Cordell Bank Ocean Monitoring Program (CBOMP)

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INTRODUCTION
Cordell Bank National Marine Sanctuary (CBNMS) initiated a long-term Monitoring Program in January 2004. Monitoring objectives include:
- Describe the planktonic and vertebrate fauna relative to oceanography
- Assess temporal and spatial variation in occurrence and abundance of fauna and oceanography
- Encourage collaborators to perform integrated ancillary research from the vessel

METHODS – FAUNA
- Surveys are conducted once/month using standard strip transect methodology (weather and ocean conditions permitting). Observers survey quarter-circle areas for birds and small circular areas for mammals, forward and abeam of observer location. All birds (except albatrosses), fish, and turtles are counted within 200 m strip; albatrosses are counted within 350 m strip; pinnipeds and small cetaceans are counted within 350 m on both sides of the vessel, binned into 200 m strips. Line-transect methodology is also used to survey whales (for comparative purposes). Prior to each survey a float attached to a rod reel is extended 200 and 350 m to calibrate individual observer distance estimations. Whale distances are estimated with reticul bioculares.

METHODS – OCEANOGRAPHY
- Thermosalinograph used to record sea surface temperature (SST) and sea surface salinity continuously along transect lines.
- CTD casts performed at selected locations using a SEABIRD SBE 19; data processed using SBE software and displayed using Surfer 7.0.
- Simrad EK60 echosounder with single 120kHz split-beam transducer used to estimate krill abundance.
- ArcView 9.0 Geographical Information System (GIS) used to integrate backscatter, fauna, and oceanography. SSTs were interpolate from TSG data using kriging.

PRELIMINARY RESULTS - 2004
- Eight surveys were conducted (due to weather and mechanical problems no surveys were conducted in Feb, May, June, July).
- 10,243 birds of 40 taxa, 501 marine mammals of 13 taxa, and 168 fish of 3 taxa were census.
- Depth, sea surface temperature, and backscatter mapped, and sighting locations of fauna for the October 2004 survey overlaid. High backscatter was documented along the shelf-break and this likely reflected krill abundance (based on similar work being conducted during the Wind to Whales surveys in Monterey Bay).
- CTD casts showed stratified and unstratified profiles depending on wind conditions. A cold water cell was embedded in the warmer stratified water between 50 - 100m and was apparent in profiles 4-6 in the late fall and into winter.

SEABIRDS
- Cassin’s Auklet were the most abundant seabird observed during all surveys; Densities varied spatially and temporally, likely reflecting variation in krill densities.
- Ashy Storm Petrel was the most abundant species during the August survey, when >6000 were estimated on and off transect.
- Unusual species sighted included the Laysan Albatross, Manx Shearwater, Black and Least storm petrels, and Xantus’ Murrelet.

MARINE MAMMALS
- Humpback and Blue Whales were relatively abundant in September and November.
- Dall’s Porpoise were relatively abundant in September.
- Pacific white-sided dolphins were relatively abundant in January and August.
- Greatest diversity of marine birds and mammals occurred in August.

FUTURE PLANS and ANALYSIS
- Add a Wellsflas fluorometer comparable to the fluorometer on the CTD which will sample continuous surface chlorophyll.
- Ground-truth backscatter data to classify as krill or other plankton.
- Conduct spatial analysis to test for mechanistic relationships between oceanography, prey, and marine birds and mammals.
- Document how relationships may change seasonally and annually in the context of the larger-scale distribution of predators in the Cordell Bank, Gulf of the Farallones, and Monterey Bay.

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