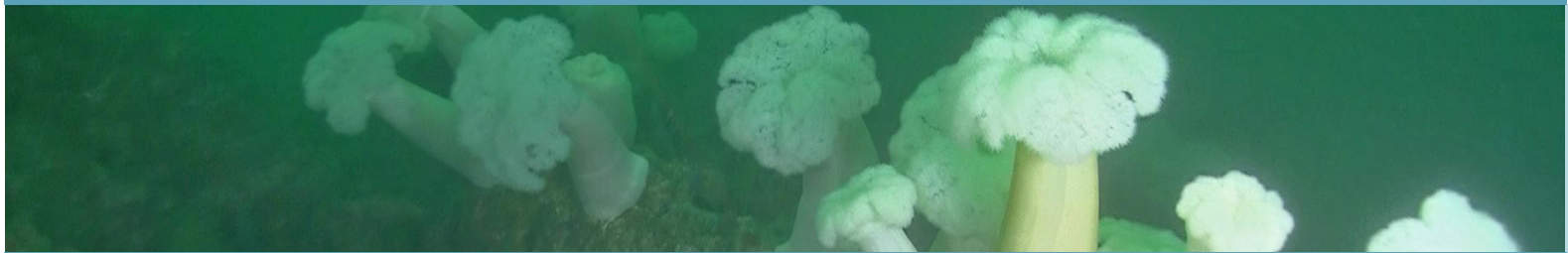




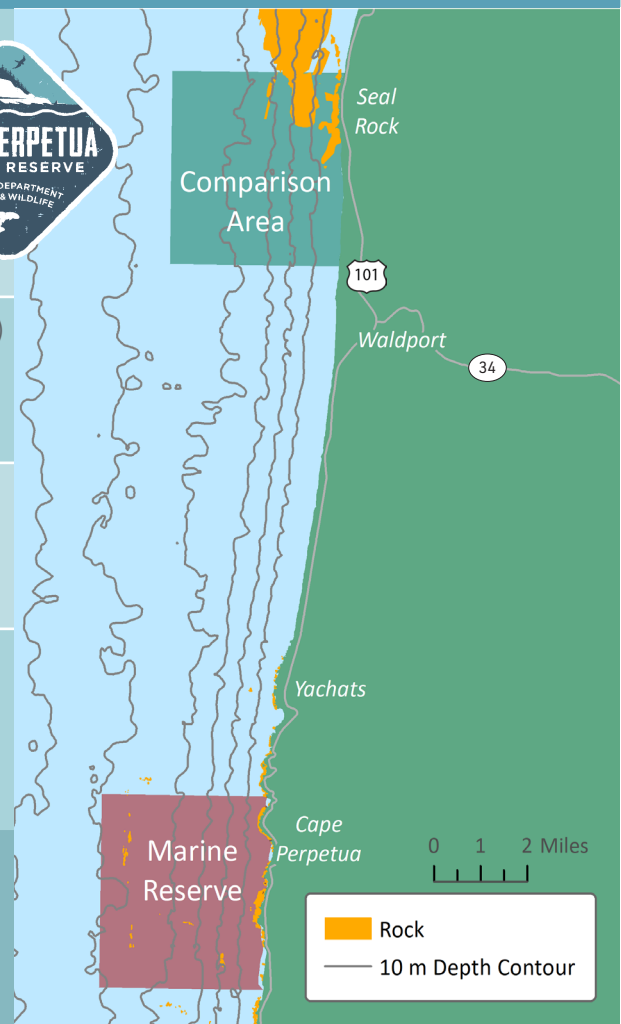


# CAPE PERPETUA MARINE RESERVE

What have we learned from 8 years of monitoring?



<b>Restrictions Began</b>	2014
<b>Monitoring Began</b>	2012
<b>Size</b>	Reserve: 14.3 square miles
<b>Depth Range</b>	Reserve: 0-174 ft
<b>Habitats</b>	Dominated by soft sediment, as well as deep (> 82 ft) gravel/mixed habitats. Small, isolated, patchy, low-relief rocky reef in deeper water (> 82 ft). Extensive stretches of rocky intertidal habitats.
<b>Habitat Connectivity</b>	Majority of rocky reef habitat is inside the reserve, with some small patches in the North MPA and Seabird Protection Area. No other subtidal rocky habitat found in the nearby region.
<b>Prior Fishing Pressure</b>	Moderate fishing pressure on groundfish in rocky habitat areas. High fishing pressure on crab in sand habitat areas. Additional fishing pressure on halibut, salmon, and squid. Moderate fishing pressure shoreside by recreational anglers.
<b>Core Tools</b>	<div>  <p>Hook and Line</p> </div> <div>  <p>ROV</p> </div>



## WHAT MAKES CAPE PERPETUA UNIQUE?

- The habitat at Cape Perpetua has deep, isolated rocky reefs unlike any of our other marine reserve sites.
- Higher densities of Canary, Yellowtail, Copper, Quillback and Yelloweye Rockfish are found at this reserve compared to other sites, while Cabezon and China Rockfish are absent from our hook-and-line surveys here.
- There is a distinct rocky intertidal community dominated by barnacles, mussels, and sea anemones.
- This reserve helps us track and better understand nearshore hypoxia (low oxygen) events and ocean acidification - two emerging ocean issues of high interest to Oregonians.

## NOT YOUR TYPICAL STUDY DESIGN

- Because there is no similar habitat or oceanographic conditions in the nearby vicinity of Cape Perpetua to serve as a comparison area, we had to adapt our study design at this site.
- Since it is inappropriate to directly compare data from the marine reserve to the comparison area, monitoring the comparison area instead informs us if changes we see at the reserve are part of larger, regional patterns.
- Data collected from the marine reserve informs us about the impacts of hypoxia on fish and invertebrates communities and how reserve protections at this site compare to other marine reserves.
- Currently it is too soon to attribute ecological changes to marine reserve protections at this site.

## A HOTSPOT OF LONG-TERM RESEARCH

- With over 20 years of datasets from multiple partners, this site was established on a foundation of research and monitoring.
- Data from ODFW remotely operated vehicle (ROV) and PISCO oceanographic surveys help us learn about the impacts of changing ocean conditions on biological communities.
- Intertidal datasets from PISCO and MARiNe provide a historical baseline for understanding changes in this rocky habitat.
- This site highlights the value of collaborative partnerships to expand our ability to track nearshore ecosystem changes.

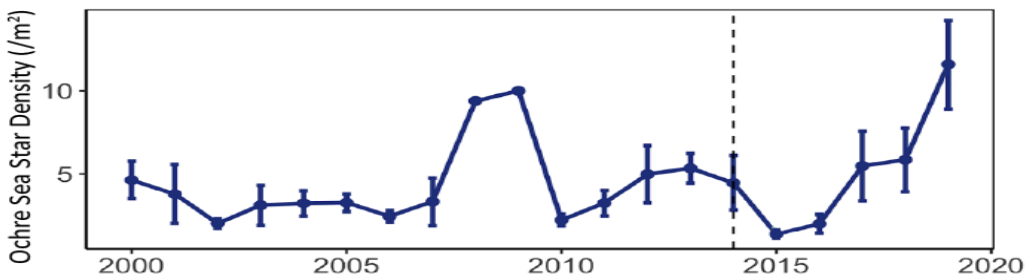
Partnership for Interdisciplinary Studies of Coastal Oceans



Photos (left to right): Giant Pacific Octopus nestled next to Plumose Anemone observed with the ROV; Dr. Francis Chan collects oceanography data as part of the PISCO partnership; Intertidal mussel bed.

## VALUED PARTNERS PROVIDE AN UNDERSTANDING OF SEA STAR RECOVERY

- Thanks to PISCO's 20 years of monitoring, this was the only marine reserve that fully captured the impact of sea star wasting disease (SSWD) on intertidal Ochre Sea Stars.
- There was an abrupt and dramatic decrease in Ochre Sea Star density following the outbreak of SSWD in 2014.
- Densities of Ochre Sea Stars have since recovered and are now more abundant than before 2014.
- Long-term monitoring by PISCO at this reserve is critical to our understanding of the frequency of wasting disease and recovery trajectories.



Ochre Sea Star

Figure: Intertidal Ochre Sea Star density at Cape Perpetua Marine Reserve. Bars represent Standard Error. Vertical dashed line denotes onset of SSWD in 2014. Note that 2008-2009 each only had a single survey completed.