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RIBBON SEAL (*Histriophoca fasciata*): Alaska Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Ribbon seals inhabit the North Pacific Ocean and adjacent parts of the Arctic Ocean. In Alaska waters, ribbon seals are found in the open sea, on the pack ice, and only rarely on shorefast ice (Kelly 1988). They range northward from Bristol Bay in the Bering Sea into the Chukchi and western Beaufort Seas (Fig. 14). From late March to early May, ribbon seals inhabit the Bering Sea ice front (Burns 1970, Burns 1981, Braham et al. 1984). They are most abundant in the northern part of the ice front in the central and western parts of the Bering Sea (Burns 1970, Burns et al. 1981). As the ice recedes in May to mid-July the seals move farther to the north in the Bering Sea, where they haul out on the receding ice edge and remnant ice (Burns 1970, Burns 1981, Burns et al. 1981). There is little known about the range of ribbon seals during the rest of the year. Recent sightings and a review of the literature suggest that many ribbon seals migrate into the Chukchi Sea for the summer (Kelly 1988). Satellite tag data from 2005 and 2007 suggest ribbon seals disperse widely. Ten seals tagged in 2005 near the eastern coast of Kamchatka spent the summer and fall throughout the Bering Sea and Aleutian Islands; eight of the 26 seals tagged in 2007 in the central Bering Sea moved to the Bering Strait, Chukchi Sea, or Arctic Basin as the seasonal ice retreated (Boveng et al. 2008).

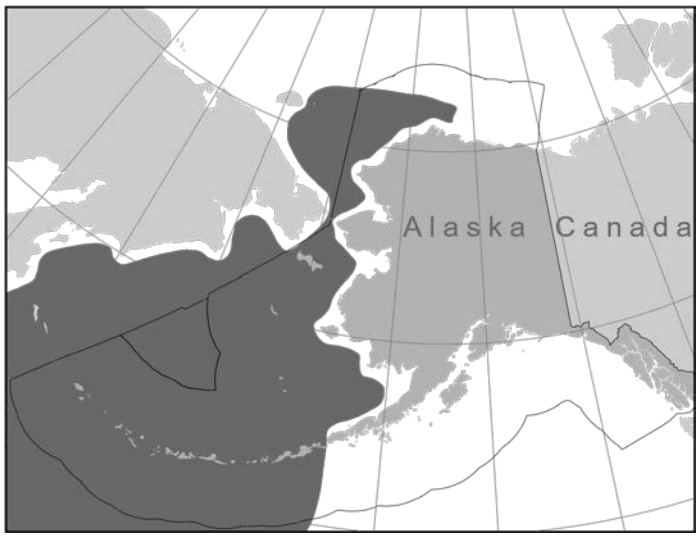

Figure 14 Approximate distribution of ribbon seals (shaded area). The combined summer and winter distribution is depicted.

The following information was considered in classifying stock structure based on the Dizon et al. (1992) phylogeographic approach: 1) Distributional data: geographic distribution continuous, 2) Population response data: unknown; 3) Phenotypic data: unknown; 4) Genotypic data: unknown. Based on this limited information, and the absence of any significant fishery interactions, there is currently no strong evidence to suggest splitting the distribution of ribbon seals into more than one stock (Boveng et al. 2008). Therefore, only the Alaska stock of ribbon seal is recognized in U.S. waters.

POPULATION SIZE

A reliable abundance estimate for the Alaska stock of ribbon seals is currently not available. Burns (1981) estimated the worldwide population of ribbon seals at 240,000 in the mid-1970s, with an estimate for the Bering Sea at 90,000-100,000.

Aerial surveys were conducted in portions of the eastern Bering Sea in spring of 2003 (Simpkins et al. 2003), 2007 (Cameron and Boveng 2007, Moreland et al. 2008), and 2008 (Peter Boveng, NMML, unpubl. data). The data from these surveys are currently being analyzed to construct estimates of abundance for the eastern Bering Sea from frequencies of sightings, ice distribution, and the timings of seal haul-out behavior. In the interim, NMML researchers have developed a provisional estimate of 49,000 ribbon seals in the eastern and central Bering Sea during the surveys.

Minimum Population Estimate

A reliable minimum population estimate (N_{MIN}) for this stock can not presently be determined because current reliable estimates of abundance are not available.

Current Population Trend

At present, reliable data on trends in population abundance for the Alaska stock of ribbon seals are unavailable. Although the current population trend is unknown, a recent estimate of 49,000 ribbon seals in the eastern and central Bering Sea is consistent with historical estimates, suggesting suggest that no major or catastrophic change has occurred in recent decades (Boveng et al. 2008). This stock is thought to occupy its entire historically-observed range (Boveng et al. 2008).

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

A reliable estimate of the maximum net productivity rate is currently unavailable for the Alaska stock of ribbon seals. Hence, until additional data become available, it is recommended that the pinniped maximum theoretical net productivity rate (R_{MAX}) of 12% be employed for this stock (Wade and Angliss 1997).

POTENTIAL BIOLOGICAL REMOVAL

Under the 1994 reauthorized Marine Mammal Protection Act (MMPA), the potential biological removal (PBR) is defined as the product of the minimum population estimate, one-half the maximum theoretical net productivity rate, and a recovery factor: $PBR = N_{MIN} \times 0.5R_{MAX} \times F_R$. The recovery factor ($F_R$) for this stock is 0.5, the value for pinniped stocks with unknown population status (Wade and Angliss 1997). However, because a reliable estimate of minimum abundance N_{MIN} is currently not available, the PBR for this stock is unknown.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fisheries Information

Until 2003, there were three different federally regulated commercial fisheries in Alaska that could have interacted with ribbon seals and were monitored for incidental mortality by fishery observers. As of 2003, changes in fishery definitions in the List of Fisheries have resulted in separating these three fisheries into 13 fisheries (69 FR 70094, 2 December 2004). This change does not represent a change in fishing effort, but provides managers with better information on the component of each fishery that is responsible for the incidental serious injury or mortality of marine mammal stocks in Alaska. Between 2002 and 2006, there were incidental serious injuries and mortalities of ribbon seals in the Bering Sea/Aleutian Islands flatfish trawl fishery (Table 18a). Estimates of marine mammal serious injury/mortality in each of these observed fisheries are provided in Perez (2006) and Perez (unpubl. ms). The estimated minimum mortality rate incidental to commercial fisheries is 0.3 ribbon seal per year, based exclusively on observer data. More current data on estimated fishery-related serious injury and mortality are being analyzed and will be available for inclusion in the 2010 SARs.

Table 18a. Summary of incidental mortality of ribbon seals (Alaska stock) due to fisheries from 2002 to 2006 and calculation of the mean annual mortality rate. Details of how percent observer coverage is measured is included in Appendix 6.

Fishery name	Years	Data type	Observer coverage	Observed mortality (in given yrs.)	Estimated mortality (in given yrs.)	Mean annual mortality
Bering Sea/Aleutian Is. flatfish trawl	2002 2003 2004 2005 2006	obs data	58.4 64.1 64.3 68.3 67.8	0 0 0 1 0	0 0 0 1.3 0	0.27 (0.50)
Total estimated annual mortality						0.3 (CV=0.50)

[1] Mortality seen by observer, but not during a monitored haul.

Subsistence/Native Harvest Information

Ribbon seals are harvested occasionally by Alaska Native subsistence hunters, primarily from villages in the vicinity of Bering Strait and to a lesser extent at villages along the Chukchi Sea coast (Kelly 1988). The annual subsistence harvest was estimated to be less than 100 seals annually from 1968 to 1980 (Burns 1981). In the mid1980s, the Alaska Eskimo Walrus Commission estimated the subsistence take to still be less than 100 seals annually (Kelly 1988).

The Division of Subsistence, Alaska Department of Fish and Game maintains a database that provides additional information on the subsistence harvest of ice seals in different regions of Alaska (ADFG 2000a, b). Information on subsistence harvest of ribbon seals has been compiled for 129 villages from reports from the Division of Subsistence (Coffing et al. 1998, Georgette et al. 1998, Wolfe and Hutchinson-Scarbrough 1999) and a report from the Eskimo Walrus Commission (Sherrod 1982). Data were lacking for 22 villages; their harvests were estimated using the annual per capita rates of subsistence harvest from a nearby village. Harvest levels were estimated from data gathered in the 1980s for 16 villages; otherwise, data gathered from 1990 to 1998 were used. As of August 2000; the subsistence harvest database indicated that the estimated number of ribbon seals harvested for subsistence use per year is 193.

At this time, there are no efforts to quantify the level of harvest of ribbon seals by all Alaska communities. However, the U.S. Fish and Wildlife Service collects information on the level of ribbon seal harvest in 5 villages as part of their Walrus Harvest Monitoring Program. Results from this program indicated that an average of 13 ribbon seals were harvested annually in Little Diomede, Gambell, Savoonga, Shishmaref, and Wales from 1999 to 2003 (U.S. Fish and Wildlife Service, Marine Mammals Management, Walrus Harvest Monitoring Project). Because this represents only five of the over 100 villages that may harvest ribbon seals, this level of harvest is known to underestimate the actual harvest level for these years. Since 2005, harvest data are only available from St. Lawrence Island (Gambell and Savoonga) due to lack of walrus harvest monitoring in areas previously monitored. There were no ribbon seals harvested on St. Lawrence Island from 2005 - 2007.

Table 18b. Summary of the 2000-2004 subsistence harvest data for ribbon seals from Little Diomede, Gambell, Savoonga, Shishmaref, and Wales. Data were collected by the U.S. Fish and Wildlife Service during the Walrus Harvest Monitoring Project. These counts only reflect the number of seals harvested during the spring walrus harvest and do not indicate total annual harvest.

Year	Estimated total number harvested
2000	2
2001	2
2002	9
2003	36
2004	3
Mean annual harvest (2000-2004)	10.4

A report on ice seal subsistence harvest in three Alaskan communities indicated that the number and species of ice seals harvested in a particular village may vary considerably between years (Coffing et al. 1999). These interannual differences are likely due to differences in ice and wind conditions that change the hunters' access to different ice habitats frequented by different types of seals. Regardless of the extent to which the harvest may vary interannually, it is clear that the harvest level of 193 ribbon seals estimated by the Division of Subsistence is somewhat higher than the previous minimum estimate. Although some of the more recent entries in the ADFG database have associated measures of uncertainty (Coffing et al. 1999, Georgette et al. 1998), the overall total does not.

STATUS OF STOCK

Ribbon seals are not listed as "depleted" under the MMPA or listed as "threatened" or "endangered" under the Endangered Species Act. Reliable estimates of the minimum population, PBR, and human-caused mortality and serious injury are currently not available. Because the PBR for ribbon seals is unknown, the level of annual U.S. commercial fishery-related mortality that can be considered insignificant and approaching zero mortality and serious injury rate is unknown. No information is available on the status of ribbon seals. Due to a very low level of interactions

between U.S. commercial fisheries and ribbon seals, the Alaska stock of ribbon seals is not considered a strategic stock.

NMFS received a petition to list ribbon seals under the ESA on 20 December 2007 due to loss of sea ice habitat caused by climate change in the Arctic. NMFS published a Federal Register notice, 73 FR 16617, 28 March 2008, indicating that there were sufficient data to warrant a review of the species. NMFS conducted a thorough review of the species and published a status review of the ribbon seal in December 2008 (Boveng et al. 2008). The findings of this review were reported in 73 FR 79822, 30 December 2008, in which it was determined that listing of the ribbon seal is not warranted at this time.

Habitat Concerns

Evidence indicates that the Arctic climate is changing significantly and that one result of the change is a reduction in the extent of sea ice in at least some regions of the Arctic (ACIA 2004, Johannessen et al. 2004). Ribbon seals, along with other seals that are dependent on sea ice for at least part of their life history, will be vulnerable to reductions in sea ice. Although a gradual decline in the ribbon seal population is likely with a decrease in frequency of years with suitable sea ice habitat, ribbon seals are not likely to become an endangered species within the foreseeable future (Boveng et al. 2008).

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