A tale of two sea stars: recovery (ochre star) or endangerment (sunflower star) following the 2014 epidemic

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**Speaker**
Miranda Winningham, Morgan E. Eisenlord, Joseph Gaydos, Diego Montecino-Latorre, Janna Nichols, Christy Pattengill-Semmens, and Catherine D. Harvell

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A Tale of Two Sea Stars: Recovery (Ochre Star) or Endangerment (Sunflower Star) Following the 2014 Epidemic

Harvell Lab Focus:
Ecology of Host-Pathogen Interactions
Largest marine wildlife epizootic/panzootic, started in 2013 and continues on the west coast. At least 20 sea star species affected. Ecologically important keystone/predator species.
Ochre Stars in the San Juan Islands (WA)

• Consistently surveyed 10 sites from 2014 – 2017
• For ochre stars: record radius (mm), disease stage (0 through 4)
• Also note presence and disease stage of other star species
• Triplicate transects
SJI SSWD prevalence in *P. ochraceus* from 2014-2016
SJI *P. ochraceus* populations from 2014-2016 (count data)

Stable healthy populations at some sites
Population Size Structure Comparison:
BEFORE: June 2014
AFTER: August 2017
Population Size Structure Comparison:
BEFORE: June 2014
AFTER: August 2017
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0192870

Fig 2. Heat map showing annual changes in abundance of P. ochraceus for each site relative to the long-term mean.
Pisaster ochraceous

• Low, stable population sizes at most sites (10%, 20%, 32% of pre-outbreak)
• Rare signs of wasting (a small increase last fall)
• Episodic big recruitment events
• Recovery seems likely
Pycnopodia helianthoides:

It all started with massive sunflower star mortality.
Devastating Transboundary Impacts of Sea Star Wasting Disease on Subtidal Asteroids

MO Turner, lead diver
Devastating Transboundary Impacts of Sea Star Wasting Disease on Subtidal Asteroids

Diego Montecino-Latorre, Morgan E. Eisenlord, Margaret Turner, Reyn Yoshioka, C. Drew Harvell, Christy V. Pattengill-Semmens, Janna D. Nichols, Joseph K. Gaydos
Catastrophic Continental Collapse of an Ecologically Important Predator by a Multi-host Infectious Disease (In prep)

D. Harvell\textsuperscript{1*}, D. Montecino-Latorre\textsuperscript{2}, J. Burt\textsuperscript{3}, A. Salomon\textsuperscript{3}, L. Lee\textsuperscript{3}, O. Pontier\textsuperscript{4}, K. Bosley\textsuperscript{5}, A. Keller\textsuperscript{5}, S. Heron\textsuperscript{6}, J. Caldwell\textsuperscript{7}, C. Pattengill-Semmens\textsuperscript{8}, J. Gaydos\textsuperscript{9}

METHODS: REEF Roving Citizen Diver Surveys
Janna Nichols and Christy Penntengill-Semmens

\textsuperscript{1} Oregon
\textsuperscript{2} Washington
\textsuperscript{3} Oregon
\textsuperscript{4} BC
\textsuperscript{5} CA
\textsuperscript{6} Oregon
\textsuperscript{7} Oregon
\textsuperscript{8} Oregon
Sea surface temperature
Departure from Average

The Pacific Ocean Becomes a Caldron

By JOHN SCHWARTZ  NOV. 2, 2015
Why little recovery in *Pycnopodia helianthoides* relative to *Pisaster ochraceous*?

- Subtidal vs Intertidal?
  - No. Other subtidal stars are recovering
- Difference in starting population density?
- Difference in Susceptibility?
  - Likely. Pycno died first and most catastrophically
  - Multi-host pathogen and Pycno the most susceptible
  - Multi-host pathogens can cause extinction/extirpation in susceptible hosts
    - Chytrid fungus and frogs
    - White nose syndrome and Brown bats
    - Avian malaria and hawaiian birds
- Is action needed to closely monitor or develop a restoration plan?
Jan Kocian’s Whidbey SeaStar Surveys
Marine Biodiversity is as Fragile as Glass
Preliminary Data from NOAA Bottom Trawls
Northwest Fisheries Science Center
NMFS-NOAA
Increased Probability of Disease with warming in 2014 (Pisaster ochraceous)

Eisenlord et al 2016