ABOUT THESE MAPS

Maps a, b and c show the combined at-sea densities (birds/km^2) of Surf Scoter, White-winged Scoter and Black Scoter (*Melanitta perspicillata, M. fusca,* and *M. nigra*, respectively) 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 scoter species 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.

In order 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.

RESULTS AND DISCUSSION

The distribution of White-winged, Surf and Black scoters in the north/central California study area is very similar to that of the grebes although the scoters are somewhat less abundant and more restricted closer to shore. There, scoters forage mostly just outside the surf break. On the outer coast, the abundant Surf Scoter dominates over the other two scoters, and Black Scoters, which occur in more protected waters, are rare. Surveys in CDAS recorded 1,787 sightings of scoters that included 42,691 individuals; more than half were identified as Surf Scoter. Scoters occurred in the study area during all three ocean seasons.

The most important areas for Surf Scoters within the study area were the San Francisco Bay tidal plume, especially southward along the Pacifica shore to Half Moon Bay, and the shallow parts of Bodega, Monterey, Estero and San Luis Obispo bays. These birds nest on the Arctic tundra along the north slope of North America; specific nesting areas of birds found wintering in or adjacent to the marine sanctuary boundaries have not been identified. The San Francisco Bay area has a large wintering population of surf scoters.

The apparent movement of these sea ducks offshore, i.e. to the outer parts of the Gulf of the Farallones, in the Upwelling Season is an artifact of their migration north or south, to or from Alaskan breeding areas. That portion of the population wintering south of central California takes the shortest distance across the Gulf of the Farallones; the offshore density cells highlighted in the maps is a record of flying scoters.

These birds do not forage far from the mainland beach, where they eat invertebrates; several dozen usually winter around the Farallon Islands. The inshore distribution of these ducks, like the grebes, makes them vulnerable to coastal oil spills. See Tables 3.5 and 3.11 for related summary information.