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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[Docket No. 1206013117-3579-02]

RIN 0648-XA768

Endangered and Threatened Wildlife; Determination on Whether to List the Ribbon Seal as a Threatened or Endangered Species

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice of a listing determination and availability of a status review document.

SUMMARY: We, NMFS, have completed a comprehensive status review of the ribbon seal (Histriophoca fasciata) under the Endangered Species Act (ESA). Based on the best scientific and commercial data available, including the Biological Review Team's (BRT's) status review report, we conclude that listing the ribbon seal as threatened or endangered under the ESA is not warranted at this time. We also announce the availability of the ribbon seal status review report.

DATES: This listing determination was made on [insert date of publication in the FEDERAL REGISTER].

ADDRESSES: The ribbon seal status review report, as well as this listing determination, can be obtained via the internet at http://alaskafisheries.noaa.gov/. Supporting documentation used in preparing this listing determination is available for public inspection, by appointment, during normal business hours at the office of NMFS Alaska Region, Protected Resources Division, 709 West Ninth Street, Room 461, Juneau, AK 99801. This documentation includes the status review report, information provided by the public, and scientific and commercial data gathered for the status review.

FOR FURTHER INFORMATION CONTACT: Tamara Olson, NMFS Alaska Region, (907) 271-5006; Jon Kurland, NMFS Alaska Region, (907) 586-7638; or Marta Nammack, NMFS Office of Protected Resources, (301) 427-8469.

SUPPLEMENTARY INFORMATION:

Background

On December 20, 2007, we received a petition from the Center for Biological Diversity (CBD) to list the ribbon seal as a threatened or endangered species under the ESA, primarily due to concern about threats to this species' habitat from climate change and resultant loss of sea ice. The Petitioner also requested that critical habitat be designated for ribbon seals concurrently with listing under the ESA. On March 28, 2008, we published a 90-day finding (73 FR 16617) in which we determined that the petition presented substantial information indicating that the petitioned action may be warranted and initiated a status review of the ribbon seal. On December 30, 2008, we published our 12-month finding and determined that listing of the ribbon seal was not warranted (73 FR 79822).

On September 3, 2009, CBD and Greenpeace, Inc. (collectively, "Petitioners") filed a complaint in the U.S. District Court for the Northern District of California challenging our 12-month finding. On December 21, 2010, after considering cross-motions for summary judgment, the Court denied the Petitioners' motion for summary judgment and granted NMFS's cross-motion. The Petitioners filed a notice of appeal of this judgment to the Ninth Circuit Court of Appeals on January 18, 2011.

Information became available since publication of the December 30, 2008, 12-month finding that had potential implications for the status of the ribbon seal relative to the listing provisions of the ESA, including new data on ribbon seal movements and diving, as well as a modified threat-specific approach to analyzing the "foreseeable future" which we used in status reviews for spotted (Phoca largha), ringed (Phoca hispida), and bearded seals (Erignathus barbatus) that we completed subsequent to the ribbon seal status review (75 FR 65239, October 22, 2010; 77 FR 76706 and 77 FR 76740, December 28, 2012). In consideration of this information, on August 30, 2011, we agreed to initiate a new status review and issue a determination on whether listing the ribbon seal as threatened or endangered is warranted and submit a determination to the Office of the Federal Register by December 10, 2012. In addition, under the terms of this agreement, following publication of the new listing determination in the Federal Register, the Petitioners will file a motion for voluntary dismissal of its appeal of the December 21, 2010, judgment. We announced the initiation of this status review on December 13, 2011 (76 FR 77467). Subsequently, NMFS and the other parties to this agreement agreed to change the 12-month deadline to July 10, 2013.

The 2013 status review report for the ribbon seal (Boveng et al., 2013) is a compilation of the best scientific and commercial data available concerning the status of the species, including identification and assessment of the past, present, and foreseeable future threats to the species. The BRT that prepared this report was composed of eight marine mammal biologists, two fishery biologists, and a climate scientist from NMFS's Alaska and Southwest Fisheries Science Centers and NOAA's Pacific Marine Environmental Laboratory. The status review report underwent independent peer review by three scientists with expertise in marine mammal biology and ecology, including specifically ribbon seals.

ESA Statutory, Regulatory, and Policy Provisions

Section 3 of the ESA defines a “species” 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.” Section 3 of the ESA further defines an endangered species as “any species which is in danger of extinction throughout all or a significant portion of its range” and a threatened species as one “which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” Thus, we interpret an "endangered species" to be one that is presently in danger of extinction. A "threatened species," on the other hand, is not presently in danger of extinction, but is likely to become so in the foreseeable future (that is, at a later time). In other words, the primary statutory difference between a threatened and endangered species is the timing of when a species may be in danger of extinction, either presently (endangered) or in the foreseeable future (threatened). Under section 4(a)(1) of the ESA, we must determine whether a species is threatened or endangered because of any one or a combination of the following factors: (A) the present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) inadequacy of existing regulatory mechanisms; or (E) other natural or human-made factors affecting its continued existence. We are to make this determination based solely on the best scientific and commercial data available after conducting a review of the status of the species and taking into account those efforts being made by states or foreign governments to protect the species. In judging the efficacy of protective efforts not yet implemented or not yet shown to be effective, we rely on the joint NMFS and FWS Policy for Evaluating Conservation Efforts When Making Listing Decisions (68 FR 15100; March 28, 2003).

Two key tasks are associated with conducting an ESA status review. The first is to identify the taxonomic group under consideration; and the second is to conduct an extinction risk assessment which will be used 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 to include "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 U.S. Fish and Wildlife Service (FWS) 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 established in the policy.

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 over 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.

Since completing the 2008 status review of the ribbon seal (Boveng et al., 2008), with its climate impact analysis, NMFS scientists have revised their analytical approach to the foreseeability of threats due to climate change 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 (AR4; IPCC, 2007) extend through the end of the century (and we note the IPCC's Fifth Assessment Report (AR5), due in 2014, will extend even farther into the future), our updated analysis of ribbon seals used the same models to assess impacts from climate change through 2100, which is consistent with the time horizon used in our recent examination of climate change effects for spotted, ringed, and bearded seals. 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. Not all potential threats to ribbon seals are climate related, and therefore not all can be regarded as foreseeable through the end of the 21st century. For example, evidence of morbillivirus (phocine distemper) exposure in sea otters has recently been reported from Alaska (Goldstein et al., 2009). Thus, distemper may be considered a threat to ribbon seals, but the time frame of foreseeability of an inherently episodic and novel threat is difficult or impossible to establish. Similarly, factors that influence the magnitude and foreseeability of threats from oil and gas industry activities are difficult to predict beyond a few decades into the future because of dynamic and changing trends in the global oil and gas industry. These are only two examples of many potential threats without clear horizons of foreseeability. Therefore, although it is intuitive that foreseeability varies among threats facing ribbon seals, it is impractical to explicitly specify separate horizons of foreseeability for some of them (i.e., there is no consensus among BRT members, let alone a broader community of scientists).

Faced with the challenge of applying the "foreseeable future" terminology of the ESA to a comprehensive scientific assessment of extinction risk, the BRT opted to evaluate threats and demographic risks on two time frames within the period defined by the horizon of foreseeability for the threats of primary concern, namely those stemming from greenhouse gas (GHG) emissions: (1) the period from now to mid-century, corresponding to the time over which the IPCC considers climate warming to be essentially determined by past and near-future emissions; and (2) the period from now to the end of the century, a period in which sustained warming is anticipated under all plausible emissions scenarios, but the magnitude of that warming is more uncertain. Consideration of threats (and demographic risks) within these two time frames was intended to provide a sense of how the BRT's judgment of all the threats and the level of certainty about those threats may vary over the period of foreseeability for climate-related threats. We agree with this threat-specific approach, which creates a more robust analysis of the best scientific and commercial data available. It is also consistent with the memorandum issued by the Department of Interior, Office of the Solicitor, regarding the meaning of the term "foreseeable future" (Opinion M-37021; January 16, 2009).

NMFS and FWS recently published a draft policy to clarify the interpretation of the phrase "significant portion of the range" in the ESA definitions of "threatened" and "endangered" (76 FR 76987; December 9, 2011). The draft policy provides that: (1) if a species is found to be endangered or threatened in only a significant portion of its range, the entire species is listed as endangered or threatened, respectively, and the ESA's protections apply across the species' entire range; (2) a portion of the range of a species is "significant" if its contribution to the viability of the species is so important that, without that portion, the species would be in danger of extinction; (3) the range of a species is considered to be the general geographical area within which that species can be found at the time FWS or NMFS makes any particular status determination; and (4) if the species is not endangered or threatened throughout all of its range, but it is endangered or threatened within a significant portion of its range, and the population in that significant portion is a valid DPS, we will list the DPS rather than the entire taxonomic species or subspecies.

The Services are currently reviewing public comment received on the draft policy. While the Services' intent is to establish a legally binding interpretation of the term "significant portion of the range," the draft policy does not have legal effect until such time as it may be adopted as final policy. Here, we apply the principles of this draft policy as non-binding guidance in evaluating whether to list the ribbon seal under the ESA. If the policy changes in a material way, we will revisit the determination and assess whether the final policy would result in a different outcome.

Species Information

A thorough review of the taxonomy, life history, and ecology of the ribbon seal is presented in the status review report (Boveng et al., 2013). We provide a summary of this information below.

Description

The ribbon seal is a strikingly-marked member of the family Phocidae that primarily inhabits the Sea of Okhotsk and the Bering and Chukchi seas. This species gets its common and specific (fasciata) names from the distinctive band or "ribbon" pattern exhibited by mature individuals, which consists of four light-colored ribbons on a background of darker pelage. Ribbon seals are medium-sized when compared to the other three species of ice-associated seals in the North Pacific; they are larger than ringed seals, smaller than bearded seals, and similar in size to spotted seals. Ribbon seals have specialized physiological features that are likely adaptations for deep diving and fast swimming, including the highest number and volume of erythrocytes (red blood cells) and the highest blood hemoglobin (oxygen-transport protein in red blood cells) of all seals, as well as larger internal organs than those of other seals.

Distribution, Habitat Use, and Movements

The distribution of ribbon seals is restricted to the northern North Pacific Ocean and adjoining sub-Arctic and Arctic seas, where they occur most commonly in the Sea of Okhotsk and Bering Sea. Habitat selection by ribbon seals is seasonally related to specific life history events that can be broadly divided into two periods: (1) spring and early summer (March-June) when whelping, nursing, breeding, and molting all take place in association with sea ice on which the seals haul out; and (2) mid-summer through fall and winter when ribbon seals rarely haul out and are mostly not associated with ice.

In spring and early summer, ribbon seal habitat is closely associated with the distribution and characteristics of seasonal sea ice. Ribbon seals are strongly associated with sea ice during the breeding season and not known to breed on shore (Burns, 1970; Burns, 1981). During this time, ribbon seals are concentrated in the ice front or "edge-zone" of the seasonal pack ice, to as much as 150 km north of the southern ice edge (Burns, 1970; Fay, 1974; Burns, 1981; Braham et al., 1984; Lowry, 1985; Kelly, 1988). Shustov (1965a) observed that ribbon seals were most abundant in the northern part of the ice front and this north-south gradient has been observed in several other studies as well. Shustov (1965a) also found that ribbon seal abundance increased only with ice concentration and was unaffected by ice type, shape, or form. This is in contrast to most studies which show that ribbon seals generally prefer new, stable, white, clean, hummocky ice floes, invariably with an even surface; it is rare to observe them on dirty or discolored floes, except when the ice begins to melt and haul-out options are more limited (Heptner et al., 1976; Burns, 1981; Ray and Hufford, 2006). Ribbon seals also seem to choose moderately thick ice floes (Burns, 1970; Fay, 1974; Burns, 1981). These types of ice floes are often located at the inner zone of the ice front and rarely occur near shore, which may explain why ribbon seals are typically found on ice floes far away from the coasts during the breeding season (Heptner et al., 1976).

In most years, the Bering Sea pack ice expands to or near the southern edge of the continental shelf. Most of this ice melts by early summer. However, Burns (1969) described a zone of sea ice that remains in the central Bering Sea until melting around mid-June. Satellite imagery has verified the presence and persistence of this zone of ice and has shown that it is located relatively close to the edge of the continental shelf. Ribbon seals are numerous in this area, which is an extremely productive region that likely provides rich foraging grounds (Burns, 1981). Prey availability could strongly influence whelping locations because females probably feed actively during the nursing period (Lowry, 1985). In spring and early summer, ribbon seals are usually found in areas where water depth does not exceed 200 m, and they appear to prefer to haul out on ice that is near or over deeper water, indicating their preference for the continental shelf slope (Heptner et al., 1976). The seasonal dive-depth patterns of a small sample of ribbon seals monitored by satellite telemetry are consistent with a preference for feeding on the continental shelf slope (National Marine Mammal Laboratory (NMML), unpublished data).

During May and June, ribbon seals spend much of the day hauled out on ice floes while weaned pups develop self-sufficiency and adults complete their molt. As the ice melts, seals become more concentrated, with at least part of the Bering Sea population moving towards the Bering Strait and the southern part of the Chukchi Sea. This suggests that proximity to the shelf slope and its habitat characteristics (e.g., water depth, available prey) become less important, at least briefly around the molting period when feeding is likely reduced.

Although ribbon seals are strongly associated with sea ice during the whelping, breeding, and molting periods, they do not remain so after molting is complete. During summer, the ice melts completely in the Sea of Okhotsk, and by the time the Bering Sea ice recedes north through the Bering Strait, there are usually only a small number of ribbon seals hauled out on the ice. Significant numbers of ribbon seals are only seen again in winter when the sea ice reforms. The widespread distribution and diving patterns of ribbon seals monitored by satellite telemetry suggest that these seals are able to exploit many different environments and can tolerate a wide range of habitat conditions in mid-summer through winter.

Life History

The rates of survival and reproduction are not well known, but the normal lifespan of a ribbon seal is probably 20 years, with a maximum of perhaps 30 years. Ribbon seals become sexually mature at 1 to 5 years of age, probably depending on environmental conditions.

Whelping in the Bering Sea and northern Sea of Okhotsk occurs on seasonal pack ice over a period of about 5-6 weeks, ranging from late March to mid-May with a peak in early to mid-April (Tikhomirov, 1964; Shustov, 1965b; Burns, 1981), perhaps with some annual variation related to weather and ice conditions (Burns, 1981). The timing of whelping in the southern Sea of Okhotsk and Tartar Straight is not known, but may occur earlier, during March-April (Tikhomirov, 1966). Pups are nursed for 3-4 weeks (Tikhomirov, 1968; Burns, 1981), during which time mothers continue to feed, sometimes leaving their pups unattended on the ice while diving. Most pups are weaned by mid-May, which occurs when the mother abandons the pup (Tikhomirov, 1964). Breeding occurs shortly after weaning.

Ribbon seals molt their coat of hair annually between late March and July, with the timing of an individual's molt depending upon its age and reproductive status (Burns, 1981).

Sexually mature seals begin molting around the time of mating, and younger seals begin molting earlier.

Feeding Habits

The year-round food habits of ribbon seals are not well known, in part because almost all information about ribbon seal diet is from the months of February through July, and particularly March through June. Ribbon seals primarily consume pelagic (open ocean) and nektobenthic (swim near the seafloor) prey, including demersal (dwell near the seafloor) fishes, squids, and octopuses. Walleye pollock (Theragra chalcogramma) is a primary prey item, at least during spring, in both the Bering Sea and the Sea of Okhotsk. Other fish prey species found in multiple studies were Arctic cod (Boreogadus saida), Pacific cod (Gadus macrocephalus), saffron cod (Eleginus gracilis), Pacific sand lance (Ammodytes hexapterus), smooth lumpsucker (Aptocyclus ventricosus), eelpouts, capelin (Mallotus villosus), and flatfish species. Several species of both squid and octopus make up a significant part of ribbon seal diets throughout their range. Some studies have also found that crustaceans are an important part of the ribbon seal's diet. Several studies indicate that pups and juveniles mainly feed on small crustaceans and adults primarily consume fish and nektobenthos, like walleye pollock, octopuses, and squids.

Current Abundance and Trends

Ribbon seal abundance estimates have been based on catch data from sealing vessels, aerial surveys, and shipboard observations when seals are hauled out on the ice to whelp and molt. Russian estimates of Bering Sea abundance and trends were determined in the early 1960s from commercial catch data. Aerial survey data were often inappropriately extrapolated to the entire area based on densities and ice concentration estimates without behavioral research to determine factors affecting habitat selection. Very few details of the aerial survey methods or data have been published, so it is difficult to judge the reliability of the reported numbers. No suitable behavior data have been available to correct for the proportion of seals in the water at the time of surveys. Current research is just beginning to address these limitations and no current and reliable abundance estimates have been published.

Aerial surveys were conducted in portions or all of the ice-covered Bering Sea east of the international date line by NMML in 2003 (Simpkins et al., 2003), 2007 (Cameron and Boveng, 2007; Moreland et al., 2008; Ver Hoef et al., 2013), 2008, and 2012. A partial population estimate of 61,100 ribbon seals in the eastern and central Bering Sea (95 percent confidence interval: 35,200-189,300) was derived from the surveys conducted in 2007 (Ver Hoef et al., 2013). Using restrictive assumptions, the BRT scaled this number according to distributions of ribbon seal breeding areas in 1987 (Fedoseev et al., 1988), to produce total Bering Sea estimates ranging from 121,000 to 235,000. Similar scaling based on a range-wide distribution presented by Fedoseev (1973) produced Bering Sea, Sea of Okhotsk, and total-range estimates of 143,000, 124,000, and 267,000, respectively. Based on application of the 95 percent confidence interval reported by Ver Hoef et al. (2013) to the scaled range-wide estimate of 267,000 animals, the total range-wide abundance estimate could be as low as 154,000 or as high as 827,000. Aerial surveys conducted during the spring of 2012 and 2013 in the Bering Sea and Sea of Okhotsk included many sightings of ribbon seals, and preliminary analyses suggest that abundance estimates derived from these data will be higher than those obtained in the more limited survey reported by Ver Hoef et al. (2013).

Within the scaled range-wide estimate of 267,000, the Sea of Okhotsk component of about 124,000 is lower than all but one previous estimate for that region, and dramatically lower than the most recent estimates from Russian surveys during 1979-1990, which ranged from

410,000 to 630,000 (Fedoseev, 2000). This difference may reflect a failure of assumptions rather than a population decline. The BRT's estimate for the Sea of Okhotsk was derived from a recent density estimate in the Bering Sea, scaled by a much generalized distribution from the 1960s of seals in the Sea of Okhotsk. The density estimate for the Bering Sea may simply not be applicable to the distribution, and vice versa. Lacking details about the Russian survey methods that produced the larger numbers, and lacking any data on abundance in Russian waters more recent than 1990, the BRT opted to use the smaller number for the Sea of Okhotsk.

The BRT concluded that the current population trend of ribbon seals cannot be determined, but that strong upward or downward trends in the recent past seem unlikely. High rates of sightings in recent surveys, and reports from Alaska Native subsistence hunters (Quakenbush and Sheffield, 2007) that indicate stable or rising numbers, suggest that there has not been a recent dramatic decline.

Species Delineation

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 if belongs; and (2) the significance of the population segment to the species or subspecies to which is belongs. If a population segment is discrete and significant (i.e., it is a DPS) its evaluation for threatened or endangered status will be based on the ESA's definitions of those terms and a review of the factors enumerated in ESA section 4(a)(1).

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.

With respect to discreteness criterion 1, the BRT concluded, and we concur, that although there are two main breeding areas for ribbon seals, one in the Sea of Okhotsk and one in the Bering Sea, there is currently no evidence of discrete populations on which to base a separation into DPSs (see Boveng et al., 2013 for additional details). As noted above, under the DPS policy, discreteness of a DPS may also be considered based on delimitation by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are notable in light of section 4(a)(1)(D) of the ESA. Ribbon seals occur throughout a vast area of international waters and waters under the jurisdiction of the United States, the Russian Federation, and the State of Alaska. The primary breeding locations are in the territorial seas and exclusive economic zones of the United States and the Russian Federation. There are differences between the United States and the Russian Federation in the control of exploitation, management of habitat, and regulatory mechanisms that influence ribbon seal conservation status. For example, as noted in the threats assessment below, and discussed in more detail in the status review report, measures to control exploitation of ribbons seals appear to be substantially different between the two nations. While commercial hunting for ribbon seals is not allowed in the United States, such harvests are permitted by the Russian Federation. Regulations which govern commercial harvest of ice seals in Russia are over 20 years old and quotas on ribbon seals in Russian waters would allow large harvests. It is thus unclear what regulatory mechanisms are currently in place to ensure that potential commercial harvests remain within sustainable levels. Still, current commercial harvest levels remain low because of poor economic viability, and unless efforts to develop new uses and markets for seal products are successful, commercial harvest of ribbon seals is unlikely to increase in the near future. As discussed above, downward trends in ribbon seal population abundance in the recent past seem unlikely, which suggests that the differences in management between the United States and the Russian Federation are not significant, and the potential for this to change is uncertain. We find that the differences in management do not rise to a level that provides a sufficient basis to justify the use of international boundaries to satisfy the discreteness criterion of our DPS Policy (i.e., we found that inadequacy of existing regulatory mechanisms does not pose a significant threat to the persistence of the ribbon seal and is not likely to do so in the foreseeable future). In addition, we note that the maritime boundary between the United States and the Russian Federation does not specifically delimit the Sea of Okhotsk breeding area. Rather, this international boundary divides the eastern and central Bering Sea portion of the ribbon seal range (i.e., U.S.) from the western Bering Sea and Sea of Okhotsk (i.e., Russian) portion. In other words, delimitation by international governmental boundaries would place the division in the Bering Sea, where the distribution of ribbon seal breeding areas appears to be continuous and where ribbon seals move routinely without regard to the maritime boundary. We therefore conclude that there are no population segments that satisfy the discreteness criteria of our DPS Policy. Since there are no discrete population segments, we cannot take the next step of determining whether any discrete population segment is significant to the taxon to which it belongs.

Summary of Factors Affecting the Ribbon Seal

The following sections discuss threats to the ribbon seal under each of the five factors specified in Section 4(a)(1) of the ESA and 50 CFR 424. The reader is also directed to section 4.2 of the status review report (Boveng et al., 2013) for a more detailed discussion of the factors affecting the ribbon seal. As discussed above, the data on ribbon seal abundance and trends in abundance are very imprecise, and there is little basis for quantitatively linking projected environmental conditions or other factors to ribbon 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 structured approach was used to elicit the BRT members' judgment about the significance of the threats facing ribbon seals (excluding Factor D). The primary threats identified were grouped by each ESA Section 4(a)(1) factor, and each individual threat was scored for its significance, in two components (each on a 5-level scale): (1) extent (portion of the population that would experience reduced survival or reproductive success if the threat condition were to occur), and (2) likelihood of occurrence within a specified time period in the foreseeable future. For many threats, such as oil spills, there are a broad range of plausible extents with little or no consensus about what scenarios are most plausible. Consequently, for such threats, the process of judging significance was often an iterative one in which extent was not always judged before likelihood, and vice-versa. Because of potential differences in the strengths of the threats between the Bering Sea and Sea of Okhotsk, the BRT assigned scores separately for these two portions of the ribbon seal's range.

Each BRT member assigned extent and likelihood scores for each threat for the time period of now to mid-century, and now to the year 2100. Consideration of threats within these two time frames was intended to provide a sense of how the BRT's judgment of all the threats and the level of certainty about those threats may vary over the period of foreseeability for climate-related threats. For the period now to 2100, a threat score was also computed for each threat by multiplying the extent score by the likelihood score The range of these threat scores was divided into significance categories of “low” (1-4), “moderate” (5-10), “high” (11-15), “very high” (16-20), and “extreme” (21-25). Using the same scale as for the threat scores, each BRT member also considered the individual threat scores in assigning an overall score for each ESA section 4(a)(1) factor (excluding Factor D). These overall factor scores reflect the BRT’s judgment about the significance of each factor as a whole, including cumulative impacts. The average score and range of scores among BRT members are reported in the status review report. In this listing determination we summarize the average threat and overall factor scores. Additional details are contained in the status review report.

<u>A. Present or Threatened Destruction, Modification, or Curtailment of the Species’ Habitat or Range</u>

The main concerns about the conservation status of the ribbon seal stem 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 which could make large areas of habitat less suitable for ribbon seals. 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 environment. A reliable assessment of the future conservation status of ribbon seals, therefore, requires a focus on the observed and projected changes in sea ice, ocean temperature, ocean pH (acidity), and associated changes in ribbon seal prey species. The threats associated with impacts of the warming climate on the habitat of ribbon seals, to the extent that they may pose risks to these seals, are expected to manifest throughout the current breeding and molting range (for sea ice related threats) or throughout the entire range (for ocean warming and acidification) of the ribbon seal.

Effects of Climate Change on Annual Formation of the Ribbon Seal's Sea Ice Habitat

Unlike the Arctic Ocean, where some sea ice is present year round (i.e., multi-year ice), the ice in the Bering Sea and Sea of Okhotsk is seasonal and forms every winter as first-year ice. The main thermodynamic physical influence at high latitudes is the cold and darkness that occurs in winter. Despite the recent dramatic reductions in Arctic Ocean ice extent during summer, the sea ice in the northern Bering Sea and Sea of Okhotsk is expected to continue forming annually in winter for the foreseeable future, with large interannual variations in sea ice extent and duration. The future central Arctic will also continue to be an ice-covered sea in winter, but will contain more first-year sea ice than multi-year ice.

Ice extent in marginal seas such as the Bering Sea is characterized not by summer minima, since these seas have been ice-free in summer throughout recorded history, but rather by winter maxima. Freezing conditions in the northern Bering Sea persist from December through April. Mean monthly maximum temperatures at Nome, Alaska are -3°C or below for all months November through April. Freezing rather than thawing should still predominate in these months even if a hypothesized ~3°C global warming signal is realized. The result is that the seasonal formation of sea ice in the northern Bering Sea and Sea of Okhotsk is substantially decoupled from the summer ice extent in the Arctic Ocean, and is expected to continue annually through the foreseeable future, along with large interannual variations in extent and duration of persistence.

IPCC Model Projections

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 two dozen AOGCMs developed by 17 international modeling centers as the basis for the AR4 (IPCC, 2007). The analysis and synthesis of information presented by the IPCC in its AR4 represents the scientific consensus view on the causes and future of climate change. The AR4 used a range of future GHG emissions produced under six illustrative "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 these 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.

More recent climate model projection experiments are in progress in preparation for publication of the IPCC's Fifth Assessment Report (AR5) in 2014. However, the AR5 is not yet available. Therefore, the BRT used the modeling results from the AR4 in the status review. Knutti and Sedlacek (2012) found that projected global temperature change from the new models that will be used in the AR5 is remarkably similar to that from those models used in the AR4 after accounting for the different underlying emissions scenarios, and the spatial patterns of temperature and precipitation change were also very consistent. The 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, such as along coastlines.

There are three main contributors to divergence in AOGCM climate projections: large natural variations, across-model differences, and the range in emissions scenarios. 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, across-model differences, 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.

The third source of variation arises from the range in plausible emissions scenarios. 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 depend strongly on the assumed emissions of CO_2 and other GHGs, versus natural variations across-model differences (IPCC, 2007). 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 than are longer-term projections to the end of the century. 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. 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 to predict trends, or one intermediate and one extreme scenario to represent a significant range of variability.

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 in the status review report is summarized below.

Data and Analytical Methods

Many of the anticipated effects of GHG emissions have been projected through the end of the 21st century, subject to certain inputs and assumptions, and these projections currently form the most widely accepted version of the best available data about future environmental conditions. In our risk assessment for ribbon seals, we therefore considered climate model projections through the end of the 21st century to analyze the threats stemming from climate change.

The IPCC model simulations used in the BRT analyses were obtained from the Program for Climate Model Diagnosis and Intercomparison (PCMDI) on-line (at http://www-pcmdi.llnl.gov/). Wang and Overland (2009) identified a subgroup of six of these models that met performance criteria for reasonably reproducing the observed magnitude of the seasonal cycle of Northern Hemisphere sea ice extent. Climate models generally perform better on continental or larger scales, but because habitat changes are not uniform throughout the hemisphere, using similar performance criteria, the BRT further evaluated each of these six IPCC models independently on their performance at reproducing the observed seasonal cycle of sea ice extent during April and May in each of four regions – the Sea of Okhotsk, western Bering Sea, eastern Bering Sea, and Chukchi Sea.

All six of the models met the performance criteria for sea ice in the Chukchi Sea and four of the six models met the criteria for the eastern Bering Sea. Only one of the six models was in reasonable agreement with observations for the western Bering Sea; this single model was therefore used to project sea ice in this region with caveats about the reliability as noted below. Due to model deficiencies and the small size of the Sea of Okhotsk region relative to the spatial resolution of the climate models, none of the models met the performance criteria for this region. Instead, for the Sea of Okhotsk, comparison of SAT projections with current climate conditions was considered. Thirteen models, which were selected based on their ability to represent the climate of the North Pacific (Overland and Wang, 2007), were used to project future SATs in the Sea of Okhotsk. Whether future monthly mean SATs are above or below the freezing point of sea water provides a reasonable indicator of the presence or absence of sea ice. Projections of SATs for the Sea of Okhotsk were considered under both a medium and a high emissions scenario; similarly, model output under both of these emissions scenarios was considered for the other three regions.

While our inferences about future regional ice 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 onset of potential impacts to ribbons seals is complicated by the coarse resolution of the IPCC models. For example, in June 2008 the NOAA ship Oscar Dyson encountered a field of ice with numerous ribbon and spotted seals near St. Matthew Island in an area where no ice was visible on the relatively high resolution (12.5 km) satellite images of sea ice for that day. Nevertheless, NMFS concluded that the models reflect reasonable assumptions regarding habitat alterations to be faced by ribbon seals in the foreseeable future.

Regional Sea Ice Projections

The projections indicate that within this century there will be no significant ice reductions in the Chukchi Sea in winter through early spring (January to May). A downward trend in ice extent is evident in the Chukchi Sea in June toward the end of the century, by which time the difference between the emissions scenarios becomes a major contributor to the trends. Interannual variability of the model projections is larger in the Chukchi Sea after mid-century. In the eastern Bering Sea, a gradual downward trend in the sea ice extent is apparent over the century in March through May, albeit with a large degree of interannual variability. The average sea ice extent in the eastern Bering Sea during these months is projected to be at 58 percent of the present day value by 2050, and at 37 percent of the present day value by 2075. As discussed above, ice projections were only available for the western Bering Sea from a single model, so the results must be interpreted in the context of possibly large bias and lack of model-to-model variation. Compared with observations, this model overestimated sea ice extent in both March and April, but performed reasonably well for May and June. The model projected a rapid decline in sea ice extent in the western Bering Sea over the first half of this century in March and April, then relative stability to the end of the century. The model projected that the western Bering Sea will continue to have ice in March and April through nearly the end of the 21st century; however, the average sea ice extent in the latter half of this century in these months is projected to be approximately 25 percent of the present-day extent. The projection for May indicates that there will commonly be years when the western Bering Sea will have little or no ice beyond mid-century. Mapped projections of sea ice concentrations in the two Bering Sea regions indicate that by mid-century and beyond, the Bering Sea can be expected to have essentially no ice during May in some years, and by 2090 May sea ice can be expected only in the northern Bering Sea.

As noted above, none of the IPCC models performed satisfactorily at projecting ice for the Sea of Okhotsk, and so projected SATs were considered relative to current climate conditions as a proxy to predict sea ice extent and duration. The Sea of Okhotsk lies to the southwest of the Bering Sea and thus can be expected to have earlier radiative heating in spring. However, this region is dominated by cold continental air masses and offshore flow for much of the winter and spring. Therefore, the present seasonal cycle of the formation of first-year sea ice during winter is expected to continue annually in the foreseeable future. Based on the temperature proxies, a continuation of sea ice formation or presence is expected for March through the end of this century, though the ice may be limited to the northern portion of this 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 if the projected warming occurs by 2100. Recent climate data indicate that during May, sea ice has warmed to the melting point throughout the Sea of Okhotsk region.

In summary, within the ribbon seal's range large areas of annual sea ice are expected to form and persist through April in most years throughout this century. However, in the Sea of Okhotsk conditions for sea ice in April are likely to be limited to the far northern reaches or non-existent if the projected warming occurs by 2100. In May, ice is projected to continue to occur in the Bering Sea in most years through mid-century, but in the latter half of the century many years are expected to have little or no ice. Sea ice extent in June is expected to be highly variable through mid-century, as it has been in the past, but the models project essentially no ice in the Bering Sea in June during the latter half of the century.

Potential Impacts of Changes in Sea Ice on Ribbon Seals

In association with a long-term warming trend, there will likely be changes in the frequency of years with extensive ice, the quality of ice, and the duration of its persistence that may impact the amount of suitable habitat in the geographic areas that ribbon seals have preferred in the past. An assessment of the risks posed by these changes must consider the ribbon seal life-history functions associated with sea ice and the potential effects on the vital rates of reproduction and survival. As discussed above, the sea ice regimes in the Bering Sea and Sea of Okhotsk will continue to be subject to large interannual variations in extent and seasonal duration, as they have been throughout recorded history. While there may be more frequent years in which sea ice coverage is reduced, the late-March to early-May period in which the peak of ribbon seal reproduction occurs will continue to have substantial ice for the foreseeable future. Still, there will likely be more frequent years in which the ice is confined to the northern regions of the observed breeding range.

In contrast to harp seals (Pagophilus groenlandicus), which are their closest relatives, ribbon seals appear much less closely tied to traditional geographic locations for important life history functions such as whelping and molting. In years of low ice it is likely that ribbon seals will adjust, at least in part, by shifting their breeding locations in response to the position of the ice edge, as they have likely done in the past in response to interannual variability (e.g., Fedoseev, 1973; Braham et al., 1984; Fedoseev et al., 1988), at least in the Bering Sea (this may not be possible in the Sea of Okhotsk, where there is no northern access to higher-latitude ice-covered seas because the sea is bounded to the north by land). For example, observations indicate that extreme dispersal of ribbon seals within their effective range is associated with years of unusual ice conditions. The formation of extensive ice in the Bering Sea and Sea of Okhotsk has been found to result in the occurrence of large numbers of these seals farther south than they normally occur; the reverse is also true (Burns, 1981).

There has not been, however, any study that would verify whether vital rates of reproduction or survival have been affected by these interannual variations in ice extent and breeding. Whelping, nursing of pups, and maturation of weaned pups could conceivably be impacted in years when the ice does not extend as far south as it has typically in the past, because the breeding areas would be farther from the continental shelf break, a zone that seems to be a preferred foraging area during spring. If these conditions occur more frequently, as is anticipated from projections of future climate and sea ice conditions, reproduction and survival of young would likely be impacted. Lacking relevant data, the most conservative approach is to assume that the population has been at equilibrium with respect to conditions in the past, and that a change such as more frequent breeding farther from preferred foraging habitats will have some impact on vital rates. Even given the uncertainties, we conclude that the anticipated increase in frequency of years with low ice extent in April and May is likely to have some impact on recruitment. The mechanisms for depressed recruitment from increased frequency of years with less ice could include reduced nutrition during the nursing period caused by mothers unable to reach preferred shelf-break foraging areas; pup mortality caused by more frequent failures for mothers to reunite with pups left on the ice during foraging trips; and mortality or reduced condition of maturing weaned pups caused by reduced availability of suitable ice for hauling out.

As discussed above, ribbon seals have an apparent affinity for stable, clean, moderate-sized ice floes that are slightly, but not deeply interior to the pack ice edge. Ice of this type is likely to occur annually in the Bering Sea and Sea of Okhotsk through the middle of this century, but it may more frequently be confined to smaller areas or areas farther north than in the past. It is more difficult to determine whether this type of ice will be relatively more or less available as the amount of ice declines as projected through the latter half of the century. The availability of moderately-thick, stable ice floes could potentially influence ribbon seal demography, particularly in May, via survival rates of weaned pups. Pups spend a great deal of time on the ice during a transition period of 2 to 3 weeks following weaning, presumably developing their capabilities for self-sufficient foraging (Burns, 1981). However, they also enter the water frequently during this period, and therefore may not be particularly sensitive to modest reductions in ice coverage or quality. Thus, although they are likely dependent on ice, weaned pups may not require ice floes that can persist for weeks to meet their basic haul-out needs. They may, however, be relatively limited in their capability to respond to rapidly deteriorating ice fields by relocating over large distances, a factor that could occur more frequently in the foreseeable future.

Subadult ribbon seals, which molt earlier than adults during March to mid-May, and which are not constrained by habitat requirements for whelping and breeding, may be the least sensitive to the availability and quality of sea ice. For example, in 2007, NMFS research cruises in the Bering Sea encountered subadult ribbon seals in approximately the expected age class proportions. The obvious presence of seals in the subadult age class indicated that catastrophic losses had not occurred in the ribbon seal cohorts produced during the warm years of 2001-2005.

Adult ribbon seals, which are the last to molt, might be expected to be the most sensitive to timing of the ice melt. Tikhomirov (1964) suggested that molting ribbon seals rarely enter the water and that stable ice is critical during this period. The pelage molt of phocid seals is generally thought to be facilitated or enhanced by elevated skin temperatures that can be achieved when hauled out versus in the water (Feltz and Fay, 1966). For example, it has been suggested that the harbor seal (<u>Phoca</u> <u>vitulina</u>, a small phocid, similar in size and body composition to a ribbon seal), could not complete its molt entirely in the water at temperatures that the species would normally encounter in the wild (Boily, 1995). Analysis of haul-out records (section 2.6 of the status review report) indicate that individual adult ribbon seals haul out almost continuously for a period of weeks, mostly during mid-May to late June, corresponding to the observed peak in molting. Sea ice coverage in June is expected to be low or absent more frequently in the foreseeable future. The implications of a loss of access to a haul-out substrate during this period are unknown, but they may include energetic costs, reduced fertility, increased susceptibility to skin disorders and pathogens, and possibly increased exposure to any risks from which the hair normally protects a seal (e.g., abrasion from crawling over snow and ice). Many reports of ribbon seals out of their normal range or habitat have been associated with some pelage abnormalities, usually consistent with a disrupted or delayed molt. However, adult ribbon seals may also be less constrained to a specific geographic area or region of the ice pack once breeding is complete, around the onset of the adult molt (Boveng et al., 2007). They may therefore be capable of considerable shifts in distribution to ensure contact with suitable ice through the molt period, especially in the Bering Sea where there is access through the Bering Strait to the Chukchi Sea, where ice is expected to persist more frequently in June. The ultimate effect of decreased availability of stable platforms for adults to complete their molt out of the water on adult survival rate is currently difficult or impossible to model.

The impacts discussed above on ribbon seal survival and reproduction in years of low ice extent, poor ice quality, or early melting are all of a sort that would not necessarily be significant in any one year; a year of low ice extent seems unlikely to cause widespread mortality through disruption of the adult molt, or increased energetic costs for pups developing their foraging capabilities. Rather, the overall strength of the impacts is likely a function of the frequency of years in which they are anticipated to occur, and the proportion of the population's range over which they would occur. Also, the effects on different age classes might be expected to be correlated, though not always in concert, because they involve ice characteristics at different times in the breeding-molting period; low ice extent during breeding may not always be accompanied by early melting, and vice versa. As above, in the assessment of impacts on reproduction, we conclude that the anticipated increase in frequency of years with low ice extent in April, May, and June is likely to have an impact on survival rates.

The extent to which ribbon seals might adapt to more frequent years with early ice melt by shifting the timing of reproduction and molting is unknown. There are many examples in the scientific literature of shifts in the timing of reproduction by pinnipeds and terrestrial mammals in response to body condition and food availability. In most of these cases, sub-optimal conditions led to later reproduction, which would not likely be beneficial to ribbon seals as a response to earlier spring ice melt. Over the longer term (i.e., beyond the foreseeable future) a shift to an earlier mean melt date may provide selection pressure for an evolutionary response over many generations toward earlier reproduction.

In summary, more frequent future years of reduced spring ice extent or ice quality could result in reduced vital rates of ribbon seal reproduction and survival. These potential impacts are premised on the assumption of a population at equilibrium with conditions in the recent (cooler) past and the related possibility that changes such as displacement of breeding locations or reduced availability of preferred ice types will have some energetic costs that will ultimately be reflected in vital rates. The age of maturation for ribbon seal females has been very low and pregnancy rates have been high in the recent past (Quakenbush and Citta, 2008), implying that foraging conditions have been favorable, a scenario more likely to reflect population growth rather than equilibrium; if so, there may be some capacity to withstand a reduction in vital rates without incurring an actual population decline. In the absence of relevant data, it is not feasible to estimate quantitatively the magnitude of the anticipated impacts. The significance of demographic risks to the persistence of ribbon seals within the foreseeable future is assessed qualitatively below (see Demographic Risks Assessment).

The threats associated with decreases in sea ice habitat that were judged by the BRT to be of high significance include reductions in sea ice habitat suitable for molting in both the Bering Sea and the Sea of Okhotsk; and reductions in sea ice habitat suitable for whelping and nursing, pup maturation, and mating in the Sea of Okhotsk. Reductions in sea ice habitat suitable for whelping and nursing, pup maturation, and mating in the Bering Sea were judged by the BRT to be of moderate significance. We concur with the BRT's assessment.

Impacts on Ribbon Seals Related to Changes in Ocean Conditions

Ocean acidification is an ongoing process whereby chemical reactions occur that lower seawater pH and carbonate saturation due to CO_2 absorption by the ocean. Ocean acidification is likely to affect the ecosystem structure in the ribbon seals' habitats in the foreseeable future. The exact nature of these impacts cannot be predicted, and some likely will amplify more than others. As discussed above, ribbon seals eat a variety of fishes, squids, octopuses, and crustaceans. In addition to interfering with calcification of organisms at lower trophic levels, changes in ocean chemistry can have direct effects on the physiology of marine invertebrates and fish. Among invertebrates, squid are expected to be particularly sensitive to increases in CO_2. These ecosystem responses may have very long lags as they propagate through trophic webs.

Although the ribbon seal's varied diet would appear to confer some resilience to shifts in prey availability, major disruptions in the amount of productivity reaching pelagic, upper trophic species would be expected to have demographic impacts. Survival of juvenile ribbon seals would be expected to be the most sensitive, as their diet is narrower and more skewed toward invertebrates. Sufficiently large ecosystem shifts that persist more than a few years could also impact adult survival and reproductive rates. The range of potential ecological scenarios, however, is extremely complex and may even include some that could be ameliorative or beneficial to ribbon seals. The vast preponderance of ocean acidification impacts that have been identified, however, seem negative for ribbon seal prey. In the absence of compelling evidence for specific positive effects, the net effect of ocean acidification on ribbon seals is expected to be negative. The threat posed to ribbon seals from decreases in prey density and/or availability due to ocean acidification was judged by the BRT to be of moderate significance in both the Bering Sea and Sea of Okhotsk, and we agree with this assessment.

Changes in ribbon seal prey, anticipated in response to habitat changes resulting from ocean warming and loss of sea ice, have the potential for negative impacts, but these impacts are not well understood. Some changes already documented in the Bering Sea and the North Atlantic Ocean are of a nature that could be ameliorative or beneficial to ribbon seals. For example, warming and decrease in ice extent could increase pelagic productivity in favor of pelagic foraging by ribbon seals. Such ecosystem responses may have very long lags as they propagate through trophic webs. The apparent flexibility in ribbon seal foraging locations and habits may make the threats posed from changes in prey due to ocean warming and loss of ice of lower concern than more direct impacts from changes in sea ice. The BRT judged the threats posed to ribbon seals from decreases in prey density and/or availability due to changes in ice cover and ocean warming to be of moderate significance in both the Bering Sea and the Sea of Okhotsk, and we agree with this assessment.

Summary of Factor A

The BRT judged the threats to ribbon seal persistence from destruction or modification of habitat to be of greater significance than the threats posed from all other factors. Overall, the BRT judged the threats posed under Factor A to be of high significance in the Bering Sea and of very high significance in the Sea of Okhotsk. The BRT concluded that although it is impossible to project the trajectory of ribbon seal abundance with any certainty, it is likely that the combined effects of diminished sea ice habitat and disrupted prey communities will reduce ribbon seals' vital rates of survival and reproduction gradually throughout the foreseeable future. We agree with the BRT's findings. However, as discussed below, our analysis did not indicate these anticipated impacts on ribbon seal vital rates render the species likely to become an endangered species within the foreseeable future (threatened). Relevant considerations supporting this conclusion include: (1) there is evidence from some recent years with unusual ice conditions that ribbon seals may compensate for changes in sea ice, as least in part, by moving to areas with better ice, at least in the Bering Sea; (2) ribbon seals are known to have a diet that is ecologically and trophically diverse and they are able to forage over a wide range of ocean depths, which should enhance resilience to climate-related changes in prey communities; and (3) individual ribbon seals have the capability to undertake large seasonal movements and shifts between pelagic and pack ice habitats, which may mitigate some anticipated impacts of anthropogenic climate change. The demographic risks to the persistence of ribbon seals within the foreseeable future are considered further below (see Demographic Risks Assessment).

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

While commercial hunting for ribbon seals is not allowed in the United States, such harvests are permitted by the Russian Federation. Commercial harvests by Russian sealers have at times been high enough to cause significant reductions in abundance and catch-per-unit-effort. The population apparently rebounded from a period of high harvest in the 1960s. Substantial but lower numbers were harvested for a few years in the early 1990s. Although Russian government quotas were recently put in place that would allow large harvests (~18,000 annually), the actual takes are low because of poor economic viability. There is some effort in Russia to develop new uses and markets for seal products, but unless this effort is successful, the harvest is unlikely to increase in the near future. The numbers of ribbon seals harvested for subsistence use by indigenous hunters in Russia and Alaska are considered insignificant by most researchers, primarily due to the difficulty of accessing the seals in far offshore ice. Subsistence harvest levels have been low historically in Russia, and the current subsistence harvest is not thought to be a threat to ribbon seals there. Although estimates of subsistence harvest in Alaska are varied, all are low and sustainable relative to the population size. Subsistence harvest levels could potentially increase in the future if ribbon seals are forced to use a reduced and more northerly ice field, which could put them in closer proximity to Alaska Native communities near the Bering Strait. Changes in subsistence or commercial takes cannot be predicted with any certainty at this time. Scientific and educational utilization of ribbon seals is currently at very low levels and is not projected to increase to significant threat levels in the foreseeable future. Overall, the significance of the threats posed to ribbon seal persistence from overutilization were judged by the BRT to be low in both the Bering Sea and the Sea of Okhotsk, and we concur with this finding.

C. Diseases, Parasites, and Predation

A variety of pathogens (or antibodies), diseases, helminthes, cestodes, and nematodes have been found in ribbon seals. The prevalence of these agents is not unusual among seals, but the population impact is unknown. Beginning in July and August 2011, higher than normal numbers of sick and dead ringed seals along the coast of the North Slope of Alaska led to the declaration of an unusual mortality event (UME). Most pinnipeds with UME symptoms were ringed seals from the North Slope, but sick walruses (Odobenus rosmarus), spotted seals, and bearded seals were also found on the North Slope and in the Bering Strait region. Only one ribbon seal, a yearling, was reported with UME symptoms. The cause of the UME is still unknown, but additional bacterial and fungal testing and advanced molecular screening for unknown viruses are being conducted in a continuing effort to determine an explanation. There are a couple possibilities that may explain why only one sick ribbon seal was found during this UME. Ribbon seals are primarily pelagic and solitary during the summer and fall months when most of the UME seals were found. Thus, they might not have become sick in the same numbers as other ice seals because disease transmission among individuals may be limited due to their solitary lifestyle. However, it is also possible that many ribbon seals did become sick during the UME, but because they are pelagic they may have died out at sea and not stranded in areas where they could be counted. There may be an increased risk of outbreaks of novel pathogens or parasites as climate-related shifts in species distributions lead to new modes of transmission. For both the Bering Sea and the Sea of Okhotsk, the BRT judged the potential threats to ribbon seals from increased infection or disease to be of moderate significance, and from an increase in parasites to be of low significance, and we agree with these findings.

There is little or no direct evidence of significant predation on ribbon seals, and they are not thought to be a primary prey of any predators. Polar bears (Ursus maritimus) and killer whales (Orcinus orca) may be the most likely opportunistic predators in the current sea ice regime, but walruses and sharks could pose a potentially greater risk if reduced sea ice conditions force these species into closer proximity in the future. The BRT judged the significance of the threat posed to ribbon seals from increased predation associated with changes in sea ice cover to be low in both the Bering Sea and the Sea of Okhotsk, and we agree with this assessment.

D. Inadequacy of Existing Regulatory Mechanisms

As noted above in the discussion of Factor A, a primary concern about the conservation status of the ribbon 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 combined with modification of habitat by ocean acidification and warming water temperatures. Current mechanisms do not effectively regulate GHG emissions, which are contributing to global climate change and associated modifications to ribbon seal habitat. The projections we used to assess risks from GHG emissions were based on the assumption that no new regulation will take place (the underlying IPCC emissions scenarios were all "non-mitigated" scenarios). Therefore, the inadequacy of mechanisms to regulate GHG emissions is already included in our risk assessment, and contributes to the risks posed to ribbon seals by these emissions.

We also note that regulations which govern commercial harvest of ice seals in Russia are over 20 years old and we do not have good information regarding whether regulatory mechanisms are in place to ensure that potential commercial harvests in Russian waters are conducted in a sustainable fashion. As noted above, currently there is some effort in Russia to develop new uses and markets for seal products, but unless this effort is successful, the harvest is unlikely to increase in the near future. The BRT considered the threat posed to ribbon seal persistence by commercial harvest to be low in both the Bering Sea and the Sea of Okhotsk. We conclude that the data currently available do not suggest that inadequacy of mechanisms to regulate commercial harvest poses a significant threat to ribbon seals.

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

Although some pollutants are elevated in ribbon seals, there is no conspicuous evidence of toxicity or other significant impacts to the species. Continued and expanded monitoring would be prudent to document any trends in the contaminants of greatest concern.

Oil and gas exploration and development activities may include drilling operations, pipeline construction and operation, seismic surveys, and vessel and aircraft operations. The main issues for evaluating the impacts of exploration and development activities on ribbon seals are the effects of noise, physical disturbance, and potential oil spills produced from these activities. Any negative effects on ribbon seals from noise and disturbance associated with development activities are likely to be minor and localized. Ribbon seals are also highly dispersed during the summer open-water season, so the rate of interactions with seismic surveys would likely be low, and, in any case, seals have not been shown to be significantly impacted by oil and gas seismic surveys. The threat posed to ribbon seals by oil spills will increase if offshore oil and gas development and shipping activities increase across their range as predicted. The potential impacts would be greatest during April - June when the seals are relatively aggregated, and substantially lower during the remainder of the year when they are dispersed in the open water throughout the North Pacific Ocean, Sea of Okhotsk, and Bering and Chukchi seas.

Estimates from observed bycatch in commercial fisheries indicate that less than 200 ribbon seals per year are taken, though mortalities may be under-reported in some fisheries. This level of estimated bycatch of ribbon seals represents less than 0.1 percent of their estimated population. Because there is little or no fishery activity near the widely distributed low densities of ribbon seals when they are associated with ice, and they are highly dispersed during the remainder of the year, bycatch is unlikely to be a significant threat to ribbon seal populations. For the same reason, competition from fisheries that reduce local abundance of ribbon seal prey is unlikely to be a significant threat to ribbon seal populations. Broad-scale reduction in a commercially-fished, primary prey species could have a significant impact, but the large groundfish fisheries in Alaskan waters are managed to prevent depletion of the stocks; none of those fisheries is in an overfished status.

The extraordinary reduction in Arctic sea ice that has occurred in recent years has renewed interest in trans-Arctic navigation routes connecting the Atlantic and Pacific Oceans via the Northwest Passage and the Northern Sea Route. Climate models predict that the warming trend in the Arctic will accelerate, causing the ice to melt 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. 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 considerable ship traffic is needed to support present oil and gas operations, primarily off the northeastern coast of Sakhalin Island and the western coast of the Kamchatka Peninsula, with future developments pointing to an ever-growing shipping industry to support the area's energy and minerals commerce. Large-scale commercial fishing, which occurs in many parts of the Sea of Okhotsk, also contributes to ship traffic there.

The most significant risk posed by shipping activities to ribbon seals 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 ribbon seals directly through noise and physical disturbance (e.g., icebreaking vessels), as well as indirectly through ship emissions and possible effects of introduction of invasive species.

Current and future shipping activities in the Arctic pose varying levels of threat to ribbon seals depending on the type and intensity of the shipping activity and its degree of spatial and temporal overlap with the seals. These factors are inherently difficult to know or predict, making threat assessment uncertain. Ribbon seals are typically reported to be widely distributed in low densities on sea ice during the spring reproductive season, are likely even more dispersed during the summer and fall open-water seasons, and are not known to congregate in large numbers. Their highly dispersed distribution may help mitigate the risks of localized shipping threats, such as 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 purposefully avoids areas of ice and primarily occurs during the ice-free or low-ice seasons may also help mitigate the threats of shipping to ribbon seals since this species is closely associated with ice during the whelping, nursing, and molting periods when the seals (especially young pups) may be most vulnerable to shipping impacts. Icebreakers may pose special risks to ribbon seals since they are capable of operating year-round in all but the heaviest ice conditions and are sometimes 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, and disturbance) occurring in ice-covered areas where ribbon seals reside will likely also increase. Shipping impacts alone may comprise a low risk to entire populations, but when combined with the effects related to diminishing ice cover, such as increasingly denser aggregations, the impacts may be magnified and may play an important role in affecting the future health of populations.

Overall, the BRT judged the threats posed to ribbon seals from other natural or man-made factors to be of moderate significance in both the Bering Sea and the Sea of Okhotsk. We agree with the BRT's finding.

Demographic Risks Assessment

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 viability criteria, outlined in McElhany et al. (2000), reflect concepts that are well-founded in conservation biology and that individually and collectively 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 (variability in population growth rates arising from random differences among individuals in survival and reproduction), 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 BRT members' assessments of the significance of demographic risks to the persistence of ribbon seals were summarized qualitatively using a numerical scoring system. This scoring system, which was modeled on similar approaches used in other ESA status reviews (e.g., Atlantic Wolffish BRT, 2009; Butler et al., 2009; Cameron et al., 2010; Kelly et al., 2010), was designed to elicit expert judgment about the likelihood that the known and potential threats will impact the species' persistence. Specifically, each BRT member considered the risk that the population may be placed in danger of extinction by demographic problems with abundance, productivity, spatial structure, or diversity, within the next 50 years and the next 100 years, and then assigned a score to each of these demographic risk categories using the following values: 1 - very low or zero risk, 2 - low risk, 3 - medium risk, 4 - high risk, and 5 - very high risk. The average score and the range of scores were tabulated for each of the four demographic risk categories.

The BRT judged the demographic risks to the persistence of the ribbon seal between now and 2050 to be very low (abundance, productivity, and diversity) to low (spatial structure); and between now and 2100 to be low (abundance, productivity, and diversity) to medium (spatial structure). The medium risk score for demographic problems associated with spatial structure primarily reflects the anticipated direct impacts to ribbon seals stemming from loss of habitat patches and connectivity. We concur with the BRTs findings.

To supplement the demographic risks assessment and express a single, summarized judgment about extinction risk, each BRT member also allocated 10 likelihood points among five time interval categories (now to 2025, 2026 to 2050, 2051 to 2075, 2076 to 2100, and beyond 2100) to indicate his or her judgment about the time until ribbon seals would reach a population level of 5,000 individuals, representing a hypothetical minimum viable population (MVP). Degree of uncertainty in this judgment is expressed by spreading the points across the time interval categories. In other words, if a member believed that ribbon seals will never decline to 5,000 individuals, or at least not for a very long time, all 10 likelihood points would be allocated to the interval "beyond 2100." Or, if the member believed strongly that ribbon seals will reach that level in the latter half of this century, and it is equally likely to happen in either the time interval “2051 to 2075” or “2076 to 2100,” five likelihood points would be allocated to each of those two categories. Thus, this assignment of likelihood points represents the opinion of BRT members as to whether the population may decline below the hypothetical MVP in the specified time intervals based on reasoned expert judgment. The level of 5,000 individuals was selected without regard to specific aspects of ribbon seal life history that would determine the species’ MVP size (which are largely unknown). Rather, it was chosen as a value that has been asserted to be useful because of its derivation as the approximate median from a meta-analysis of MVPs for many species (Traill et al., 2007; Traill et al., 2010). We note, however, that some have cautioned about placing confidence in this value (Flather et al., 2011). The BRT members assigned all likelihood points to the three time intervals beyond 2050. Among the eleven BRT members, 0 percent of the likelihood points was ascribed to the combined intervals from now to 2050, four percent was ascribed to the interval 2051 to 2075, 13 percent was ascribed to 2076 to 2100, and 83 percent was ascribed to the period beyond 2100. In other words, the BRT’s collective distribution of points among time intervals indicating when the ribbon seal population may decline to a hypothetical MVP was concentrated in the time interval beyond the end of the current century. The range among BRT members in the percentage of likelihood points assigned to the combined time interval categories from now to 2100 was 0 percent (five BRT members) to 50 percent (i.e., 5 points; one BRT member), reflecting the variation in this judgment that results from sparse and uncertain information underlying this assessment (the 5 other BRT members assigned from 1 to 4 points). The BRT’s scoring was of course subjective, but it offers an indication of the BRT members’ professional judgment that there is a low near-term extinction risk. We compared the scoring here with the BRT’s demographic risk assessment and our evaluation of the ESA section 4(a)(1) factors above and found them consistent.

Conservation Efforts

When considering the listing of a species, section 4(b)(1)(A) of the ESA requires consideration of 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 monitoring compliance and effectiveness, incorporates the principles of adaptive management, and is likely to improve the species' viability at the time of the listing determination.

At this time, we are not aware of any formalized conservation efforts for ribbon 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 domestic conservation efforts under the PECE.

NMFS has an agreement with the Ice Seal Committee (ISC) under section 119 of the Marine Mammal Protection Act to conserve and provide co-management of subsistence use of ice seals by Alaska Natives. 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 ribbon seals. The new information from research will be used to enhance our understanding of the risk factors affecting ribbon seals, thereby improving our ability to develop effective management measures for the species.

ESA section 4(b)(1)(B) requires us to give consideration to species which have been designated as requiring protection from unrestricted commerce by any foreign nation, or pursuant to any international agreement; or identified as in danger of extinction, or likely to become so within the foreseeable future, by any state agency or any agency of a foreign nation that is responsible for the conservation of the species. We are not aware of any such special protections or designations, or of any conservation efforts undertaken by foreign nations specifically to protect ribbon seals. Ribbon seals are not afforded any protective measures or special status via the Convention for the International Trade in Endangered Species or the International Union for Conservation of Nature.

Listing Determination

We have reviewed the status of the ribbon seal, fully considering the best scientific and commercial data available, including the status review report. We have reviewed the threats to the ribbon seal, as well as other relevant factors, and given consideration to conservation efforts and special designations for ribbon seals by states and foreign nations. The best available information indicates that the threats posed to the persistence of the ribbon seal from foreseeable future destruction or modification of habitat attributable to climate change are of greater significance than threats from other factors. Although the trajectory of ribbon seal abundance is impossible to project with certainty, it is likely that the effects of diminished sea ice habitat and disrupted prey communities will reduce ribbon seal’s vital rates of reproduction and survival gradually throughout the foreseeable future. However, our analysis did not indicate that the ribbon seal is in danger of extinction (endangered) or that the anticipated impacts on ribbon seal vital rates render the species likely to become an endangered species within the foreseeable future (threatened) throughout its range. Relevant considerations supporting this conclusion include: (1) there is evidence from some recent years with unusual ice conditions that ribbon seals may compensate for changes in sea ice, as least in part, by moving to areas with better ice, at least in the Bering Sea; (2) ribbon seals are known to have a diet that is ecologically and trophically diverse and they are able to forage over a wide range of ocean depths, which should enhance resilience to climate-related changes in prey communities; (3) ribbon seals tend to be highly dispersed and mostly solitary during the ice-free season, which would provide a hedge against localized threats such as oil spills, concentrations of fishery activity, and interactions with shipping; and (4) individual ribbon seals have the capability to undertake large seasonal movements and shifts between pelagic and pack ice habitats, which may mitigate some anticipated impacts of anthropogenic climate change. We therefore find that the ribbon seal does not warrant listing as threatened or endangered throughout its range at this time.

Significant Portion of the Range Evaluation

Under the ESA and our implementing regulations, a species warrants listing if it is threatened or endangered throughout all or a significant portion of its range. In our analysis for this listing determination, we initially evaluated the status of and threats to the ribbon seal throughout its entire range. We found that the consequences of habitat change associated with a warming climate can be expected to manifest throughout the current breeding and molting ranges of ribbon seals, and that the ongoing and projected changes in sea ice habitat are likely to reduce the ribbon seal’s vital rates of reproduction and survival gradually through the foreseeable future. However, despite the expectation of a gradual decline, we concluded that the ribbon seal is not endangered nor is it likely to become so within the foreseeable future throughout its range.

The magnitude of the threats posed to the persistence of ribbon seals, including from changes in sea ice habitat, is likely to vary to some degree across the range of the species depending on a number of factors, including where affected populations occur. In light of the potential differences in the magnitude of the threats to specific areas or populations, we next evaluated whether the ribbon seal might be threatened or endangered in any significant portion of its range. In accordance with our draft policy on “significant portion of its range,” our first step in this evaluation was to review the entire supporting record for this listing determination to “identify any portions of the range[s] of the [DPSs] that warrant further consideration” (76 FR 77002; December 9, 2011). We evaluated whether substantial information indicated “that (i) the portions may be significant [within the meaning of the draft policy] and (ii) the species [occupying those portions] may be in danger of extinction or likely to become so within the foreseeable future” (76 FR 77002; December 9, 2011). Depending on the biology of a species, its range, and the threats it faces, it might be more efficient for us to address the significance question first or the status question first. Thus, if we determine that a portion of the range is not “significant,” we do not need to determine whether the species occupying that portion is threatened or endangered there; if we determine that the members of a species occupying a portion of its range are not threatened or endangered, we do not need to determine if that portion is “significant.” In practice, a key part of the determination as to whether a species is in danger of extinction in a significant portion of its range is whether the threats are geographically concentrated in some way. If the threats to the species are essentially uniform throughout its range, no portion is likely to warrant further consideration. Moreover, if any concentration of threats to the species occurs only in portions of the species’ range that clearly would not meet the biologically based definition of “significant,” such portions will not warrant further consideration. Finally, if threats, even though acting only in a portion of the range of the species, would cause the entire species to be threatened or endangered, the conclusion would be that the species is threatened or endangered throughout its range (rather than only in a significant portion of its range).

All of the ESA threat factors assigned scores by the BRT (Factors A, B, C, and E) were judged to be of relatively higher significance in the Sea of Okhotsk than in the Bering Sea, and we concur with this assessment. Therefore, we evaluated whether there is substantial information suggesting that the hypothetical loss of the portion of the species residing in the Sea of Okhotsk would reasonably be expected to increase the demographic risks to the point that the species would then be in danger of extinction, i.e., whether the Sea of Okhotsk portion of the species’ range should be considered “significant.” At present, the numbers of ribbon seals in both the Bering Sea and Sea of Okhotsk portions of the range are on the order of 100,000 or more in each sea basin. As discussed in more detail in the status review report, populations or sub-populations of this magnitude and with the life history characteristics of the ribbon seal are typically immune to demographic risks that are associated with or exacerbated by low abundance, such as year-to-year environmental fluctuations, loss of diversity, failure of breeding systems, and lack of potential for productivity. The climate related threats facing ribbon seals are expected to increase more or less in parallel between the Bering Sea and Sea of Okhotsk, albeit more quickly in the latter. If ribbon seal numbers in the Bering Sea decrease in the future to levels at which the demographic risks discussed above become significant, then the loss of either the Sea of Okhotsk or the Bering Sea portions would likely place the entire species in danger of extinction. However, at least in the near term, the BRT concluded, and we agree, that the loss of the Sea of Okhotsk portion of the ribbon seal population would not place the remainder, the Bering Sea portion, in danger of extinction (Boveng et al., 2013, section 4.3.3.3). Because the portion of the ribbon seal population residing in the Sea of Okhotsk is not so significant that its hypothetical loss would render the species endangered, we conclude that the Sea of Okhotsk portion does not constitute a significant portion of the ribbon seal's range. Consequently, we need not address the question of whether the portion of the species occupying the Sea of Okhotsk is threatened or endangered.

Conclusion

Our review of the information pertaining to the five ESA section 4(a)(1) factors does not support the assertion that there are threats acting on the species or its habitat that have rendered the ribbon seal to be in danger of extinction or likely to become so in the foreseeable future, throughout all or a significant portion of its range. Therefore, listing the ribbon seal as threatened or endangered under the ESA is not warranted at this time.

We will continue to monitor the status of the ribbon seal. If conditions change in the future, we will re-evaluate the status of this species to determine whether it should be listed as threatened or endangered under the ESA. Because of the remaining uncertainties regarding the effects of climate change, sea ice cover, and potential Russian harvests, following the 2008 status review of the ribbon seal, this species was added to our Species of Concern list (http://www.nmfs.noaa.gov/pr/species/concern/). The Species of Concern list serves to: (1) increase public awareness about the species; (2) further identify data deficiencies and uncertainties in the species' status and the threats it faces; and (3) stimulate cooperative research efforts to obtain the information necessary to evaluate the species' status and threats. As resources permit, we will conduct further studies of ribbon seal abundance and status. We will evaluate results of these and any other studies that may be conducted and undertake a new status review, if warranted.

References Cited

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

Authority

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

Dated: July 3, 2013

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Alan D. Risenhoover,
Director, Office of Sustainable Fisheries,
performing the functions and duties of the
Deputy Assistant Administrator for Regulatory Programs.

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