Detecting changes in fish abundance in the deep waters of the Channel Islands marine reserves using a remotely operated vehicle

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Scientists from the California Department of Fish and Game, in collaboration with the National Oceanic and Atmospheric Administration (NOAA), Pacific States Marine Fisheries Commission, Marine Applied Research and Exploration, and The Nature Conservancy, studied marine habitats and fishes in the Channel Islands marine protected areas (MPAs) using a remotely operated vehicle (ROV). Since 2004, scientists used the ROV to survey rocky areas inside and outside of MPAs at depths of 45 to 220 feet. While SCUBA divers are only able to reach depths of 60 feet, the ROV provides data on areas that are too deep to monitor with SCUBA surveys. Scientists surveyed over 240 kilometers of rocky habitat with the ROV to measure whether or not MPAs had an impact on fish abundances.

Are there differences in fish abundances in MPAs relative to fished areas? Yes!

Fish Species	Abundance in MPAs
Blacksmith	>
Blue Rockfish	>
California Sheephead	>
Copper Rockfish	>
Gopher Rockfish	>
Lingcod	>
Olive Rockfish	=
Pile Perch	=
Sebastomus	=
Señorita	<
Treefish	>
Vermilion Rockfish	>

>	Abundance is significantly greater in MPAs.
<	Abundance is significantly greater in fished areas.
=	Abundance is similar in MPAs & fished areas.

- 8 of 12 finfish species, including several species of rockfish, were significantly more abundant in MPAs relative to fished areas (see table, left).
- SCUBA surveys[3] in shallower waters also showed that 7 of the 8 species were more abundant in MPAs than in fished areas.
- Fish species with the greatest differences in abundance between MPAs and fished areas were those targeted by fishing.
- One fast-growing prey species, señorita, was more abundant in fished areas than in MPAs.

Can differences in fish abundances be attributed to protection from fishing?

Not yet! Three years of data provide a baseline, which will allow scientists to detect future changes in fish abundance. But, three years of data are not enough to distinguish the effects of protection in MPAs from other factors. Some species, such as rockfish, grow slowly and may take decades to respond to protection in MPAs.

Can we use remotely operated vehicles to detect effects of MPAs, if and when they occur?

- Yes! We started by gathering a baseline of information for the past three years. The survey design and technique are rigorous so we can detect changes in abundance over time, even for species at low densities, such as lingcod. In the coming years, we can use ROV surveys to detect if and when abundance of fish begins to change through growth and reproduction in MPAs.

[3]SCUBA surveys conducted by PISCO (Partnership for Interdisciplinary Studies of Coastal Oceans) at the University of California, Santa Barbara.