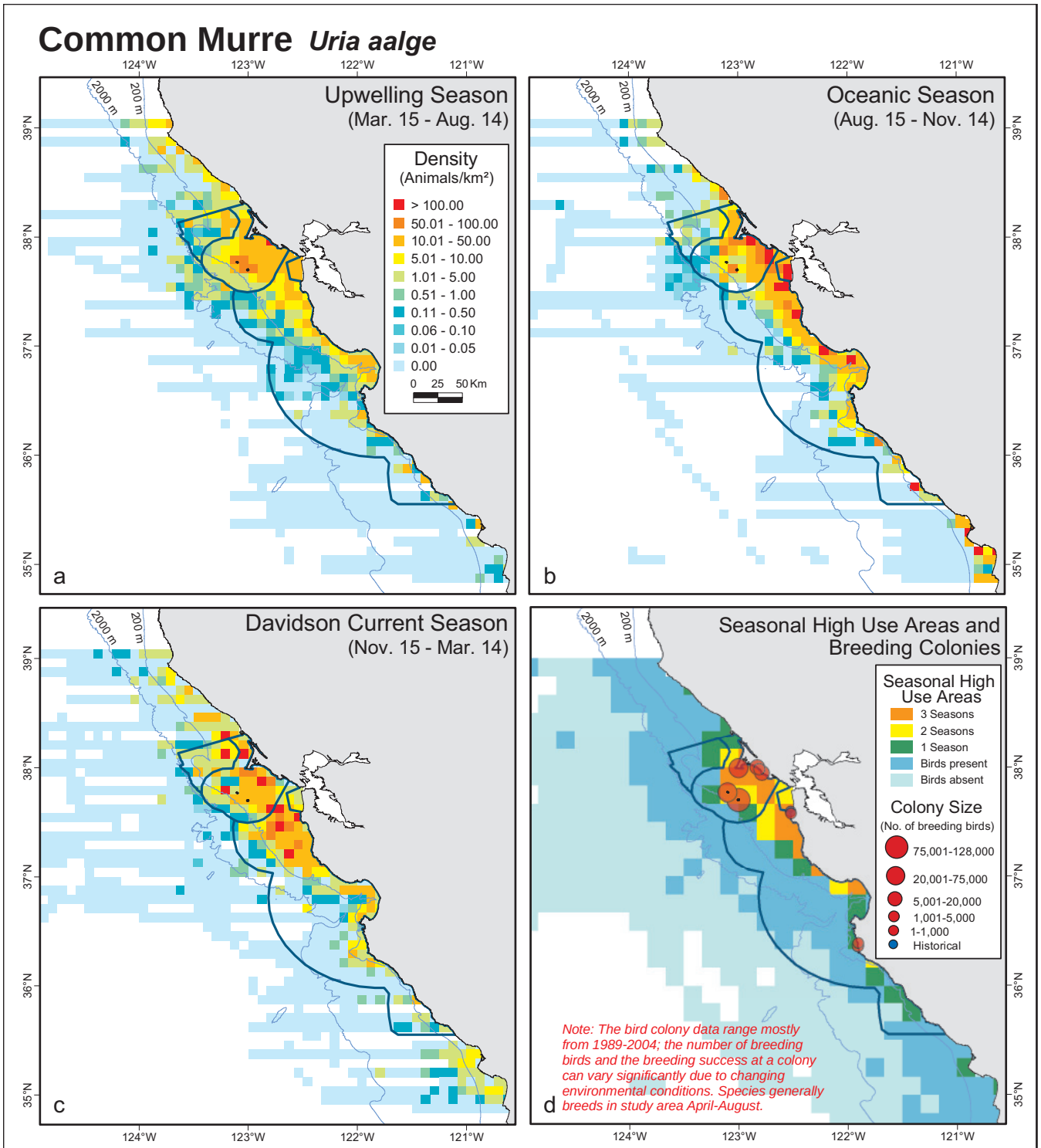

Figure 3.32. Common Murre: maps of seasonal density, high use areas, and breeding colonies.

ABOUT THESE MAPS

Maps a, b and c show the at-sea density (birds/km^2) of Common Murre (*Uria aalge*) in three ocean seasons – Upwelling, Oceanic, and Davidson Current, displayed in cells of 5' latitude by 5' longitude. Densities are based on the combined data sets of several studies; see the Data and Analyses section of this chapter. The color and mapping intervals were selected to show the most structure and highlight significant areas, while allowing comparisons among marine bird species. Cells that were surveyed but in which no Common Murres were observed have a density of zero. Areas not surveyed appear white; no information was available for these areas. 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 m and 2,000 m isobaths are shown in light blue.

To provide an integrated look at the patterns of a species' spatial and temporal occurrence and abundance in the study area, map d shows seasonal high-use areas, displayed in cells of 10' latitude by 10' longitude, and also breeding colonies (when available). The seasonal high use map provides a further synthesis of densities presented in maps a, b and c, and portrays the relative importance of various areas to the species. Areas with consistently high use are highlighted. See the Data and Analyses section of this chapter for further explanation of high-use areas.

DATA SOURCES AND METHODS

The at-sea data set is referred to as the CDAS central California data set (1980-2001) and was developed using software called Marine Mammal and Seabird Computer Data Analysis System (CDAS), by the R.G. Ford Consulting Co. The data set extends from Pt. Arena to Pt. Sal in the study area, and the surveys used were conducted between 1980 and 2001. See the Data and Analyses section of this chapter for more information on the at-sea survey data sets and methods. Data on colony sizes were recently updated and obtained from Capitolo *et al.,* (2006) and McChesney *et al.,* (2005) for the 2004 breeding season. Aerial photographic surveys of colonies are conducted annually in late May to early June by the U.S. Fish and Wildlife Service in cooperation with Humboldt State University and California Department of Fish and Game. Murres nest in very dense aggregations, often shoulder-to-shoulder, and do not build nests; thus, estimating numbers is very difficult without aerial photography. Bird counts, therefore, were adjusted using a correction factor of 1.67 (Sowls *et al.,* 1980, Sydeman *et al.,* 1997) to account for pair members not present and nonbreeders present during the survey. An exception was at Devil's Slide Rock and Mainland, where a known number of breeding pairs was multiplied by two to provide number of breeding birds. This species demonstrates a clear pattern of diurnal nest attendance (Ainley and Boekelheide 1990).

RESULTS AND DISCUSSION

The Common Murre is very abundant in the study area, being the second most numerous marine bird (to Sooty Shearwater) in waters off central California, and is the most numerous breeding species in the study area. The at-sea surveys in CDAS logged 21,893 sightings of 141,964 individuals, with the ratio between these numbers confirming that murres usually occur in flocks. Within the study area, the species nests mainly within the Gulf of the Farallones at a complex of densely-occupied colonies, including the Farallon Islands, Point Reyes, Drakes Bay area (including Point Resistance, Millers Point Rocks, and Double Point Rocks), and a small colony at Devil's Slide Rock. This complex constitutes one of the largest, if not the largest, breeding population of this species south of Alaska. A relatively small, disjunct breeding population, the southernmost for this species, occurs on a complex of rocks ("Castle-Hurricane Colony Complex") off the northern Big Sur coast (Monterey Bay National Marine Sanctuary).

Common Murres reside in the study area year-round, being particularly abundant in waters overlying the shelf and upper slope (mean depth 110 ± 5 m), with little seasonal change in distribution. Murre densities in general, however, were significantly higher during the Upwelling Season, probably because the entire local breeding population is present at that time. During the other seasons, some breeding individuals likely disperse outside of the study area. Murres attend the breeding colonies at least sporadically during much of the non-breeding season, indicating that most of the breeding population remains within the area during the fall and winter. A multiple regression model of nine independent variables explained 52.3% of variation in density; especially through inverse relationships with distance to colony, ocean depth, and distance to land; see Table 3.8. No significant trend in Common Murre abundance existed between 1985 and 2002, and abundance was not affected by short-term climate fluctuations (e.g., periods of unusually warm or cold sea temperatures).

Near the large Farallon Island colonies during nesting, many Common Murres range seaward beyond the continental slope (and outside sanctuary boundaries), perhaps as a response to increased intraspecific competition for prey at that time. As a result, the Farallon Escarpment is an area of high concentration, as well as the Farallon Ridge and shelf waters inshore of it. Murres occur in Monterey Bay after nesting, especially during the Oceanic Season. During years of unusually warm waters (and depleted prey), murres occur more frequently inshore, especially along the coast from Point Reyes south to Año Nuevo Island, the usual area of concentration during the relatively warm Oceanic Season.

The central California Common Murre population is recovering from a large decline suffered in the late 1800s, with a small setback in recovery occurring the 1980s. This latter decline was attributed to large-scale mortality in a nearshore set gill-net fishery, oil spills, and the intense 1982-83 El Niño event (Takekawa *et al.,* 1990, Carter *et al.,* 2001). All central California colonies were affected, and a colony of about 3,000 murres at Devil's Slide Rock was extirpated. Closures to the gill-net fishery dramatically reduced anthropogenic mortality and the population began increasing again in the 1990s. By 2004, populations at some colonies had increased to near the pre-decline (early 1980s) level, although growth at the Castle-Hurricane colonies has been slower (G. J. McChesney, pers. comm.). A restoration project resulted in recolonization of the Devil's Slide Rock colony in 1996 (Parker *et al.,* 2007).

This species is a deep diver (to 180 m depth; Ainley *et al.,* 2002) that feeds on fishes and invertebrates. During winter and early spring, major prey include herring, market squid and euphausiids; the murre's diet then shifts mostly to juvenile rockfish and anchovies in mid-summer. See Tables 3.5 - 3.11 for related summary information.