

## **Shark movements and the design of protected pelagic environments within and beyond the Galapagos Marine Reserve**

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The Galapagos Archipelago is one of the last outposts where large numbers of sharks and other marine predators still remain in the eastern tropical Pacific. The Galapagos Marine Reserve (GMR) offers some protection, but its effectiveness is limited because marine predators were not included in the general layout of the reserve. We intend to alleviate this management problem by incorporating movements of sharks in the design of protected pelagic environments. Our studies using satellite and continuous tracking at the Galapagos Islands show movements of scalloped hammerhead, Galapagos, and whale sharks in insular (< 50 km), inter-island (50-400 km) and oceanic (> 500 km) spatial scales. This implies 1) a high degree of use of areas bordering islands, 2) inter-island connectivity within the GMR, and 3) the likelihood of migratory corridors between the Galapagos and other open water regions beyond the reserve either adjacent to the 40-mile limit of the GMR or further offshore. Our work demonstrates that hotspots vary in scale, from large-scale hotspots encompassing Darwin and Wolf islands to small-scale hotspots contiguous to islands. These findings have strong implications in the shaping of marine reserves based on movements and habitat use of top marine predators rather than existing standards.