PACIFIC WALRUS (*Odobenus rosmarus divergens*): Alaskan Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The family Odobenidae is represented by a single modern species *Odobenus rosmarus* of which two subspecies are generally recognized: the Atlantic walrus (*O. r. rosmarus*), and the Pacific walrus (*O. r. divergens*). The two subspecies occur in geographically isolated populations. The Pacific walrus is the only form occurring in U.S. waters and considered in this account.

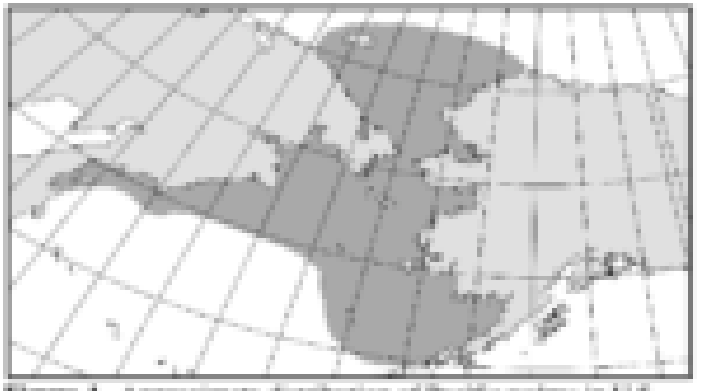

Figure 1. Approximate distribution of Pacific walrus in U.S. and Russian territorial waters. (shaded area). The combined summer and winter distributions are depicted.

Pacific walrus range throughout the continental shelf waters of the Bering and Chukchi seas, occasionally moving into the East Siberian Sea and the Beaufort Sea (Fig. 1). During the summer months most of the population migrates into the Chukchi Sea, however several thousand animals, primarily adult males, congregate near coastal haulouts in the Gulf of Anadyr and in Bristol Bay. During the late winter breeding season walrus are found in two major concentration areas of the Bering Sea where open leads, polynyas, or thin ice occur (Fay *et al.* 1984). While the specific location of these groups varies annually and seasonally depending upon the extent of the sea ice, generally one group ranges from the Gulf of Anadyr into a region southwest of St. Lawrence Island, and a second group is found in the southeastern Bering Sea from south of Nunivak Island into northwestern Bristol Bay. Currently, animals in these two regions are assumed to represent a single stock. Mitochondrial and nuclear DNA analysis of tissue samples taken from animals in the two areas in April (shortly after breeding season) indicate that either they are not discrete breeding groups, or, that separation took place so recently that it is not genetically detectable (Scribner *et al.* 1997).

POPULATION SIZE

The size of the Pacific walrus population has never been known with certainty. Based on large sustained harvests in the 18th and 19th centuries, Fay (1982) speculated that the pre-exploitation population was represented by a minimum of 200,000 animals. Since that time, population size is believed to have fluctuated markedly in response to varying levels of human exploitation (Fay *et al.* 1989). Large scale commercial harvests reduced the population to an estimated 50,000-100,000 animals in the mid-1950's (Fay *et al.* 1997). The population is believed to have increased rapidly in size during the 1960s and 1970s in response to reductions in hunting pressure (Fay *et al.* 1989).

Between 1975 and 1990, aerial surveys were carried out by the United States and Russia at five year intervals, producing population estimates ranging from 201,039 to 234,020 animals (Table 1). The estimates generated from these surveys are considered conservative population estimates and are not useful for detecting trends (Hills and Gilbert 1994, Gilbert *et al.* 1995). Efforts to survey the Pacific walrus population were suspended after 1990 due to unresolved problems with survey methods which produced population estimates with unacceptably large confidence intervals (Gilbert *et al.* 1992, Gilbert 1999). The current size of the Pacific walrus population is unknown.

In March 2000 the U.S. Fish and Wildlife Service (USFWS) and U.S. Geological Survey hosted a workshop on walrus survey methods (Garlich-Miller and Jay 2000). Workshop participants reviewed past efforts to survey the Pacific walrus population and discussed various approaches to estimate population size and trend. The amount of survey effort required to achieve a population estimate with an acceptably small variance (CV = 0.3) is expected to be extensive. Survey effort could be maximized by flying more transects, increasing survey swath width to sample a wider area, or both. Stratification could help focus survey area and reduce the amount of survey effort required, but will require additional research on the relationship between walrus distribution and environmental variables. Workshop participants