



MONITORING SEA STAR WASTING DISEASE IN MARINE RESERVES

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Sea Star's Role and Why Wasting is Important

- Sea star wasting is a disease that is believed to be caused by a virus
- An outbreak occurred in 2013 and by April 2014 spread to Oregon
- This epidemic was unprecedented in magnitude and spread of the disease
- There are six recognized symptoms of wasting:

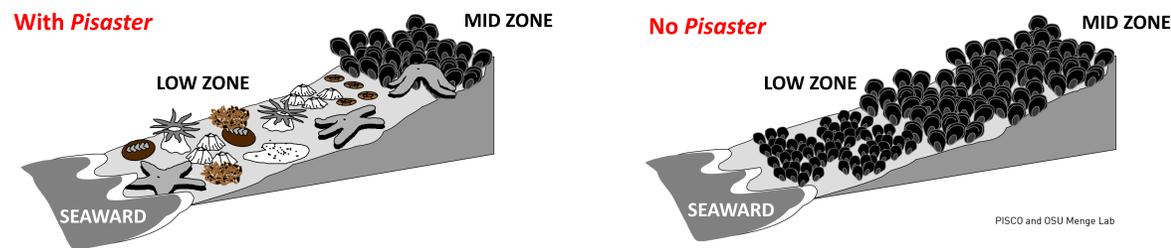
- Deflated
- Twisted arms
- Lesions



- Arms Lost
- Losing Grip
- Dissolved



- Studies have shown that *Pisaster ochraceus* (Ochre Sea Star) can be a keystone predator



Monitoring Sea Stars

Prevalence of Wasting Over Years and Sites

Timed Search

- Search a large area for a given time for *Pisaster ochraceus*
- Identify the sea star, measure, and assign an affliction code
- Collect data at Otter Rock and Cascade Head twice a year



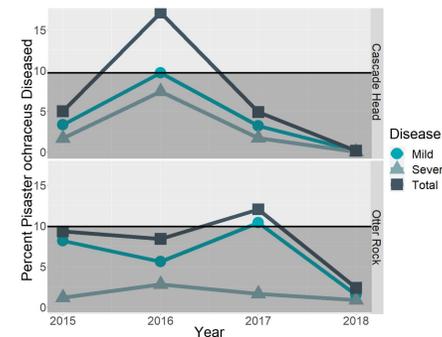
Changes in Population Density Over Years and Sites

Belt Transect

- Search along 5 permanent transect each an area of 10m²
- Identify the sea star, measure, and assign an affliction code
- Collect data at Otter Rock and Cascade Head twice a year

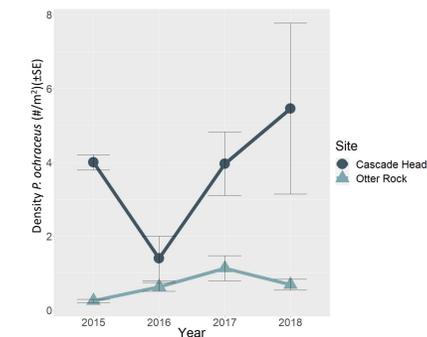
Recovery of the Ochre Sea Stars?

Are Sea Stars Healthy?



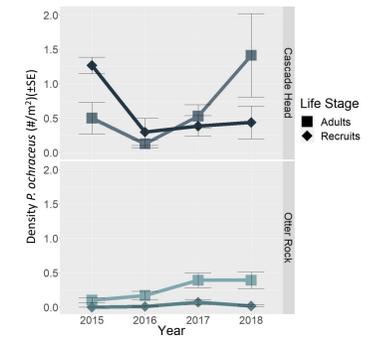
Percent *P. ochraceus* showing signs of wasting on three levels: mild (few lesions), severe (many lesions, arms lost, disintegrating), total (any symptom) at Cascade Head and Otter Rock over 2015-2018 from both timed search and belt transects combined data

Are Populations Recovering?

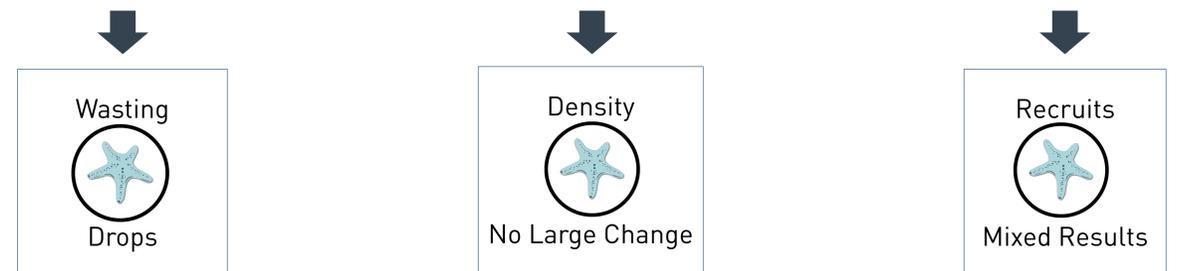


Average Density of *P. ochraceus* (±SE) from each transect per year from all belt transects for 2015-2018 at Otter Rock and Cascade Head

How are Adults/Recruits Doing?



Average Density of *P. ochraceus* recruits (±SE) and adults (±SE) from each transect per year for all belt transects for 2015-2018 at Otter Rock and Cascade Head



Different trends at the different sites between 2015-2017 suggests site-specific influences

Similar trends in severely diseased individuals at both sites

Rarely observe levels above normal (10%) and much lower compared to 2014 (60-98%)

Cascade Head observed a decrease in density the same year that the site observed a spike in wasting

No significant change in density at Cascade Head

Densities very low at Otter Rock with 2017 higher than 2015

Cascade Head showed a trend similar to previous studies¹: large increase in recruitment after wasting

Cascade Head shows an inverse relationship for recruits and adults

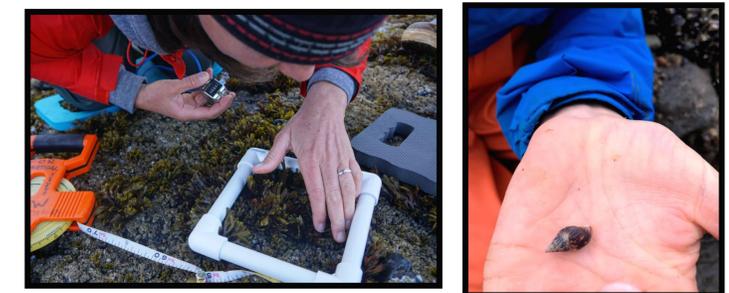
Otter Rock has both low recruit and adult densities over the four years

Collaborations West Coast Wide

Compare these trends to west coast wide data

Monitor possible effects from reduced numbers of *Pisaster ochraceus* to the intertidal community

Explore linkages to baseline biodiversity at each reserve



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References: 1. Menge et al. (2016) Sea Star Wasting Disease in the Keystone Predator *Pisaster ochraceus* in Oregon: Insights into Different Population Impacts, Recovery, Predation Rate, and Temperature Effects from Long-Term Research. Plos ONE 11(5): e0153994. doi:10.1371/journal.pone.0153994

