



Figure 3.37. Marbled Murrelet: maps of seasonal density, high use areas, and breeding colonies.

ABOUT THESE MAPS

Maps a, b and c show the at-sea density (birds/km²) of Marbled Murrelet (*Brachyramphus marmoratus*) 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 Marbled Murrelets 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.

The information on the Marbled Murrelet breeding population adjacent to the study area was from Steve Hampton (CDFG), pers. comm. 2006.

RESULTS AND DISCUSSION

The Marbled Murrelet is designated a Federal threatened species and a California state-listed endangered species. This species has shown a decline since the beginning of the study period (1980). At-sea surveys in the CDAS central California data set recorded 170 sightings of 357 individuals. Based on CDAS (1980-2001), the species is considered to be uncommon in the study area. During breeding in the Upwelling Season, it is found in coastal waters adjacent to where it nests, i.e. the old growth forest, inland from Año Nuevo, in the Santa Cruz Mountains area (see below). It moves

to and from its nesting sites at dawn and dusk. Most Marbled Murrelets occurred in ocean waters within 1-2 km of shore. After breeding, the majority of the population moved to northern Monterey Bay for the remainder of the year. Therefore, the Monterey Bay National Marine Sanctuary includes most of the important marine habitat for this population. Marbled Murrelets tend to spread farther offshore during warmwater periods.

Adjacent to the study area, the species nests in old-growth, redwood-dominated forests of the Santa Cruz Mountains. The current population estimate of Marbled Murrelets in this area is approximately 500 birds for the entire Santa Cruz Mountain area, including Big Basin Redwoods State Park, as well as nearby parks and surrounding areas. The area includes the drainage areas of Pescadero, Butano, Gazos, Waddell, and Scott Creeks. This estimate of 500 includes all marbled murrelets - adults, juveniles, etc. The number of breeding pairs is probably much less than 200, and the number actually nesting in a given year could easily be less than that. In 2004, the Fish and Wildlife Service reported that the southern population in California could be gone within the next several decades. Old-growth forest logging, predation and oil spills are key threats to this small, tree-nesting seabird's survival.

Given its rareness and the restricted area occupied by this species, a multiple-regression model of nine independent variables of the CDAS data set explained only 4.7% of variation in density; the top three variables included ENSO period (higher abundance during La Niña - cool water periods), and negative relationships with distance to land and latitude. In addition to La Niña, this species was also more abundant during the Davidson Current Season (mean density 4.3 birds per 100 km²) than during the Upwelling and Oceanic seasons (mean densities 1.3 and 0.3 birds per 100 km², respectively). Higher at-sea abundance during the Davidson Current Season likely reflected individuals being free of nesting duty.

The Marbled Murrelet feeds by diving in shallow waters, where it preys on euphausiids and fish (e.g., smelt, anchovy, juvenile rockfish). See Tables 3.5, 3.8, 3.9, 3.10 and 3.11 for related summary information.