National Marine Sanctuaries and Marine Spatial Planning: The Importance of Apex Predators in Planning for the Future

TOPP
Tagging Of Pacific Pelagics

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Introduction & Methods:

Understanding how apex predators use marine protected areas is crucial to implementing marine spatial management (MSP) (Hooker & Gerber 2004). We used satellite tracking to determine habitat utilization with the California Current System and US National Marine Sanctuaries between 2003 and 2008. Species include:

1. **Blue whales**, *Balaenoptera musculus*; n=51; 2004 – 2007
2. **Humpback whales**, *Megaptera novaeangliae*; n=21; 2004 – 2005
3. **California sea lions**, *Zalophus californianus*; n=79; 2003 – 2008
4. **Sooty shearwaters**; *Puffinus griseus*; n=26, 2005 – 2006
5. **Black-footed albatrosses**, *Diomedea nigripes*; n=38; 2003 – 2006
6. **Laysan albatrosses**, *D. immutabilis*; n=99; 2003, 2005 – 2006

Tracks were gridded (0.25°) and high density areas calculated for individual species and all species over a number of time periods.
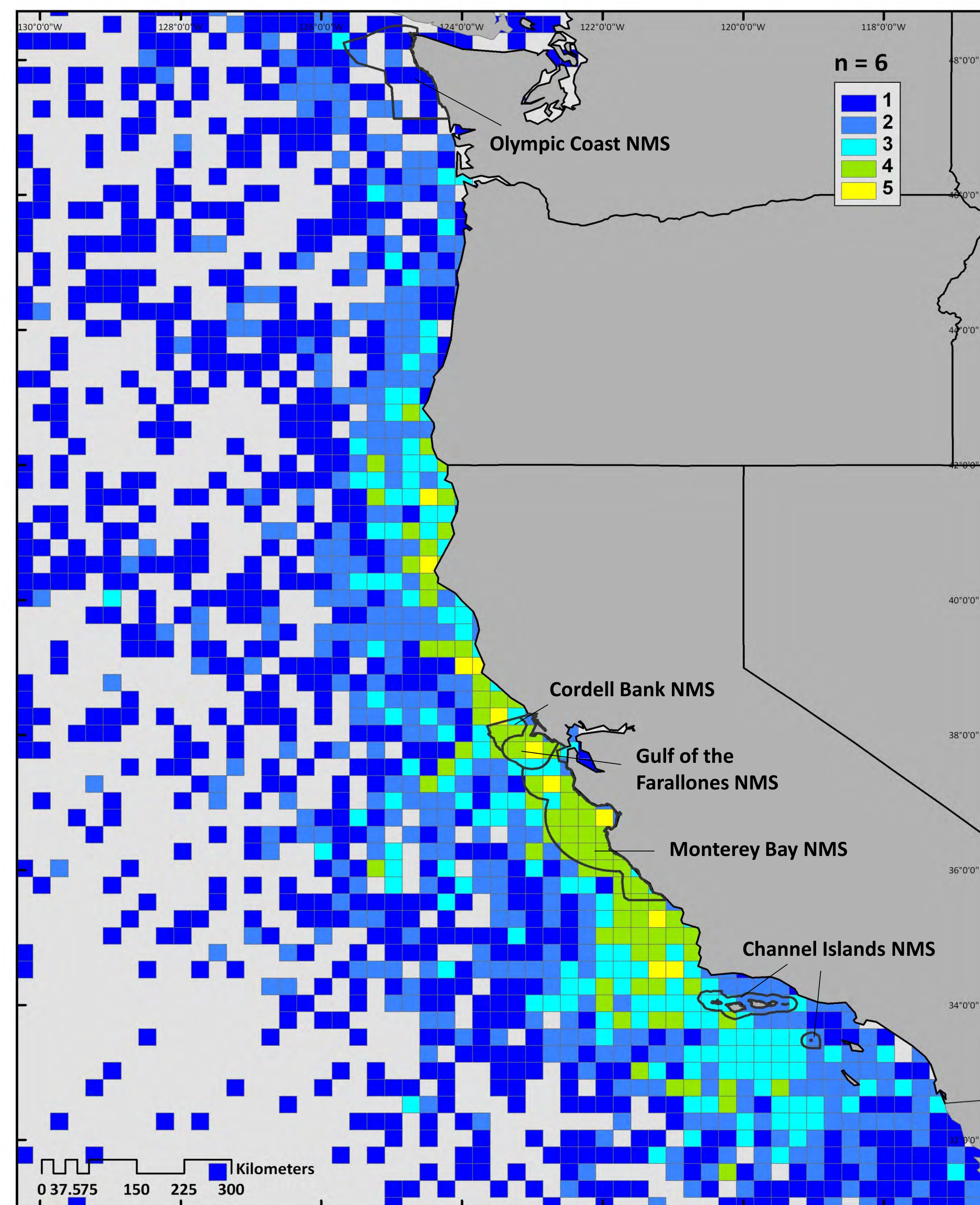

Figure 1. Number of species per grid cell for all satellite tracking years (2003-2008). The Sanctuaries incorporate high-density areas in central California but additional protections are necessary offshore and to the north. Species represented: Blue whales, humpback whales, California sea lions, sooty shearwaters, black-footed albatrosses and Laysan albatrosses.

Conclusions & Recommendations:

The Sanctuaries incorporate high density species areas though gaps occur in northern California and southern Oregon (Figure 1). Shifts in distribution patters occurred between years, particularly anomalously warm oceanographic years (Figure 2) (Schwing et al 2006) and use varied by species (Figure 3). We recommend:

1. **Extending Sanctuary boundaries** offshore to protect during variable years
2. Apply MSP to reduce interactions between whales and potential **offshore oil and gas development**.
3. Use MSP to prevent against direct (i.e. bird bycatch) and indirect (i.e. resource competition with sea lions) **fishery interactions** within Sanctuary boundaries.
4. **Increase protections** in northern California and southern Oregon.

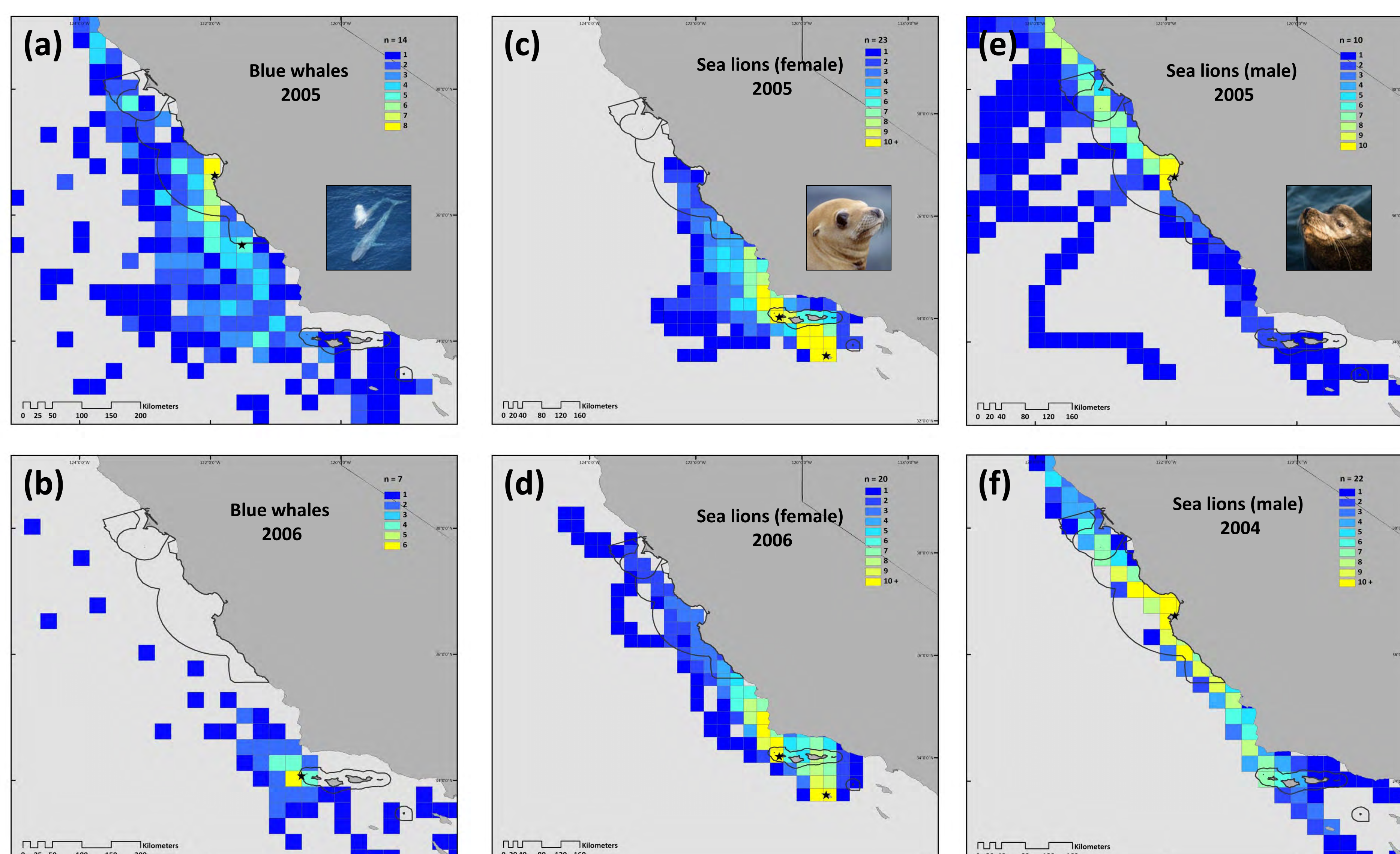These changes will result in more comprehensive protections on along the US West Coast.

Figure 2. Species distributions (animals per grid cell) for blue whales in 2005 (a) and 2006 (b), female California sea lions in 2005 (c) and 2006 (d); Califronia sea lion males in 2005 (e) and 2004 (f) show how distribution varied in cooler (2004 or 2006) vs. warmer (2005) years. Stars represent tagging locations.
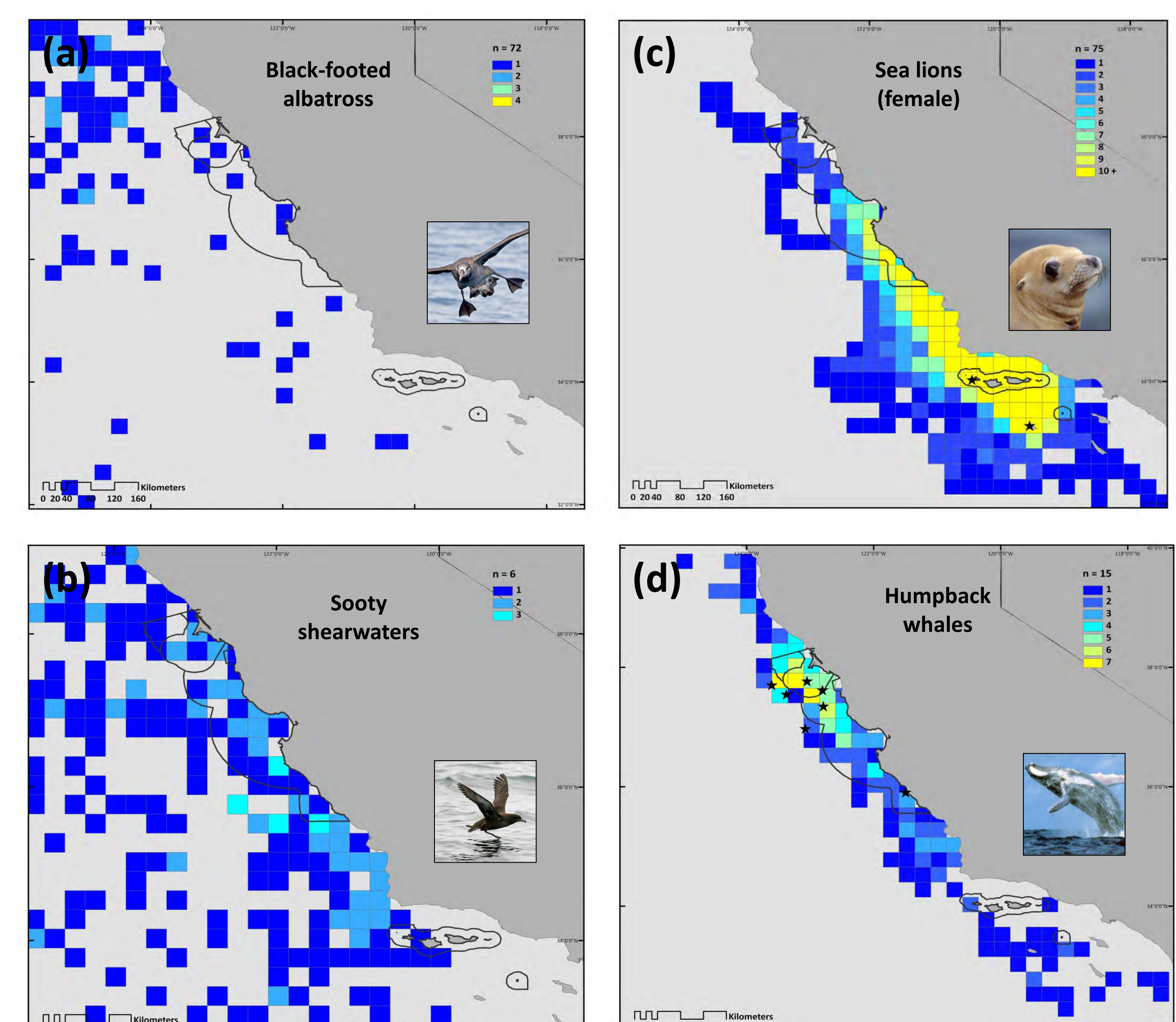

Figure 3. Overall species distributions (animals per grid cell) for black-footed albatrosses (a), sooty shearwaters (b), female sea lions (c) and humpback whales (d) show the various intensities species use the Sanctuaries.