



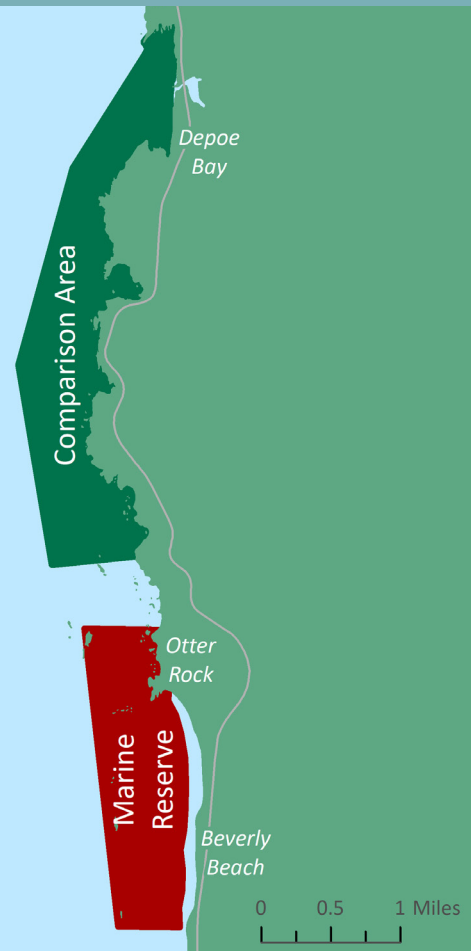


OTTER ROCK MARINE RESERVE

What did we learn after the first 10 years of monitoring?



RESTRICTIONS BEGAN	2012
MONITORING BEGAN	2010
SIZE	Reserve: 1.16 mi ²
DEPTH RANGE	Reserve: 0-46 ft
HABITATS	Shallow rocky habitats including bedrock and boulders, and patches of kelp beds, as well as emergent rocks and islands. Areas of soft sediment. Rocky intertidal habitats from Devils Punchbowl north.
HABITAT CONNECTIVITY	Rocky habitats extend north and south, and slightly farther offshore, beyond the reserve.
PRIOR FISHING PRESSURE	Relatively low fishing pressure due to shallow depths and small area, with exception for red urchin that experienced relatively high pressure and moderate fishing pressure shoreside by recreational anglers.
CORE TOOLS	 VIDEO LANDER  SCUBA



WHAT MAKES OTTER ROCK UNIQUE

- A living laboratory for shallow water species. Surfperch and Gumboot Chitons are frequently observed here.
- The intertidal habitat has the highest diversity of algae and sea grass compared to other marine reserves.
- The reserve is easy for researchers to access and has the most long-term collaboration projects, expanding our knowledge about:
 - juvenile fish settlement
 - sea star health
 - oceanography
 - intertidal biodiversity
 - sea urchin populations

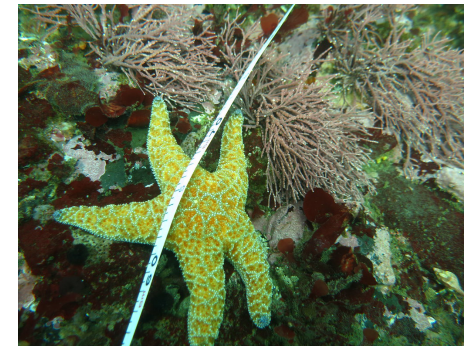
OTTER ROCK MARINE RESERVE

WE DOCUMENTED KEY CHANGES IN SPECIES AND ECOLOGICAL COMMUNITIES

- We observed the complete disappearance of the Sunflower Sea Star in response to sea star wasting disease at the marine reserve and its comparison area.
- We documented natural, inter-annual variability in fish, algae, and invertebrate communities.
- It is too soon to attribute ecological changes to marine reserve protections.
- While we anticipate minimal changes attributable to marine reserve protections at this site due to low historical fishing pressure and small size, our monitoring provides a foundation to evaluate future changes.

DIFFERING TRENDS IN OCHRE SEA STARS ABOVE AND BELOW THE TIDELINE

- Sea star wasting disease (SSWD) first appeared on the Oregon Coast in 2014, prevalent in intertidal Ochre Sea Star populations.
- We observed differences in trends following SSWD, with fluctuating densities in the intertidal, whereas densities increased below the tideline in the subtidal habitat.
- Long-term monitoring at this site provides a more complete picture of the impacts of SSWD above and below the tideline.



Ochre Sea Star on a subtidal SCUBA survey at Otter Rock.

DIFFERENT YEARS, DIFFERENT TRENDS IN JUVENILE CABEZON SETTLEMENT

- Juvenile fish can spend days to months in the plankton before settling to shallower, nearshore waters.
- Our longest collaboration at Otter Rock is with Oregon State University studying the settlement of juvenile fish, using devices called standard monitoring units for the recruitment of fishes (SMURFs).
- Patterns of juvenile fish settlement are helpful for understanding changes in adult populations in the future.
- For Cabezon, we saw settlement vary year to year, but observed similar trends at both the marine reserve and comparison area through time.
- This collaboration has contributed to the 2019 Cabezon Stock Assessment and the training and research of graduate and undergraduate students resulting in peer reviewed publications.



Baby Cabezon from SMURF sampling.

Figure: Timeseries of Cabezon mean settlement rate at Otter Rock Marine Reserve and Cape Foulweather Comparison Area over eight years. Error bars indicate the standard error.

