Establishing base-line data for killer whale (*Orcinus orca*) distribution and habitat use in the Galápagos Marine Reserve

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This study represents the first attempt to establish base-line information on killer whale (*Orcinus orca*) habitat use and distribution in the Galápagos Marine Reserve (GMR) using historical line-transect surveys (1976-2000) and opportunistic sightings (1948-1997). Analysis was conducted using data collected 1976-1997 (n=154) due to both collection methods being employed simultaneously. Sighting data were analyzed for both spatial and temporal distribution with respect to multiple variables: bi-annual seasonality; the Multivariate El Niño Southern Oscillation Index (MEI); and resource distribution (chlorophyll a and pinniped rookeries). Three questions were posed: 1) do killer whale sightings display temporal variability; 2) are sightings spatially associated with resources; and 3) if sightings are spatially associated with resources, does the spatial association change temporally? Sightings were roughly equally distributed between non-upwelling (56%) and upwelling seasons (July-December). No direct correlation was found between sightings and the MEI. Sightings occurred more often than expected by chance during the peak upwelling months of August-November when the MEI was within one standard deviation of the average (binomial $z=2.91$, $p< 0.05$). Sightings were spatially associated with areas of high chlorophyll a values (binomial $z=4.46$, $p< 0.05$), pinniped rookeries (binomial $z=6.03$, $p< 0.05$), and areas with high combined resource value (binomial $z=5.36$, $p< 0.05$). The spatial distribution of sightings did not shift with seasonality, with the exception that sightings occurred less often than expected in areas of low combined resource value during the upwelling period (binomial $z=-3.17$, $p< 0.05$). Though uncertainty in observer effort should be considered when evaluating these data, these results do not suggest a strong pattern of seasonal occupancy or that killer whales are responsive to El Niño Southern Oscillation events. Our work attempts to identify important habitat and seasonal use by killer whales in the GMR to support both regional conservation measures and future focal investigations into their role in the ecosystem.