), purple saxifrage *(Saxifraga oppositifolia),* grasses, forbs, and lichens (COSEWIC 2004, pp. 23, 32–34). During the summer, the Dolphin and Union caribou acquires most of its dietary protein from sedges, grasses, and willows (SARC 2013, p. 32; Joly et al. 2010, p. 322; COSEWIC 2004, pp. 32–33). During the winter on the mainland,

caribou diet consists mostly of moss and willow and lichen (SARC 2013, p. 33).

Under ideal conditions, caribou forage by pushing soft snow off the vegetation with their noses. When snowpack is deeper, they will dig small craters with their hooves in the snow to reach the vegetation (COSEWIC 2004, p. 35). However, snow conditions can limit the accessibility to vegetation. Rain in late October and November can cause a layer of ice to form over the vegetation, which may prevent caribou from accessing it (COSEWIC 2004, pp. 33–34). Snowfall within the range of the Dolphin and Union caribou varies, and the amount of snow is determined by several variables, such as terrain, wind speed and direction, and air and ground temperatures (Sturm 2003, as cited in Maher 2012, p. 84). During the winter, caribou tend to forage in drier, exposed areas that have less snow (Miller and Gunn 2001, p. 221).

Conservation Status of the Dolphin and Union Caribou

The caribou species (*Rangifer tarandus*) is recognized at the species level as ''vulnerable'' by the International Union for Conservation of Nature (IUCN 2012, unpaginated). Individual caribou subspecies are not differentiated by IUCN and as such, IUCN has made no assessment of the Dolphin and Union caribou. The IUCN Red List of Threatened Species identifies and documents those species considered to be most in need of conservation attention if global extinction rates are to be reduced, and the IUCN Red List is recognized as an approach for evaluating the conservation status of plant and animal species. However, designations by the IUCN convey no actual protections. COSEWIC (2004, entire) evaluated the status of Dolphin and Union caribou and assessed them as special concern. In February 2011, they were added to Canada's Federal *Species at Risk Act* as Special Concern (SARC 2013, p. 97). The recovery plan for the Dolphin and Union caribou published in 2018. We will discuss the recovery plan in greater detail in Status of Existing Regulatory Mechanisms (Governments of the Northwest Territories and Nunavut 2018, entire; SARC 2013, p. 97).

Regulatory and Analytical Framework

We apply the same regulatory and analytical framework to the Dolphin and Union as we apply to other species. Please consult the *Regulatory Framework* and *Analytical Framework* sections above in the discussion of Peary caribou for details.

Summary of Biological Status and Threats

In this section, we review the biological condition of the species and its resources, and factors that affect the species to assess the species' overall persistence. The Dolphin and Union caribou lives in a harsh environment that is sparsely populated with people. Ecosystems can be complex, and factors affecting the health and viability of species are not always readily apparent. Caribou biologists have suggested a number of factors that may contribute to the decline of the Dolphin and Union caribou. In addition to the major threats we discussed below, we also assessed other threats that we concluded to have minor effects on the species; those assessments can be found in our Species Report. The minor threats include deterioration of the quality and quantity of nutrients available within their habitat, predation (primarily by wolves), and outbreak of parasites or disease. The major threats that will be discussed below are:

- Sea-ice loss;
- Hindered ability to seasonally migrate due to lack of sea ice and possible drowning;
- Hunting;
- Disturbance due to development, oil and gas exploration, or shipping.

A primary factor affecting the Dolphin and Union caribou is the timing of freeze-up and sea-ice connectivity; these conditions are affected by ships disturbing the gray ice (young ice whose thickness is less than 4–6 inches), ice-breaking activities for tourism and oil and gas industries, and potential loss of sea ice due to climate change (Leclerc 2017, *in litt.;* Dumund and Lee 2013, p. 335; Poole et al. 2010, entire). These related factors are discussed in two reports: Sea Ice and Migration of the Dolphin and Union Caribou Herd in the Canadian Arctic: An Uncertain Future (Poole et al. 2010, entire) and the species status report prepared by the Species at Risk Committee for the Dolphin and Union caribou, published in December 2013, for the Northwest Territories (SARC 2013, entire). Additionally, a draft management plan for the Dolphin and Union caribou was made available for public comment in the spring of 2017 after a reassessment conducted by COSEWIC in 2015–2016 (Leclerc 2017, *in litt.*). We refer readers to these documents, which are available at *www.regulations.gov,* Docket number FWS–HQ–ES–2019–0014 for more detailed information. Here, we summarize the information.

Climate Change

Changes in climate and weather patterns are suspected to be a major contributor to the decline of this caribou (Hansen et al. 2011, pp. 1,917, 1,920–1,922; Miller and Barry 2009, p. 176; Prowse et al. 2009a, p. 269; Tews et al. 2007a, pp. 95–96; COSEWIC 2004, pp. viii, 55–58). The term ''climate change'' thus refers to a change in the mean or variability of one or more measures of climate (*e.g.,* temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2013, p. 1,450).

The demographic, ecological, and evolutionary responses of caribou to threats from climate change are complicated to predict. The complexity stems from the species' habitat requirements and resilience to the effects of climate change. Current models for the Arctic predict deeper snow cover, increasing rainfall, increasing rain-on-snow events, warm periods, more thawing–freezing cycles, and a higher risk of ice layer formation on the soil within the snowpack during the winters of the coming decades (Hansen et al. 2011, p. 1,917; Turunen et al. 2009, pp. 813–814; Putkonen and Roe 2003, entire). Caribou populations will respond negatively to climate change due to the occurrence of more precipitation, greater snowfall, and subsequently more freezing rain events, which will make access to food more difficult (COSEWIC 2015, pp. 44–46; Miller et al. 2007, p. 33). However, other models support a conclusion that caribou may experience increases in population numbers if climate change results in a 50 percent increase of taller, denser vegetation and woody shrubs (Leclerc 2017, *in litt.;* Tews et al. 2007a, p. 95). As ecological systems are dynamic, it is complicated to predict how one change (such as a rise in temperature) will affect other elements within the ecosystem (such as the amount of precipitation that falls as freezing rain, rather than snow) (Parrott 2010, p. 1,070; Green and Sadedin 2005, pp. 117–118; Burkett et al. 2005, p. 357).

For the purpose of this assessment, given that the primary threat to the Dolphin and Union caribou is considered by caribou researchers to be loss of sea ice due to climate change and increase in shipping activities, we rely on climate projection models undertaken by IPCC (IPCC 2014a, pp. 8–12). Relevant to our discussion, these models discuss future trends for precipitation and air and water temperature, which has an impact on

the condition of the caribou habitat. Projections of sea-ice loss using RCP 4.5 and 8.5 scenarios and rain-on-snow events in the Canadian Arctic varies in their time scale (Mallory and Boyce 2018, p. 2,192; Jenkins et al. 2016, p. 4; Engler and Pelot 2013, p. 21; Stroeve et al. 2012, p. 1,012). Some models project out to the year 2080 or 2100 (Mallory and Boyce 2018, p. 2,192; Jenkins et al. 2016, p. 4). Other models project to a shorter timeframe of up to 2050s (Derksen et al. 2018, p. 218; Stroeve et al. 2012, p. 1,012). While all climate models agree that sea-ice loss will occur in the Canadian Arctic, there is disagreement on when that loss will take place. Some models project the Canadian Arctic will experience ice-free periods as early as 2050 while others project that due to the influx of sea ice from the Arctic Ocean, sea ice in the Canadian Arctic will persist into the 2080s (Li et al. 2019, pp. 1 2; Derksen et al. 2018, p. 198; Mallory and Boyce 2018, pp. 2,194 2,195; Johnson et al. 2016, p. 16; Jenkins et al. 2016, p. 4). This uncertainty is due in part to the flow of sea ice from the Arctic to the east coast of the Canadian Arctic Archipelago (Derksen et al. 2018, p. 218).

In addition to sea-ice loss, the thinning of sea ice can also have an impact on the caribou. This is because if sea ice is too thin, it will not be able to support the caribou's weight. We thus take into consideration changes in ratio over time between the thinner first-year ice versus the thicker, multiyear ice (Li et al. 2019, p. 2) in the Dolphin and Union caribou's range. In addition to changes in sea ice, because the Dolphin and Union caribou use the Dolphin and Union strait as part of its migration route, we also take into account information on historical, current, and projected shipping traffic through the Dolphin and Union strait. Because of projected increase in ice-free periods, shipping traffic is highly likely to increase (Governments of the Northwest Territories and Nunavut 2018, p. 41).

Most models project that portions of the Canadian Arctic will be ice free by 2040–2060 (Derksen et al. 2018, pp. 198, 218; Johnson et al. 2016, p. 16; Lu et al. 2014, p. 61). Although we possess projections that go out to 2100, there is greater uncertainty between the climate model projections in the latter half of the 21st century and how the effects of climate change will affect species response when projected past mid-century. Accordingly, we determined that the foreseeable future extends only to 2050 for the purpose of this analysis and we rely upon projections out to 2050 for predicting changes in the species conditions. This timeframe allows us to be more confident of assessing the impact of climate change on the species. Overall, given our knowledge of the Dolphin and Union caribou subpopulation trend and its fluctuations, incorporating all the variables stated above, we project the foreseeable future for this entity out to the year 2050.

Based on the best scientific and commercial information available on Dolphin and Union caribou, we reach reasonable conclusions about the likely impacts that specific changes in climatic conditions may have on the species over the foreseeable future, which will be discussed below (IPCC 2014b, entire; Schiermeier 2011, p. 185; Olsen et al. 2011, entire; Liston and Hiemstra 2011, p. 5,691; Prowse et al. 2009b, entire; Turunen et al. 2009, p. 813; Barber et al. 2008, entire; Rinke and Kethloff 2008, p. 173; Kutz et al. 2004, p. 114).

Loss of Sea Ice

Sea ice is an important component of the seasonal migration of the Dolphin and Union caribou. Dolphin and Union caribou migrate across the Dolphin and Union Strait using the temporary, annual seasonal ice bridge from Victoria Island to the mainland. During the months of September and October, Dolphin and Union caribou ''stage'' on the south coast of Victoria Island waiting for the ice to form for the herds to cross. The caribou may cross at any time during this time period on the newly formed gray ice to their winter range on the mainland (Nishi and Gunn 2004, as cited in COSEWIC 2004, p. 35). More recently, the formation of the sea ice has been delayed, which results in caribou waiting a longer period for ice to form (Poole et al. 2010, p. 414; Gunn 2003, as cited in COSEWIC 2004, p. 35).

Climate models indicate that the Arctic will experience accelerated loss of sea-ice (Zhang et al. 2010, as cited in in Meier et al. 2011, p. 9–3; Boé et al. 2009, p. 1; Wang and Overland 2009, pp. 1–3). Since the beginning of monitoring in 1979, record low levels of sea ice have occurred in recent years. From 1968 to 2015, sea ice declined at a rate of 6.1 percent per decade (Environment and Climate Change Canada 2016, p. 8). Multiyear ice, which is thick enough to support the caribou's weight, has been declining over time. In the mid-1980s, multiyear ice accounted for 75 percent of all ice in the Arctic. By 2011, it accounted for 45 percent of all ice (Li et al. 2019, p. 2). Additionally, landfast ice has also been decreasing. This is important to the Dolphin and Union caribou as the Dolphin and Union strait is a narrow passage that the DPS uses for its migration corridors. Over the 10-year intervals starting in 1976, the maximum extent of landfast ice throughout the Arctic was: 2.1×10^6 km^2 (1976–1985), 1.9×10^6 km^2 (1986–1995), 1.74×10^6 km^2 (1996–2005), and 1.66×10^6 km^2 (2006–2018) (Li et al. 2019, p. 5).

A decrease in sea ice has continued to occur with trends accelerating since the year 2000 (COSEWIC 2015, p. 46). Sea-ice freezing now occurs 8–10 days later in the Dolphin and Union Strait and Coronation Gulf than in 1982 (Poole et al. 2010, pp. 414, 419, 425). Current and projected decrease in sea ice is likely to negatively affect the crossings by the Dolphin and Union caribou, including the potential of breaking through the ice and drowning (Governments of the Northwest Territories and Nunavut 2018, pp. 41–42; Poole et al. 2010, p. 426). Because the Dolphin and Union strait is located at the southernmost point of the Canadian Arctic Archipelago, sea-ice loss in this region is higher than in other regions farther to the north (Pizzolato 2015, p. 28). Additionally, continued increase in shipping is expected through the Northwest Passage (Governments of the Northwest Territories and Nunavut 2018, p. 42). The effects of increasing shipping will be especially pronounced for the Dolphin and Union caribou because the Dolphin and Union strait is the primary migration route for the caribou and is also a major shipping lane through the Northwest Passage (Engeler and Pelot 2013, p. 9).

As the sea-ice season is shortened and the ice thins, it is more easily broken by ice-breaking ships. A longer shipping season and an increase in ships in the Northwest Passage can fragment the Dolphin and Union caribou's summer and wintering ranges while delaying their migration. Due to the shorter sea-ice season, the number of ships travelling through the Northwest Passage has already increased from four per year in the 1980s to 20–30 per year in 2009–2013. The majority of these transits are icebreakers with trips primarily occurring in August through October, the period of time when the Dolphin and Union caribou are preparing for their southward migration to the mainland (Governments of the Northwest Territories and Nunavut 2018, p. 41). For example, in late October 2007, barge ships broke the ice every 12 hours for a few days in the Cambridge Bay to keep a channel open. This channel prevented the caribou from crossing during this time (Poole et al. 2010, p. 426). As stated above, sea-ice freezing in the fall now forms 8–10 days later than it was in 1982. Using

RCP models 4.5 and 8.5, the annual time period where the Arctic is ice-free is projected to increase over the course of the 21st century (Governments of the Northwest Territories and Nunavut 2018, p. 43; Poole et al. 2010, p. 425). Given the increases in period of ice-free months, it is reasonable to conclude that shipping traffic through the strait will increase over the course of the 21st century. Therefore, the breaking up of sea ice due to continued increases in shipping traffic, combined with projected sea-ice loss due to climate change will have a significant negative impact on the species now and into the future (Governments of the Northwest Territories and Nunavut 2018, pp. 41–44; Leclerc 2017, *in litt.;* Ray 2017, *in litt.*).

Given the Dolphin and Union caribou's current population, it is unlikely that Victoria Island will be able to support the subpopulation if connection to wintering grounds in the mainland is lost (Ray 2017, *in litt.;* Leclerc 2017, *in litt.*).

Summary of Climate Change

Climate change is likely to negatively affect the Dolphin and Union caribou in a number of ways. The most significant impact of climate change on the caribou is the timing of the formation of sea ice. As part of their life cycle, Dolphin and Union caribou migrated between calving ground on Victoria Island and wintering ground on the mainland (Nishi and Gunn 2004, as cited in COSEWIC 2004, p. 35). However, sea-ice formation has been delayed with caribou having to wait for a longer period of time before they can cross between Victoria Island and the mainland (Poole et al. 2010, p. 414; Gunn 2003, as cited in COSEWIC 2004, p. 35). In addition to a delay in sea-ice formation, the sea ice that forms tends to be thinner, increasing the likelihood of ice breakup and drowning events (Poole et al. 2010, p. 426).

Overall, the Dolphin and Union caribou subpopulation appears to continue to decline (Leclerc 2017, in litt.; Gunn et al. 2000, pp. 42–43). While we do not know the exact reason for the decline, the delay and loss in the formation of sea ice can impact the Dolphin and Union caribou's ability to migrate between the mainland and Victoria Island. Therefore, given the projected impacts of sea-ice loss in the Dolphin and Union strait, we anticipate that these effects will likely have a negative impact on the Dolphin and Union caribou.

Parasitic Harassment by Botflies

As noted above for Peary caribou, caribou serve as host to two oestrid species: warble flies (*Hypoderma tarandi*) and nose botflies (*Cephenemyia trompe*). In the Arctic region, there are few hosts available for parasites; warble flies and nose botflies are particularly well adapted to survive in the Arctic climate using caribou as their host. Although these oestrids are widespread throughout the summer range of most caribou herds, their populations are considerably smaller in the high Arctic as that is the latitudinal extreme of their range due to temperature, hours of daylight, and wind conditions (Gunn et al. 2011, pp. 12–14; Kutz et al. 2004, p. 114). However, some researchers have expressed concern that, should warming trends continue, the parasitic rate of development and/or infectivity timeframes could become altered, which may increase energy expenditure of Dolphin and Union caribou through harassment (Kutz et al. 2004, p. 114). The biological effects of warble and nose botflies on caribou are described in the Peary caribou section above. Below we will describe the anticipated effects of fly activities for the Dolphin and Union caribou, which are found farther to the south than the Peary caribou.

Warble Flies

Temperature and cloud cover are vital factors for harassment of caribou by warble flies as these two factors affect their activity level (Weladji et al. 2003, p. 80; Nilssen 1997, p. 301). Warble flies are most active during warm, sunny days; warble fly activity increases with increasing temperature (Weladji et al. 2003, p. 80). Within the Arctic, the annual mean surface temperature has increased at a rate of 0.34 °C (0.61 °F) per decade (Wang et al. 2012, p. 1). Satellite observations indicate an increase in the duration of the melt season by 10–17 days per decade, which is representative of these warmer temperatures (Comiso 2003, p. 3,498).

In Cambridge Bay, Victoria Island, the mean average daily temperature in the winter is between −36.2 and −29.8 °C (−33.2 and −21.6 °F). In summer, the mean average daily temperature is between −6.8 and 10 °C (37.4 and 44.2 °F) (Dumund and Lee 2013, p. 330). Atmosphere-ocean-ice general circulation models (AOGCMs) and other models indicate that average annual temperatures may increase by 3–6 °C by 2080 (Meier et al. 2011, pp. 9–17–9–18; Olsen et al. 2011, p. 112; Dunkley-Jones et al. 2010, p. 2,411). Based on these anticipated temperatures, we calculated the expected temperatures if the temperature was to increase by 3 degrees Celsius (scenario 1) and by 6 degrees Celsius (scenario 2). The climate models used in this table used a previous set of scenarios known as the Special Report on Emissions Scenarios (SRES) to project the low-emissions scenario (SRES B1) and high-emissions scenario (SRES A2) (Marengo et al. 2011, p. 27). More recently, a newer set of scenarios (*i.e.,* RCPs) were prepared that include a wider range of future conditions and emissions. However, to compare the SRES and RCP scenarios, SRES B1 is roughly comparable to RCP 4.5 and SRES A2 is similar to RCP 8.5 (Melillo et al. 2014, p. 821). These similarities between specific RCP and SRES scenarios make it possible to compare the results from different modeling efforts over time (Melillo et al. 2014, p. 821). See table 3, below.

TABLE 3—CAMBRIDGE BAY, VICTORIA ISLAND, NUNAVUT, CANADA: TEMPERATURE INCREASE SCENARIO UP TO 2080

[Adapted from Environment Canada 2013, as cited in Dumond and Lee 2013, p. 330]

Month	Mean average daily temp.	Current conditions		Scenario 1 (temperature increase by 3 °C)		Scenario 2 (temperature increase by 6 °C)	
December	Low	−36.2 °C	−33.2 °F	−33.2 °C	−26 °F	−30.2 °C	−20 °F
	High	−29.8 °C	−21.6 °F	−26.8 °C	−16.2 °F	−23.8 °C	−10.8 °F
July	Low	6.8 °C	44.2 °F	9.8 °C	49.6 °F	12.8 °C	55 °F
	High	10 °C	50.0 °F	13 °C	55.4 °F	16 °C	60.8 °F

Many studies indicate that the low temperature threshold for warble fly activity is around 10 °C (50 °F) (Vistness et al. 2008, p. 1,312; Weladji et al. 2003, p. 81; Nilssen 1997, pp. 296, 300; Breyev 1956, 1961, as cited in Nilssen and Anderson 1995, p. 1,236). Before pupation, warble fly larvae can move at least 30 centimeters (12 inches) per day

at 4 °C (39.2 °F). At 4 °C (39.2 °F), pupation did not occur, but larvae were observed to be alive (crawling) up to 47 days after exit from the host (Nilssen 1997, p. 298). The transition of warmer temperatures to areas of cooler air creates a barrier, north of which pupation may not occur. Because parasitic fly harassment is low below 13 °C (55.4 °F), and no oestrid harassment occurs below 10 °C (50 °F), this temperature threshold is significant for caribou, particularly the Dolphin and Union caribou with respect to oestrid harassment. Since the area where Dolphin and Union caribou exist is located farther to the south than the area for Peary caribou, the average summer temperature is higher. Under both scenarios, summer temperatures are projected to increase to a high of 13–16 °C, which would result in an increase in warble fly harassment.

Infestations by both warble flies and botflies cause metabolic costs, such as behavioral responses (Witter et al. 2012, p. 292; Nilssen and Anderson 1995, p. 1,237). Caribou increase and modify their movement when harassed by warble flies (Witter et al. 2012, p. 284). When warble flies are present, caribou spend a greater proportion of time avoiding insects, rather than resting or feeding (Witter et al. 2012, p. 292; Fauchald et al. 2007, p. 496). Avoidance behaviors include jumping, running, leg stomping, and, with respect to nose botflies, sudden nose dropping (Fauchald et al. 2007, p. 496; Colman et al. 2003, p. 15). Cows were observed temporarily disassociating themselves from their calves in an attempt to avoid flies (Thomas and Kiliaan 1990, p. 415). Additionally, reduced fitness may result in a reduction of available milk for calves in lactating females (Weladji et al. 2003, p. 84). The projected increase in temperature during the summertime will result in an increase in botfly activities, which will result in a reduction in fitness for the Dolphin and Union caribou.

Nose Botflies

Caribou experts consider the potential negative effects of nose botfly on caribou to be less than warble flies. While the types of effects are similar between the two species of flies, such as causing avoidance behavior in caribou, the magnitude of those effects are not as extreme for the nose botfly as that caused by the warble fly. This species enters the caribou through the caribou's nose and lives in the caribou's throat for part of its life cycle. The caribou exhibit distress from this species—they have been observed to duck their heads under water to avoid nose botflies (Witter et al. 2012, p. 284; Fauchald et al. 2007, p. 496). An increase in the temperature by more than 3 or 6 degrees Celsius in July could increase harassment of nose botflies on the Dolphin and Union caribou, although the severity will not be as high as that caused by warble flies.

Summary of Parasitic Harassment

Currently, oestrids that use caribou as their hosts are at the latitudinal extreme of their range due to temperature, hours of daylight, and wind conditions (Vistness et al. 2008, p. 1,307). We note that a threat to the Dolphin and Union caribou and the caribou's response to that threat are not, in general, equally predictable or foreseeable. Oestrid flies could expand their range, and they could possibly negatively affect the Dolphin and Union caribou if the temperature increases by 3 to 6 degrees by 2080. The lower temperature threshold for warble fly activity has been determined to be around 10 °C (50 °F) (Vistness et al. 2008, p. 1,312; Weladji et al. 2003, p. 81; Nilssen 1997, pp. 296, 300; Breyev 1956, 1961, as cited in Nilssen and Anderson 1995, p. 1,236). However, a warmer climate is likely to increase the distribution and abundance of warble flies and will lead to greater impact on the Dolphin and Union caribou.

Status of Existing Regulatory Mechanisms

Under the Act, we are required to evaluate whether the existing regulatory mechanisms are adequate. With respect to existing regulatory mechanisms, the Dolphin and Union caribou was listed as special concern under SARA in 2011 and the Government of the Northwest Territories (GNWT) Species at Risk (NWT) Act (SARC 2013, p. v). ''Special concern'' means that the NWT manage it on the basis that it may become threatened if it is not managed effectively. Species listed as of special concern are not protected under prohibitions that apply to threatened and endangered species. For these species, conservation benefits are provided through a management plan that is prepared after the species is listed (S.C. Ch. 65).

The management plan for the Dolphin and Union caribou was published in 2018 (Governments of the Northwest Territories and Nunavut 2018, entire; SARC 2013, p. 97). The management plan contains a list of recommended actions. These actions include: Hold regular meetings between management agencies and local communities to make recommendation on the management of the Dolphin and Union caribou DPS, monitor changes in the Dolphin and Union caribou DPS's population and habitat, and obtain better harvest data (Governments of the Northwest Territories and Nunavut 2018, pp. 56–61). However, these recommendations are voluntary and do not commit the parties involved to any actions (Governments of the Northwest Territories and Nunavut 2018, p. 3). While the management plan does not commit any parties to any actions, the management and hunting of the Dolphin and Union caribou is mutually agreed upon by the native people (Inuit and Inuvialuit) and the territorial governments (NWT and Nunavut). Species experts note that the jurisdictional structure of caribou management in Canada is complex (Festa-Bianchet et al. 2011, p. 422). Wildlife management in the territories is under a co-management structure and falls under the Land Claims Agreement of the different indigenous groups. Caribou conservation involves legislation at the Federal and Territorial levels, in addition to wildlife management boards (COSEWIC 2004, p. 61).

Hunting

Caribou are an integral element of human society in the high Arctic (Taylor 2005, as cited, in Maher et al. 2012, p. 78; Miller and Barry 2009, p. 176). Under SARA, exceptions to prohibitions enable indigenous peoples to exercise their harvesting rights (COSEWIC 2015, p. 52). The Dolphin and Union caribou is currently hunted by the Inuit and Inuvialuit for subsistence, and this subsistence hunting is managed by local governments and the communities. However, there are concerns about the sustainability of hunting due to the lack of accurate harvesting data, which are submitted voluntarily by indigenous communities (Governments of the Northwest Territories and Nunavut 2018, pp. 20, 67; Governments of Nunavut and the NWT 2011, p. 18). Non-subsistence hunting including sport-hunting by non-indigenous residents and non-residents is managed through an annual quota system (Governments of the Northwest Territories and Nunavut 2018, pp. 68–69). Caribou are protected by land claim agreements, and hunts are co-managed by boards such as the Nunavut Wildlife Management Board, the Government of Nunavut, Department of Environment (GN–DOE), and hunting associations (COSEWIC 2004, p. 61). The Wildlife Management Advisory Council for the Inuvialuit Settlement Region in the Northwest Territories, Nunavut Wildlife Management Board for the Nunavut

Territory, the GN–DOE, and the Inuit and Inuvialuit native people all play a role in the regulation of hunting of the Dolphin and Union caribou population.

Although there are no harvest limitations of the Dolphin and Union caribou for indigenous communities, Inuit hunters who hunt caribou for subsistence have voluntarily placed moratoriums on hunts in the past (Governments of the Northwest Territories and Nunavut 2018, pp. 20–21). Based on extrapolations of harvest between 1996 and 2001 of the communities of Kugluktuk, Cambridge Bay, Umingmaktok, and Bathurst Inlet, subsistence harvest of the ''island'' caribou (which may include individuals not from the D&U herd) in Nunavut was estimated to be from 2,000 to 3,000 annually for those years (Schneidmiller 2011, p. 1). From 1988 to 1997, annual harvest of Dolphin and Union caribous by the community of Ulukhaktok varied between 178 and 509 per year (Governments of the Northwest Territories and Nunavut 2018, p. 20). Since then, local communities have tried to reduce the annual harvests of the caribou. Data for 2010–2014 reveal a decline of annual harvest to 10–80 caribou per year (Governments of the Northwest Territories and Nunavut 2018, p. 20). While the reporting of this data is voluntary, the reduction in annual harvest since the 1990s suggest that local communities have been able to regulate hunting activities conducted by its members as the Dolphin and Union caribou population has also declined.

In contrast to indigenous communities, Canadian citizens and resident immigrants are limited to a specific number of caribou they can hunt per year. In the NWT, Canadian citizens and residents are allowed to take up to two bulls per year during the hunting season (August 15–November 15). Non-resident and non-Canadian citizens are allowed the same number but need to be accompanied by a guide. In Nunuvut, residents can hunt up to five caribou per year (Governments of the Northwest Territories and Nunavut 2018, pp. 68–69). Despite the availability of hunting tags, in the past several years, there has been no tag-based sport-hunting of Dolphin and Union caribou in Nunavut (Governments of the Northwest Territories and Nunavut 2018, p. 69; Leclerc 2017, *in litt.;* Governments of Nunavut and the NWT 2011, p. 18).

In the NWT, the governments reported that 25 tags are available annually for outfitted sport-hunting on Dolphin and Union Caribou, but no such hunts have occurred in more than 20 years (Governments of NWT and Nunavut 2011, p. 10).

At a more local scale, committees and trapper associations are involved in monitoring caribou. In 2007, non-binding management recommendations were made to maintain a balanced harvest for subsistence (harvest different age classes and sexes of animals depending on the season and avoid shooting pregnant cows during the spring) (Dumund 2007, p. 44). However, reporting of subsistence harvest is voluntary and there is uncertainty about the effect of hunting on the overall population (Governments of the Northwest Territories and Nunavut 2018, p. 67; Ray 2017, *in litt.*).

With respect to imports into the United States, as noted above there has been no tag-based non-subsistence hunting (sport-hunting) in Nunavut or NWT in recent years, and there is no trade data indicating that Dolphin and Union caribou are hunted and subsequently imported into the United States. This caribou entity is not listed in the Appendices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (*http://www.cites.org;* also see Conservation Status). CITES is an international agreement between governments with the purpose of ensuring that international commercial and noncommercial trade in wild animals and plants does not threaten their survival. CITES entered into force in 1975 and is an international treaty among 183 parties, including Canada and the United States. A review of the Service's Law Enforcement Management Information System (LEMIS) database indicated that caribou are not currently tracked by subspecies (LEMIS contains information on caribou at the species level), so we do not currently have data on the import of the Dolphin and Union caribou.

Hunting has not been implicated as a current threat to Dolphin and Union caribou. While unsustainable hunting may have contributed to a historical decline in the Dolphin and Union caribou, currently subsistence hunting is managed, and sport-hunting is not taking place. (Dumond and Lee 2013, p. 329; SARC 2013, p. ix; Dumund 2012, unpaginated). The Dolphin and Union caribou is being monitored closely by the Government of Nunavut, the Government of the Northwest Territories, and the Government of Canada. In summary, hunting may have played a role in the decline of the Dolphin and Union caribou in the past; however, management of the Dolphin and Union caribou has reduced the impact of hunting.

Protected Areas

As of 2011, no Canadian herd had a fully protected calving ground, although some are partly protected (Gunn et al. 2011, p. 26). The southwestern portion of the Dolphin and Union caribou range lies within the boundaries of Tuktut Nogait National Park (Ray 2017, *in litt.*). There is no protection of the calving ground for this caribou herd with calving-ground delimitation projects having failed in the past. Studies are currently under way to define a calving strategy and determine suitable habitat (Leclerc 2017, *in litt.*). Caribou biologists indicate that areas that are suitable for calving but are currently unused should be anticipated and managed for potential future use (Nagy 2011, p. 35). The best available information suggests that current protected areas are well managed.

Roads

There is inconclusive information about the effects of roads on caribou (Fahrig and Rytwinski 2009, unpaginated; Frair et al. 2008, p. 1,504; Neufeld 2006, as cited in Nagy 2011, p. 101). The presence of permanent or temporary roads could affect the caribou migration route. Additionally, roads could increase access for hunters, a trend observed in other caribou subspecies. Currently, there are major expansion projects (the Grays Bay Road and Port Project and the Black River Project) in the road network to service mining development near the Bathurst Inlet, which is located near the wintering range of the Dolphin and Union caribou (Governments of the Northwest Territories and Nunavut 2018, pp. 51–52). However, the Dolphin and Union caribou exists in areas that are sparsely populated with human communities and have very few roads, which should limit the effects of development on the entity. While the road network in the species' range remains limited, development could increase in the next 10 years (Governments of the Northwest Territories and Nunavut 2018, p. 51; Leclerc 2017, *in litt.*).

Shipping, Exploration, and Developmental Activities

The Northwest Passage, which includes the Dolphin and Union Strait, is likely to become more navigable to large ships in the near future and could be exposed to exploration activities. Ships traveling through the Northwest Passage could be routed through the Dolphin and Union Strait as temperatures become substantially warmer. In recent years, the strait has

been ice-free for 2 months during the summer, leading to increased maritime traffic with heavy ship traffic concentrating around the strait used by the Dolphin and Union caribou (Leclerc 2017, *in litt.;* Pizzolato et al. 2016, pp. 12,148–12,149). Given that ice levels in the 2010–2012 periods have been the lowest since 1968, it is very likely that shipping traffic through the strait will increase (Howell et al. 2013, as cited in Pizzolato et al. 2016, p. 12,152). Currently, traffic to the Beaufort Sea is the second highest in the Northwest Passage after the Hudson Bay (Pizzolato et al. 2016, p. 12,149; SAC 2013, p. 94). Shipping traffic through the strait increases in years where multiyear-ice levels, which present significant impediment to ship traffic, are low (Pizzolato et al. 2016, p. 12,152). In the Victoria Strait region (located at the opposite end of the channel to the Dolphin and Union strait), shipping activity tripled during the 2006–2013 period (Pizzolato et al. 2016, p. 12,152). Shipping traffic negatively affects the migration of the Dolphin and Union caribou by causing ice breakup during the winter (SARC 2013, p. 47).

If the warming trend continues in this region as climate models indicate, conditions for offshore oil and gas exploration and production will likely improve, increasing the likelihood of shipping traffic (Pizzolato et al. 2016, p. 12,152; Barber et al. 2008, p. 17). The potential increase in mining and shipping traffic in the Dolphin and Union Strait could have demographic and ecological consequences for the Dolphin and Union caribou. A larger number of Dolphin and Union caribou on the mainland has been sighted with a thicker coat of fur suggesting that more of them are falling through the ice (Poole et al. 2010, p. 416). While increasing shipping traffic will lead to the breakup of the ice, some Inuit have indicated ships run through the straits during the summer months, which is outside of the primary migration months (SARC 2013, p. 47). However, the reduction in multiyear ice in the strait over time will result in greater shipping traffic even during the winter (Pizzolato et al. 2016, p. 12,152; SARC 2013, p. 94).

Stochastic (Random) Events and Processes

Species endemic to small regions, or known from few, widely dispersed locations, are inherently more vulnerable to extinction than widespread species because of the higher risks from localized stochastic (random) events and processes, such as industrial spills and drought. Such species face an increased likelihood of stochastic extinction due to changes in demography, the environment, genetics, or other factors, in a process described as an extinction vortex (a mutual reinforcement that occurs among biotic and abiotic processes that drives population size downward to extinction) (Gilpin and Soulé 1986, pp. 24–25). The negative impacts associated with vulnerability to random demographic fluctuations or natural catastrophes can be further magnified by synergistic interactions with other threats.

The Dolphin and Union caribou is known from a single geographic population that migrates between Victoria Island and the Canadian mainland (SARC 2013, p. xiv; Governments of NWT and Nunavut 2011, p. 2; Poole et al. 2009, p. 415). As a result, the Dolphin and Union caribou is vulnerable to stochastic processes and is highly likely negatively affected by these processes. Year-to-year variation in the timing of sea-ice formation, shipping traffic, and usage of icebreakers, in combination with other threats, could impact the migration of the Dolphin and Union caribou (Poole et al. 2010, pp. 414, 419, 425; Sharma et al. 2009, p. 2,559). Therefore, it is likely that stochastic processes have negative impacts on the species in combination with other factors such as sea-ice loss and shipping.

Synergistic Interactions Between Threat Factors

We have evaluated the individual threats to the Dolphin and Union caribou throughout its range. The primary threat affecting the Dolphin and Union caribou is the loss of sea ice due to climate change and increased shipping through the straits. Other factors, though not as severe as loss of sea ice and shipping, can become threats due to the cumulative effects they will have on the Dolphin and Union caribou. For the Dolphin and Union caribou DPS, warble fly and nose botfly harassment, disease, and predation are threats that, synergistically, could have an impact on the Dolphin and Union caribou.

As discussed in the previous sections, the Dolphin and Union caribou population continues to decline from its recent peak in 1997 (Dumond and Lee 2013, p. 334). While the exact cause of the decline is not known, a number of factors acting synergistically can put additional pressure on the population. Botfly harassment has the potential to increase if surface temperature increases by more than 3–6 °C (Dumund and Lee 2013, p. 330). One recent climate-projection model points toward an increase in botfly activity, which will increase the energy expenditure of caribou (Witter et al. 2012, p. 284). Although these factors individually do not amount to a threat to the Dolphin and Union caribou, acting synergistically with major threats of sea-ice loss and shipping, they can have a detrimental impact.

Determination of Dolphin and Union Caribou Status

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of ''endangered species'' or ''threatened species.'' The Act defines an ''endangered species'' as a species that is ''in danger of extinction throughout all or a significant portion of its range,'' and a ''threatened species'' as a species that is ''likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' The Act requires that we determine whether a species meets the definition of ''endangered species'' or ''threatened species'' because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. For a more detailed discussion on the factors considered when determining whether a species meets the definition of ''endangered species'' or ''threatened species'' and our analysis on how we determine the foreseeable future in making these decisions, please see the *Regulatory Framework* section above.

Status Throughout All of Its Range

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the Dolphin and Union caribou. Experts remain uncertain of how changes in climate will affect this DPS and its ecosystem (Brodie et al. 2012, p. 29; Poole et al. 2010, entire; Turunen et al. 2009, pp. 816, 826), and we have made reasonable conclusions about the potential impacts these changes may have on the species based on the best scientific and commercial information available on Dolphin and Union caribou. As is the case with all threats that we assess, even if we conclude that a species is currently affected or is likely to be

affected in a negative way by one or more climate-related impacts, it does not necessarily follow that the species meets the definition of an ''endangered species'' or a ''threatened species'' under the Act. That said, the best available information indicates that the Dolphin and Union caribou is in decline (Leclerc 2017, *in litt*). Although the exact cause is not known, a number of threats acting synergistically could have a role in reducing the population. We have concluded that these threats are primarily loss of sea ice due to climate change and an increase in shipping traffic (Factor A). Other threats, including parasitism (Factor C), disease (Factor C), predation (Factor C), and hunting (Factor B), have a limited or unknown impact.

Although the herd has changed its migration patterns and its resource use in the past, access to the wintering ground on the mainland played an important role in the historical recovery of the species (Leclerc 2017, *in litt.;* Nishi and Gunn 2004, as cited in COSEWIC 2004, p. 35). Current trends indicate sea-ice loss in the Dolphin and Union caribou's range will continue through the end of the 21st century (Meier et al. 2011, pp. 9–2–9–3; Wang and Overland 2009, p. L07502; Boé et al. 2009, p. 1). Additionally, an increase in shipping traffic through the Dolphin and Union caribou's habitat will delay the formation of sea ice. The result of both these threats is that sea ice between Victoria Island and the mainland now forms 8–10 days later than it did in 1982, a trend that will continue to accelerate (Poole *et al* 2010, p. 414). Additionally, because the Dolphin and Union strait occurs at the southernmost point of the Northwest Passage, shipping traffic is more concentrated in this region than in other portions of the Canadian Archipelago (Pizzolato et al. 2016, pp. 12,148–12,149). The continued increase in shipping traffic combined with projected ice loss in this region will have a significant effect on the Dolphin and Union caribou by delaying or preventing the migration to wintering grounds on the mainland (Poole *et al* 2010, p. 414). Although the Dolphin and Union caribou was able to adapt in the past after the caribou ceased migration to the mainland, the trend since 1997 suggests a steady decline. Furthermore, given the population size, it is unlikely that Victoria Island will be able to support the Dolphin and Union caribou (Leclerc 2017, *in litt*).

In addition to the potential loss of connectivity between Victoria Island and the mainland, the Dolphin and Union caribou also experience impacts from other threats. The impacts of these other threats, however, are more uncertain. Insect harassment from warble flies increases the energy expenditure of affected animals (Scheer 2004, pp. 10–11). With regard to disease, although local communities have identified affected individuals, the impact on the overall subpopulation is unknown (SARC 201, p. 80). Predation could have an impact on the Dolphin and Union caribou. Earlier reports suggest that predation does not represent a major threat, but there are lingering concerns (Ray 2017, *in litt.;* Gunn 2005, pp. 10–11, 39–41). Lastly, while unregulated hunting played an important role in the historical decline of the Dolphin and Union caribou, there are current management efforts in place to regulate hunting and sport-hunting is not currently taking place. However, the DPS continues to decline (Dumond and Lee 2013, p. 329; SARC 2013, p. ix; Dumond 2012, unpaginated).

In summary, the Dolphin and Union caribou has experienced significant population change over the past century. The Dolphin and Union caribou experienced a significant decline in the early 20th century due to the introduction of firearms and excessive hunting (COSEWIC 2004, p. 41; Gunn et al. 2011, p. 37; Manning 1960, pp. 9–10). Populations rebounded in the latter half of the 20th century reaching its maximum size in 1997. Since then, however, the single population of the Dolphin and Union caribou has declined once more. Surveys conducted in 2007 revealed a modest decline of the species (Dumond and Lee 2013, p. 334). However, a survey in 2015 revealed that the decline continues (Governments of the Northwest Territories and Nunavut 2018, p. 36; Leclerc 2017, *in litt.*). We find that a number of threats, including primarily sea-ice loss due to climate change and shipping, and to a lesser extent insect harassment, predation, and hunting, acting in tandem and synergistically, are anticipated to continue to have a negative impact on the species, leading to continued decline over the foreseeable future.

In section 3(6), the Act defines an ''endangered species'' as any species that is ''in danger of extinction throughout all or a significant portion of its range'' and in section 3(20), defines a ''threatened species'' as any species that is ''likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' As noted above, the Dolphin and Union caribou historically experienced population decline in the early 20th century. The DPS rebounded in the latter half of the previous century reaching a new maximum population in 1997 at 28,000 individuals (Governments of the Northwest Territories and Nunavut 2018, p. 36). Since then, due to a combination of factors including primarily the effects of climate change and shipping traffic on sea-ice loss, the population has declined by approximately one-third with the most recent population estimate of 18,413 in 2015 (Governments of the Northwest Territories and Nunavut 2018, p. 36). Sea-ice thickness has been getting thinner and the quantity of multi-year ice is decreasing (COSEWIC 2017, p. 30). Additionally, warming fall temperature on the south coast of Victoria Island has delayed the formation of new sea ice by up to 10 days and thicker grey ice by 8 days when compared to the fall season in 1982 (COSEWIC 2017, p. 30). Over the foreseeable future to mid-century, this trend will likely contribute to a decrease in sea-ice thickness, thereby increasing the possibility of mass drowning events by the Dolphin and Union caribou. Some climate-change models project that the strait between Victoria Island and the mainland may partially ice-free even during the wintertime by 2050 (Jenkins et al. 2015, p. 4). However, at present, the Dolphin and Union caribou has been observed crossing the strait to the mainland (Governments of the Northwest Territories and Nunavut 2018, p. 30). This suggests that current sea-ice thickness is still sufficient for crossings to occur. Continued migration to the mainland will give the Dolphin and Union caribou access to resources to survive the winter months in the short term such that the DPS is not currently in danger of extinction.

While the Dolphin and Union caribou is not currently in danger of extinction due to wintertime connectivity with the mainland, climate models project fragmentation of migration corridors between Victoria Island and the mainland by the mid-21st century. Even without the effects of shipping traffic, many climate models project that sea ice in the southern portion of the Canadian Arctic Archipelago where Dolphin and Union caribou is found will likely become partially fragmented even during the wintertime by mid-century (Derksen et al. 2018, p. 218; Jenkins et al. 2015, p. 4). When adding the increasing frequency of shipping traffic through the strait currently and the likely further increase in the foreseeable future, the result is a likely greater fragmentation of migration corridor during the wintertime. The result of this change is thinner ice leading to likely

increases in mass drowning events. Because the effects of sea-ice loss due to climate change and shipping traffic are both projected to increase over the foreseeable future, these two threats will continue to have a negative and increasing effects on the Dolphin and Union caribou. Furthermore, because the Dolphin and Union caribou is already experiencing a persistent decline within the past twenty years, the increases of frequency of mass drowning events due to sea-ice loss as a result of climate change and shipping traffic will result in an accelerated population decline such that the DPS is likely to become in danger of extinction within the next few decades.

Therefore, after evaluating threats to the species and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we conclude that the Dolphin and Union caribou is not currently in danger of extinction, but as a result of the ongoing and projected decline caused by the factors described above, the Dolphin and Union caribou is likely to become in danger of extinction within the foreseeable future throughout all of its range.

Thus, after assessing the best available information, we conclude that Dolphin and Union caribou is not currently in danger of extinction but is likely to become in danger of extinction within the foreseeable future throughout all of its range. If new information is found that results in a changed level of threats, we will consider that information in the final rule.

Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. The court in *Center for Biological Diversity* v. *Everson,* 2020 WL 437289 (D.D.C. Jan. 28, 2020) (*Center for Biological Diversity*), vacated the aspect of the 2014 Significant Portion of its Range Policy that provided that the Services do not undertake an analysis of significant portions of a species' range if the species warrants listing as threatened throughout all of its range. Therefore, we evaluated whether the species is endangered in a significant portion of its range—that is, whether there is any portion of the species' range for which both (1) the portion is significant; and, (2) the species is in danger of extinction in that portion. Depending on the case, it might be more efficient for us to address the ''significance'' question or the ''status'' question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species' range.

Following the court's holding in *Center for Biological Diversity,* we now consider whether there are any significant portions of the species' range where the species is in danger of extinction now (*i.e.,* endangered). In undertaking this analysis for Dolphin and Union caribou, we choose to address the status question first—we consider information pertaining to the geographic distribution of both the species and the threats that the species faces to identify any portions of the range where the species is endangered.

For the Dolphin and Union caribou, we considered whether the threats are geographically concentrated in any portion of the species' range at a biologically meaningful scale. We examined the following threats: Increase in icing events, sea-ice loss, and increase in shipping traffic, including cumulative effects. Icing events are often fairly localized to specific areas. Historical trends show that increases in icing events per year is associated with a decline in caribou numbers (Governments of the Northwest Territories and Nunavut 2018, p. 50). Sea-ice loss affects the Dolphin and Union caribou ability to cross the sea ice between Victoria Island and the mainland (Governments of the Northwest Territories and Nunavut 2018, p. 30). Additionally, the migration route the Dolphin and Union caribou passes through is one of the primary shipping lanes in the Northwest Passage (Pizzolato et al. 2016, pp. 12,148–12,149). This increase in shipping traffic combined with climate change will result in the late formation or premature breakup of sea ice, which could lead to mass drowning events as well as delay in the subpopulation ability to migrate across the strait.

While the threats affecting the Dolphin and Union caribou may be topographically differentiated (icing events on land and sea-ice loss and shipping traffic on water), the Dolphin and Union caribou consist of one herd. Although that herd temporarily splits into smaller subunits during calving periods (Governments of the Northwest Territories and Nunavut 2018, p. 30), this split is temporary, and individuals congregate in the fall at southern portion of Victoria Island. There, the herd forages until sea ice reaches a sufficient thickness for the herd to cross over (Governments of the Northwest Territories and Nunavut 2018, p. 32). Thus, there is no biologically meaningful subdivision of the Dolphin and Union caribou DPS's range into portions. While threats can affect certain areas of the Dolphin and Union caribou range, any such threats will affect the entire herd. Overall, we found no concentration of threats in any portion of the Dolphin and Union caribou range at a biologically meaningful scale. Thus, there are no portions of the species' range where the species has a different status from its range-wide status. Therefore, no portion of the species' range provides a basis for determining that the species is in danger of extinction in a significant portion of its range, and we determine that the species is likely to become in danger of extinction within the foreseeable future throughout all of its range. This is consistent with the courts' holdings in *Desert Survivors* v. *Department of the Interior,* No. 16–cv–01165–JCS, 2018 WL 4053447 (N.D. Cal. Aug. 24, 2018), and *Center for Biological Diversity* v. *Jewell,* 248 F. Supp. 3d, 946, 959 (D. Ariz. 2017).

Determination of Status

Our review of the best available scientific and commercial information indicates that the Dolphin and Union caribou DPS meets the definition of a threatened species. Therefore, we propose to list the Dolphin and Union caribou DPS as a threatened species in accordance with sections 3(20) and 4(a)(1) of the Act.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness and encourages and results in conservation actions by Federal and State governments, foreign governments, private agencies and interest groups, and individuals.

As explained below, the proposed 4(d) rule for Dolphin and Union caribou would, in part, make it illegal for any person subject to the jurisdiction of the United States to import, export; deliver, receive, carry, transport, or ship in interstate or foreign commerce in the course of commercial activity; or sell or offer for sale in interstate or foreign commerce any Dolphin and Union caribou. Certain exceptions apply to agents of the Service and State conservation agencies. An exception is also provided in the proposed 4(d) rule for import of personal sport-hunted trophies legally hunted in and exported

from Canada with accompanying sport-hunting tags.

Our regulations at 50 CFR part 402 implement the interagency cooperation provisions found under section 7 of the Act. Under section 7(a)(1) of the Act, Federal agencies are to use, in consultation with and with the assistance of the Service, their authorities in furtherance of the purposes of the Act. Section 7(a)(2) of the Act, as amended, requires Federal agencies to ensure, in consultation with the Service, that ''any action authorized, funded, or carried out'' by such agency is not likely to jeopardize the continued existence of a listed species or result in destruction or adverse modification of its critical habitat. An ''action'' that is subject to the consultation provisions of section 7(a)(2) has been defined in our implementing regulations at 50 CFR 402.02 as ''all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas.'' With respect to this species, there are no ''actions'' known to require consultation under section 7(a)(2) of the Act. Given the regulatory definition of ''action,'' which clarifies that it applies to ''activities or programs . . . in the United States or upon the high seas,'' the species is unlikely to be the subject of section 7 consultations, because the terrestrial species conducts its entire life cycle outside of the United States and is unlikely to be affected by U.S. Federal actions. Additionally, no critical habitat will be designated for this species because, under 50 CFR 424.12(g), we will not designate critical habitat within foreign countries or in other areas outside of the jurisdiction of the United States.

Section 8(a) of the ESA authorizes the provision of limited financial assistance for the development and management of programs that the Secretary of the Interior determines to be necessary or useful for the conservation of endangered or threatened species in foreign countries. Sections 8(b) and 8(c) of the ESA authorize the Secretary to encourage conservation programs for foreign listed species, and to provide assistance for such programs, in the form of personnel and the training of personnel.

Section 9 of the Act and our implementing regulations at 50 CFR 17.21 set forth a series of general prohibitions that apply to all endangered wildlife, and which may be applied to threatened species through a regulation issued under section 4(d) of the Act. As noted above, the proposed 4(d) rule for Dolphin and Union caribou imposes prohibitions tailored to the needs of the threatened species (see Proposed 4(d) Rule below). Permits may be issued to carry out otherwise prohibited activities involving threatened wildlife species under certain circumstances. Regulations governing permits for threatened species are codified at 50 CFR 17.32. With regard to threatened wildlife, a permit may be issued for scientific purposes, to enhance the propagation or survival of the species, for incidental take in connection with otherwise lawful activities, as well as for zoological exhibition, education, and special purposes consistent with the Act. The Service may also register persons subject to the jurisdiction of the United States through its captive-bred-wildlife (CBW) program if certain established requirements are met under the CBW regulations (50 CFR 17.21(g)). Through a CBW registration, the Service may allow a registrant to conduct certain otherwise prohibited activities under certain circumstances to enhance the propagation or survival of the affected species: Take; export or re-import; deliver, receive, carry, transport or ship in interstate or foreign commerce, in the course of a commercial activity; or sell or offer for sale in interstate or foreign commerce. A CBW registration may authorize interstate purchase and sale only between entities that both hold a registration for the taxon concerned. The CBW program is available for species having a natural geographic distribution not including any part of the United States and other species that the Director has determined to be eligible by regulation. The individual specimens must have been born in captivity in the United States. There are also certain statutory exemptions from the prohibitions, which are found in sections 9 and 10 of the Act.

III. Proposed Rule for Dolphin and Union Caribou Issued Under Section 4(d) of the Act

Background

Section 4(d) of the Act contains two sentences. The first sentence states that the ''Secretary shall issue such regulations as he deems necessary and advisable to provide for the conservation'' of species listed as threatened. The U.S. Supreme Court has noted that statutory language like ''necessary and advisable'' demonstrates a large degree of deference to the agency (see *Webster* v. *Doe,* 486 U.S. 592 (1988)). ''Conservation'' is defined in the Act to mean ''the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to [the Act] are no longer necessary.'' Additionally, the second sentence of section 4(d) of the Act states that the Secretary ''may by regulation prohibit with respect to any threatened species any act prohibited under section 9(a)(1), in the case of fish or wildlife, or section 9(a)(2), in the case of plants.'' Thus, the combination of the two sentences of section 4(d) provides the Secretary with wide latitude of discretion to select and promulgate appropriate regulations tailored to the specific conservation needs of the threatened species. The second sentence grants particularly broad discretion to the Service when adopting the prohibitions under section 9.

The courts have recognized the Secretary's discretion under this standard to develop rules that are appropriate for the conservation of a species. For example, courts have approved rules developed under section 4(d) that include a taking prohibition for threatened wildlife or include a limited taking prohibition (see *Alsea Valley Alliance* v. *Lautenbacher,* 2007 U.S. Dist. Lexis 60203 (D. Or. 2007); *Washington Environmental Council* v. *National Marine Fisheries Service,* 2002 U.S. Dist. Lexis 5432 (W.D. Wash. 2002)). Courts have also approved 4(d) rules that do not address all of the threats a species faces (*see State of Louisiana* v. *Verity,* 853 F.2d 322 (5th Cir. 1988)). As noted in the legislative history when the Act was initially enacted, ''once an animal is on the threatened list, the Secretary has an almost infinite number of options available to him with regard to the permitted activities for those species. He may, for example, permit taking, but not importation of such species, or he may choose to forbid both taking and importation but allow the transportation of such species.'' (H.R. Rep. No. 412, 93rd Cong., 1st Sess. 1973).

Exercising its authority under section 4(d) of the Act, the Service has developed a proposed rule that is designed to address the Dolphin and Union caribou's conservation needs. Although the statute does not require the Service to make a ''necessary and advisable'' finding with respect to the adoption of specific prohibitions under section 9, we find that this rule as a whole satisfies the requirement in section 4(d) of the Act to issue regulations deemed necessary and advisable to provide for the conservation of the Dolphin and Union caribou. As discussed under Summary of Biological Status and Threats, the Service has concluded that the Dolphin and Union caribou is likely to be at risk

of extinction within the foreseeable future primarily due to the cumulative effects of sea-ice loss due to climate change and shipping traffic. The provisions of this proposed 4(d) rule would promote conservation of the Dolphin and Union caribou by ensuring that activities undertaken with the Dolphin and Union caribou by any person under the jurisdiction of the United States are also supportive of the conservation efforts undertaken for the Dolphin and Union caribou in Canada, thereby encouraging management in ways that meet the conservation needs of the Dolphin and Union caribou. The provisions of this rule are one of many tools that the Service would use to promote the conservation of the Dolphin and Union caribou. This proposed 4(d) rule would apply only if and when the Service makes final the listing of the Dolphin and Union caribou as a threatened species.

Provisions of the Proposed 4(d) Rule

For the Dolphin and Union caribou, the Service has determined that a 4(d) rule is appropriate. In this proposed rule, we identified several factors that, in concert with climate change, may have a negative impact for the Dolphin and Union caribou. These risk factors include an increase in icing events, loss of sea ice, and parasitic harassment by botflies (Dumund and Lee 2013, p. 335; Poole et al. 2010, entire). Loss of sea ice due to climate change and shipping traffic constitute the primary threat affecting the Dolphin and Union caribou. However, because these effects are manifesting in Canada, the Service has limited regulatory means to ameliorate them. Therefore, the provisions of our 4(d) rule focus on ensuring that any activities undertaken with the Dolphin and Union caribou by any person under the jurisdiction of the United States encourage and support conservation management efforts for the Dolphin and Union caribou in Canada to help meet the conservation needs of the Dolphin and Union caribou.

Additionally, we have identified the existing regulatory mechanisms in place in Canada to conserve Dolphin and Union caribou. We assessed the conservation needs of these caribou in light of the protections provided to the species under SARA and COSEWIC. The Dolphin and Union caribou is listed as an entity of ''special concern'' under SARA. While subsistence and sport hunting of Dolphin and Union caribou is allowed and managed, as noted previously, the management plan for the Dolphin and Union caribou provides recommendations on how to better manage and conserve the DPS. Accordingly, in part due to current management efforts to limit the take of the DPS in Canada, the best available commercial data indicates that the current legal harvest of this caribou DPS is not occurring at levels that are affecting the population of the DPS (Governments of the Northwest Territories and Nunavut 2018, pp. 47). While we have found that these current efforts alone will be inadequate to prevent the species from likely becoming in danger of extinction within the foreseeable future throughout all of its range, we also recognize the value these management efforts play in helping to conserve the species.

This proposed 4(d) rule would provide for the conservation of the Dolphin and Union caribou and ensure that activities undertaken by any person under the jurisdiction of the United States are also supportive of the conservation efforts undertaken for the DPS in Canada, by prohibiting the following activities with the Dolphin and Union caribou, except as otherwise authorized or permitted: Importing or exporting; delivering, receiving, transporting, or shipping in interstate or foreign commerce in the course of commercial activity; or selling or offering for sale in interstate or foreign commerce.

The proposed rule would also provide an exception for the import of personal sport-hunted trophies legally hunted in and exported from Canada with accompanying hunting tags. As explained previously, while there is no information to indicate that non-subsistence hunting (sport-hunting) is occurring, legal subsistence hunting and sport-hunting is also not considered to be a current threat because of current management efforts undertaken by national and local governments. Under the current management efforts, a U.S. sport-hunter or other non-resident and non-Canadian citizen may be issued tags to hunt up to 5 caribou per year in Nunavut and need to be accompanied by a guide, while no more than 25 total caribou tags may be issued in NWT to U.S. or other non-Canadian outfitted sport-hunters. Our proposed 4(d) rule would provide that if a Dolphin and Union caribou is legally hunted in and exported from Canada with accompanying sport-hunting tag issued by Nunavut or NWT, import of the personal sport-hunted trophy by the hunter into the United States would not require a threatened species permit.

We may also issue permits to carry out otherwise prohibited activities, including those described above, involving threatened wildlife under certain circumstances, such as for scientific purposes, or the enhancement of propagation or survival of the Dolphin and Union caribou in the wild. In issuing such permits we consider a number of factors, including whether the permit, if issued, would conflict with any known program intended to enhance the survival probabilities of the population, the probable direct and indirect effect that issuing the permit would have on the wild populations, and whether the purpose for which the permit is required would be likely to reduce the threat of extinction facing the species. Regulations governing permits for threatened wildlife are codified at 50 CFR 17.32, and are further described in Available Conservation Measures, above. This proposed 4(d) rule, if finalized, would apply to all live and dead Dolphin and Union caribou and parts and products, support conservation management efforts for Dolphin and Union caribou in the wild in Canada, and allow for trade and interstate and foreign commerce consistent with the purposes of the Act and conservation of the species as provided for in our threatened species permitting provisions.

Required Determinations

Clarity of the Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(1) Be logically organized;

(2) Use the active voice to address readers directly;

(3) Use clear language rather than jargon;

(4) Be divided into short sections and sentences; and

(5) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the names of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

We have determined that we do not need to prepare environmental analyses pursuant to the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 *et seq.*) in connection with listing a species under the Act. We published a notice

outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

References Cited

A complete list of references cited is available on *http://www.regulations.gov* under Docket Number FWS–R4–ES–2019–0014.

Authority

The authority for this action is the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Authors

The primary authors of this proposed rule are the staff members of the Branch of Delisting and Foreign Species, Ecological Services, U.S. Fish and Wildlife Service.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Proposed Regulation Promulgation

Accordingly, we hereby propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as follows:

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

■ 1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 1531–1544; and 4201–4245; unless otherwise noted.

■ 2. Amend § 17.11(h) by adding an entry for ''Caribou, barren-ground [Dolphin and Union caribou DPS]'' in alphabetical order under Mammals to the List of Endangered and Threatened Wildlife, to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Common name	Scientific name	Where listed	Status	Listing citations and applicable rules
MAMMALS				
* *	*	* *	*	* *
Caribou, barren-ground [Dolphin and Union caribou DPS].	*Rangifer tarandus groenlandicus*.	Canada (Victoria Island, Canadian Mainland in Nunavut and Northwest Territories).	T	[**Federal Register** *citation when published as a final rule*]; 50 CFR 17.40(t). [4d]
* *	*	* *	*	* *

■ 3. Amend § 17.40 by adding paragraph (t) to read as follows:

§ 17.40 Special rules—mammals.

* * * * *

(t) Caribou, barren-ground [Dolphin and Union caribou distinct population segment (DPS)] (*Rangifer tarandus groenlandicus*).

(1) *Prohibitions.* Except as provided under paragraph (t)(2) of this section and §§ 17.4–17.5, it is unlawful for any person subject to the jurisdiction of the United States to commit, to attempt to commit, to solicit another to commit, or to cause to be committed, any of the following acts with regard to this species:

(i) Import or export, as set forth for endangered wildlife at § 17.21(b).

(ii) Interstate or foreign commerce in the course of commercial activity, as set forth for endangered wildlife at § 17.21(e).

(iii) Sale or offer for sale, as set forth for endangered wildlife at § 17.21(f).

(2) *Exceptions from prohibitions.* With regard to this species, you may:

(i) Import personal sport-hunted trophies legally hunted in and exported from Canada with accompanying hunting tags.

(ii) Conduct activities as authorized by permit under § 17.32.

(iii) Conduct activities as authorized by a captive-bred wildlife registration for endangered wildlife under § 17.21(g).

Martha Williams,

Principal Deputy Director, Exercising the Delegated Authority of the Director, U.S. Fish and Wildlife Service.

[FR Doc. 2021–18098 Filed 8–30–21; 8:45 am]

BILLING CODE 4333–15–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 20

[Docket No. FWS–HQ–MB–2021–0057; FF09M22000–212–FXMB1231099BPP0]

RIN 1018–BF07

Migratory Bird Hunting; Proposed 2022–23 Migratory Game Bird Hunting Regulations (Preliminary) With Requests for Indian Tribal Proposals; Notification of Meetings

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; availability of supplemental information.

SUMMARY: The U.S. Fish and Wildlife Service (Service or we) proposes to establish annual hunting regulations for certain migratory game birds for the 2022–23 hunting season. We annually prescribe outside limits (frameworks) within which States may select hunting seasons. This proposed rule provides the regulatory schedule, announces the Service Migratory Bird Regulations Committee (SRC) and Flyway Council meetings, describes the proposed regulatory alternatives for the 2022–23 general duck seasons and preliminary proposals that vary from the 2021–22 hunting season regulations, and requests proposals from Indian Tribes that wish to establish special migratory game bird hunting regulations on Federal Indian reservations and ceded lands. Migratory bird hunting seasons provide opportunities for recreation and sustenance; aid Federal, State, and Tribal governments in the management of migratory game birds; and permit harvests at levels compatible with migratory game bird population status and habitat conditions.

DATES:

Comments: You may comment on the general duck season regulatory alternatives and other preliminary proposals for the 2022–23 season until September 30, 2021. In subsequent **Federal Register** documents, you will be given an opportunity to submit comments on the proposed frameworks (see Schedule of Biological Information Availability, Regulations Meetings and **Federal Register** Publications for the