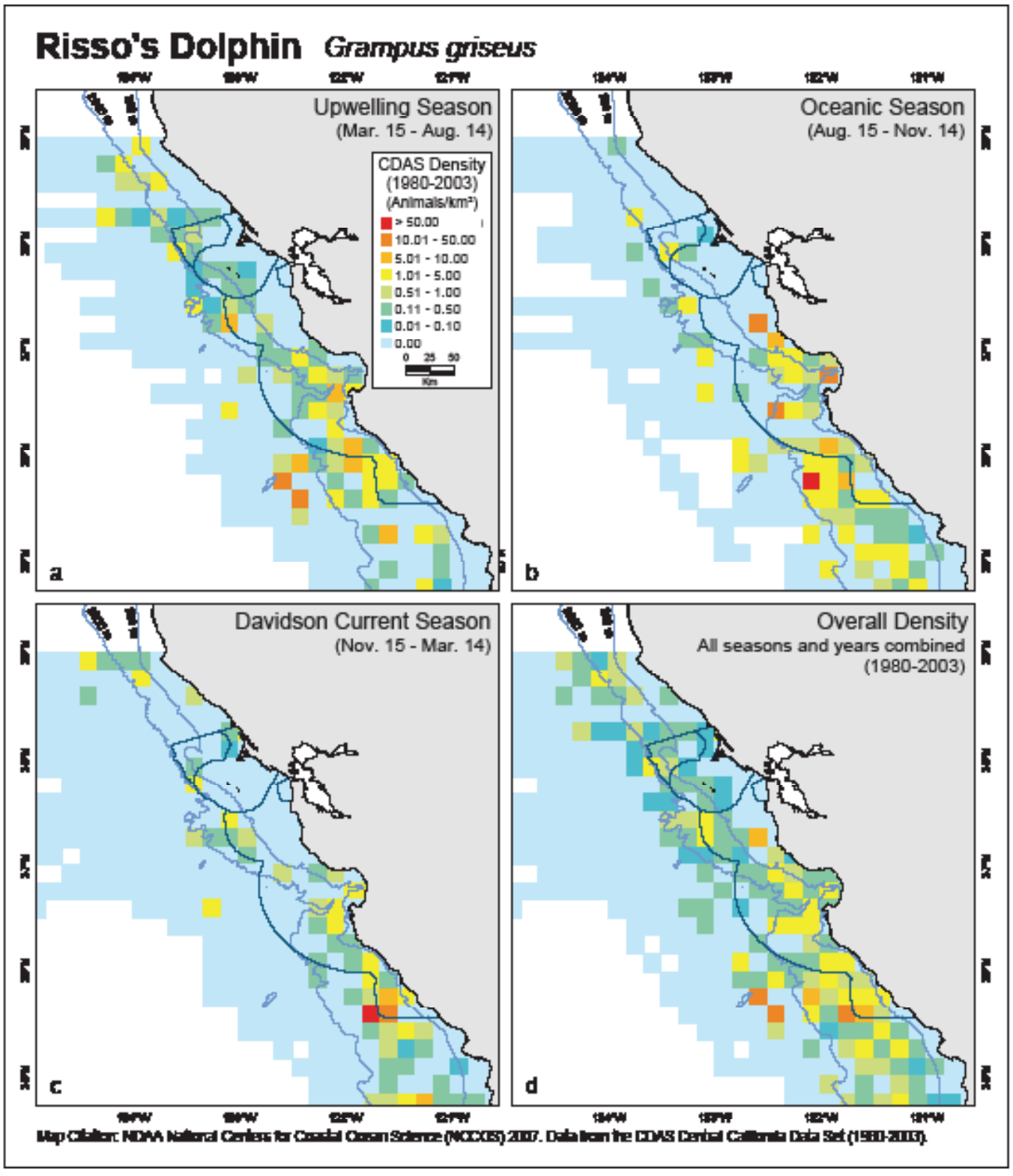

Figure 4.19. Maps for Risso's dolphin: seasonal and overall densities from the CDAS central California data set (1980-2003).

ABOUT THESE MAPS

Figures 4.19 a, b and c show the density (animals/km^2) of Risso's dolphin (*Grampus griseus*) in the Upwelling, Oceanic, and Davidson Current seasons, displayed in 10'x10' cells. Figure 4.19 d shows the overall density combining all three seasons. Densities are based on combined data of several ship-based and aerial survey studies conducted from 1980 to 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 Risso's dolphin 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 Risso's dolphin is distributed in tropical and warm-temperate ocean waters world-wide (Carretta *et al.,* 2004), including waters off the U.S. west coast. Within the U.S. Exclusive Economic Zone, Risso's dolphins are divided into two, discrete, non-contiguous areas: 1) waters off Washington, Oregon, and California, and 2) Hawaiian waters. (Carretta *et al.,* 2004; Carretta *et al.,* 2006). The distribution of Risso's dolphin off California, Oregon, and Washington is highly variable, apparently in response to seasonal and interannual oceanographic changes (Forney and Barlow, 1998). Dolphins found off California during colder water months are thought to shift northward into Oregon and Washington as water temperatures increase in late spring and summer (Carretta *et al.,* 2001; Green *et al.,* 1992).

In the study area, the species is widely distributed over outer shelf, slope, canyon and deep ocean habitats, both in and beyond all three sanctuaries. Risso's dolphin was the third most abundant cetacean in the CDAS central California data set (1980-2003); 373 sightings of 17,042 individuals occurred across all seasons; the Davison Current seaon had the highest overall seasonal density and the Upwelling season had the lowest. Overall higher densities of Risso's dolphins occurred in the central and southern portions of the study area, mostly in waters of the Monterey Bay National Marine Sanctuary and to the west and south. In general, the absence of sightings of Risso's 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 of 1991, 1993, 1996 and 2001). This map provides additional information on the range of the species off the coasts of California, Oregon and Washington.

There are no known habitat issues of concern for the Risso's dolphin, and the species is not listed as "threatened", "endangered", or "depleted". Insufficient data prohibit evaluation of potential trends in abundance (Carretta *et al.,* 2004; Carretta *et al.,* 2006).

Due to drift gillnet fisheries for sharks and swordfish, human-related sources of mortality and serious injury may occur off Baja California, Mexico, where drift gillnetting occurs along the entire Mexican coast (Carretta *et al.,* 2004; Carretta *et al.,* 2006). Off California, Oregon, and Washington, low levels of mortality of Risso's dolphin have been documented in the domestic groundfish trawl fisheries (Carretta *et al.,* 2004; Carretta *et al.,* 2006). The total fishery mortality and serious injury for this stock is considered to be insignificant. However, an additional mortality of unknown extent documented off Southern California is associated with the squid purse seine fishery (Carretta *et al.,* 2004; Carretta *et al.,* 2006; Heyning *et al.,* 1994).

Risso's dolphin feed almost exclusively on squid (Koski *et al.,* 1998; Orr, 1966).