Historic and Current Habitat Use by North Pacific Right Whales, *Eubalaena japonica*, in the Bering Sea and Gulf of Alaska

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Key Words: North Pacific right whale, *Eubalaena japonica*, northern right whale, *Eubalaena glacialis*[1], habitat, distribution, prey, harvests, surveys, whaling records, Bering Sea, Gulf of Alaska

Extended Abstract: Prior to 1840, North Pacific right whales (*Eubalaena japonica*) were abundant during summer months across much of the North Pacific Ocean, particularly in the southeastern Bering Sea and Gulf of Alaska; however, commercial whaling during the latter half of the 1800s up until the 1960s nearly drove this species to extinction. Part of the difficulty in determining what habitat is important to the survival of such a rare species is that we cannot obtain sufficient sample sizes on critical variables such as sighting distribution, calving areas, or prey preferences. Furthermore, we cannot assume that the residual population will identify the full range of habitat that is important to this species. To help define areas and ecological parameters (bathymetry, season, prey) critical to the survival of the remnant population, habitat preferences were studied by examining all available sighting or harvest records in or near the southeastern Bering Sea and Gulf of Alaska over the past two centuries.

Maps were created with square 5º latitudinal/longitudinal blocks using GIS software to compare the monthly distribution of catches, sightings, and effort. The data were limited to the area between shore and 180º W and north of 40º N. Data were collated from (1) whaling records from the 1800s to the early 1900s, (2) sightings and harvests from 1924 to 1967, (3) Japanese survey effort and sighting data from 1964 to 1990, and (4) U.S. survey effort and sightings during the post-whaling period from 1979 to 2002.

Right whales were found consistently from the 1830s to the early 1960s over (1) the continental shelf break of the southeastern Bering Sea, (2) the southeastern Bering Sea middle shelf, (3) the continental shelf and slope south of Unimak Pass, (4) the shelf and slope south of Kodiak Island, and (5) the eastern Gulf of Alaska, extending south to the Queen Charlotte Islands. Spatial and temporal differences in the occupation of these areas were evident, though temporal patterns may reflect when and where whaling or survey activities took place. Since the 1960s, right whales have been found with some consistency only in the southeastern Bering Sea middle shelf, in spite of relatively extensive and widespread coastal survey efforts. It is unknown how

[1]The only species of right whale listed by NatureServe Explorer (version 4.0, July 2004) is the northern right whale (*Eubalaena glacialis*).

important the southeastern Bering Sea was to right whales when they were numerous, but it is obviously an area of importance to the remnant population as the whales still occupy this area from April to November as they did in the past.

Nearly all of the whaling in the southeastern Bering Sea (91%) took place in shelf waters less than 200 m deep. Conversely, south of the Aleutians, right whales were taken over the steep continental slope (200–2000 m) and basin waters (> 2000 m), and at least 80% of the right whales harvested in the Gulf of Alaska east of 160º W were in waters deeper than 2500 m. Since the late 1970s, spring and summer surveys specifically directed at detecting cetaceans have been focused on the shelf and slope waters of both the southeastern Bering Sea and the Gulf of Alaska. Recent sighting records indicate that right whales are found over shelf waters; however, relatively little search effort has occurred beyond the shelf break. Thus, sampling is insufficient to define bathymetric features that delimit right whale range.

Seasonal changes in distribution are suggested by the data, but this may simply reflect the timing and location of commercial whaling and survey activities. South of the Aleutian Islands and west of 160º W, most sightings were made in May (47%) and June (43%), with some made in July and September. In the Gulf of Alaska (east of 160º W), right whales were harvested from April through October, with the majority taken in June (33%) and July (34%). In the southeastern Bering Sea, harvests and sightings were made from May through October, with most occurring in August (30%) and September (34%). Therefore, based on the available records, a large proportion of the population occurred south of the Aleutian Islands in the spring, then to the east in the Gulf of Alaska in early/mid-summer, followed by higher concentrations to the north in the southeastern Bering Sea in late summer. There is no clear evidence of where North Pacific right whales are in winter.

Dates and sizes of four fetuses collected during right whale harvests suggest that calving may occur in autumn as early as October. This may explain why whalers, who usually departed the southeastern Bering Sea and Gulf of Alaska in October, never reported a calving area. Available data, however, are too sparse to be conclusive.

Right whales in the North Pacific prey on a variety of zooplankton species including *Calanus marshallae, Euphausia pacifica, Metridia* spp., and *Neocalanus* spp. Where sampled, *Neocalanus* and *Calanus* comprise the dominant zooplankton biomass in areas over the shelf and shelf break in the southeastern Bering Sea. They are widely distributed across oceanic, shelf, and coastal waters of the Gulf of Alaska. Determining oceanographic factors that aggregate prey is clearly important to any interpretation of whale distribution.

Defining habitat that is critical to the survival of the endangered North Pacific right whale population is difficult given the paucity of life history data. General migration patterns have been surmised, but there is no evidence of calving and nursery areas. Biological studies have been limited to nine whales killed for research in the early 1960s. An opportunistic sighting of a group of whales in July 1996 precipitated a series of aerial and shipboard surveys focused on the southeastern Bering Sea middle shelf. These studies have included photo-identification, genetics,

and acoustic monitoring in the southeastern Bering Sea and Gulf of Alaska, but because so few right whales remain, it is difficult to make any meaningful inferences regarding essential habitat elements for this species.