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Endangered and Threatened Species; Proposed Threatened Status for Subspecies of the Ringed Seal; Endangered and Threatened Species; Proposed Threatened and Not Warranted Status for Subspecies and Distinct Population Segments of the Bearded Seal; Proposed Rules

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 223

[Docket No. 101126590–0589–01]

RIN 0648–XZ59

Endangered and Threatened Species; Proposed Threatened Status for Subspecies of the Ringed Seal

AGENCY: National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Commerce.

ACTION: Proposed rule; 12-month petition finding; status review; request for comments.

SUMMARY: We, NMFS, have completed a comprehensive status review of the ringed seal (*Phoca hispida*) under the Endangered Species Act (ESA) and announce a 12-month finding on a petition to list the ringed seal as a threatened or endangered species. Based on consideration of information presented in the status review report, an assessment of the factors in the ESA, and efforts being made to protect the species, we have determined the Arctic (*Phoca hispida hispida*), Okhotsk (*Phoca hispida ochotensis*), Baltic (*Phoca hispida botnica*), and Ladoga (*Phoca hispida ladogensis*) subspecies of the ringed seal are likely to become endangered throughout all or a significant portion of their range in the foreseeable future. Accordingly, we issue a proposed rule to list these subspecies of the ringed seal as threatened species, and we solicit comments on this proposed action. At this time, we do not propose to designate critical habitat for the Arctic ringed seal because it is not currently determinable. In order to complete the critical habitat designation process, we also solicit information on essential physical and biological features of Arctic ringed seal habitat.

DATES: Comments and information regarding this proposed rule must be received by close of business on February 8, 2011. Requests for public hearings must be made in writing and received by January 24, 2011.

ADDRESSES: Send comments to Kaja Brix, Assistant Regional Administrator, Protected Resources Division, Alaska Region, NMFS, Attn: Ellen Sebastian. You may submit comments, identified by RIN 0648–XZ59, by any one of the following methods:

• *Electronic Submissions:* Submit all electronic public comments via the Federal eRulemaking Portal *http://www.regulations.gov.*

• *Mail:* P.O. Box 21668, Juneau, AK 99802.

• *Fax:* (907) 586–7557.

• *Hand delivery to the Federal Building:* 709 West 9th Street, Room 420A, Juneau, AK.

All comments received are a part of the public record. No comments will be posted to *http://www.regulations.gov* for public viewing until after the comment period has closed. Comments will generally be posted without change. All Personal Identifying Information (for example, name, address, *etc.*) voluntarily submitted by the commenter may be publicly accessible. Do not submit Confidential Business Information or otherwise sensitive or protected information.

We will accept anonymous comments (enter N/A in the required fields, if you wish to remain anonymous). You may submit attachments to electronic comments in Microsoft Word, Excel, WordPerfect, or Adobe PDF file formats only.

The proposed rule, maps, status review report, and other materials relating to this proposal can be found on the Alaska Region Web site at: *http://alaskafisheries.noaa.gov/.*

FOR FURTHER INFORMATION CONTACT: Tamara Olson, NMFS Alaska Region, (907) 271–5006; Kaja Brix, NMFS Alaska Region, (907) 586–7235; or Marta Nammack, Office of Protected Resources, Silver Spring, MD (301) 713–1401.

SUPPLEMENTARY INFORMATION: On March 28, 2008, we initiated status reviews of ringed, bearded (*Erignathus barbatus*), and spotted seals (*Phoca largha*) under the ESA (73 FR 16617). On May 28, 2008, we received a petition from the Center for Biological Diversity to list these three species of seals as threatened or endangered under the ESA, primarily due to concerns about threats to their habitat from climate warming and loss of sea ice. The Petitioner also requested that critical habitat be designated for these species concurrent with listing under the ESA. Section 4(b)(3)(B) of the ESA of 1973, as amended (16 U.S.C. 1531 *et seq.*), requires that when a petition to revise the List of Endangered and Threatened Wildlife and Plants is found to present substantial scientific and commercial information, we make a finding on whether the petitioned action is (a) Not warranted, (b) warranted, or (c) warranted but precluded from immediate proposal by other pending proposals of higher priority. This finding is to be made within 1 year of the date the petition was received, and the finding is to be published promptly in the **Federal Register**.

After reviewing the petition, the literature cited in the petition, and other literature and information available in our files, we found (73 FR 51615; September 4, 2008) that the petition met the requirements of the regulations under 50 CFR 424.14(b)(2), and we determined that the petition presented substantial information indicating that the petitioned action may be warranted. Accordingly, we proceeded with the status reviews of ringed, bearded, and spotted seals and solicited information pertaining to them.

On September 8, 2009, the Center for Biological Diversity filed a lawsuit in the U.S. District Court for the District of Columbia alleging that we failed to make the requisite 12-month finding on its petition to list the three seal species. Subsequently, the Court entered a consent decree under which we agreed to finalize the status review of the ringed seal (and the bearded seal) and submit this 12-month finding to the Office of the **Federal Register** by December 3, 2010. Our 12-month petition finding for bearded seals is published as a separate notice concurrently with this finding. Spotted seals were also addressed in a separate **Federal Register** notice (75 FR 65239; October 22, 2010; see also, 74 FR 53683, October 20, 2009).

The status review report of the ringed seal is a compilation of the best scientific and commercial data available concerning the status of the species, including the past, present, and future threats to this species. The Biological Review Team (BRT) that prepared this report was composed of eight marine mammal biologists, a fishery biologist, a marine chemist, and a climate scientist from NMFS's Alaska and Northeast Fisheries Science Centers, NOAA's Pacific Marine Environmental Lab, and the U.S. Fish and Wildlife Service (USFWS). The status review report underwent independent peer review by five scientists with expertise in ringed seal biology, Arctic sea ice, climate change, and ocean acidification.

ESA Statutory, Regulatory, and Policy Provisions

There are two key tasks associated with conducting an ESA status review. The first is to delineate the taxonomic group under consideration; and the second is to conduct an extinction risk assessment to determine whether the petitioned species is threatened or endangered. To be considered for listing under the ESA, a group of organisms must constitute a "species," which section 3(16) of the ESA defines as "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." The term "distinct population segment" (DPS) is not commonly used in scientific discourse, so the USFWS and NMFS developed the "Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act" to provide a consistent interpretation of this term for the purposes of listing, delisting, and reclassifying vertebrates under the ESA (61 FR 4722; February 7, 1996). We describe and use this policy below to guide our determination of whether any population segments of this species meet the DPS criteria of the DPS policy.

The ESA defines the term "endangered species" as "any species which is in danger of extinction throughout all or a significant portion of its range." The term "threatened species" is defined as "any species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range." The foreseeability of a species' future status is case specific and depends upon both the foreseeability of threats to the species and foreseeability of the species' response to those threats. When a species is exposed to a variety of threats, each threat may be foreseeable in a different time frame. For example, threats stemming from well-established, observed trends in a global physical process may be foreseeable on a much longer time horizon than a threat stemming from a potential, though unpredictable, episodic process such as an outbreak of disease that may never have been observed to occur in the species.

In the 2008 status review of the ribbon seal (Boveng, *et al.,* 2008; see also 73 FR 79822, December 30, 2008), NMFS scientists used the same climate projections used in our risk assessment here, but terminated the analysis of threats to ribbon seals at 2050. One reason for that approach was the difficulty of incorporating the increased divergence and uncertainty in climate scenarios beyond that time. Other reasons included the lack of data for threats other than those related to climate change beyond 2050, and the fact that the uncertainty embedded in the assessment of the ribbon seal's response to threats increased as the analysis extended farther into the future.

Since that time, NMFS scientists have revised their analytical approach to the foreseeability of threats and responses to those threats, adopting a more threat-specific approach based on the best scientific and commercial data available for each respective threat. For example, because the climate projections in the Intergovernmental Panel on Climate Change's (IPCC's) *Fourth Assessment Report* extend through the end of the century (and we note the IPCC's *Fifth Assessment Report,* due in 2014, will extend even farther into the future), we used those models to assess impacts from climate change through the end of the century. We continue to recognize that the farther into the future the analysis extends, the greater the inherent uncertainty, and we incorporated that limitation into our assessment of the threats and the species' response. For other threats, where the best scientific and commercial data does not extend as far into the future, such as for occurrences and projections of disease or parasitic outbreaks, we limited our analysis to the extent of such data. We believe this approach creates a more robust analysis of the best scientific and commercial data available.

Species Information

A thorough review of the taxonomy, life history, and ecology of the ringed seal is presented in the status review report (Kelly *et al.,* 2010a; available at *http://alaskafisheries.noaa.gov/*).

The ringed seal is the smallest of the northern seals, with typical adult body sizes of 1.5 m in length and 70 kg in weight. The average life span of ringed seals is about 15–28 years. As the common name of this species suggests, its coat is characterized by ring-shaped markings. Ringed seals are adapted to remaining in heavily ice-covered areas throughout the fall, winter, and spring by using the stout claws on their fore flippers to maintain breathing holes in the ice.

Seasonal Distribution, Habitat Use, and Movements

Ringed seals are circumpolar and are found in all seasonally ice covered seas of the Northern Hemisphere as well as in certain freshwater lakes. They range throughout the Arctic Basin and southward into adjacent seas, including the southern Bering Sea and Newfoundland. Ringed seals are also found in the Sea of Okhotsk and Sea of Japan in the western North Pacific, the Baltic Sea in the North Atlantic, and landlocked populations inhabit lakes Ladoga and Saimaa east of the Baltic Sea (Figure 1).

Throughout most of its range, the Arctic subspecies does not come ashore and uses sea ice as a substrate for resting, pupping, and molting. During the ice-free season in more southerly regions including the White Sea, the Sea of Okhotsk, and the Baltic Sea, ringed seals occasionally rest on island shores or offshore reefs. In lakes Ladoga and Saimaa, ringed seals typically rest on rocks and island shores when ice is absent. In all subspecies except the Okhotsk, pups normally are born in subnivean lairs (snow caves) on the sea ice (Arctic and Baltic ringed seals) or in subnivean lairs along shorelines (Saimaa and Ladoga ringed seals) in late winter to early spring. Although use of subnivean lairs has been reported for Okhotsk ringed seals, this subspecies apparently depends primarily on sheltering in the lee of ice hummocks.

The seasonality of ice cover strongly influences ringed seal movements, foraging, reproductive behavior, and vulnerability to predation. Born *et al.* (2004) recognized three "ecological seasons" as important to ringed seals off northwestern Greenland: The "open-water season," the ice-covered "winter," and "spring," when the seals breed and after the breeding season haul out on the ice to molt. Tracking seals in Alaska and the western Canadian Arctic, Kelly *et al.* (2010b) used different terms to refer to these ecological seasons. Kelly *et al.* (2010b) referred to the open-water period when ringed seals forage most intensively as the "foraging period," early winter through spring when seals rest primarily in subnivean lairs on the ice as the "subnivean period," and the period between abandonment of the lairs and ice break-up as the "basking period."

Open-water (foraging) period: Short and long distance movements by ringed seals have been documented during the open-water period. Overall, the record from satellite tracking indicates that ringed seals breeding in shorefast ice practice one of two strategies during the open-water foraging period. Some seals forage within 100 km of their shorefast ice breeding habitat while others make extensive movements of hundreds or thousands of kilometers to forage in highly productive areas and along the pack ice edge. Movements during the open-water period by ringed seals that breed in the pack ice are unknown. Tracking and observational records indicate that adult Arctic ringed seals breeding in the shorefast ice show inter-annual fidelity to breeding sites. Saimaa and Ladoga ringed seals show similar site fidelity. High quality, abundant food is important to the annual energy budgets of ringed seals. Fall and early winter periods, prior to the occupation of breeding sites, are important in allowing ringed seals to accumulate enough fat stores to support estrus and lactation.

Winter (subnivean period): At freeze-up in fall, ringed seals surface to breathe in the remaining open water of cracks and leads. As these openings freeze over, the seals push through the ice to breathe until it is too thick. They then open breathing holes by abrading the ice with the claws on their fore flippers. As the ice thickens, the seals continue to maintain the breathing holes by scratching at the walls. The breathing holes can be maintained in ice 2 m or greater in thickness but often are concentrated in the thinner ice of refrozen cracks.

As snow accumulates and buries the breathing hole, the seals breathe through the snow layer. Ringed seals excavate lairs in the snow above breathing holes where snow depth is sufficient. These subnivean lairs are occupied for resting, pupping, and nursing young in annual shorefast and pack ice. Snow accumulation on sea ice is typically sufficient for lair formation only where pressure ridges or ice hummocks cause the snow to form drifts at least 45 cm deep (at least 50–65 cm for birth lairs). Such drifts typically occur only where average snow depths (on flat ice) are 20–30 cm or more. A general lack of such ridges or hummocks in lakes Ladoga and Saimaa limits suitable snow drifts to island shorelines, where most lairs in Lake Ladoga and virtually all lairs in Lake Saimaa are found.

Subnivean lairs provide refuge from air temperatures too low for survival of ringed seal pups. Lairs also conceal ringed seals from predators, an advantage especially important to the small pups that start life with minimal tolerance for immersion in cold water. When forced to flee into the water to avoid predators, the pups that survive depend on the subnivean lairs to subsequently warm themselves. Ringed seal movements during the subnivean period typically are quite limited, especially where ice cover is extensive.

Spring (basking period): Numbers of ringed seals hauled out on the surface of the ice typically begin to increase during spring as the temperatures warm and the snow covering the seals' lairs melts. Although the snow cover can melt rapidly, the ice remains largely intact and serves as a substrate for the molting seals that spend many hours basking in the sun. Adults generally molt from mid-May to mid-July, although there is regional variation. The relatively long periods of time that ringed seals spend out of the water during the molt has been ascribed to the need to maintain elevated skin temperatures. Feeding is reduced and the seal's metabolism declines during the molt. As seals complete this phase of the annual pelage cycle, they spend increasing amounts of time in the water.

Food Habits

Ringed seals eat a wide variety of prey in the marine environment. Most ringed seal prey is small, and preferred fishes tend to be schooling species that form dense aggregations. Ringed seals rarely prey upon more than 10–15 species in any one area, and not more than 2–4 of those species are considered important prey. Despite regional and seasonal variations in the diet of ringed seals, fishes of the cod family tend to dominate the diet of ringed seals from late autumn through early spring in many areas. Arctic cod (*Boreogadus saida*) is often reported to be among the most important prey species, especially during the ice-covered periods of the year. Other members of the cod family, including polar cod (*Arctogadus glacialis*), saffron cod (*Eleginus gracilis*), and navaga (*Eleginus navaga*), are also seasonally important to ringed seals in some areas. Arctic cod is not found in the Sea of Okhotsk, but capelin (*Mallotus villosus*) are abundant in the region. Other fishes reported to be locally important to ringed seals include smelt (*Osmerus* sp.) and herring (*Clupea* sp.). Invertebrates appear to become more important to ringed seals in many areas during the open-water season, and are often found to dominate the diets of young seals. In the brackish water of the Baltic Sea, the prey community includes a mixture of marine and freshwater fish species, as well as invertebrates. In the freshwater environment of Lake Saimaa, several schooling fishes were reported to be the most important prey species; and in Lake Ladoga, a variety of fish species were found in the diet of ringed seals.

Reproduction

Sexual maturity in ringed seals varies with population status and can be as late as 7 years for males and 9 years for females and as early as 3 years for both sexes. Ringed seals breed annually, with timing varying regionally. Mating takes place while mature females are still nursing their pups and is thought to occur under the ice in the vicinity of birth lairs. Little is known about the breeding system of ringed seals; however, males are often reported to be territorial during the breeding season.

A single pup is born in a subnivean lair on either the shorefast ice or pack ice. In much of the Arctic, pupping occurs in late March through April, but the timing varies with latitude. Pupping in the Sea of Okhotsk takes place in March and April. In the Baltic Sea, Lake Saimaa, and Lake Ladoga, pups are born in February through March. At birth, ringed seal pups are approximately 60–65 cm in length and weigh 4.5–5.0 kg with regional variation. The pups are born with a white natal coat (lanugo) that provides insulation, particularly when dry, until it is shed after 4–6 weeks. Pups nurse for as long as 2 months in stable shorefast ice and for as little as 3–6 weeks in moving ice. Pups normally are weaned before break-up of spring ice. At weaning, pups are four times their birth weights, and they lose weight for several months after weaning.

Species Delineation

The BRT reviewed the best scientific and commercial data available on the ringed seal's taxonomy and concluded that there are five currently recognized subspecies of the ringed seal: Arctic ringed seal; Baltic ringed seal; Okhotsk ringed seal; Ladoga ringed seal; and Saimaa ringed seal (*Phoca hispida saimensis*). The BRT noted, however, that further investigation would be required to discern whether there are additional distinct units, especially within the Arctic subspecies, whose genetic structuring has yet to be thoroughly investigated. We agree with the BRT's conclusions that these five subspecies of the ringed seal qualify as "species" under the ESA. Our DPS analysis follows, and the geographic distributions of the five subspecies are shown in Figure 1.

Under our DPS policy (61 FR 4722; February 7, 1996), two elements are considered in a decision regarding the potential identification of a DPS: (1) The discreteness of the population segment in relation to the remainder of the species or subspecies to which it belongs; and (2) the significance of the population segment to the species or subspecies to which it belongs. A population segment of a vertebrate species may be considered discrete 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; or (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 ESA.

If a population segment is considered to be discrete under one or both of the above conditions, its biological and ecological significance to the taxon to which it belongs is evaluated in light of the ESA's legislative history indicating that the authority to list DPSs be used "sparingly" while encouraging the conservation of genetic diversity (*see* Senate Report 151, 96th Congress, 1st Session). This consideration may include, but is not limited to, the following: (1) Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon, (2) evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon, (3) evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range, or (4) evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

If a population segment is discrete and significant (*i.e.,* it is a DPS) its evaluation for endangered or threatened status will be based on the ESA's definitions of those terms and a review of the factors enumerated in section 4(a)(1).

With respect to discreteness criterion 1 above, we concluded that resolution of ringed seal population segments beyond the subspecies level is not currently possible using the best available scientific and commercial data. We also did not find sufficient differences in the conservation status or management within any of the ringed seal subspecies among their respective range countries to justify the use of international boundaries to satisfy the discreteness criterion of our DPS Policy. We therefore conclude that there are no population segments within any of the subspecies that satisfy the discreteness criteria of our DPS Policy. Since there are no discrete population segments within any of the subspecies, we cannot take the next step of determining whether any discrete population segment is significant to the taxon to which it belongs.

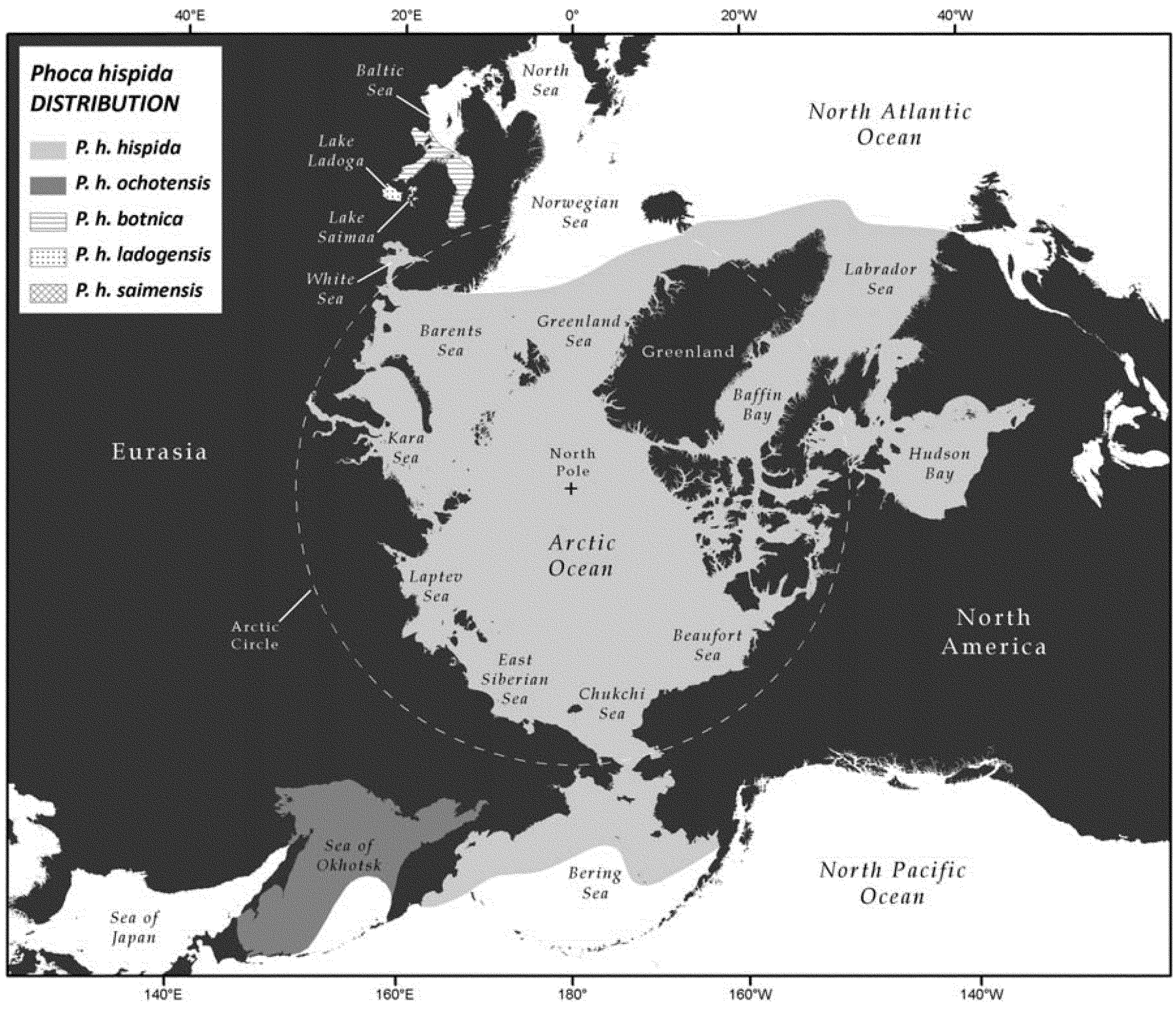

Figure 1. Distributions of the five subspecies of the ringed seal (Phoca hispida), from Kelly et al. (2010a).

Abundance and Trends

Several factors make it difficult to accurately assess ringed seals' abundance and trends. The remoteness and dynamic nature of their sea ice habitat, time spent below the surface, and their broad distribution and seasonal movements make surveying ringed seals expensive and logistically challenging. Additionally, the species' range crosses political boundaries and there has been limited international cooperation to conduct range-wide surveys. Details of survey methods and data are often limited or have not been published, making it difficult to judge the reliability of the reported numbers. Some studies have relied on surveys of seal holes and then estimated the number of seals based on various assumptions of the ratio of seals to holes. Most surveys are conducted during the basking period and the numbers of seals on ice is multiplied by some factor to estimate population size or determine a population index. While a few, recent studies have used data recorders and haul-out models to develop correction factors for seals submerged and unseen, many studies present only estimates for seals visible on ice (i.e., "basking population"). The timing of annual snow and ice melts also varies widely from year to year and, unless surveys are conducted to coincide with similar ice and weather conditions, comparisons between years (even if conducted during the same time of year) can be erroneous. With these limitations in mind, the best scientific and commercial data on abundance and trends are summarized below for each of the ringed seal subspecies.

Arctic Ringed Seal

The Arctic ringed seal is the most abundant of the ringed seal subspecies and has a circumpolar distribution. The BRT divided the distribution of Arctic ringed seals into five regions: Greenland Sea and Baffin Bay, Hudson Bay, Beaufort Sea, Chukchi Sea, and the White, Barents and Kara Seas. These regions were largely chosen to reflect the geographical groupings of published studies and not to imply any actual population structure. These areas also do not represent the full distribution of Arctic ringed seals as estimates are not available in some areas (*e.g.,* areas of the Russian Arctic coast and the Canadian Arctic Archipelago).

The only available comprehensive estimate for the Greenland Sea and Baffin Bay region is 787,000, based on surveys conducted in 1979. Consistency in harvest records over time lends some confidence that the population has not changed significantly.

The Hudson Bay ringed seal population was estimated at 53,346 based on the mid-point of estimates from aerial surveys conducted in 2007 and 2008. Prior surveys conducted in western Hudson Bay in the 1970s produced an estimate of 455,000 seals, which was much larger than the 218,300 reported in the 1950s. The earlier studies did not account for seals using pack ice habitats which might account for the difference. A more recent survey in 1995 provided an estimate of approximately 280,000 seals when missed seals were accounted for.

Population assessments of ringed seals in the Beaufort and Chukchi Seas have been mostly confined to U.S. and Canadian waters. Based on the available abundance estimates for study areas within this region and extrapolations for pack ice areas without survey data, a reasonable estimate for the Chukchi and Beaufort Seas is 1 million seals. Estimates derived for all Alaskan shorefast ice habitats in both the Chukchi and Beaufort Seas based on aerial surveys conducted in the mid 1980s were 250,000 ringed seals in the shorefast ice and 1–1.5 million including seals in the pack-ice habitat.

The White, Barents, Kara, and East Siberian Seas encompass at least half of the worldwide distribution of Arctic ringed seals. The total population across these seas may be as many as 220,000 seals based on available survey data, primarily from 1975–1993.

Okhotsk Ringed Seal

Based on aerial surveys, ringed seal abundance in the Sea of Okhotsk from 1968–1990 was estimated at between 676,000 and 855,000 seals. These estimates include a general (not species-specific) 30 percent adjustment to account for seals in the water. Fluctuations in population estimates since catch limits were initiated in 1968 were suspected to be natural (Fedoseev, 2000). Based on these surveys, a conservative estimate of the current total population of ringed seals in the Sea of Okhotsk would be 676,000 seals. Aerial surveys conducted in the Sea of Okhotsk from 1968–1969 provided a population estimate of 800,000. This was the same as the estimate previously back-calculated from catch data in 1966 when a population decline due to hunting was identified. These calculations also suggested that ringed seal abundance in the Sea of Okhotsk had been in a state of steady decline since 1955 when estimates suggested the population exceeded 1 million seals.

Baltic Ringed Seal

The Baltic ringed seal population was estimated at 10,000 seals based on comprehensive surveys conducted in 1996. Historical estimates of population size for the Baltic ringed seal range from 50,000 to 450,000 seals in 1900 (Kokko *et al.,* 1999). These estimates were derived as back calculations from historical bounty records. The large range in the estimates reflects uncertainty in the hunting dynamics and whether the populations were historically subject to density dependence. By the 1940s, the population had been reduced to 25,000 seals in large part due to Swedish and Finnish removal efforts. Ringed seals in the Baltic are found in three general regions, the Bothnian Bay, Gulf of Finland, and Gulf of Riga plus the Estonian west coast. Low numbers of ringed seals are also present in the Bothnian Sea and the southwestern region of Finland. The greatest concentration of Baltic ringed seals is found in the Bothnian Bay.

Ladoga Ringed Seal

The population size of ringed seals in Lake Ladoga is currently suggested to range between 3,000 and 5,000 seals based on an aerial survey in 2001. This represents a decline from estimates of 20,000 and 5,000–10,000 seals reported for the 1930s and the 1960s, respectively (Chapskii, 1974). Results from a Russian aerial survey in the 1970s estimated the population of ringed seals in Lake Ladoga to be 3,500–4,700 seals.

Saimaa Ringed Seal

The current population estimate of ringed seals in Lake Saimaa is less than 300, and the mean population growth rate from 1990–2004 was 1.026. Lake Saimaa is a complex body of water, and the population trends and abundance for Saimaa ringed seals have differed across the various regions. It has been projected that the population of Saimaa ringed seals may reach 400 by 2015, but with the caveat that seals may no longer be present in some regions of the lake. Historical abundance of ringed seals in Lake Saimaa is estimated to have been between 4,000 and 6,000 animals approximately 5,000 years ago (Sipilä and Hyvärinen, 1998; Sipilä, 2006). However, using a back-casting process based on reported bounty statistics, the population was estimated in 1893 to be between 100 and 1,300 seals. In 1993, the Saimaa seal was listed as endangered under the ESA (58 FR 26920; May 6, 1993) and as depleted under the U.S. Marine Mammal Protection Act of 1972, as amended. At that time, the population was estimated at 160–180 seals (57 FR 60162; December 18, 1992).

Summary of Factors Affecting the Ringed Seal

Section 4(a)(1) of the ESA and the listing regulations (50 CFR part 424) set forth procedures for listing species. We must determine, through the regulatory process, if a species is endangered or threatened because of any one or a combination of the following factors: (1) The present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; or (5) other natural or human-made factors affecting its continued existence. These factors are discussed below, with each subspecies of the ringed seal considered under each factor. The reader is also directed to section 4.2 of the status review report for a more detailed discussion of the factors affecting the five subspecies of the ringed seal (*see* **ADDRESSES**). As discussed above, the data on ringed seal abundance and trends of most populations are unavailable or imprecise, especially in the Arctic and Okhotsk subspecies, and there is little basis for quantitatively linking projected environmental conditions or other factors to ringed seal survival or reproduction. Our risk assessment therefore primarily evaluated important habitat features and was based upon the best available scientific and commercial data and the expert opinion of the BRT members.

A. Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

The main concern about the conservation status of ringed seals stems from the likelihood that their sea ice habitat has been modified by the warming climate and, more so, that the scientific consensus projections are for continued and perhaps accelerated warming in the foreseeable future. A second concern, related by the common driver of carbon dioxide (CO_2) emissions, is the modification of habitat by ocean acidification, which may alter prey populations and other important aspects of the marine ecosystem. A reliable assessment of the future conservation status of each of the subspecies of the ringed seal therefore requires a focus on the observed and projected changes in sea ice, snow cover, ocean temperature, ocean pH (acidity), and associated changes in ringed seal prey species.

The threats (analyzed below) associated with impacts of the warming climate on the habitat of ringed seals, to the extent that they may pose risks to these seals, are expected to manifest throughout the current breeding and molting range (for snow and ice related threats) or throughout the entire range (for ocean warming and acidification) of each of the subspecies, since the spatial resolution of data pertaining to these threats is currently limited.

Overview of Global Climate Change and Effects on the Annual Formation of the Ringed Seal's Sea Ice Habitat

Sea ice in the Northern Hemisphere can be divided into first-year sea ice that formed in the most recent autumn-winter period, and multi-year sea ice that has survived at least one summer melt season. The Arctic Ocean is covered by a mix of multi-year sea ice. More southerly regions, such as the Bering Sea, Barents Sea, Baffin Bay, the Baltic Sea, Hudson Bay, and the Sea of Okhotsk are known as seasonal ice zones, where first year sea ice is renewed every winter. Similarly, freshwater ice in lakes Ladoga and Saimaa forms and melts annually. Both the observed and the projected effects of a warming global climate are most extreme in northern high-latitude regions, in large 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.

Sea ice extent at the end of summer (September) 2007 in the Arctic Ocean was a record low (4.3 million sq km), nearly 40 percent below the long-term average and 23 percent below the previous record set in 2005 (5.6 million sq km) (Stroeve *et al.,* 2008). Sea ice extent in September 2010 was the third lowest in the satellite record for the month, behind 2007 and 2008 (second lowest). Most of the loss of sea ice was on the Pacific side of the Arctic. Of even greater long-term significance was the loss of over 40 percent of Arctic multi-year sea ice over the last 5 years (Kwok *et al.,* 2009). While the annual minimum of sea ice extent is often taken as an index of the state of Arctic sea ice, the recent reductions of the area of multi-year sea ice and the reduction of sea ice thickness is of greater physical importance. It would take many years to restore the ice thickness through annual growth, and the loss of multi-year sea ice makes it unlikely that the Arctic will return to previous climatological conditions. Continued loss of sea ice will be a major driver of changes across the Arctic over the next decades, especially in late summer and autumn.

Sea ice and other climatic conditions that influence ringed seal habitats are quite different between the Arctic and seasonal ice zones. In the Arctic, sea ice loss is a summer feature with a delay in freeze up occurring into the following fall. Sea ice persists in the Arctic from late fall through mid-summer due to cold and dark winter conditions. Sea ice variability is primarily determined by radiation and melting processes during the summer season. In contrast, the seasonal ice zones are free of sea ice during summer. The variability in extent, thickness, and other sea ice characteristics important to marine mammals is determined primarily by changes in the number, intensity, and track of winter and spring storms in the sub-Arctic. Although there are connections between sea ice conditions in the Arctic and the seasonal ice zones, the early loss of summer sea ice in the Arctic cannot be extrapolated to the seasonal ice zones, which are behaving differently than the Arctic. For example, the Bering Sea has had 4 years of colder than normal winter and spring conditions from 2007 to 2010, with near record sea ice extents, rivaling the sea ice maximum in the mid-1970s, despite record retreats in summer.

IPCC Model Projections

The analysis and synthesis of information presented by the IPCC in its *Fourth Assessment Report* (AR4) represents the scientific consensus view on the causes and future of climate change. The IPCC AR4 used a range of future greenhouse gas (GHG) emissions produced under six "marker" scenarios from the *Special Report on Emissions Scenarios* (SRES) (IPCC, 2000) to project plausible outcomes under clearly-stated assumptions about socio-economic factors that will influence the emissions. Conditional on each scenario, the best estimate and likely range of emissions were projected through the end of the 21st century. It is important to note that the SRES scenarios do not contain explicit assumptions about the implementation of agreements or protocols on emission limits beyond current mitigation policies and related sustainable development practices.

Conditions such as surface air temperature and sea ice area are linked in the IPCC climate models to GHG emissions by the physics of radiation processes. When CO_2 is added to the atmosphere, it has a long residence time and is only slowly removed by ocean absorption and other processes. Based on IPCC AR4 climate models, expected increases in global warming—defined as the change in global mean surface air temperature (SAT)—by the year 2100 depends strongly on the assumed emissions of CO_2 and other GHGs. By contrast, global warming projected out to about 2040–2050 will be primarily due to emissions that have already occurred and those that will occur over the next decade. Thus, conditions projected to mid-century are less sensitive to assumed future emission scenarios. Uncertainty in the amount of warming out to mid-century is primarily a function of model-to-model differences in the way that the physical processes are incorporated, and this uncertainty can be addressed in predicting ecological responses by incorporating the range in projections from different models.

Comprehensive Atmosphere-Ocean General Circulation Models (AOGCMs) are the major objective tools that scientists use to understand the complex interaction of processes that determine future climate change. The IPCC used the simulations from about 2 dozen AOGCMs developed by 17 international modeling centers as the basis for the AR4 (IPCC, 2007). The AOGCM results are archived as part of the Coupled Model Intercomparison Project-Phase 3 (CMIP3) at the Program for Climate Model Diagnosis and Intercomparison (PCMDI). The CMIP3 AOGCMs provide reliable projections, because they are built on well-known dynamical and physical principles, and they simulate quite well many large scale aspects of present-day conditions. However, the coarse resolution of most current climate models dictates careful application on small scales in heterogeneous regions.

There are three main contributors to divergence in AOGCM climate projections: Large natural variations, the range in emissions scenarios, and across-model differences. The first of these, variability from natural variation, can be incorporated by averaging the projections over decades, or, preferably, by forming ensemble averages from several runs of the same model. The second source of variation arises from the range in plausible emissions scenarios. As discussed above, the impacts of the scenarios are rather similar before mid-21st century. For the second half of the 21st century, however, and especially by 2100, the choice of the emission scenario becomes the major source of variation among climate projections and dominates over natural variability and model-to-model differences (IPCC, 2007). Because the current consensus is to treat all SRES emissions scenarios as equally likely, one option for representing the full range of variability in potential outcomes would be to project from any model under all of the six "marker" scenarios. This can be impractical in many situations, so the typical procedure for projecting impacts is to use an intermediate scenario, such as A1B or B2 to predict trends, or one intermediate and one extreme scenario (*e.g.,* A1B and A2) to represent a significant range of variability. The third primary source of variability results from differences among models in factors such as spatial resolution. This variation can be addressed and mitigated in part by using the ensemble means from multiple models.

There is no universal method for combining AOGCMs for climate projections, and there is no one best model. The approach taken by the BRT for selecting the models used to project future sea ice and snow conditions is summarized below.

Data and Analytical Methods

NMFS scientists have recognized that the physical basis for some of the primary threats faced by the species had been projected, under certain assumptions, through the end of the 21st century, and that these projections currently form the most widely accepted version of the best available data about future conditions. In our risk assessment for ringed seals, we therefore considered all the projections through the end of the 21st century to analyze the threats stemming from climate change.

The CMIP3 (IPCC) model simulations used in the BRT analyses were obtained from PCMDI on-line (PCMDI, 2010). The six IPCC models previously identified by Wang and Overland (2009) as performing satisfactorily at reproducing the magnitude of the observed seasonal cycle of sea ice extent in the Arctic under the A1B ("medium") and A2 ("high") emissions scenarios were used to project monthly sea ice concentrations in the Northern Hemisphere in March–July for each of the decadal periods 2025–2035, 2045–2055, and 2085–2095. Snow cover on sea ice in the Northern Hemisphere was forecasted using one of the six models, the Community Climate System Model, version 3 (CCSM3, National Center for Atmospheric Research) (under the A1B scenario), a model that is known for incorporating advanced sea ice physics, and for which snow data were available. To incorporate natural variability, this model was run seven times.

Climate models generally perform better on continental or larger scales, but because habitat changes are not uniform throughout the hemisphere, the six IPCC models used to project sea ice conditions in the Northern Hemisphere were further evaluated independently on their performance at reproducing the magnitude of the observed seasonal cycle of sea ice extent in 14 different regions throughout the ringed seal's range, including 12 regions for the Arctic ringed seal, one region for the Okhotsk ringed seal, and one region for the Baltic, Ladoga, and Saimaa ringed seals. For Arctic ringed seals, in three regions (Chukchi Sea, east Siberian Sea, and the central Arctic) six of the models simulated sea ice conditions in reasonable agreement with observations, in two regions (Beaufort and eastern Bering Seas) four models met the performance criteria, in two regions (western Bering and the Barents Seas) a single model (CCSM3) met the performance criteria, and in five regions (Baffin Bay, Hudson Bay, the Canadian Arctic Archipelago, east Greenland, and the Kara and Laptev Seas) none of the models performed satisfactorily. The models also did not meet the performance criteria for the Baltic region and the Sea of Okhotsk. Other less direct means of predicting regional ice cover, such as comparison of surface air temperature predictions with past climatology (Sea of Okhotsk), other existing analyses (Baltic Sea and Hudson Bay), and results from the hemispheric predictions (Baffin Bay, the Canadian Arctic Archipelago, and the East Greenland, Kara, and Laptev Seas), were used for regions where ice projections could not be obtained. For the Baltic Sea we reviewed the analysis of Jylha *et al.* (2008). They used seven regional climate models and found good agreement with observations for the 1902–2000 comparison period. For Hudson Bay we referred to the analysis of Joly *et al.* (2010). They used a regional sea ice-ocean model to investigate the response of sea ice and oceanic heat storage in the Hudson Bay system to a climate-warming scenario.

Regional predictions of snow cover were based on results from the hemispheric projections for Arctic and Okhotsk ringed seals, and on other existing analyses for Baltic, Ladoga, and Saimaa ringed seals. For the Baltic Sea we referred to the analysis of Jylha *et al.* (2008) noted above. For lakes Ladoga and Saimaa we considered the analysis of Saelthun *et al.* (1998; cited in Kuusisto, 2005). They used a modified hydrological model to analyze the effects of climate change on hydrological conditions and runoff in Finland and the Scandinavian Peninsula.

While our inferences about future regional ice and snow conditions are based upon the best available scientific and commercial data, we recognize that there are uncertainties associated with predictions based on hemispheric projections or indirect means. We also note that judging the timing of the onset of potential impacts to ringed seals is complicated by the coarse resolution of the IPCC models.

Northern Hemisphere Sea Ice and Snow Cover Predictions

Projections of Northern Hemisphere sea ice concentrations for November indicate a major delay in fall freeze-up by 2050 north of Alaska and in the Barents Sea. By 2090, the average sea ice concentration in November is below 50 percent in the Russian Arctic, and some models show a nearly ice free Arctic, except for the region of the Canadian Arctic Archipelago. In March and April, winter type conditions persist out to 2090. There is some reduction of sea ice by 2050 in the outer portions of the seasonal ice zones, but the sea ice south of Bering Strait, eastern Barents Sea, Baffin Bay, and the Kara and Laptev Seas remains substantial. The month of May shows diminishing sea ice cover at 2050 and 2090 in the Barents and Bering Seas and the Sea of Okhotsk. By the month of June, projections begin to show substantial changes as the century progresses. Current conditions occasionally exhibit a lack of sea ice near the Bering Strait during June. By 2050, however, this sea ice loss becomes a major feature, with open water continuing along the northern Alaskan coast in most models. Open water in June spreads to the East Siberian Shelf by 2090. The eastern Barents Sea experiences a reduction in sea ice between 2030 and 2050. The models indicate that sea ice in Baffin Bay will be affected very little until the end of the century.

In July, the Arctic Ocean shows a marked effect of global warming, with the sea ice retreating to a central core as the century progresses. The loss of multi-year sea ice over the last 5 years has provided independent evidence for this conclusion. By 2050, the continental shelves of the Beaufort, Chukchi, and East Siberian Seas are nearly ice free in July, with ice concentrations less than 20 percent in the ensemble mean projections. The Kara and Laptev Seas also show a reduction of sea ice in coastal regions by mid-century in most but not all models. The Canadian Arctic Archipelago and the adjacent Arctic Ocean north of Canada and Greenland, however, are predicted to become a refuge for sea ice through the end of the century. This conclusion is supported by typical Arctic wind patterns, which tend to blow onshore in this region. Indeed, this refuge region is why sea ice scientists use the phrase: A nearly sea ice free summer in the Arctic by mid-century.

As the Arctic Ocean warms and is covered by less ice, precipitation is expected to increase overall including during the winter months. Five climate models used by the *Arctic Climate Impact Assessment* forecasted an average increase in precipitation over the Arctic Ocean of 14 percent by the end of the century (Walsh *et al.*, 2005). The impact of increased winter precipitation on the depth of snow on sea ice, however, will be counteracted by delays in the formation of sea ice. Over most of the Arctic Ocean, snow cover reaches its maximal depth in May, but most of that accumulation takes place in the autumn (Sturm *et al.*, 2002). Snow depths reach 50 percent of the annual maximum by the end of October and 67 percent of their maximum by the end of November (Radionov et *al.*, 1997). Thus, delays of 1–2 months in the date of ice formation would result in substantial decreases in spring snow depths despite the potential for increased winter precipitation. Thinner ice will be more susceptible to deforming and producing pressure ridges and ice hummocks favoring snow drifts where depths exceed those on flat ice (Iacozaa and Barber, 1999; Strum *et al.*, 2006). However, as noted above, average snow depths of 20–30 cm or more are typically necessary to form drifts that are deep enough for ringed seal lair formation. As spring air temperatures continue to warm, snow melt will continue to come earlier in the year. The CCSM3 model forecasted that the accumulation of snow on sea ice will decrease by almost 50 percent by the end of this century, with more than half of that decline projected to occur by 2050. Although the forecasted snow accumulations in the seven integrations of the model varied, all predicted substantial declines over the century.

Regional Sea Ice and Snow Cover Predictions by Subspecies

Arctic ringed seal: In the East Siberian, Chukchi, Beaufort, Kara-Laptev, and Greenland Seas, as well as in Baffin Bay, and the Canadian Arctic Archipelago, little or no decline in ice extent is expected in April and May during the remainder of this century. In most of these areas, a moderate decline in sea ice is predicted during June within this century, while substantial declines in sea ice are projected in July and November after mid-century. The central Arctic (defined as regions north of 80° N. latitude) also shows declines in sea ice cover that are most apparent in July and November after 2050. For Hudson Bay, under a warmer climate scenario (for the years 2041–2070) Joly *et al.* (2010) projected a reduction in the sea ice season of 7–9 weeks, with substantial reductions in sea ice cover most apparent in July and during the first months of winter.

In the Bering Sea, April and May ice cover is projected to decline throughout this century, with substantial inter-annual variability forecasted in the eastern Bering Sea. The projection for May indicates that there will commonly be years with little or no ice in the western Bering Sea beyond mid-century. Very little ice has remained in the eastern Bering Sea in June since the mid-1970s. Sea ice cover in the Barents Sea in April and May is also projected to decline throughout this century, and in the months of June and July, ice is expected to disappear rapidly in the coming decades.

Based on model projections, April snow depths over much of the range of the Arctic ringed seal averaged 25–35 cm in the first decade of this century, consistent with on-ice measurements by Russian scientists (Weeks, 2010). By mid-century, a substantial decrease in areas with April snow depths of 25–35 cm is projected (much of it reduced to 20–15 cm). The deepest snow (25–30 cm) is forecasted to be found just north of Greenland, in the Canadian Arctic Archipelago, and in an area tapering north from there into the central Arctic Basin. Southerly regions, such as the Bering Sea and Barents Sea, are forecasted to have snow depths of 10 cm or less my mid-century. By the end of the century, April snow depths of 20–25 cm are forecasted only for a portion of the central Arctic, most of the Canadian Arctic Archipelago, and a few small, isolated areas in a few other regions. Areas with 25–30 cm of snow are projected to be limited to a few small isolated pockets in the Canadian Arctic by 2090–2099.

Okhotsk ringed seal: As noted above, none of the IPCC models performed satisfactorily at projecting sea ice for the Sea of Okhotsk, and so projected surface air temperatures were examined relative to current climate conditions as a proxy to predict sea ice extent and duration. Based on that analysis, ice is expected to persist in the Sea of Okhotsk in March during the remainder of this century, although ice may be limited to the northern region in most years after mid-century. Conditions for sea ice in April are likely to be limited to the far northern reaches of the Sea of Okhotsk or non-existent by 2100. Little to no sea ice is expected in May by mid-century. Average snow depth projections for April show depths of 15–20 cm only in the northern portions of the Sea of Okhotsk in the past 10 years and nowhere in that sea by mid-century. By the end of the century average snow depths are projected to be 10 cm or less even in the northern Sea of Okhotsk.

Baltic, Ladoga, and Saimaa ringed seals: For the Baltic Sea, the analysis of regional climate models by Jylhä *et al.* (2008) was considered. They used seven regional climate models and found good agreement with observations for the 1902–2000 comparison period. For the forecast period 2071–2100, one model predicted a change to mostly mild conditions, while the remaining models predicted unprecedentedly mild conditions. They noted that their estimates for a warming climate were in agreement with other studies that found unprecedentedly mild ice extent conditions in the majority of years after about 2030. The model we used to project snow depths (CCSM3) did not provide adequate resolution for the Baltic Sea. The climate models analyzed by Jylhä *et al.* (2008), however, forecasted decreases of 45–60 days in duration of snow cover by the end of the century in the northern Baltic Sea region. The shortened seasonal snow cover would result primarily from earlier spring melts, but also from delayed onset of snow cover. Depth of snow is forecasted to decrease 50–70 percent in the region over the same period. The depth of snow also will be decreased by mid-winter thaws and rain events. Simulations of the snow cover indicated that an increasing proportion of the snow pack will consist of icy or wet snow.

Ice cover has diminished about 12 percent over the past 50 years in Lake Ladoga. Although we are not aware of any ice forecasts specific to lakes Ladoga and Saimaa, the simulations of future climate reported by Jylhä *et al.* (2008) suggest warming winters with reduced ice and snow cover. Snow cover in Finland and the Scandinavian Peninsula is projected to decrease 10–30 percent before mid-century and 50–90 percent by 2100 (Saelthun *et al.,* 1998, *cited in* Kuusisto, 2005).

Effects of Changes in Ice and Snow Cover on Ringed Seals

Ringed seals are vulnerable to habitat loss from changes in the extent or concentration of sea ice because they depend on this habitat for pupping, nursing, molting, and resting. The ringed seal's broad distribution, ability to undertake long movements, diverse diet, and association with widely varying ice conditions suggest resilience in the face of environmental variability. However, the ringed seal's long generation time and ability to produce only a single pup each year may limit its ability to respond to environmental challenges such as the diminishing ice and snow cover projected in a matter of decades. Ringed seals apparently thrived during glacial maxima and survived warm interglacial periods. How they survived the latter periods or in what numbers is not known. Declines in sea ice cover in recent decades are more extensive and rapid than any known for at least the last few thousand years (Polyak *et al.,* 2010).

Ringed seals create birth lairs in areas of accumulated snow on stable ice including the shore-fast ice over continental shelves along Arctic coasts, bays, and inter-island channels. While some authors suggest that shorefast ice is the preferred pupping habitat of ringed seals due to its stability throughout the pupping and nursing period, others have documented ringed seal pupping on drifting pack ice both nearshore and offshore. Both of these habitats can be affected by earlier warming and break-up in the spring, which shortens the length of time pups have to grow and mature in a protected setting. Harwood *et al.* (2000) reported that an early spring break-up negatively impacted the growth, condition, and apparent survival of unweaned ringed seal pups. Early break-up was believed to have interrupted lactation in adult females, which in turn, negatively affected the condition and growth of pups.

Unusually heavy ice has also been implicated in shifting distribution, high winter mortality, and reduced productivity of ringed seals. It has been suggested that reduced ice thickness associated with warming in some areas could lead to increased biological productivity that might benefit ringed seals, at least in the short-term. However, any transitory and localized benefits of reduced ice thickness are expected to be outweighed by the negative effects of increased thermoregulatory costs and vulnerability of seal pups to predation associated with earlier ice break-up and reduced snow cover.

Ringed seals, especially the newborn, depend on snow cover for protection from cold temperatures and predators. Occupation of subnivean lairs is especially critical when pups are nursed in late March–June. Ferguson *et al.* (2005) attributed low ringed seal recruitment in western Hudson Bay to decreased snow depth in April and May. Reduced snowfall results in less snow drift accumulation next to pressure ridges, and pups in lairs with thin snow cover are more vulnerable to predation than pups in lairs with thick snow cover (Hammill and Smith, 1989; Ferguson *et al.,* 2005). When snow cover is insufficient, pups can also freeze in their lairs as documented in 1974 when roofs of lairs in the White Sea were only 5–10 cm thick (Lukin and Potelov, 1978). Similarly, pup mortality from freezing and polar bear (*Ursus maritimus*) predation increased when unusually warm spring temperatures caused early melting near Baffin Island in the late 1970s (Smith and Hammill, 1980; Stirling and Smith, 2004). Prematurely exposed pups also are vulnerable to predation by wolves (*Canis lupus*) and foxes (*Alopex lagopus* and *Vulpes vulpes)*—as documented during an early snow melt in the White Sea in 1977 (Lukin, 1980)—and by gulls (Laridae) and ravens (*Corvus corax*) as documented in the Barents Sea (Gjertz and Lydersen, 1983; Lydersen and Gjertz, 1987; Lydersen *et al.,* 1987; Lydersen and Smith, 1989; Lydersen and Rig, 1990; Lydersen, 1998). When lack of snow cover has forced birthing to occur in the open, some studies have reported that nearly 100 percent of pups died from predation (Kumlien, 1879; Lydersen *et al.,* 1987; Lydersen and Smith, 1989; Smith *et al.,* 1991; Smith and Lydersen, 1991). The high fidelity to birthing sites exhibited by ringed seals also makes them more susceptible to localized degradation of snow cover (Kelly *et al.,* 2010).

Increased rain-on-snow events during the late winter also negatively impact ringed seal recruitment by damaging or eliminating snow-covered birth lairs, increasing exposure and the risk of hypothermia, and facilitating predation by polar bears and other predators. Stirling and Smith (2004) documented the collapse of subnivean lairs during unseasonal rains near southeastern Baffin Island and the subsequent exposure of ringed seals to hypothermia. They surmised that most of the pups that survived exposure to cold were eventually killed by polar bears, Arctic foxes, or possibly gulls. Stirling and Smith (2004) postulated that, should early season rain become regular and widespread in the future, mortality of ringed seal pups will increase, especially in more southerly parts of their range.

Potential Impacts of Projected Ice and Snow Cover Changes on Ringed Seals

As discussed above, ringed seals divide their time between foraging in the water, and reproducing and molting out of the water, where they are especially vulnerable to predation. Females must nurse their pups for 1–2 months, and the small pups are vulnerable to cold temperatures and avian and mammalian predators on the ice, especially during the nursing period. Thus, a specific habitat requirement for ringed seals is adequate snow for the occupation of subnivean lairs, especially in spring when pups are born and nursed.

Northern Hemisphere snow cover has declined in recent decades and spring melt times have become earlier (ACIA, 2005). In most areas of the Arctic Ocean, snow melt advanced 1–6 weeks from 1979–2007. Throughout most of the ringed seal's range, snow melt occurred within a couple of weeks of weaning. Thus, in the past 3 decades, snow melts in many areas have been pre-dating weaning. Shifts in the timing of reproduction by other pinnipeds in response to changes in food availability have been documented. However, the ability of ringed seals to adapt to earlier snow melts by advancing the timing of reproduction will be limited by snow depths. As discussed above, over most of the Arctic Ocean, snow cover reaches its maximal depth in May, but most of that accumulation takes place in autumn. It is therefore unlikely that snow depths for birth lair formation would be improved earlier in the spring. In addition, the pace at which snow melts are advancing is rapid relative to the generation time of ringed seals, further challenging the potential for an adaptive response.

Snow drifted to 45 cm or more is needed for excavation and maintenance of simple lairs, and birth lairs require depths of 50 to 65 cm or more (Smith and Stirling, 1975; Lydersen and Gjertz, 1986; Kelly, 1988; Furgal *et al.,* 1996; Lydersen, 1998; Lukin *et al.,* 2006). Such drifts typically only occur where average snow depths are at least 20–30 cm (on flat ice) and where drifting has taken place along pressure ridges or ice hummocks (Hammill and Smith, 1991; Lydersen and Ryg, 1991; Smith and Lydersen, 1991; Ferguson *et al.,* 2005). We therefore considered areas forecasted to have less than 20 cm average snow depth in April to be inadequate for the formation of ringed seal birth lairs.

Arctic ringed seal: The depth and duration of snow cover is projected to decrease throughout the range of Arctic ringed seals within this century. Whether ringed seals will continue to move north with retreating ice over the deeper, less productive Arctic Basin waters and whether forage species that they prey on will also move north is uncertain (see additional discussion below). Initially, impacts may be somewhat ameliorated if the subspecies' range retracts northward with its sea ice habitats. By 2100, however, April snow cover is forecasted to become inadequate for the formation and occupation of ringed seal birth lairs over much of the subspecies' range. The projected decreases in ice and, especially, snow cover are expected to lead to increased pup mortality from premature weaning, hypothermia, and predation.

Okhotsk ringed seal: Based on temperature proxies, ice is expected to persist in the Sea of Okhotsk through the onset of pupping in March through the end of this century. Ice suitable for pupping and nursing likely will be limited to the northernmost portions of the sea, as ice is likely to be limited to that region in April by the end of the century. The snow cover projections suggest that snow depths may already be inadequate for lairs in the Sea of Okhotsk, and most Okhotsk ringed seals apparently now give birth on pack ice in the lee of ice hummocks. However, it appears unlikely that this behavior could mitigate the threats posed by the expected decreases in sea ice. The Sea of Okhotsk is bounded to the north by land, which will limit the ability of Okhotsk ringed seals to respond to deteriorating sea ice and snow conditions by shifting their range northward. Some Okhotsk ringed seals have been reported on terrestrial resting sites during the ice-free season, but these sites provide inferior pupping and nursing habitat. Within the foreseeable future, the projected decreases in sea ice habitat suitable for pupping, nursing, and molting in the Sea of Okhotsk are expected to lead to reduced abundance and productivity.

Baltic, Ladoga, and Saimaa ringed seals: The considerable reductions in ice extent forecasted by mid-century, coupled with deteriorating snow conditions, are expected to substantially alter the habitats of Baltic ringed seals. Climate forecasts for northern Europe also suggest reduced ice and snow cover for lakes Ladoga and Saimaa within this century. These habitat changes are expected to lead to decreased survival of pups (due to hypothermia, predation, and premature weaning) and considerable declines in the abundance of these subspecies in the foreseeable future. Recent (2005–2007) high rates of pup mortality in Saimaa ringed seals (more than double those in 1980–2000) have been attributed to insufficient snow for lair formation and occupation. Given the small population size of the Saimaa ringed seal, this subspecies is at particular risk from the projected habitat changes. Although Baltic, Ladoga, and Saimaa ringed seals have been reported using terrestrial resting sites when ice is absent, these sites provide inferior pupping and nursing habitat. As sea ice and snow conditions deteriorate, Baltic ringed seals will be limited in their ability to respond by shifting their range northward because the Baltic Sea is bounded to the north by land; and the landlocked seal populations in lakes Ladoga and Saimaa will be unable to shift their ranges.

Impacts on Ringed Seals Related to Changes in Ocean Conditions

Ocean acidification is an ongoing process whereby chemical reactions occur that reduce both seawater pH and the concentration of carbonate ions when CO_2 is absorbed by seawater. Results from global ocean CO_2 surveys over the past two decades have shown that ocean acidification is a predictable consequence of rising atmospheric CO_2 levels. The process of ocean acidification has long been recognized, but the ecological implications of such chemical changes have only recently begun to be appreciated. The waters of the Arctic and adjacent seas are among the most vulnerable to ocean acidification. Seawater chemistry measurements in the Baltic Sea suggest that this sea is equally vulnerable to acidification as the Arctic. We are not aware of specific acidification studies in lakes Ladoga and Saimaa. Fresh water systems, however, are much less buffered than ocean waters and are likely to experience even larger changes in acidification levels than marine systems. The most likely impact of ocean acidification on ringed seals will be at lower tropic levels on which the species' prey depends. Cascading effects are likely both in the marine and freshwater environments. Our limited understanding of planktonic and benthic calcifiers in the Arctic (*e.g.,* even their baseline geographical distributions) means that future changes will be difficult to detect and evaluate.

Warming water temperatures and decreasing ice likely will result in a contraction in the range of Arctic cod, a primary prey of ringed seals. The same changes will lead to colonization of the Arctic Ocean by more southerly species, including potential prey, predators, and competitors. The outcome of new competitive interactions cannot be specified, but as sea ice specialists, ringed seals may be at a disadvantage in competition with generalists in an ice-diminished Arctic. Prey biomass may be reduced as a consequence of increased freshwater input and loss of sea ice habitat for amphipods and copepods. On the other hand, overall pelagic productivity may increase.

Summary of Factor A

Climate models consistently project overall diminishing sea ice and snow cover at least through the current century, with regional variation in the timing and severity of those losses.

Increasing atmospheric concentrations of greenhouse gases, including CO_2, will drive climate warming and increase acidification of the ringed seal's ocean and lake habitats. The impact of ocean warming and acidification on ringed seals is expected to be primarily through changes in community composition. However, the nature and timing of these changes is uncertain.

Diminishing ice and snow cover are the greatest challenges to persistence of all of the ringed seal subspecies. While winter precipitation is forecasted to increase in a warming Arctic, the duration of ice cover is projected to be substantially reduced, and the net effect will be lower snow accumulation on the ice. Within the century, snow cover adequate for the formation and occupation of birth lairs is forecasted only for parts of the Canadian Arctic Archipelago, a portion of the central Arctic, and a few small isolated areas in a few other regions. Without the protection of lairs, ringed seals, especially newborn, are vulnerable to freezing and predation. We conclude that the ongoing and projected changes in sea ice habitat pose significant threats to the persistence of each of the five subspecies of the ringed seal.

B. Overutilization for Commercial, Subsistence, Recreational, Scientific, or Educational Purposes

Ringed seals have been hunted by humans for millennia and remain a fundamental subsistence resource for many northern coastal communities today. Ringed seals were also harvested commercially in large numbers during the 20th century, which led to the depletion of their stocks in many parts of their range. Commercial harvests in the Sea of Okhotsk and predator-control harvests in the Baltic Sea, Lake Ladoga, and Lake Saimaa caused population declines in the past, but have since been restricted. Although subsistence harvest of the Arctic subspecies is currently substantial in some regions, harvest levels appear to be sustainable. Climate change is likely to alter patterns of subsistence harvest of marine mammals by changing their local densities or distributions in relation to hunting communities. Predictions of the impacts of climate change on subsistence hunting pressure are constrained by the complexity of interacting variables and imprecision of climate and sea ice models at small scales. Accurate information on both harvest levels and species' abundance and trends will be needed in order to assess the impacts of hunting as well as to respond appropriately to potential climate-induced changes in populations. Recreational, scientific, and educational uses of ringed seals are minimal and are not expected to increase significantly in the foreseeable future. We conclude that overutilization does not currently threaten any of the five subspecies of the ringed seal.

C. Diseases, Parasites, and Predation

Ringed seals have co-evolved with numerous parasites and diseases, and those relationships are presumed to be stable. Evidence of distemper virus, for example, has been reported in Arctic ringed seals, but there is no evidence of impacts to ringed seal abundance or productivity. Abiotic and biotic changes to ringed seal habitat potentially could lead to exposure to new pathogens or new levels of virulence, but we consider the potential threats to ringed seals as low.

Ringed seals are most commonly preyed upon by Arctic foxes and polar bears, and less commonly by other terrestrial carnivores, sharks, and killer whales (*Orcinus orca*). When ringed seal pups are forced out of subnivean lairs prematurely because of low snow accumulation and/or early melts, gulls and ravens also successfully prey on them. Avian predation is facilitated not only by lack of sufficient snow cover but also by conditions favoring influxes of birds. Lydersen and Smith (1989) pointed out that the small size of newborn ringed seals, coupled with their prolonged nursing period, make them vulnerable to predation by birds and likely sets a southern limit to their distribution.

Ringed seals and bearded seals are the primary prey of polar bears. Polar bear predation on ringed seals is most successful in moving offshore ice, often along floe edges and rarely in ice-free waters. Polar bears also successfully hunt ringed seals on stable shorefast ice by catching animals when they surface to breathe and when they occupy lairs. Hammill and Smith (1991) further noted that polar bear predation on ringed seal pups increased 4-fold in a year when average snow depths in their study area decreased from 23 to 10 cm. They concluded that while a high proportion of pups born each year are lost to predation, "without the protection provided by the subnivean lair, pup mortality would be much higher."

The distribution of Arctic foxes broadly overlaps with that of Arctic ringed seals. Arctic foxes prey on newborn seals by tunneling into the birth lairs. The range of the red fox overlaps with that of the Okhotsk, Baltic, Saimaa, and Ladoga subspecies, and on rare occasion red foxes also prey on newborn ringed seals in lairs.

High rates of predation on ringed seal pups have been associated with anomalous weather events that caused subnivean lairs to collapse or melt before pups were weaned. Thus, declining snow depths and duration of snow cover during the period when ringed seal pups are born and nursed can be expected to lead to increased predation on ringed seal pups. We conclude that the threat posed to ringed seals by predation is currently moderate, but predation risk is expected to increase as snow and sea ice conditions change with a warming climate.

D. Inadequacy of Existing Regulatory Mechanisms

A primary concern about the conservation status of the ringed seal stems from the likelihood that its sea ice habitat has been modified by the warming climate and, more so, that the scientific consensus projections are for continued and perhaps accelerated warming in the foreseeable future. A second major concern, related by the common driver of CO_2 emissions, is the modification of habitat by ocean acidification, which may alter prey populations and other important aspects of the marine ecosystem. There are currently no effective mechanisms to regulate GHG emissions, which are contributing to global climate change and associated modifications to ringed seal habitat. The risk posed to ringed seals due to the lack of mechanisms to regulate GHG emissions is directly correlated to the risk posed by the effects of these emissions. The projections we used to assess risks from GHG emissions were based on the assumption that no regulation will take place (the underlying IPPC emissions scenarios were all "non-mitigated" scenarios). Therefore, the lack of mechanisms to regulate GHG emissions is already included in our risk assessment. We thus recognize that the lack of effective mechanisms to regulate global GHG emissions is contributing to the risks posed to ringed seals by these emissions.

Drowning in fishing gear has been reported as the most common cause of death reported for Saimaa ringed seals. Although there have been seasonal fishing restrictions instituted in some parts of Lake Saimaa, these are apparently insufficient, as annual loss of seals has continued. We therefore conclude that the inadequacy of existing mechanisms to regulate bycatch of Saimma ringed seals is contributing to its endangered status.

E. Other Natural or Manmade Factors Affecting the Species' Continued Existence Pollution and Contaminants

Contaminants research on ringed seals is very extensive and has been conducted in most parts of the species' range (with the exception of the Sea of Okhotsk), particularly throughout the Arctic environment where ringed seals are an important diet item in coastal human communities. Pollutants such as organochlorine (OC) compounds and heavy metals have been found in all of the subspecies of ringed seal (with the exception of the Okhotsk ringed seal). The variety, sources, and transport mechanisms of contaminants vary across ringed seal ecosystems. Statistical analysis of OC compounds in marine mammals has shown that, for most OCs, the European Arctic is more contaminated than the Canadian and U.S. Arctic.

Reduced productivity in the Baltic ringed seal in recent decades resulted from impaired fertility that was associated with pollutants. High levels of DDT (dichloro-diphenyl-trichloroethane) and PCBs (polychlorinated biphenyls) were found in Baltic (Bothnian Bay) ringed seals in the 1960s and 1970s, and PCB levels were correlated with reproductive failure. More recently, PFOSs (perfluorooctane sulfonate; a perfluorinated contaminant or PFC) were reported as 15 times greater in Baltic ringed seals than in Arctic ringed seals.

Mercury levels detected in Saimaa ringed seals were higher than those reported for the Baltic Sea and Arctic Ocean. It has been suggested that high mercury levels may have contributed to the Saimaa ringed seal's population decline in the 1960s and 1970s. The high level of mercury in the seal's prey and shortage of selenium would reduce the seal's capacity for metabolic detoxification. The major source of mercury in Lake Saimaa has been noted as the pulp industry.

Present and future impacts of contaminants on ringed seal populations should remain a high priority issue. Climate change has the potential to increase the transport of pollutants from lower latitudes to the Arctic, highlighting the importance of continued monitoring of ringed seal contaminant levels.

Oil and Gas Activities

Extensive oil and gas reserves coupled with rising global demand make it very likely that oil and gas activity will increase throughout the U.S. Arctic and internationally in the future. Climate change is expected to enhance marine access to offshore oil and gas reserves by reducing sea ice extent, thickness, and seasonal duration, thereby improving ship access to these resources around the margins of the Arctic Basin. Oil and gas exploration, development, and production activities include, but are not limited to: Seismic surveys; exploratory, delineation, and production drilling operations; construction of artificial islands, causeways, ice roads, shore-based facilities, and pipelines; and vessel and aircraft operations. These activities have the potential to impact ringed seals primarily through noise, physical disturbance, and pollution, particularly in the event of a large oil spill or blowout.

Within the range of the Arctic ringed seal, offshore oil and gas exploration and production activities are currently underway in the United States, Canada, Greenland, Norway, and Russia. In the United States, oil and gas activities have been conducted off the coast of Alaska since the 1970s, with most of the activity occurring in the Beaufort Sea. Although five exploratory wells have been drilled in the past, no oil fields have been developed or brought into production in the Chukchi Sea to date. In December 2009, an exploration plan was approved by the Bureau of Ocean Energy Management, Regulation, and Enforcement (formerly the Minerals Management Service) for drilling at five potential sites within three prospects in the Chukchi Sea in 2010. These plans have been put on hold until at least 2011 pending further review following the Deepwater Horizon blowout in the Gulf of Mexico. There are no offshore oil or gas fields currently in development or production in the Bering Sea.

Of all the oil and gas produced in the Arctic today, about 80 percent of the oil and 99 percent of the gas comes from the Russian Arctic (AMAP, 2007). With over 75 percent of known Arctic oil, over 90 percent of known Arctic gas, and vast estimates of undiscovered oil and gas reserves, Russia will continue to be the dominant producer of Arctic oil and gas in the future (AMAP, 2007). Oil and gas developments in the Kara and Barents Seas began in 1992, and large-scale production activities were initiated during 1998–2000. Oil and gas production activities are expected to grow in the western Siberian provinces and Kara and Barents Seas in the future. Recently there has also been renewed interest in the Russian Chukchi Sea, as new evidence emerges to support the notion that the region may contain world-class oil and gas reserves. In the Sea of Okhotsk, oil and natural gas operations are active off the northeastern coast of Sakhalin Island, and future developments are planned in the western Kamchatka and Magadan regions.

A major project underway in the Baltic Sea is the Nord Stream 1,200-km gas line, which will be the longest subsea natural gas pipeline in the world. Concerns have been expressed about the potential disturbance of World War II landmines and chemical toxins in the sediment during construction. There are also concerns about potential leaks and spills from the pipeline and impacts on the Baltic Sea marine environment once the pipeline is operational. Circulation of waters in the Baltic Sea is limited and any contaminants may not be flushed efficiently.

Large oil spills or blowouts are considered to be the greatest threat of oil and gas exploration activities in the marine environment. In contrast to spills on land, large spills at sea are difficult to contain and may spread over hundreds or thousands of kilometers. Responding to a spill in the Arctic environment would be particularly challenging. Reaching a spill site and responding effectively would be especially difficult, if not impossible, in winter when weather can be severe and daylight extremely limited. Oil spills under ice or in ice-covered waters are the most challenging to deal with, simply because they cannot be contained or recovered effectively with current technology. The difficulties experienced in stopping and containing the oil blowout at the Deepwater Horizon well in the Gulf of Mexico, where environmental conditions and response preparedness are comparatively good, point toward even greater challenges of attempting a similar feat in a much more environmentally severe and geographically remote location.

Although planning, management, and use of best practices can help reduce risks and impacts, the history of oil and gas activities, including recent events, indicates that accidents cannot be eliminated. Tanker spills, pipeline leaks, and oil blowouts are likely to occur in the future, even under the most stringent regulatory and safety systems. In the Sea of Okhotsk, an accident at an oil production complex resulted in a large (3.5-ton) spill in 1999, and in winter 2009, an unknown quantity of oil associated with a tanker fouled 3 km of coastline and hundreds of birds in Aniva Bay. To date, there have been no large spills in the Arctic marine environment from oil and gas activities.

Researchers have suggested that pups of ice-associated seals may be particularly vulnerable to fouling of their dense lanugo coats. Adults, juveniles, and weaned young of the year rely on blubber for insulation, so effects on their thermoregulation are expected to be minimal. A variety of other acute effects of oil exposure have been shown to reduce seals' health and possibly survival. Direct ingestion of oil, ingestion of contaminated prey, or inhalation of hydrocarbon vapors can cause serious health effects including death.

It is important to evaluate the effects of anthropogenic perturbations, such as oil spills, in the context of historical data. Without historical data on distribution and abundance, it is difficult to predict the impacts of an oil spill on ringed seals. Population monitoring studies implemented in areas where significant industrial activities are likely to occur would allow for comparison of future impacts with historical patterns, and thus to determine the magnitude of potential effects.

Commercial Fisheries Interactions and Bycatch

Commercial fisheries may impact ringed seals through direct interactions (i.e., incidental take or bycatch) and indirectly through competition for prey resources and other impacts on prey populations. Estimates of Arctic ringed seal bycatch could only be found for commercial fisheries that operate in Alaskan waters. Based on data from 2002–2006, there has been an annual average of 0.46 mortalities of Arctic ringed seals incidental to commercial fishing operations. NAMMCO (2002) stated that in the North Atlantic region Arctic ringed seals are seldom caught in fishing gear because their distribution does not coincide with intensive fisheries in most areas. No information could be found regarding ringed seal bycatch levels in the Sea of Okhotsk; however, given the intensive levels of commercial fishing that occur in this sea, bycatch of ringed seals likely occurs on some level there.

Drowning in fishing gear has been reported as one of the most significant mortality factors for seals in the Baltic Sea, especially for young seals, which are prone to getting trapped in fishing nets. There are no reliable estimates of seal bycatch in this sea, and existing estimates are known to be low in many areas, making risk assessment difficult. Based on monitoring of 5 percent of the commercial fishing effort in the Swedish coastal fisheries, bycatch of Baltic ringed seals was estimated at 50 seals in 2004. In Finland, it was estimated that about 70 Baltic ringed seals were caught by fishing gear annually during the period 1997–1999. There are no estimates of seal bycatch from Lithuanian, Estonian, or Russian waters of the Baltic. It has been suggested that decreases in the use of the most harmful types of nets (*i.e.*, gillnets and unprotected trap nets), along with the development of seal-proof fishing gear, may have resulted in a decline in Baltic ringed seal bycatch (Ministry of Agriculture and Forestry, 2007).

It has been estimated that 200–400 Ladoga ringed seals died annually in fishing gear during the late 1980s and early 1990s. Fishing patterns have reportedly changed since then due to changes in the economic market. As of the late 1990s, fishing was not regarded to be a threat to Ladoga ringed seal populations, but it was suggested that it could become so should market conditions improve (Sipilä and Hyvärinen, 1998). Based on interviews with fishermen in Lake Ladoga, Verevkin *et al.* (2006) reported that at least 483 Ladoga ringed seals were killed in fishing gear in 2003, even though official records only recorded 60 cases of bycatch. These figures from 2003 suggest that bycatch mortality is likely to be a continuing conservation concern for Ladoga ringed seals.

Small-scale fishing was thought to be the most serious threat to ringed seals in Lake Saimaa (Sipilä and Hyvärinen, 1998). More than half of the Saimaa seal carcasses that were examined for the period 1977–2000 were determined to have died from drowning in fishing gear, making this the most common cause of death for Saimaa ringed seals. Season and gear restrictions have been implemented in some parts of the lake to reduce bycatch. However, during the late 1990s, 1–3 adult ringed seals were lost annually from drowning in fishing gear (Sipilä and Hyvärinen, 1998), and bycatch mortalities have been reported since then, indicating that bycatch mortality remains a significant conservation concern.

For indirect interactions, we note that commercial fisheries target a number of known ringed seal prey species such as walleye pollock (*Theragra chalcogramma*), Pacific cod, herring (*Clupea* sp.), and capelin. These fisheries may affect ringed seals indirectly through reductions in prey biomass and through other fishing mediated changes in ringed seal prey species.

Shipping

The extraordinary reduction in Arctic sea ice that has occurred in recent years has renewed interest in using the Arctic Ocean as a potential waterway for coastal, regional, and trans-Arctic marine operations. Climate models predict that the warming trend in the Arctic will accelerate, causing the ice to begin melting earlier in the spring and resume freezing later in the fall, resulting in an expansion of potential shipping routes and lengthening the potential navigation season.

The most significant risk posed by shipping activities in the Arctic is the accidental or illegal discharge of oil or other toxic substances carried by ships, due to their immediate and potentially long-term effects on individual animals, populations, food webs, and the environment. Shipping activities can also affect ringed seals directly through noise and physical disturbance (*e.g.,* icebreaking vessels), as well as indirectly through ship emissions and possible effects of introduction of exotic species on the lower trophic levels of ringed seal food webs.

Current and future shipping activities in the Arctic pose varying levels of threats to ringed seals depending on the type and intensity of the shipping activity and its degree of spatial and temporal overlap with ringed seal habitats. These factors are inherently difficult to know or predict, making threat assessment highly uncertain. However, given what is currently known about ringed seal populations and shipping activity in the Arctic, some general assessments can be made. Arctic ringed seal densities are variable and depend on many factors; however, they are often reported to be widely distributed in relatively low densities and rarely congregate in large numbers. This may help mitigate the risks of more localized shipping threats (*e.g.,* oil spills or physical disturbance), since the impacts from such events would be less likely to affect large numbers of seals. The fact that nearly all shipping activity in the Arctic (with the exception of icebreaking) purposefully avoids areas of ice and primarily occurs during the ice-free or low-ice seasons also helps to mitigate the risks associated with shipping to ringed seals, since they are closely associated with ice at nearly all times of the year. Icebreakers pose special risks to ringed seals because they are capable of operating year-round in all but the heaviest ice conditions and are often used to escort other types of vessels (*e.g.,* tankers and bulk carriers) through ice-covered areas. If icebreaking activities increase in the Arctic in the future as expected, the likelihood of negative impacts (e.g., oil spills, pollution, noise, disturbance, and habitat alteration) occurring in ice-covered areas where ringed seals occur will likely also increase.

Though few details are available regarding actual shipping levels in the Sea of Okhotsk, resource development over the last decade stands out as a likely significant contributor. It is clear that relatively high levels of shipping are needed to support present oil and gas operations. In addition, large-scale commercial fishing occurs in many parts of the sea. Winter shipping activities in the southern Sea of Okhotsk are expected to increase considerably as oil and gas production pushes the development and use of new classes of icebreaking ships, thereby increasing the potential for shipping accidents and oil spills in the ice-covered regions of this sea.

The Baltic Sea is one of the most heavily trafficked shipping areas in the world, with more than 2,000 large ships (including about 200 oil tankers) sailing on its waters on an average day. Additionally, ferry lines, fishing boats, and cruise ships frequent the Baltic Sea. Both the number and size of ships (especially oil tankers) have grown in recent years, and the amount of oil transported in the Baltic (especially from the Gulf of Finland) has increased significantly since 2000. The risk of oil exposure for seals living in the Baltic Sea is considered to be greatest in the Gulf of Finland, where oil shipping routes pass through ringed seal pupping areas as well as close to rocks and islets where seals sometimes haul out. Icebreaking during the winter is considered to be the most significant marine traffic factor for seals in the Baltic Sea, especially in the Bothnian Bay.

Lakes Ladoga and Saimaa are connected to the Baltic Sea and other bodies of water via a network of rivers and canals and are used as waterways to transport people, resources, and cargo throughout the Baltic region. However, reviews of the biology and conservation of Ladoga and Samiaa ringed seals have not identified shipping-related activities (other than accidental bycatch in fishing gear) as being important risks to the conservation status of these subspecies.

The threats posed from shipping activity in the Sea of Okhotsk, Baltic Sea, and lakes Ladoga and Saimaa are largely the same as they are for the Arctic. Two obvious but important distinctions between these regions and the Arctic are that these bodies of water are geographically smaller and more confined than many areas where the Arctic subspecies lives, and they contain much smaller populations of ringed seals. Therefore, shipping impacts and ringed seals are more likely to overlap spatially in these regions, and a single accident (e.g., a large oil spill) could potentially impact these smaller populations severely. However, the lack of specific information on actual threats and impacts (now and in the future) makes threat assessment in these regions similarly uncertain. More information is needed in order to adequately assess the risks of shipping to ringed seals.

Summary of Factor E

We find that the threats posed by pollutants, oil and gas activities, fisheries, and shipping, do not individually or cumulatively raise concern about them placing the Arctic or Okhotsk subspecies of ringed seals at risk of becoming endangered. We recognize, however, that the significance of these threats would increase for populations diminished by the effects of climate change or other threats.

Reduced productivity in the Baltic Sea ringed seal in recent decades resulted from impaired fertility that was associated with pollutants. We do not have any information to conclude that there are currently population-level effects on Baltic ringed seals from contaminant exposure. We find that the threats posed by pollutants, petroleum development, commercial fisheries, and increased ship traffic do not individually or cumulatively pose a significant risk to the persistence of the Baltic ringed seal throughout all or a significant portion of this subspecies' range. We recognize, however, that the significance of these threats would increase for populations diminished by the effects of climate change or other threats. We also note that, particularly given the elevated contaminant load in the Baltic Sea, continued efforts are necessary to ensure that population-level effects from contaminant exposure do not recur in Baltic ringed seals in the future.

Drowning of seals in fishing gear and disturbance by human activities are conservation concerns for ringed seals in lakes Ladoga and Saimaa and could exacerbate the effects of climate change on these seal populations. Drowning in fishing gear is also one of the most significant sources of mortality for ringed seals in the Baltic Sea. We currently do not have any data to conclude that these threats are having population-level effects on Ladoga or Baltic ringed seals. However, bycatch mortality in Lake Ladoga particularly warrants additional investigation, as does consideration of ways to minimize seal entanglement in fishing gear. Given the very low numbers of the Saimaa ringed seal, we consider the risk posed to this subspecies from mortality incidental to fishing activities to be a significant factor in our classification of the Saimaa ringed seal as endangered.

Analysis of Demographic Risks

Threats to a species' long-term persistence are manifested demographically as risks to its abundance; productivity; spatial structure and connectivity; and genetic and ecological diversity. These demographic risks provide the most direct indices or proxies of extinction risk. A species at very low levels of abundance and with few populations will be less tolerant to environmental variation, catastrophic events, genetic processes, demographic stochasticity, ecological interactions, and other processes. A rate of productivity that is unstable or declining over a long period of time can indicate poor resiliency to future environmental change. A species that is not widely distributed across a variety of well-connected habitats is at increased risk of extinction due to environmental perturbations, including catastrophic events. A species that has lost locally adapted genetic and ecological diversity may lack the raw resources necessary to exploit a wide array of environments and endure short- and long-term environmental changes.

The key factors limiting the viability of all five ringed seal subspecies are the forecasted reductions in ice extent and, in particular, depths and duration of snow cover on ice. Early snow melts already are evident in much of the species' range. Increasingly late ice formation in autumn is forecasted, contributing to expectations of substantial decreases in snow accumulation. The ringed seal's specific requirement for habitats with adequate spring snow cover is manifested in the pups' low tolerance for exposure to wet, cold conditions and their vulnerability to predation. Premature failure of the snow cover has caused high mortality due to freezing and predation. Climate warming will result in increasingly early snow melts, exposing vulnerable ringed seal pups to predators and hypothermia.

The BRT considered the current risks to the persistence of Arctic, Okhotsk, Baltic, and Ladoga ringed seals as low to moderate. Given the low population size (less than 300 seals) of the Saimaa ringed seal, the present risk to population persistence was judged by the BRT to be high for all of the demographic attributes.

Within the foreseeable future, the BRT judged the risks to Arctic ringed seal persistence to be moderate (diversity and abundance) to high (productivity and spatial structure). As noted above, the impacts to Arctic ringed seals may be somewhat ameliorated initially if the subspecies's range retracts northward with sea ice habitats, but by the end of the century snow depths are projected to be insufficient for lair formation and maintenance throughout much of the subspecies' range. The BRT also judged the risks to persistence of the Okhotsk ringed seal in the foreseeable future to be moderate (diversity) to high (abundance, productivity, and spatial structure). Okhotsk ringed seals will have limited opportunity to shift their range northward because the sea ice will retract toward land.

Risks to ringed seal persistence within the foreseeable future were judged by the BRT to be highest for the Baltic, Ladoga, and, in particular, Saimaa ringed seal. Risks were judged as moderate (diversity) to high (abundance productivity, and spatial structure) for Baltic ringed seals; moderate (diversity), or high to very high (abundance, productivity, and spatial structure) for Ladoga ringed seals; and high to very high (abundance, productivity, spatial structure, and diversity) for Saimaa ringed seals. As noted above, Ladoga and Saimaa ringed seals are landlocked populations that will be unable to respond to the pronounced degradation of ice and snow habitats forecasted to occur by shifting their range. In addition, the range of the Baltic ringed seal is bounded to the north by land, and so there is limited opportunity for this subspecies to shift its range. The low density of the Saimaa ringed seal population coupled with limited dispersal opportunities and depensatory effects continue to put this subspecies at risk of extinction. An estimate of the demographic effective population size of Saimaa ringed seals indicated that low population size is exacerbated by habitat fragmentation and that the subspecies is "vulnerable to extinction due to demographic stochasticity alone" (Kokko *et al.,* 1998).

Conservation Efforts

When considering the listing of a species, section 4(b)(1)(A) of the ESA requires us to consider efforts by any State, foreign nation, or political subdivision of a State or foreign nation to protect the species. Such efforts would include measures by Native American tribes and organizations, local governments, and private organizations. Also, Federal, tribal, state, and foreign recovery actions (16 U.S.C. 1533(f)), and Federal consultation requirements (16 U.S.C. 1536) constitute conservation measures. In addition to identifying these efforts, under the ESA and our Policy on the Evaluation of Conservation Efforts (PECE) (68 FR 15100; March 28, 2003), we must evaluate the certainty of implementing the conservation efforts and the certainty that the conservation efforts will be effective on the basis of whether the effort or plan establishes specific conservation objectives, identifies the necessary steps to reduce threats or factors for decline, includes quantifiable performance measures for the monitoring of compliance and effectiveness, incorporates the principles of adaptive management, and is likely to improve the species' viability at the time of the listing determination.

International Conservation Efforts Specifically To Protect Ringed Seals

Baltic ringed seals: (1) Some protected areas in Sweden, Finland, the Russian Federation, and Estonia include Baltic ringed seal habitat; (2) The Baltic ringed seal is included in the Red Book of the Russian Federation as "Category 2" (decreasing abundance), is classified as "Endangered" in the Red Data Book of Estonia, and is listed as "Near Threatened" on the Finnish and Swedish Red Lists; (3) Hunting of Baltic ringed seals has been suspended in Baltic Sea region countries, although Finland is permitting the harvest of small numbers of ringed seals in Bothnia Bay beginning in 2010; and (4) Helsinki Commission (HELCOM) recommendation 27–28/2 (2006) on conservation of seals in the Baltic Sea established a seal expert group to address and coordinate seal conservation and management across the Baltic Sea region. This expert group has made progress toward completing a set of related tasks identified in the HELCOM recommendation, including coordinating development of national management plans and developing monitoring programs. The national red lists and red data books noted above highlight the conservation status of listed species and can inform conservation planning and prioritization.

Ladoga ringed seals: (1) Hunting of ringed seals in Lake Ladoga has been prohibited since 1980; (2) In May 2009, Ladoga Skerries National Park, which will encompass northern and northwest Lake Ladoga, was added to the Russian Federation's list of protected areas to be established; and (3) The Ladoga ringed seal is included in the Red Data Books of the Russian Federation, the Leningrad Region, and Karelia.

Saimaa ringed seals: (1) The Saimaa ringed seal is classified as a non-game species, and has been protected from hunting under Finnish law since 1955; (2) The Saimaa ringed seal is designated as an "Endangered" species on the Finnish Red List; (3) To conserve seal breeding areas, new construction on Lake Saimaa is not permitted within designated shoreline conservation areas (water bodies excluded), some of which are located within two national parks; (4) New construction on Lake Saimaa outside of designated shoreline conservation areas has been regulated since 1999 to limit the density of new buildings; however, it has been reported that lakeshore development has still increased substantially; (5) To reduce mortalities due to fishery interactions, restrictions have been placed on certain types of fishing gear within the breeding areas of the Saimaa ringed seal, and seasonal closure agreements have been signed with numerous fishing associations. However, continuing loss of seals, in particular juveniles, due to drowning in fishing gear has been reported. A working group for reconciliation of fishing and conservation of Saimaa ringed seals has recommended establishing a single contiguous protected area by December 2010 within which a mandatory seasonal net fishing closure and other fishing restrictions would be implemented. The Finnish Ministry of Agriculture and Forestry recently reported that the Finnish government has signed agreements with most of the Saimaa Lake fishing associations and that it is continuing to negotiate agreements with a few associations. However, in May 2010 the European Commission sent formal notice to Finland that it had not implemented adequate measures to protect the Saimaa ringed seal and that better targeted measures are still needed.

International Agreements

The International Union for the Conservation of Nature and Natural Resources (IUCN) Red List identifies and documents those species believed by its reviewers to be most in need of conservation attention if global extinction rates are to be reduced, and is widely recognized as the most comprehensive, apolitical global approach for evaluating the conservation status of plant and animal species. In order to produce Red Lists of threatened species worldwide, the IUCN Species Survival Commission draws on a network of scientists and partner organizations, which uses a standardized assessment process to determine species' risks of extinction. However, it should be noted that the IUCN Red List assessment criteria differ from the listing criteria provided by the

ESA. The ringed seal is currently classified as a species of "Least Concern" on the IUCN Red List. The Red List assessment notes that, given the risks posed to the ringed seal by climate change, the conservation status of all ringed seal subspecies should be reassessed within a decade. The European Red List compiles assessments of the conservation status of European species according to IUCN red listing guidelines. The assessment for the ringed seal currently classifies the Saimaa ringed seal as "Endangered" and the Ladoga ringed seal as "Vulnerable." The Baltic ringed seal is classified as a species of "Least Concern" on the European Red List, with the caveats that population numbers remain low and that there are significant conservation concerns in some part of the Baltic Sea. Similar to inclusion in national red lists and red data books, these listings highlight the conservation status of listed species and can inform conservation planning and prioritization.

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) is a regional treaty on conservation. Current parties to the Bern Convention within the range of the ringed seal include Norway, Sweden, Finland, Estonia, and Latvia. The agreement calls for signatories to provide special protection for fauna species listed in Appendix II (species to be strictly protected) and Appendix III to the convention (species for which any exploitation is to be regulated). The Saimaa and Ladoga ringed seals are listed under Appendix II, and other ringed seals fall under Appendix III. As discussed above, the Saimaa ringed seal has been protected from hunting since 1955, hunting of Ladoga ringed seals has been prohibited since 1980, and hunting of Baltic ringed seals has also been suspended (but with the recent exception noted above).

The provisions of the Council of the European Union's Directive 92/43/EEC on the Conservation of Natural Habitats of Wild Fauna and Flora (Habitats Directive) are intended to promote the conservation of biodiversity in European Union (EU) member countries. EU members meet the habitat conservation requirements of the directive by designating qualified sites for inclusion in a special conservation areas network known as Natura 2000. Current members of the EU within the range of the ringed seal include Sweden, Finland, and Estonia. Annex II to the Habitats Directive lists species whose conservation is to be specifically considered in designating special conservation areas, Annex IV identifies species determined to be in need of strict protection, and Annex V identifies species whose exploitation may require specific management measures to maintain favorable conservation status. The Saimaa ringed seal is listed in Annex II (as a priority species) and IV, the Baltic ringed seal is listed in Annex II and V, and the Arctic ringed seal is listed in Annex V. Some designated Natura 2000 sites include Baltic or Saimaa ringed seal habitat. Although Finland has implemented specific management measures and designated conservation areas for Saimaa ringed seals, as discussed above, the European Commission has sent its first formal notice to Finland that better targeted measures are urgently needed.

In 2005 the International Maritime Organization (IMO) designated the Baltic Sea Area outside of Russian territorial waters as a Particularly Sensitive Sea Area (PSSA), which provides a framework under IMOS's International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) for developing internationally agreed upon measures to reduce risks posed from maritime shipping activities. To date, a maritime traffic separation scheme is the sole protective measure associated with the Baltic PSSA. Expansion of Russian oil terminals is contributing to a marked increase in oil transport in the Baltic Sea; however, the Russian Federation has declined to support the Baltic Sea PSSA designation.

HELCOM's main goal since the Helsinki convention first entered force in 1980 has been to address Baltic Sea pollution caused by hazardous substances and to restore and safeguard the ecology of the Baltic. HELCOM acts as a coordinating body among the nine countries with coasts along the Baltic Sea. Activities of HELCOM have led to significant reductions in a number of monitored hazardous substances in the Baltic Sea. However, pollution caused by hazardous substances continues to pose risks.

The Agreement on Cooperation in Research, Conservation, and Management of Marine Mammals in the North Atlantic (North Atlantic Marine Mammal Commission [NAMMCO]) was established in 1992 by a regional agreement among the governments of Greenland, Iceland, Norway, and the Faroe Islands to cooperatively conserve and manage marine mammals in the North Atlantic. NAMMCO has provided a forum for the exchange of information and coordination among member countries on ringed seal research and management.

There are no known regulatory mechanisms that effectively address the factors believed to be contributing to reductions in ringed seal sea ice habitat at this time. The primary international regulatory mechanisms addressing GHG emissions and global warming are the United Nations Framework Convention on Climate Change and the Kyoto Protocol. However, the Kyoto Protocol's first commitment period sets targets for action only through 2012. There is no regulatory mechanism governing GHG emissions in the years beyond 2012. The United States, although a signatory to the Kyoto Protocol, has not ratified it; therefore, the Kyoto Protocol is non-binding on the United States.

Domestic U.S. Regulatory Mechanisms

Several laws exist that directly or indirectly promote the conservation and protection of ringed seals. These include the Marine Mammal Protection Act of 1972, as Amended, the National Environmental Policy Act, the Outer Continental Shelf Lands Act, the Coastal Zone Management Act, and the Marine Protection, Research and Sanctuaries Act. Although there are some existing domestic regulatory mechanisms directed at reducing GHG emissions, these mechanisms are not expected to be effective in counteracting the increase in global GHG emissions within the foreseeable future.

At this time, we are not aware of any formalized conservation efforts for ringed seals that have yet to be implemented, or which have recently been implemented, but have yet to show their effectiveness in removing threats to the species. Therefore, we do not need to evaluate any conservation efforts under the PECE.

NMFS has established a co-management agreement with the Ice Seal Committee (ISC) to conserve and provide co-management of subsistence use of ice seals by Alaska Natives. The ISC is an Alaska Native Organization dedicated to conserving seal populations, habitat, and hunting in order to help preserve native cultures and traditions. The ISC co-manages ice seals with NMFS by monitoring subsistence harvest and cooperating on needed research and education programs pertaining to ice seals. NMFS's National Marine Mammal Laboratory is engaged in an active research program for ringed seals. The new information from research will be used to enhance our understanding of the risk factors affecting ringed seals, thereby improving our ability to develop effective management measures for the species.

Proposed Determinations

We have reviewed the status of the ringed seal, fully considering the best scientific and commercial data available, including the status review report. We have reviewed threats to the five subspecies of the ringed seal, as well as other relevant factors, and given consideration to conservation efforts and special designations for ringed seals by states and foreign nations. In consideration of all of the threats and potential threats to ringed seals identified above, the assessment of the risks posed by those threats, the possible cumulative impacts, and the uncertainty associated with all of these, we draw the following conclusions:

Arctic subspecies: (1) There are no specific estimates of population size available for the Arctic subspecies, but most experts would postulate that the population numbers in the millions. (2) The depth and duration of snow cover are forecasted to decrease substantially throughout the range of the Arctic ringed seal. Within this century, snow cover is forecasted to be inadequate for the formation and occupation of birth lairs over most of the subspecies' range. (3) Because ringed seals stay with the ice as it annually advances and retreats, the southern edge of the ringed seal's range may initially shift northward. Whether ringed seals will continue to move north with retreating ice over the deeper, less productive Arctic Basin waters and whether the species that they prey on will also move north is uncertain. (4) The Arctic ringed seal's pupping and nursing seasons are adapted to the phenology of ice and snow. The projected decreases in sea ice, and especially snow cover, will likely lead to decreased pup survival and a substantial decline in the abundance of the Arctic subspecies. We conclude that the Arctic subspecies of the ringed seal is not in danger of extinction throughout all or a significant portion of its range, but is likely to become so within the foreseeable future. Therefore, we propose to list the Arctic subspecies of the ringed seal as threatened under the ESA.

Okhotsk subspecies: (1) The best available scientific data suggest a conservative estimate of 676,000 ringed seals in the Sea of Okhotsk, apparently reduced from historical numbers. (2) Before the end of the current century, ice suitable for pupping and nursing is forecasted to be limited to the northernmost regions of the Sea of Okhotsk, and projections suggest that snow cover may already be inadequate for birth lairs. The Sea of Okhotsk is bounded to the north by land, which will limit the ability of Okhotsk ringed seals to respond to deteriorating sea ice and snow conditions by shifting their range northward. (3) Although some Okhotsk ringed seals have been reported resting on island shores during the ice-free season, these sites provide inferior pupping and nursing habitat. (4) The Okhotsk ringed seal's pupping and nursing seasons are adapted to the phenology of ice and snow. Decreases in sea ice habitat suitable for pupping, nursing, and molting will likely lead to declines in abundance and productivity of the Okhotsk subspecies. We conclude that the Okhotsk subspecies of the ringed seal is not in danger of extinction throughout all or a significant portion of its range, but is likely to become so within the foreseeable future. Therefore, we propose to list the Okhotsk subspecies of the ringed seal as threatened under the ESA.

Baltic subspecies: (1) Current estimates of 10,000 Baltic ringed seals suggest that the population has been significantly reduced from historical numbers. (2) Reduced productivity in the Baltic subspecies in recent decades resulted from impaired fertility associated with pollutants. (3) Dramatic reductions in sea ice extent are projected by mid-century and beyond in the Baltic Sea, coupled with declining depth and insulating properties of snow cover on Baltic Sea ice. The Baltic Sea is bounded to the north by land, which will limit the ability of Baltic ringed seals to respond to deteriorating sea ice and snow conditions by shifting their range northward. (4) Although Baltic ringed seals have been reported resting on island shores or offshore reefs during the ice-free season, these sites provide inferior pupping and nursing habitat. (5) The Baltic ringed seal's pupping and nursing seasons are adapted to the phenology of ice and snow. The projected substantial reductions in sea ice extent and deteriorating snow conditions are expected to lead to decreased survival of pups and a substantial decline in the abundance of the Baltic subspecies. We conclude that the Baltic subspecies of the ringed seal is not in danger of extinction throughout all or a significant portion of its range, but is likely to become so within the foreseeable future. Therefore, we propose to list the Baltic subspecies of the ringed seal as threatened under the ESA.

Ladoga subspecies: (1) The population size of the ringed seal in Lake Ladoga is currently estimated at 3,000 to 5,000 seals. (2) Reduced ice and snow cover are expected in Lake Ladoga within this century based on regional projections. As ice and snow conditions deteriorate, the landlocked population of Ladoga ringed seals will be unable to respond by shifting its range. (3) Although Ladoga ringed seals have been reported resting on rocks and island shores during the ice-free season, these sites provide inferior pupping and nursing habitat. (4) The Ladoga ringed seal's pupping and nursing seasons are adapted to the phenology of ice and snow. Reductions in ice and snow are expected to lead to decreased survival of pups and a substantial decline in the abundance of this subspecies. We conclude that the Ladoga subspecies of the ringed seal is not in danger of extinction throughout all or a significant portion of its range, but is likely to become so within the foreseeable future. Therefore, we propose to list the Ladoga subspecies of the ringed seal as threatened under the ESA.

Saimaa subspecies: (1) The Saimaa ringed seal population currently numbers less than 300 animals, and has been significantly reduced from historical numbers. (2) Although the population has slowly grown under active management, it currently exists at levels where it is at risk of extinction from demographic stochasticity and small population effects. (3) Reduced ice and snow cover are expected in Lake Saimaa within this century. As ice and snow conditions deteriorate, the landlocked population of Saimaa ringed seal will be unable to respond by shifting its range. (4) Although Saimaa ringed seals have been reported resting on rocks and island shores during the ice-free season, these sites provide inferior pupping and nursing habitat. (5) The Saimaa ringed seal's pupping and nursing seasons are adapted to the phenology of ice and snow. Reductions in ice and snow cover are expected to lead to decreased survival of pups and a substantial decline in the abundance of this subspecies. (6) Ongoing mortality incidental to fishing activities is also a significant conservation concern. We conclude that the Saimaa subspecies of the ringed seal is in danger of extinction throughout its range, consistent with its current listing as endangered under the ESA.

Prohibitions and Protective Measures

Section 9 of the ESA prohibits certain activities that directly or indirectly affect endangered species. These prohibitions apply to all individuals, organizations and agencies subject to U.S. jurisdiction. Section 4(d) of the ESA directs the Secretary of Commerce (Secretary) to implement regulations "to provide for the conservation of [threatened] species" that may include extending any or all of the prohibitions of section 9 to threatened species. Section 9(a)(1)(g) also prohibits violations of protective regulations for threatened species implemented under section 4(d). Based on the status of each of the ringed seal subspecies and their conservation needs, we conclude that the ESA section 9 prohibitions are necessary and advisable to provide for their conservation. We are therefore proposing protective regulations pursuant to section 4(d) for the Arctic, Okhotsk, Baltic, and Ladoga subspecies of ringed seal to include all of the prohibitions in section 9(a)(1).

Sections 7(a)(2) and (4) of the ESA require Federal agencies to consult with us to ensure that activities they authorize, fund, or conduct are not likely to jeopardize the continued existence of a listed species or a species proposed for listing, or to adversely modify critical habitat or proposed critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with us. Examples of Federal actions that may affect Arctic ringed seals include permits and authorizations relating to coastal development and habitat alteration, oil and gas development (including seismic exploration), toxic waste and other pollutant discharges, and cooperative agreements for subsistence harvest.

Sections 10(a)(1)(A) and (B) of the ESA provide us with authority to grant exceptions to the ESA's section 9 "take" prohibitions. Section 10(a)(1)(A) scientific research and enhancement permits may be issued to entities (Federal and non-Federal) for scientific purposes or to enhance the propagation or survival of a listed species. The type of activities potentially requiring a section 10(a)(1)(A) research/enhancement permit include scientific research that targets ringed seals. Section 10(a)(1)(B) incidental take permits are required for non-Federal activities that may incidentally take a listed species in the course of otherwise lawful activity.

Our Policies on Endangered and Threatened Wildlife

On July 1, 1994, we and FWS published a series of policies regarding listings under the ESA, including a policy for peer review of scientific data (59 FR 34270) and a policy to identify, to the maximum extent possible, those activities that would or would not constitute a violation of section 9 of the ESA (59 FR 34272). We must also follow the Office of Management and Budget policy for peer review as described below.

Role of Peer Review

The intent of the peer review policy is to ensure that listings are based on the best scientific and commercial data available. Prior to a final listing, we will solicit the expert opinions of three qualified specialists, concurrent with the public comment period. Independent specialists will be selected from the academic and scientific community, Federal and State agencies, and the private sector.

In December 2004, the Office of Management and Budget (OMB) issued a Final Information Quality Bulletin for Peer Review establishing minimum peer review standards, a transparent process for public disclosure of peer review planning, and opportunities for public participation. The OMB Bulletin, implemented under the Information Quality Act (Pub. L. 106–554), is intended to enhance the quality and credibility of the Federal Government's scientific information, and applies to influential or highly influential scientific information disseminated on or after June 16, 2005. The scientific information contained in the ringed seal status review report (Kelly *et al.,* 2010) that supports this proposal to list the Arctic, Okhotsk, Baltic, and Ladoga subspecies of the ringed seal as threatened species under the ESA received independent peer review.

The intent of the peer review policy is to ensure that listings are based on the best scientific and commercial data available. Prior to a final listing, we will solicit the expert opinions of three qualified specialists, concurrent with the public comment period. Independent specialists will be selected from the academic and scientific community, Federal and state agencies, and the private sector.

Identification of Those Activities That Would Constitute a Violation of Section 9 of the ESA

The intent of this policy is to increase public awareness of the effect of our ESA listing on proposed and ongoing activities within the species' range. We will identify, to the extent known at the time of the final rule, specific activities that will be considered likely to result in violation of section 9, as well as activities that will not be considered likely to result in violation. Because the Okhotsk, Baltic, and Ladoga ringed seal occur outside the jurisdiction of the United States, we are presently unaware of any activities that could result in violation of section 9 of the ESA for these subspecies; however, because the possibility for violations exists (for example, import into the United States), we have proposed maintaining the section 9 protection. Activities that we believe could result in violation of section 9 prohibitions against "take" of the Arctic ringed seal include: (1) Unauthorized harvest or lethal takes of Arctic ringed seals; (2) in-water activities that produce high levels of underwater noise, which may harass or injure Arctic ringed seals; and (3) discharging or dumping toxic chemicals or other pollutants into areas used by Arctic ringed seals.

We believe, based on the best available information, the following actions will not result in a violation of section 9: (1) Federally funded or approved projects for which ESA section 7 consultation has been completed and mitigated as necessary, and that are conducted in accordance with any terms and conditions we provide in an incidental take statement accompanying a biological opinion; and (2) takes of Arctic ringed seals that have been authorized by NMFS pursuant to section 10 of the ESA. These lists are not exhaustive. They are intended to provide some examples of the types of activities that we might or might not consider as constituting a take of Arctic ringed seals.

Critical Habitat

Section 3 of the ESA (16 U.S.C. 1532(3)) defines critical habitat as "(i) the specific areas within the geographical area occupied by the species, at the time it is listed * * * on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed * * * upon a determination by the Secretary that such areas are essential for the conservation of the species." Section 3 of the ESA also defines the terms "conserve," "conserving," and "conservation" to mean "to use and 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 this chapter are no longer necessary."

Section 4(a)(3) of the ESA requires that, to the extent practicable and determinable, critical habitat be designated concurrently with the listing of a species. Designation of critical habitat must be based on the best scientific data available, and must take into consideration the economic, national security, and other relevant impacts of specifying any particular area as critical habitat. Once critical habitat is designated, section 7 of the ESA requires Federal agencies to ensure that they do not fund, authorize, or carry out any actions that are likely to destroy or adversely modify that habitat. This requirement is in addition to the section 7 requirement that Federal agencies ensure their actions do not jeopardize the continued existence of the species.

In determining what areas qualify as critical habitat, 50 CFR 424.12(b) requires that NMFS "consider those physical or biological features that are essential to the conservation of a given species including space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, and rearing of offspring; and habitats that are protected from disturbance or are representative of the historical geographical and ecological distribution of a species." The regulations further direct NMFS to "focus on the principal biological or physical constituent elements * * * that are essential to the conservation of the species," and specify that the "known primary constituent elements shall be listed with the critical habitat description." The regulations identify primary constituent elements (PCEs) as including, but not limited to: "Roost sites, nesting grounds, spawning sites, feeding sites, seasonal wetland or dryland, water quality or quantity, host species or plant pollinator, geological formation, vegetation type, tide, and specific soil types."

The ESA directs the Secretary of Commerce to consider the economic impact, the national security impacts, and any other relevant impacts from designating critical habitat, and under section 4(b)(2), the Secretary may exclude any area from such designation if the benefits of exclusion outweigh those of inclusion, provided that the exclusion will not result in the extinction of the species. At this time, the Arctic ringed seal's critical habitat is not determinable. We will propose critical habitat for the Arctic ringed seal in a separate rulemaking. To assist us with that rulemaking, we specifically request information to help us identify the PCEs or "essential features" of the Arctic ringed seal's habitat, and to what extent those features may require special management considerations or protection, as well as the economic attributes within the range of the Arctic ringed seal that could be impacted by critical habitat designation. Although the range of the Arctic ringed seal is circumpolar, 50 CFR 424.12(h) specifies that critical habitat shall not be designated within foreign countries or in other areas outside U.S. jurisdiction. Therefore, we request information only on potential areas of critical habitat within the United States or waters within U.S. jurisdiction.

Public Comments Solicited

Relying on the best scientific and commercial information available, we exercised our best professional judgment in developing this proposal to list the Arctic, Okhotsk, Baltic, and Ladoga ringed seals. To ensure that the final action resulting from this proposal will be as accurate and effective as possible, we are soliciting comments and suggestions concerning this proposed rule from the public, other concerned governments and agencies, Alaska Natives, the scientific community, industry, and any other interested parties. Comments are encouraged on this proposal as well as on the status review report (*See* **DATES** and **ADDRESSES**). Comments are particularly sought concerning:

(1) The current population status of ringed seals;

(2) Biological or other information regarding the threats to ringed seals;

(3) Information on the effectiveness of ongoing and planned ringed seal conservation efforts by states or local entities;

(4) Activities that could result in a violation of section 9(a)(1) of the ESA if such prohibitions applied to the Arctic ringed seal;

(5) Information related to the designation of critical habitat, including identification of those physical or biological features which are essential to the conservation of the Arctic ringed seal and which may require special management considerations or protection; and

(6) Economic, national security, and other relevant impacts from the designation of critical habitat for the Arctic ringed seal.

You may submit your comments and materials concerning this proposal by any one of several methods (*see* **ADDRESSES**). We will review all public comments and any additional information regarding the status of these subspecies and will complete a final determination within 1 year of publication of this proposed rule, as required under the ESA. Final promulgation of the regulation(s) will consider the comments and any additional information we receive, and such communications may lead to a final regulation that differs from this proposal.

Public Hearings

50 CFR 424.16(c)(3) requires the Secretary to promptly hold at least one public hearing if any person requests one within 45 days of publication of a proposed rule to list a species. Such hearings provide the opportunity for interested individuals and parties to give opinions, exchange information, and engage in a constructive dialogue concerning this proposed rule. We encourage the public's involvement in this matter. If hearings are requested, details regarding location(s), date(s), and time(s) will be published in a forthcoming **Federal Register** notice.

Classification

National Environmental Policy Act (NEPA)

The 1982 amendments to the ESA, in section 4(b)(1)(A), restrict the information that may be considered when assessing species for listing. Based on this limitation of criteria for a listing decision and the opinion in *Pacific Legal Foundation* v. *Andrus,* 657 F. 2d 829 (6th Cir. 1981), we have concluded that NEPA does not apply to ESA listing actions. (See NOAA Administrative Order 216–6.)

Executive Order (E.O.) 12866, Regulatory Flexibility Act, and Paperwork Reduction Act

As noted in the Conference Report on the 1982 amendments to the ESA, economic impacts cannot be considered when assessing the status of a species. Therefore, the economic analyses required by the Regulatory Flexibility Act are not applicable to the listing process. In addition, this rule is exempt from review under E.O. 12866. This rule does not contain a collection of information requirement for the purposes of the Paperwork Reduction Act.

E.O. 13132, Federalism

E.O. 13132 requires agencies to take into account any federalism impacts of regulations under development. It includes specific directives for consultation in situations where a regulation will preempt state law or impose substantial direct compliance costs on state and local governments (unless required by statute). Neither of those circumstances is applicable to this rule.

E.O. 13175, Consultation and Coordination With Indian Tribal Governments

The longstanding and distinctive relationship between the Federal and tribal governments is defined by treaties, statutes, executive orders, judicial decisions, and co-management agreements, which differentiate tribal governments from the other entities that deal with, or are affected by, the Federal Government. This relationship has given rise to a special Federal trust responsibility involving the legal responsibilities and obligations of the United States toward Indian Tribes and the application of fiduciary standards of due care with respect to Indian lands, tribal trust resources, and the exercise of tribal rights. E.O. 13175—Consultation and Coordination with Indian Tribal Governments—outlines the responsibilities of the Federal Government in matters affecting tribal interests. Section 161 of Public Law 108–199 (188 Stat. 452), as amended by section 518 of Public Law 108–447 (118 Stat. 3267), directs all Federal agencies to consult with Alaska Native corporations on the same basis as Indian tribes under E.O. 13175.

We intend to coordinate with tribal governments and native corporations which may be affected by the proposed action. We will provide them with a copy of this proposed rule for review and comment and offer the opportunity to consult on the proposed action.

References Cited

A complete list of all references cited in this rulemaking can be found on our Web site at *http://alaskafisheries.noaa.gov/* and is available upon request from the NMFS office in Juneau, Alaska (*see* **ADDRESSES**).

List of Subjects in 50 CFR Part 223

Endangered and threatened species, Exports, Imports, Transportation.

Dated: December 3, 2010.

Eric C. Schwaab,

Assistant Administrator for Fisheries, National Marine Fisheries Service.

For the reasons set out in the preamble, 50 CFR part 223 is proposed to be amended as follows:

PART 223—THREATENED MARINE AND ANADROMOUS SPECIES

1. The authority citation for part 223 continues to read as follows:

Authority: 16 U.S.C. 1531 1543; subpart B, § 223.201–202 also issued under 16 U.S.C. 1361 *et seq.;* 16 U.S.C. 5503(d) for § 223.206(d)(9).

2. In § 223.102, in the table, amend paragraph (a) by adding paragraphs (a)(4), (a)(5), (a)(6), and (a)(7) to read as follows:

§ 223.102 Enumeration of threatened marine and anadromous species.

* * * * *

Species [1]		Where listed	Citation(s) for listing determination(s)	Citation(s) for critical habitat designation(s)
Common name	Scientific name			
(a) * * *				
(4) Ringed seal, Arctic subspecies.	*Phoca hispida hispida.*	The Arctic subspecies of ringed seal includes all breeding populations of ringed seals east of 157 degrees east longitude, and east of the Kamchatka Peninsula, in the Pacific Ocean.	[INSERT FR CITATION & DATE WHEN PUBLISHED AS A FINAL RULE].	NA.
(5) Ringed seal, Baltic subspecies.	*Phoca hispida botnica.*	The Baltic subspecies of ringed seal includes all breeding populations of ringed seals within the Baltic Sea.	[INSERT FR CITATION & DATE WHEN PUBLISHED AS A FINAL RULE].	NA.
(6) Ringed seal, Ladoga subspecies.	*Phoca hispida ladogensis.*	The Ladoga subspecies of ringed seal includes all breeding populations of ringed seals within Lake Ladoga.	[INSERT FR CITATION & DATE WHEN PUBLISHED AS A FINAL RULE].	NA.
(7) Ringed seal, Okhotsk subspecies.	*Phoca hispida ochotensis.*	The Okhotsk subspecies of ringed seal includes all breeding populations of ringed seals west of 157 degrees east longitude, or west of the Kamchatka Peninsula, in the Pacific Ocean.	[INSERT FR CITATION & DATE WHEN PUBLISHED AS A FINAL RULE].	NA.
* *	*	* *	*	*

[1] Species includes taxonomic species, subspecies, distinct population segments (DPSs) (for a policy statement, see 61 FR4722, February 7, 1996), and evolutionarily significant units (ESUs) (for a policy statement, see 56 FR 58612, November 20, 1991).

* * * * *

3. In Subpart B of part 223, add § 223.212 to read as follows:

§ 223.212 Arctic subspecies of ringed seal.

The prohibitions of section 9(a)(1)(A) through 9(a)(1)(G) of the ESA (16 U.S.C. 1538) relating to endangered species shall apply to the Arctic subspecies of ringed seal listed in § 223.102(a)(4).

4. In Subpart B of part 223, add § 223.213 to read as follows:

§ 223.213 Baltic subspecies of ringed seal.

The prohibitions of section 9(a)(1)(A) through 9(a)(1)(G) of the ESA (16 U.S.C. 1538) relating to endangered species shall apply to the Baltic subspecies of ringed seal listed in § 223.102(a)(5).

5. In Subpart B of part 223, add § 223.214 to read as follows:

§ 223.214 Ladoga subspecies of ringed seal.

The prohibitions of section 9(a)(1)(A) through 9(a)(1)(G) of the ESA (16 U.S.C. 1538) relating to endangered species shall apply to the Ladoga subspecies of ringed seal listed in § 223.102(a)(6).

6. In Subpart B of part 223, add § 223.215 to read as follows:

§ 223.215 Okhotsk subspecies of ringed seal.

The prohibitions of section 9(a)(1)(A) through 9(a)(1)(G) of the ESA (16 U.S.C. 1538) relating to endangered species shall apply to the Okhotsk subspecies of ringed seal listed in § 223.102(a)(7).

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