

**California Marine Life Protection Act Initiative**  
**Methods Used to Evaluate Marine Protected Area Proposals in the**  
**MLPA South Coast Study Region (Draft)**

**Section 7.0 – Size**

*Draft revised January 5, 2009*

**7.0 SIZE (GOALS 2 AND 6)**

**Summary of Guidelines: Size Analyses**

Size guidelines were developed to provide for the persistence of important bottom-dwelling fish and invertebrate groups within marine protected areas (MPAs) (MLPA goals 2 and 6).

Guidance on size found in the *California Marine Life Protection Act Master Plan for Marine Protected Areas* states:

- “For an objective of protecting adult populations, based on adult neighborhood sizes and movement patterns. MPAs should have an alongshore span of 5-10 kilometers (3-6 miles or 2.5-5.4 nautical miles) of coastline, and preferably 10-20 kilometers (6-12.5 miles or 5.4- 11 nautical miles). Larger MPAs would be required to fully protect marine birds, mammals and migratory fish.”
- “For an objective of protecting the diversity of species that live at different depths and to accommodate the movement of individuals to and from shallow nursery or spawning grounds to adult habitats offshore, MPAs should extend from the intertidal zone to deep waters offshore.”

The first size guideline arises primarily from data on the movement of adult and juvenile fish and invertebrates. Since MPAs will be most effective if they are substantially larger than the distance that individuals move, larger MPAs provide benefit to a wider diversity of species.

A summary of existing scientific studies of adult movement shows that adult movement varies greatly among California’s marine species (Table 4). A recent synthesis and analysis of movement information for west coast rocky reef fishes indicates that the range of movement for 75 percent of individuals of a species (the 75<sup>th</sup> percentile movement range) was 3 kilometers (km) or less for 85% of the 26 species for which data are available<sup>1</sup>. However, the majority of movement data are available for shallow dwelling reef fishes (depth < 30-50 meters). This synthesis also shows that movement distance was not correlated with days at liberty for eleven species for which data are available, indicating that movement of these species was unlikely a diffusive process (i.e. increasing range with time). The analysis also showed that movement distances for deeper dwelling species (n= 6, 75<sup>th</sup> percentile = 35 km) was significantly greater than for shallower dwelling species (n= 18, 75<sup>th</sup> percentile = 2 km).

Therefore the choice of any MPA size determines the subset of species that could potentially benefit. For species with average movement distances of 100s to 1000s of miles, MPAs are unlikely to be a source of significant protection (except when they protect critical locations, e.g., spawning or nesting grounds). As a result, the master plan guidelines focus on species in the first three movement categories in Table 4. The minimum size guideline of 5 to 10 km targets species in the first two categories. The preferable 10 to 20 km size range attempts to provide substantially more benefit to the important group of species in category 3 (10 - 100 km

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<sup>1</sup> Jan Freiwald, unpublished dissertation.

movement). This group includes a number of important rockfishes from the California coast. Therefore, MPAs that meet the preferable size guideline should protect more biological diversity than MPAs that just meet the less stringent minimum guideline.

Table 4. Scales of adult movement for California coastal marine species

 <b>SAT Guidelines: Goals 2 and 6</b>				
0 – 1 km	1 – 10 km	10 – 100 km	100 – 1000 km	> 1000 km
<b>Invertebrates</b> abalone, mussel, octopus, sea star, snail, urchin <b>Rockfishes</b> black & yellow brown, copper, gopher, grass,* kelp, quillback, starry, treefish, vermillion <b>Other Fishes</b> cabezon, eels, greenlings, giant seabass, black, striped, and pile perch, pricklebacks	<b>Rockfishes</b> black, China, greenspotted,* olive, yelloweye <b>Other Fishes</b> walleye perch* 	<b>Invertebrates</b> Dung. crab** <b>Rockfishes</b> blue, bocaccio, yellowtail <b>Other Fishes</b> Ca. halibut, lingcod, starry flounder <b>Birds</b> gulls, cormorants <b>Mammals</b> harbor seals, otter	<b>Rockfishes</b> canary <b>Fishes</b> anchovy, big skate, herring, Pacific halibut, sablefish,** salmonids,** sole spp., sturgeon <b>Birds</b> gulls** <b>Mammals</b> porpoises, sea lions**	<b>Invertebrates</b> jumbo squid** <b>Fishes</b> sardine, sharks**, tunas**, whiting** <b>Turtles**</b> <b>Birds</b> albatross**, pelican**, shearwater**, shorebirds**, terns** <b>Mammals</b> dolphins, sea lions**, whales**
		* Studies of this species included fewer than 10 individuals ** Seasonal Migration		

[Staff note: Replace with actual table]

The second size guideline arises from an attempt to connect habitats across depth ranges. Many marine species spend different parts of their life cycle in different habitats that often span a range of depths. By connecting these different habitats in a single MPA, species that move among contiguous habitats will likely benefit.

Therefore, *the second size guideline states*: “For an objective of protecting the diversity of species that live at different depths and to accommodate the movement of individuals to and from shallow nursery or spawning grounds to adult habitats offshore, MPAs should extend from the intertidal zone to deep waters offshore.”

This guideline reflects the recommendation of the MLPA Master Plan Science Advisory Team (SAT) that MPAs extend from the shore to the boundary of state waters (3 nautical miles).

Extending MPA boundaries to the edge of state waters has the added benefit of allowing for connections with any potential future MPA designations in federal waters. The combination of the two size guidelines forms the basis for SAT evaluation of MPAs.

In evaluating the size of MPAs, the SAT considers the area of individual MPAs and clusters of contiguous MPAs. The size guidelines in the master plan specify that MPAs should cover an alongshore span of at least 3 to 6 statute miles (preferably 6 to 12 statute miles) and extend from the coast to deep waters offshore. Because state waters extend only 3 nautical miles offshore, the SAT considers an MPA or cluster of MPAs that extend to the offshore limit of state waters to meet the offshore guideline. The SAT combines and simplifies alongshore and offshore guidelines from the master plan by using a minimum size threshold of 9 square statute miles (3 miles alongshore and 3 miles offshore) while recognizing that the state waters extend 3 nautical miles offshore. No MPA that is smaller than 9 square miles could meet both the alongshore and onshore-offshore size guidelines mentioned above. Thus, for the purpose of SAT analyses, MPA clusters with areas 9 to 18 square miles are considered to fall within the minimum size range, and those 18 to 36 square miles fall within the preferred size range.

In evaluating the size of MPAs, the SAT:

- combines contiguous MPAs at or above a given level of protection into clusters. Size analyses are conducted at three different LOPs: mod-high, high, and very-high.
- tabulates the number of MPA clusters in each size range (below minimum, minimum size range, preferred size range).

Note that estuarine MPAs are not evaluated with respect to size. Because species and life stages that inhabit estuaries, rarely stray from the favorable estuarine habitat, the overall size of the MPA is less important than protecting the entire estuarine system. Thus, the SAT recommends that MPAs encompass entire estuaries, if feasible, but does not evaluate the size of estuarine MPAs relative to the size guidelines.