

# How do patterns of abundance and size structure differ between fished and unfished waters in the Channel Islands? Results from SCUBA surveys

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Two research programs, Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) and Channel Islands National Park - Kelp Forest Monitoring (NPS-KFM) program use SCUBA surveys to monitor kelp forest communities inside and outside of marine reserves around the northern Channel Islands. On average, species targeted by fishing are larger and more abundant, resulting in greater biomass (total weight), in marine reserves than in fished waters. In contrast, abundance, biomass and size of species that are not targeted by fishing generally are similar in reserves and fished waters. These results suggest that removal of fishing pressure within reserves may account for the difference in abundance, size and biomass.

## Key Findings:

- For targeted fish species, density was 1.5 times greater and biomass was 1.7 times greater, on average, in reserves relative to fished areas. Density and biomass of non-targeted fish species were about the same inside and outside reserves.
- Fishes were larger inside reserves, on average, and size differences were more pronounced for targeted species. There were, however, island by island differences. Kelp bass (targeted by fishing) were larger inside reserves relative to fished areas at all islands; California sheephead (also targeted by fishing) were larger inside reserves at the eastern islands (Anacapa), but larger outside reserves at the western islands (San Miguel).
- Density of targeted invertebrates was 1.4 times greater in reserves relative to fished areas, while density of non-targeted invertebrates was about equal inside and outside reserves. Several species, including California spiny lobster (targeted) and red and golden gorgonians (non-targeted species), were more abundant inside reserves relative to outside, but this result occurred at only a few islands where these species are very abundant.
- In 2005, scientists from PISCO and NPS-KFM began fine spatial scale monitoring inside and outside of four reserves. The fine spatial scale monitoring shows that, for California sheephead and kelp bass (fished species), abundance is higher towards the center of reserves and declines towards the boundaries. This pattern could result from fishing at the edges of reserves or variation in habitat.

