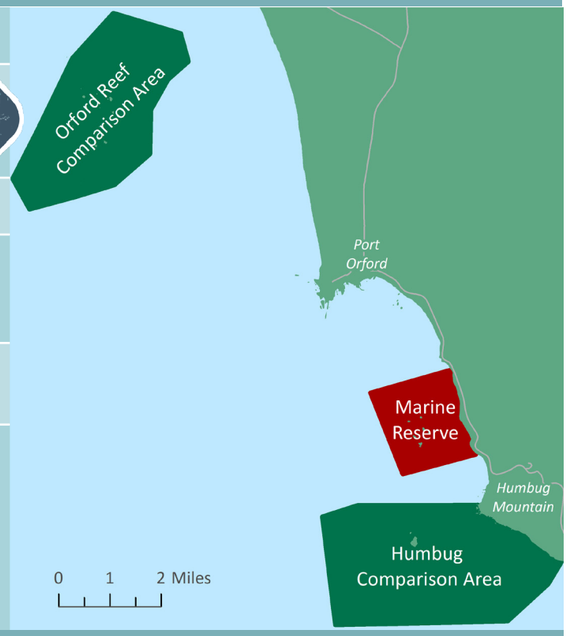
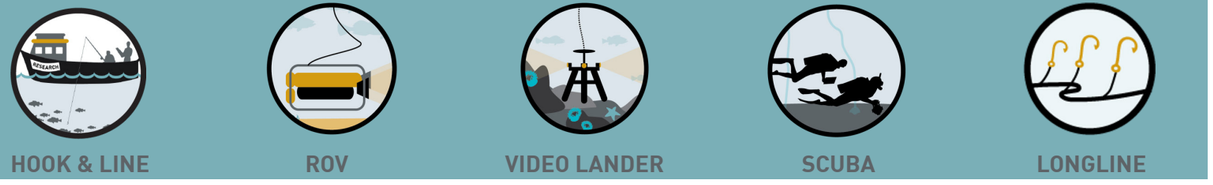
REDFISH ROCKS MARINE RESERVE

What have we learned after the first 10 years of monitoring?

RESTRICTIONS BEGAN	2012	
MONITORING BEGAN	2010	
SIZE	Reserve:	7 km²
DEPTH RANGE	Reserve:	0-40 m
HABITATS	Emergent rocks and islands, kelp beds, large boulders, complex high-relief rocky reef, and soft sediment habitats.	
HABITAT CONNECTIVITY	Rocky reef habitats extend north and south beyond the reserve.	
PRIOR FISHING PRESSURE	Relatively high fishing pressure on groundfish and red urchins in rocky habitat areas. Relatively low fishing pressure on crab.	





WHAT MAKES REDFISH ROCKS UNIQUE

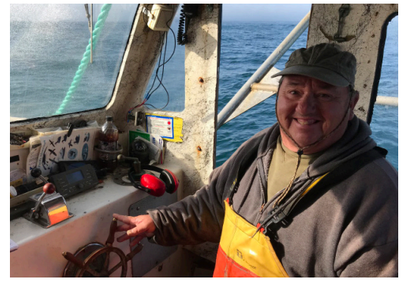
- A distinct fish community, with the highest species richness of rocky reef fish species and the most China Rockfish of all the marine reserve sites.
- The invertebrate community is distinct from all other marine reserve sites, with both Red and Purple Sea Urchin densities increasing to a greater degree than other marine reserves.
- Oceanographic conditions stand out with stronger winds leading to increased upwelling and colder water temperatures compared to other marine reserve sites.

WE DOCUMENTED KEY CHANGES IN SPECIES AND ECOLOGICAL COMMUNITIES

- We observed the impacts of sea star wasting disease at the marine reserve and its two comparison areas.
- We documented natural, inter-annual variability in fish and invertebrate communities.
- It is too soon to attribute ecological changes to marine reserve protections.
- Our monitoring provides a foundation to evaluate future changes attributable to marine reserve protections.

LONGLINE SURVEYS BOOST SAMPLING OF COMMERCIALLY TARGETED SPECIES

- Based on the expert knowledge of local fishermen, we developed a supplemental longline survey to sample species targeted by the local longline fishery in this region.
- We catch more commercially important species such as Cabezon, Vermillion Rockfish and Copper Rockfish with longline gear.
- We catch larger individuals of Lingcod, Canary Rockfish, and Quillback Rockfish with longline gear.
- These species were under represented in hook-and-line surveys, so now we use both hook-and-line and longline surveys at this site.



Jeff Miles, captain of the F/V Top Gun

SHIFTS IN ABUNDANCE OF SEA STARS, SEA URCHINS, AND CORRALINE ALGAE

- Sunflower Sea Stars - a main predator of sea urchins - completely disappeared following the outbreak of sea star wasting disease in 2014.
- Purple Sea Urchin densities began increasing as Sunflower Sea Stars decreased.
- Crustose coralline algae cover increased – a functional group of red algae often associated with sea urchin density increases.
- Continued monitoring allows us to track ecosystem responses to natural stressors.

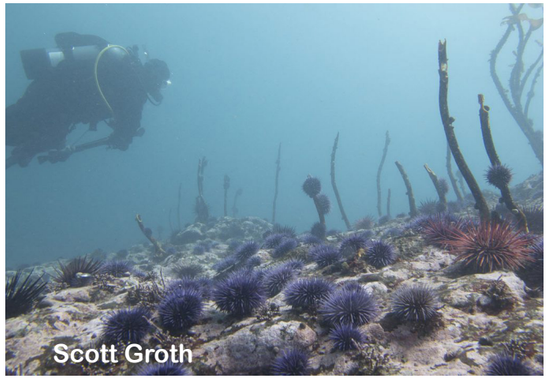


Figure: Trends in Sunflower Sea Star and Purple Urchin mean densities, and crustose coralline algae mean percent cover from 2010-2019 SCUBA surveys. Error bars indicate 95% confidence intervals (CI).