



Figure 4.20. Maps for northern right-whale dolphin: seasonal and overall densities from the CDAS central California data set (1980-2003).

ABOUT THESE MAPS

Figures 4.20 a, b and c show the density (animals/km²) of northern right whale dolphins (*Lissodelphis borealis*) in three ocean seasons – Upwelling, Oceanic, and Davidson Current, displayed in cells of 10' latitude by

10' longitude. Figure 4.20 d shows the corrected overall density combining all three seasons. Densities are based on the combined data sets of several studies conducted from 1980-2003; see Data Sources below and the Data

and Analyses section of this chapter for more information. The color and mapping intervals were selected to show the most structure and highlight significant areas, while allowing comparisons among species. Cells that were surveyed but in which no northern right whale dolphins were observed have a density of zero. Areas not surveyed appear white; no information is available for these areas. Dark blue lines indicate the boundaries of the National Marine Sanctuaries in the study area: Cordell Bank, Gulf of the Farallones and Monterey Bay. Bathymetric contours for the 200 meter and 2,000 meter isobaths are shown in blue.

DATA SOURCES AND METHODS

Densities for marine mammals at sea in this assessment are based on the CDAS central California data set (2003), developed using software called Marine Mammal and Seabird Computer Data Analysis System (CDAS), by the R.G. Ford Consulting Co. This data set contains data from eight survey programs (five aerial surveys, three ship surveys) conducted between 1980 and 2003; the data extends from Pt. Arena to Pt. Sal in the study area. See the Data and Analyses section of this chapter for information on the at-sea survey data sets and methods used to estimate density.

RESULTS AND DISCUSSION

The northern right whale dolphin is endemic to temperate waters of the North Pacific Ocean and occurs primarily in shelf, slope, and to some degree, deep ocean waters off the U.S. west coast. Although the southern end of this population's range is not well-documented, during cold-water periods, they likely range south into Mexican waters off northern Baja California (Carretta *et al.*, 2004; Carretta *et al.*, 2006). In the study area and the CDAS data set, this species occurred mostly over the outer shelf, slope, canyon, and deep ocean habitats, both within and beyond National Marine Sanctuary boundaries. The species was sighted in all three sanctuaries in all three ocean seasons, but mostly in the central and southern portion of Monterey Bay National Marine Sanctuary, and in waters to the west and south. In the CDAS central California data set (1980-2003), the northern right whale dolphin was the second most abundant cetacean, with 262 sightings of 33,856 individuals; overall seasonal density was highest in the Davidson Current season and lowest in the Upwelling season.

Northern right whale dolphins are found primarily off California during colder-water months and shift northward into Oregon and Washington as water temperatures increase in late spring and summer (Forney and Barlow, 1998). Although patterns of seasonal abundance have been observed throughout their range, there is no information to indicate that large numbers move between California, Oregon, and Washington waters (Green *et al.*, 1992).

The occurrence of northern right whale dolphin is highly variable; this species responds to oceanographic conditions on both seasonal and interannual time scales (Carretta *et al.*, 2001; Green *et al.*, 1992). In general, the absence of sightings of northern right whale dolphins in the CDAS data set may reflect the distribution of spatial and temporal survey effort rather than absence from the survey area; the maps shown likely do not reflect the total distribution of the species in the study area.

See an additional map for this species in Figure 4.28, from NOAA's Southwest Fisheries Science Center stock assessment surveys (July-December, 1991, 1993, 1996 and 2001). This map provides additional information on the range of the species off the coasts of California, Oregon and Washington.

Although human related sources of mortality and serious injury for the northern right-whale dolphin are associated with drift gillnet fisheries off California, Oregon, and Washington, entanglement rates vary among years and entanglements are relatively rare (Carretta *et al.*, 2004; Carretta *et al.*, 2006). Commercial fisheries that may take this species include the thresher shark/swordfish drift gillnet fishery of California and Oregon (Carretta *et al.*, 2004; Carretta *et al.*, 2006). Animals from this population of northern right-whale dolphins may also be taken in the drift gillnet fisheries for swordfish and sharks that exist along the entire Pacific coast of Baja California. Data are insufficient to evaluate trends in stock abundance and no habitat issues are known for this species (Carretta *et al.*, 2004; Carretta *et al.*, 2006). Although the northern right-whale dolphin is not listed as "threatened", "endangered" or "depleted", the total fishery mortality and serious injury for northern right-whale dolphins is greater than 10% of the calculated Potential Biological Removal (PBR) and cannot be considered to be insignificant and approaching zero mortality and serious injury rate (Carretta *et al.*, 2004).

Northern right whale dolphins feed on mesopelagic fishes (e.g., lanternfish) and squid (Leatherwood and Reeves, 1983).



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