Apr 6th, 11:15 AM - 11:30 AM

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

Miranda Winningham
Cornell Univ., United States, mcw245@cornell.edu

Morgan E. Eisenlord
Cornell Univ., United States, me367@cornell.edu

Joseph K. Gaydos
The SeaDoc Society, United States, jkgaydos@ucdavis.edu

Diego Montecino-Latorre
Univ. of California, Davis, United States, dmontecino@ucdavis.edu

Janna Nichols
Reef Environmental Education Foundation, United States, janna@reef.org

See next page for additional authors

Speaker

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

A Tale of Two Sea Stars:

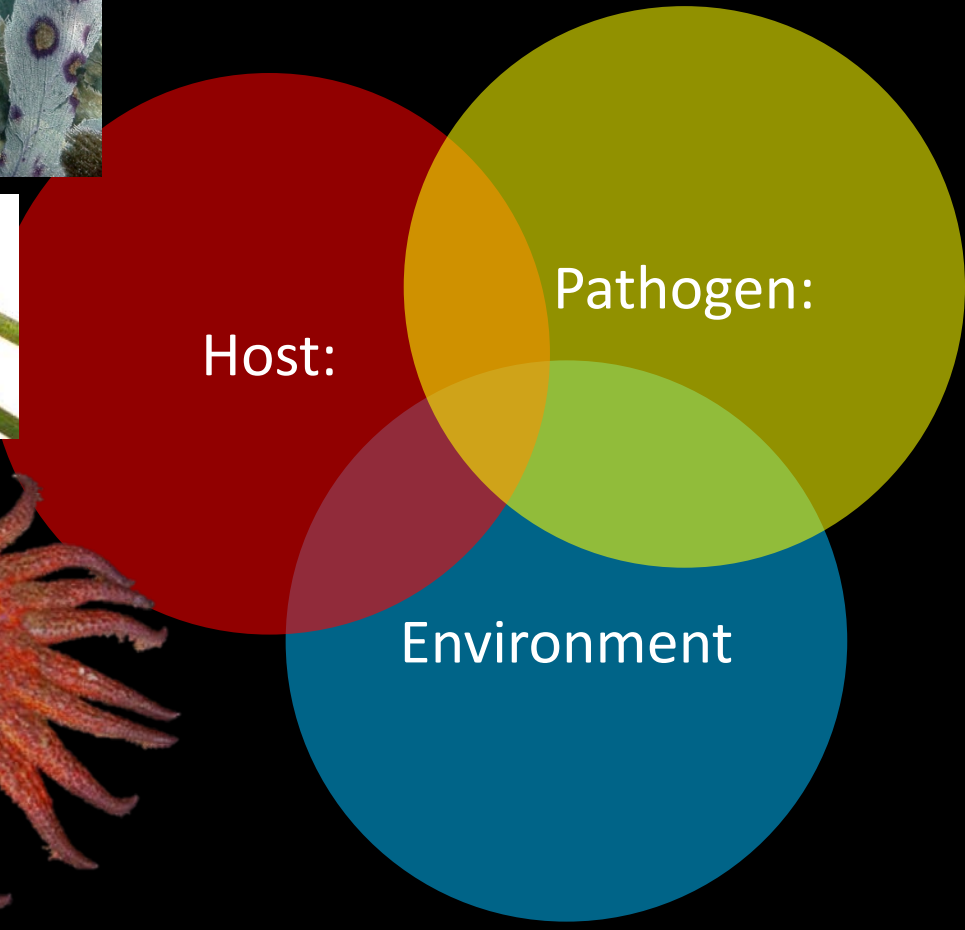
Recovery (Ochre Star) or Endangerment (Sunflower Star) Following the 2014 Epidemic

Winningham MC, Eisenlord ME, Gaydos J, Montecino- Latorre D, Nichols J, Pattengill- Semmens C, Harvell D

Cornell University
David R. Atkinson Center for a Sustainable Future

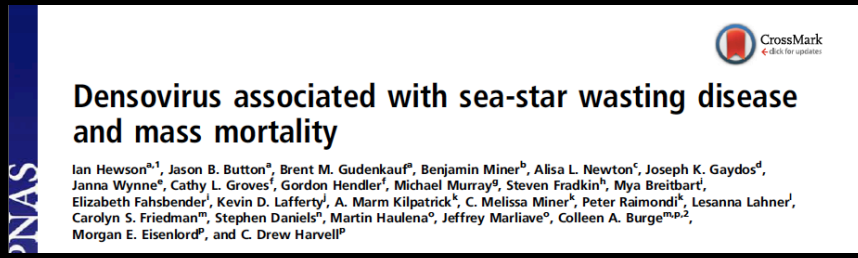
THE SEADOC SOCIETY
People and science healing the sea

Harvell Lab Focus:
Ecology of Host-Pathogen Interactions



Sea Star Wasting Disease (SSWD)

- 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



CrossMark

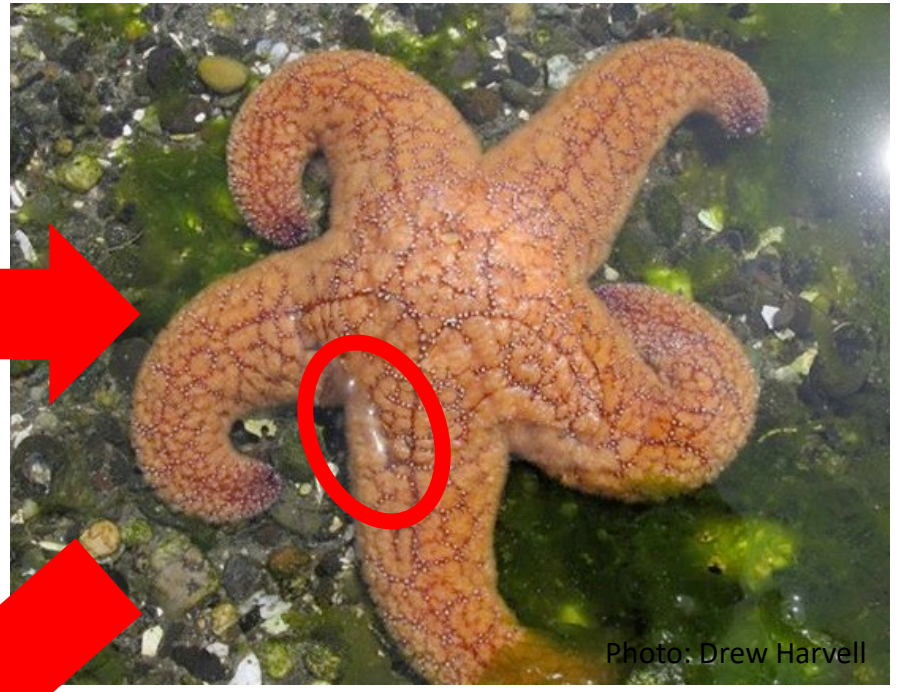
Densovirus associated with sea-star wasting disease and mass mortality

Ian Hewson[a,1], Jason B. Button[a], Brent M. Gudenkauf[a], Benjamin Miner[b], Alisa L. Newton[c], Joseph K. Gaydos[d], Janna Wynne[e], Cathy L. Groves[f], Gordon Hendler[f], Michael Murray[g], Steven Fradkin[h], Mya Breitbart[i], Elizabeth Fahsbender[i], Kevin D. Lafferty[j], A. Marm Kilpatrick[k], C. Melissa Miner[k], Peter Raimondi[k], Lesanna Lahner[l], Carolyn S. Friedman[m], Stephen Daniels[n], Martin Haulena[o], Jeffrey Marliave[o], Colleen A. Burge[m,p,2], Morgan E. Eisenlord[p], and C. Drew Harvell[p]

http://www.jaxshells.org/5298.htm

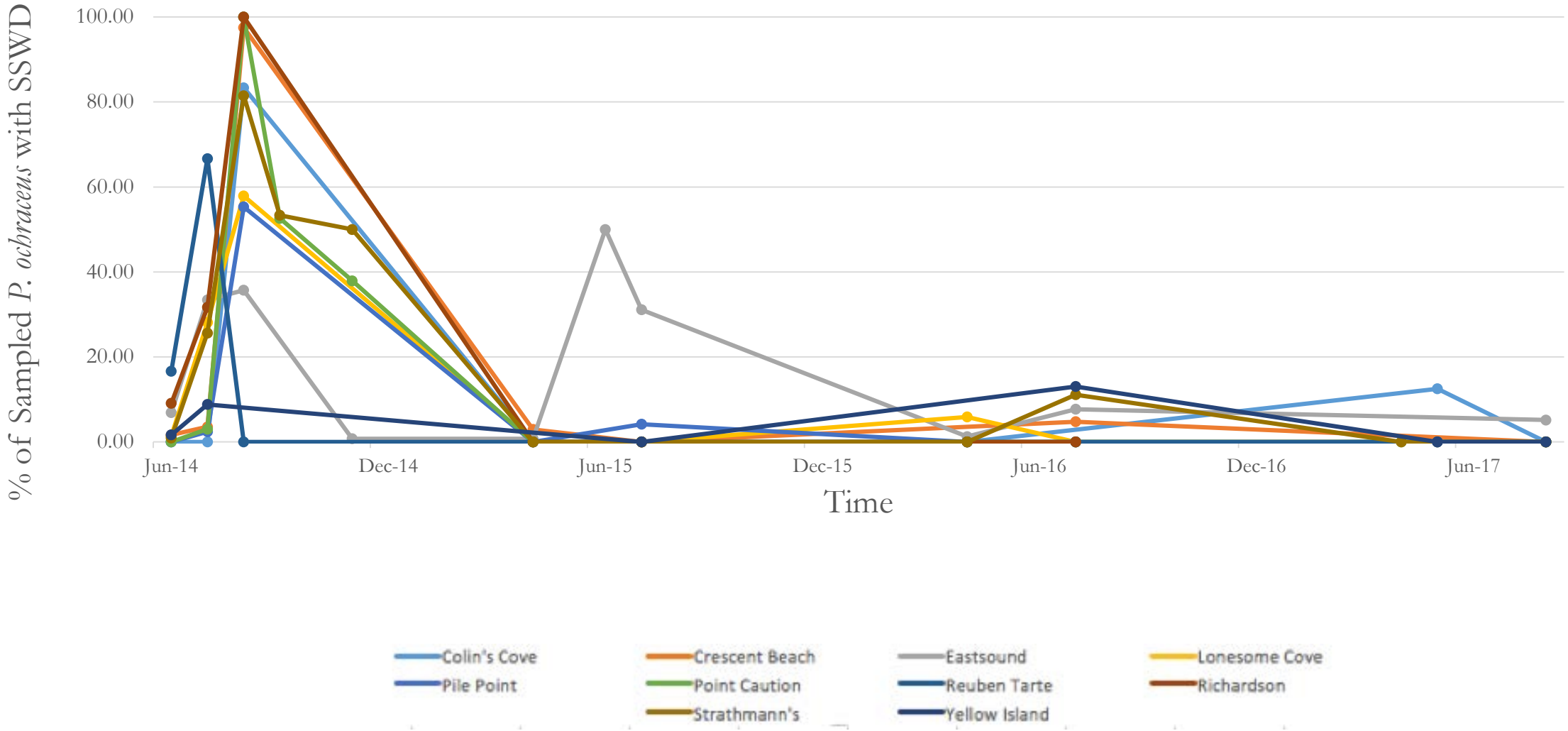
Ochre Stars in the San Juan Islands (WA)

- 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 transcects

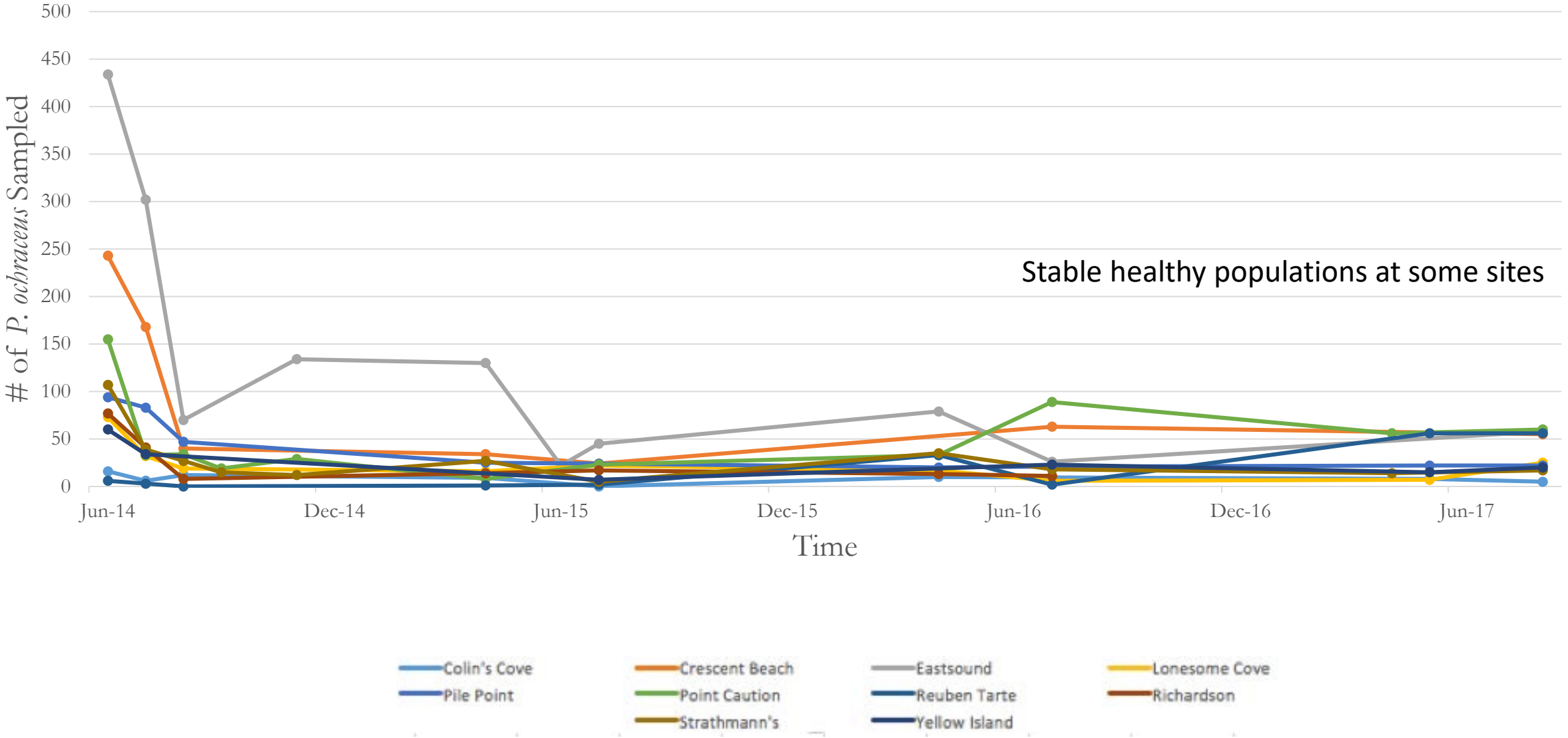


Duration
3 weeks in lab

SJI SSWD prevalence in *P. ochraceus* from 2014- 2016

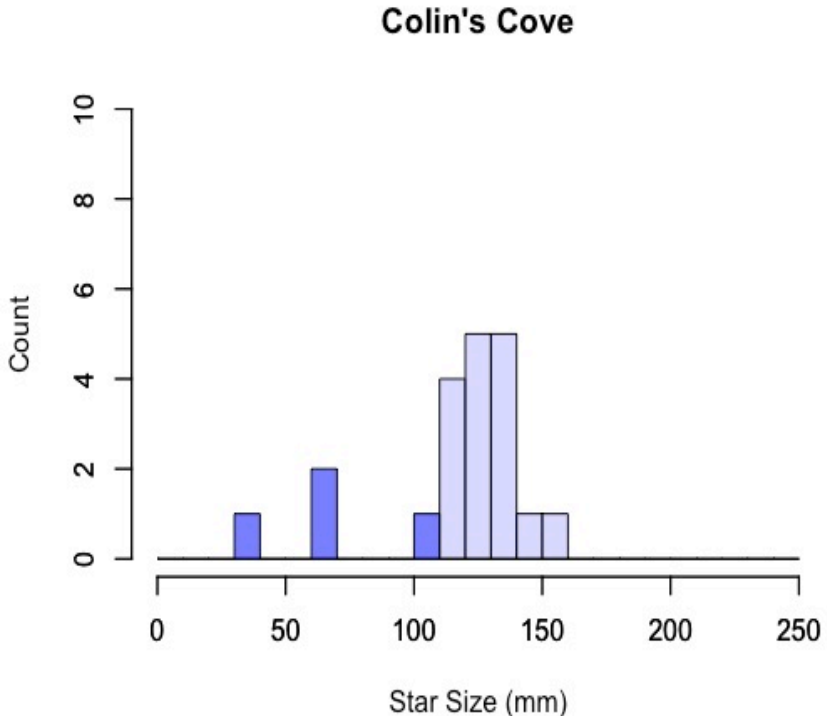


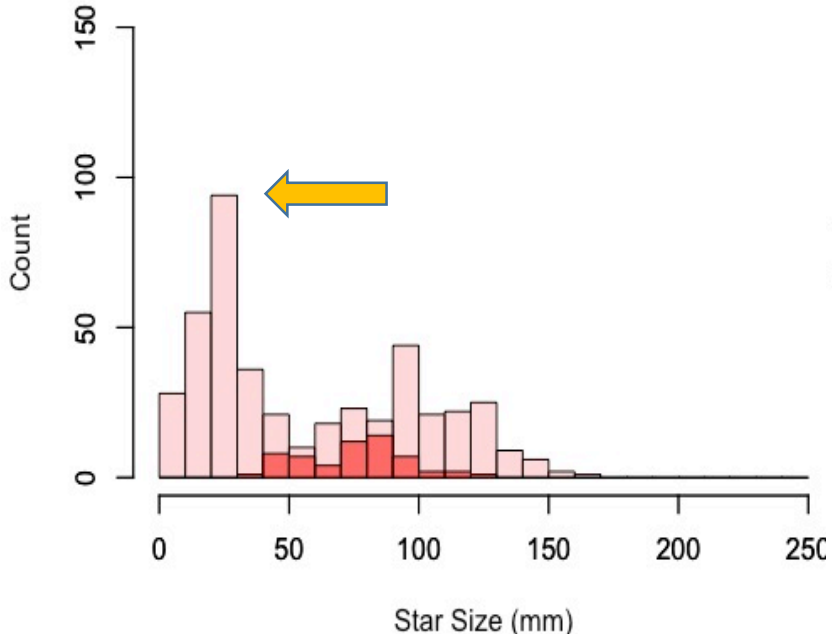
SJI *P. ochraceus* populations from 2014- 2016 (count data)

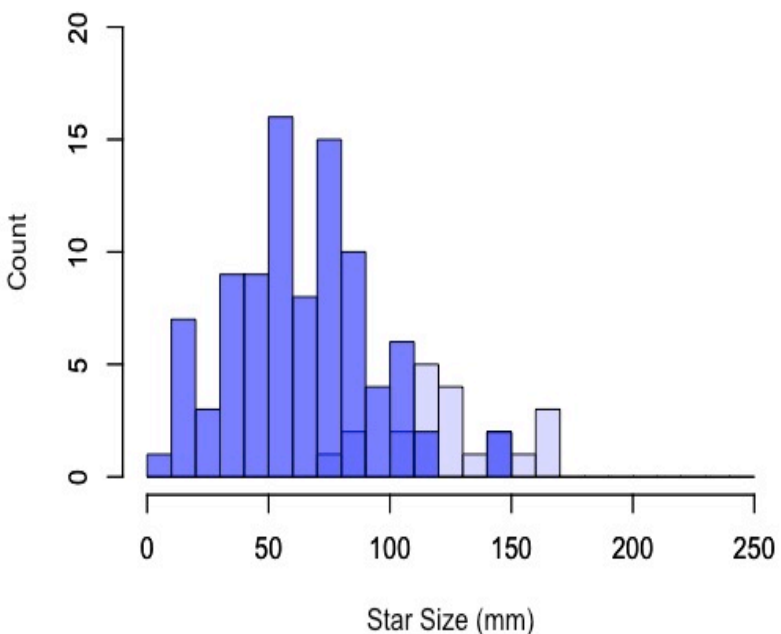


Population Size Structure Comparison:

BEFORE: June 2014
AFTER: August 2017







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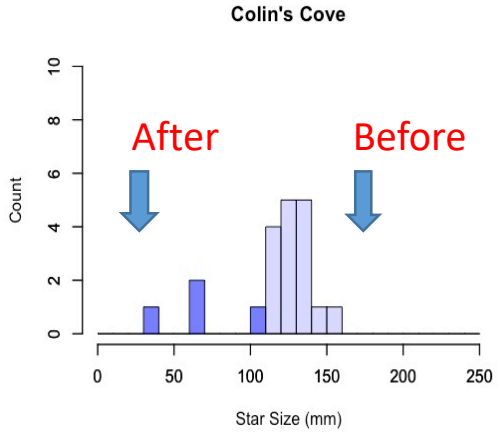
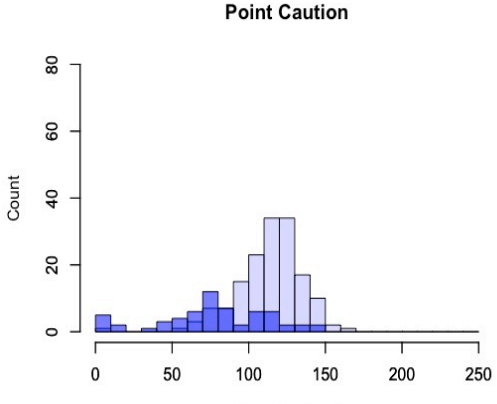
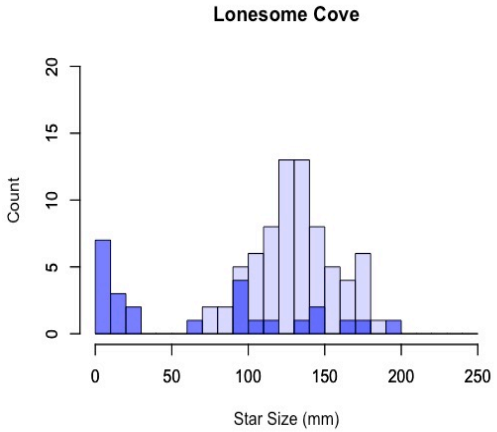
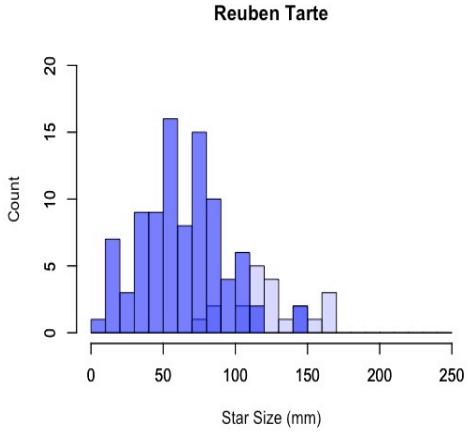
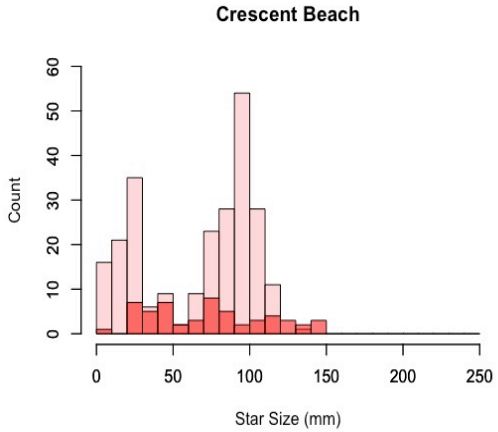
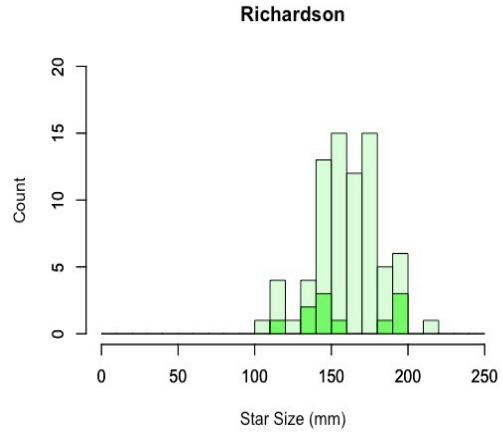


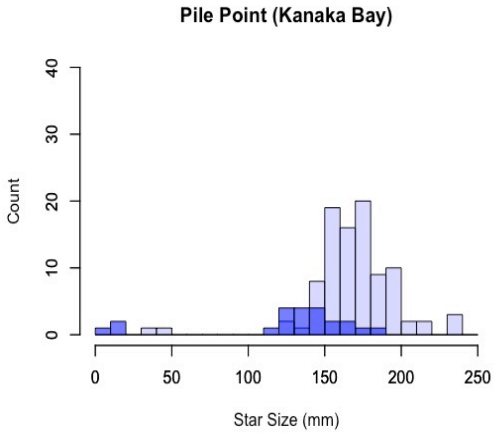


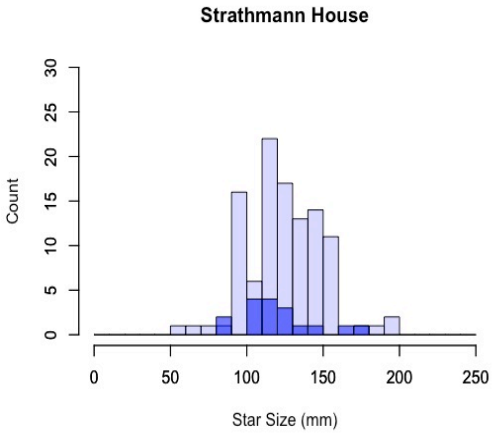


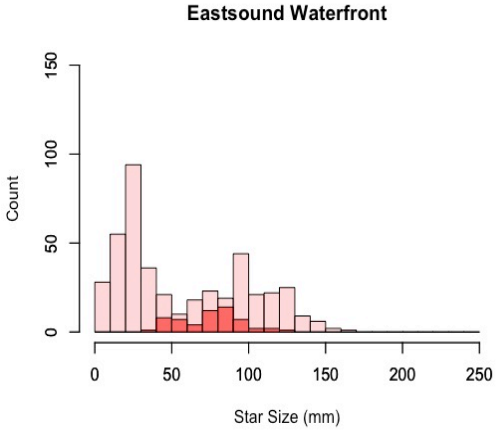


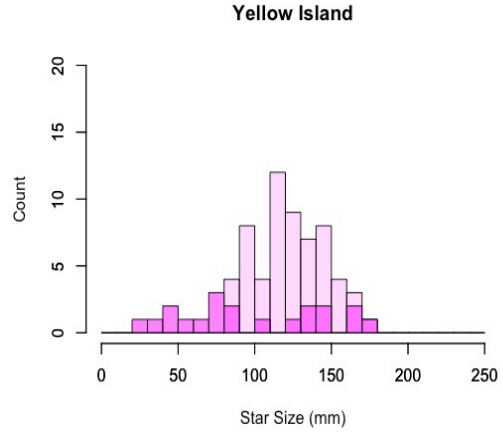




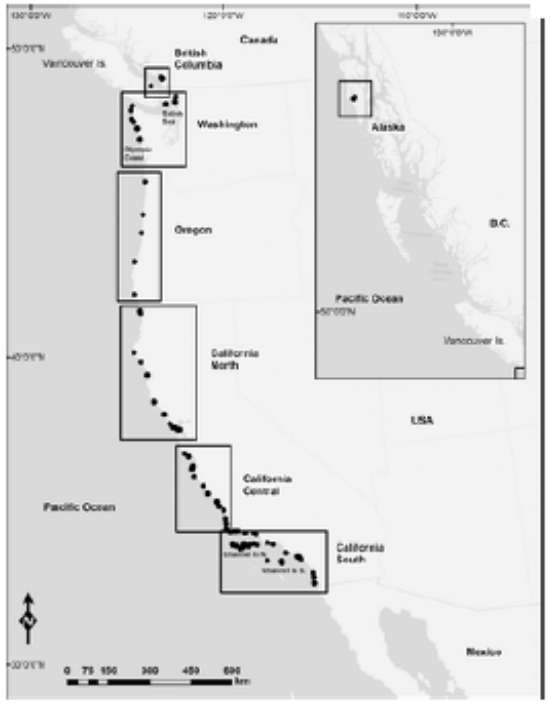








Miner CM, Burnaford JL, Ambrose RF, Antrim L, Bohlmann H, et al. (2018) Large-scale impacts of sea star wasting disease (SSWD) on intertidal sea stars and implications for recovery. PLOS ONE 13(3): e0192870. https://doi.org/10.1371/journal.pone.0192870
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0192870



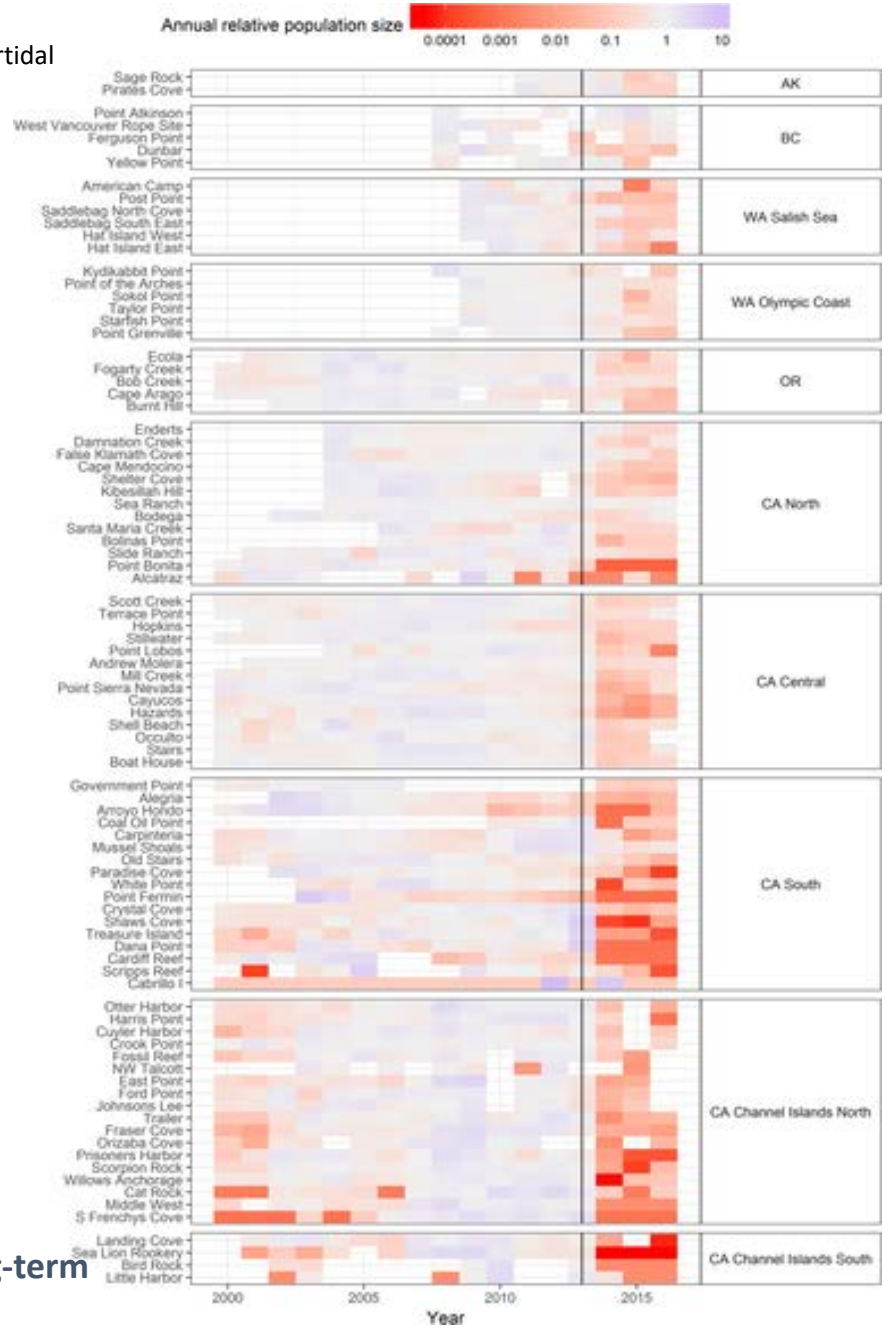
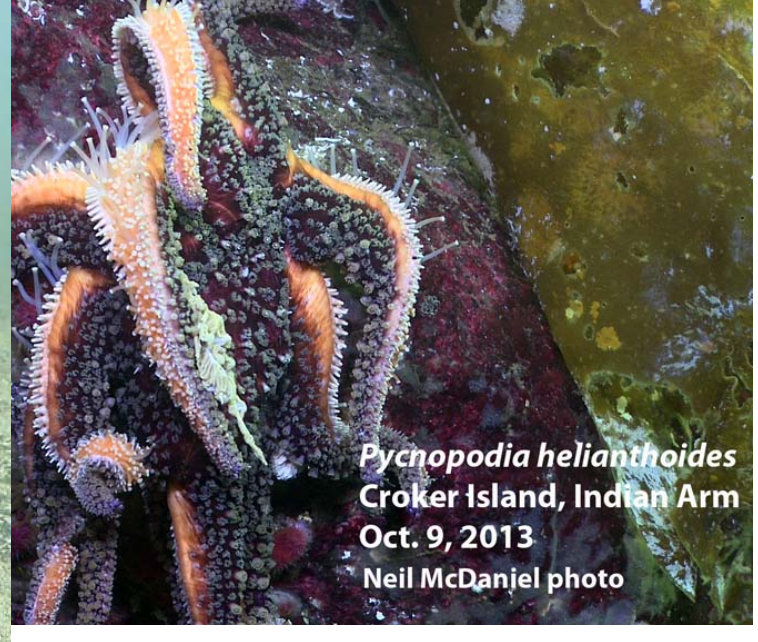


Fig 2. Heat map showing annual changes in abundance of P. ochraceus for each site relative to the long-term mean.

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



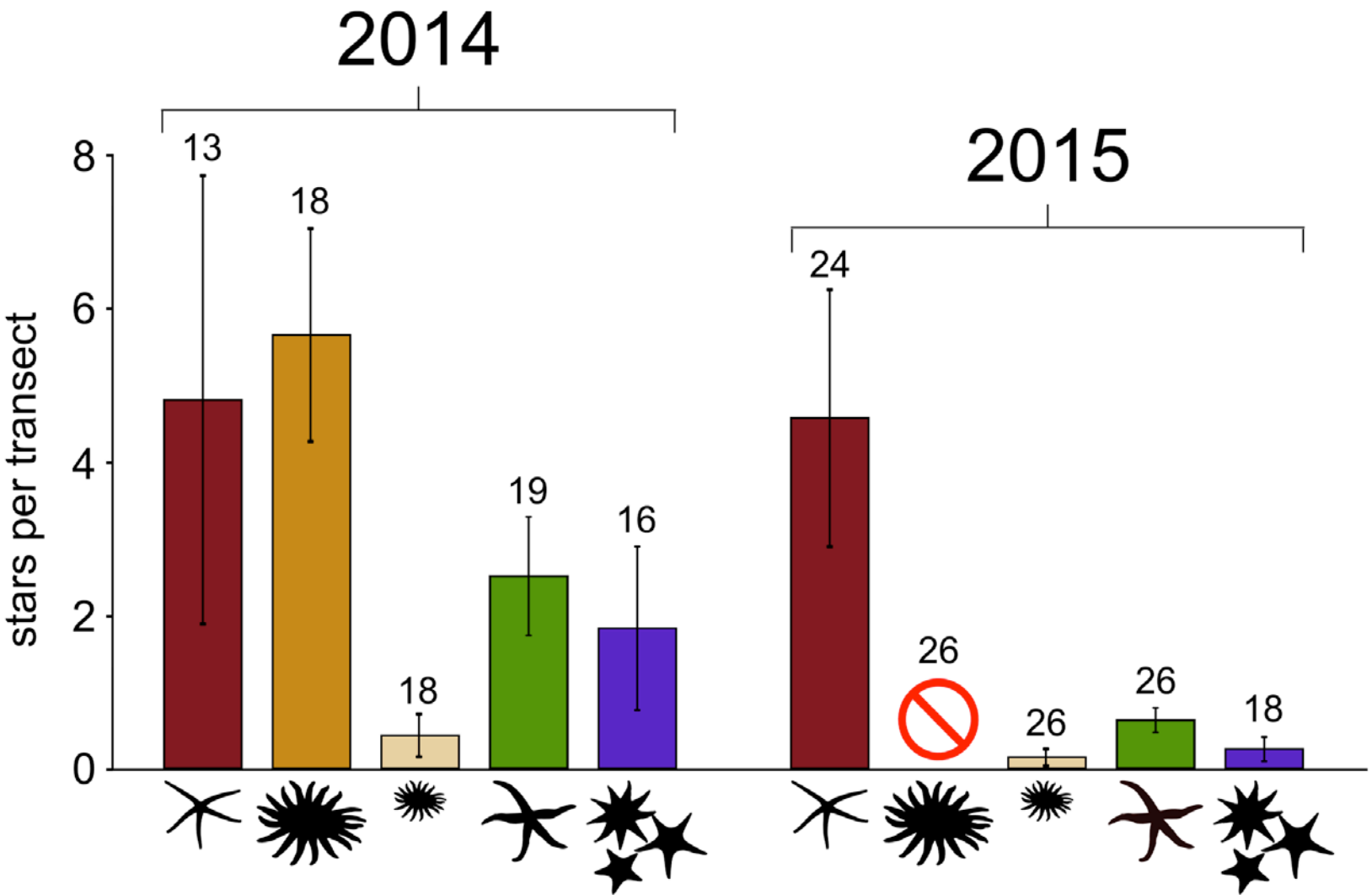
Pycnopodia helianthoides:

It all started with
massive sunflower star
mortality

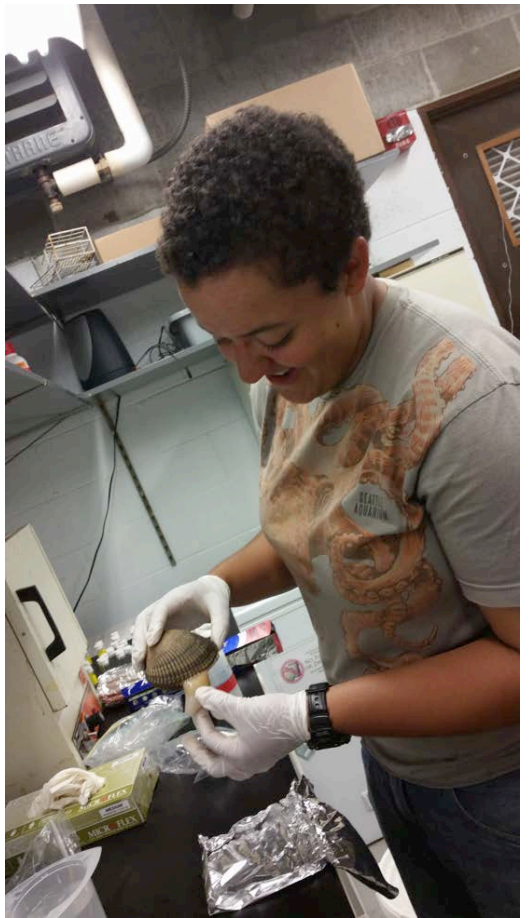
PLOS ONE

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



MO Turner, lead diver



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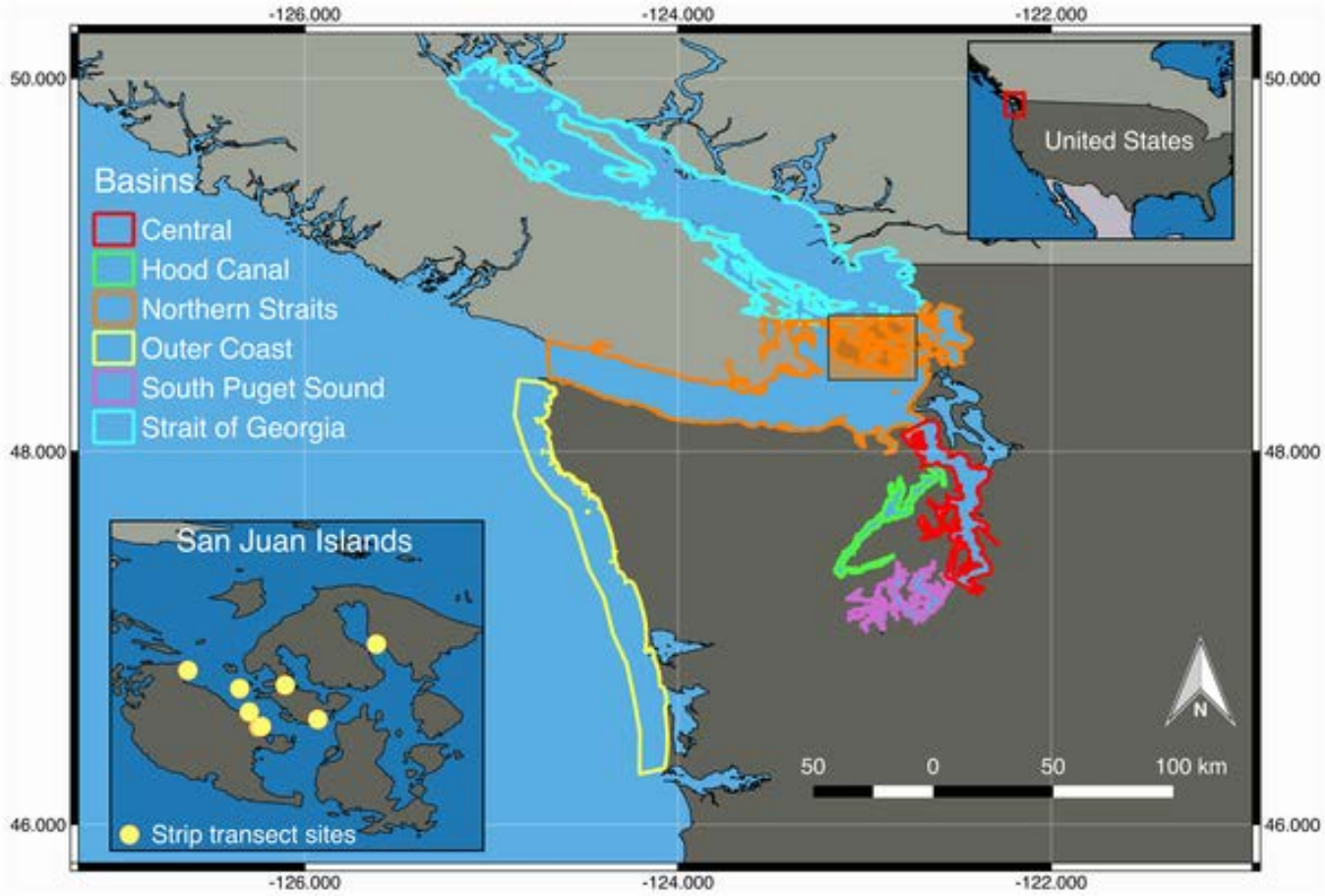
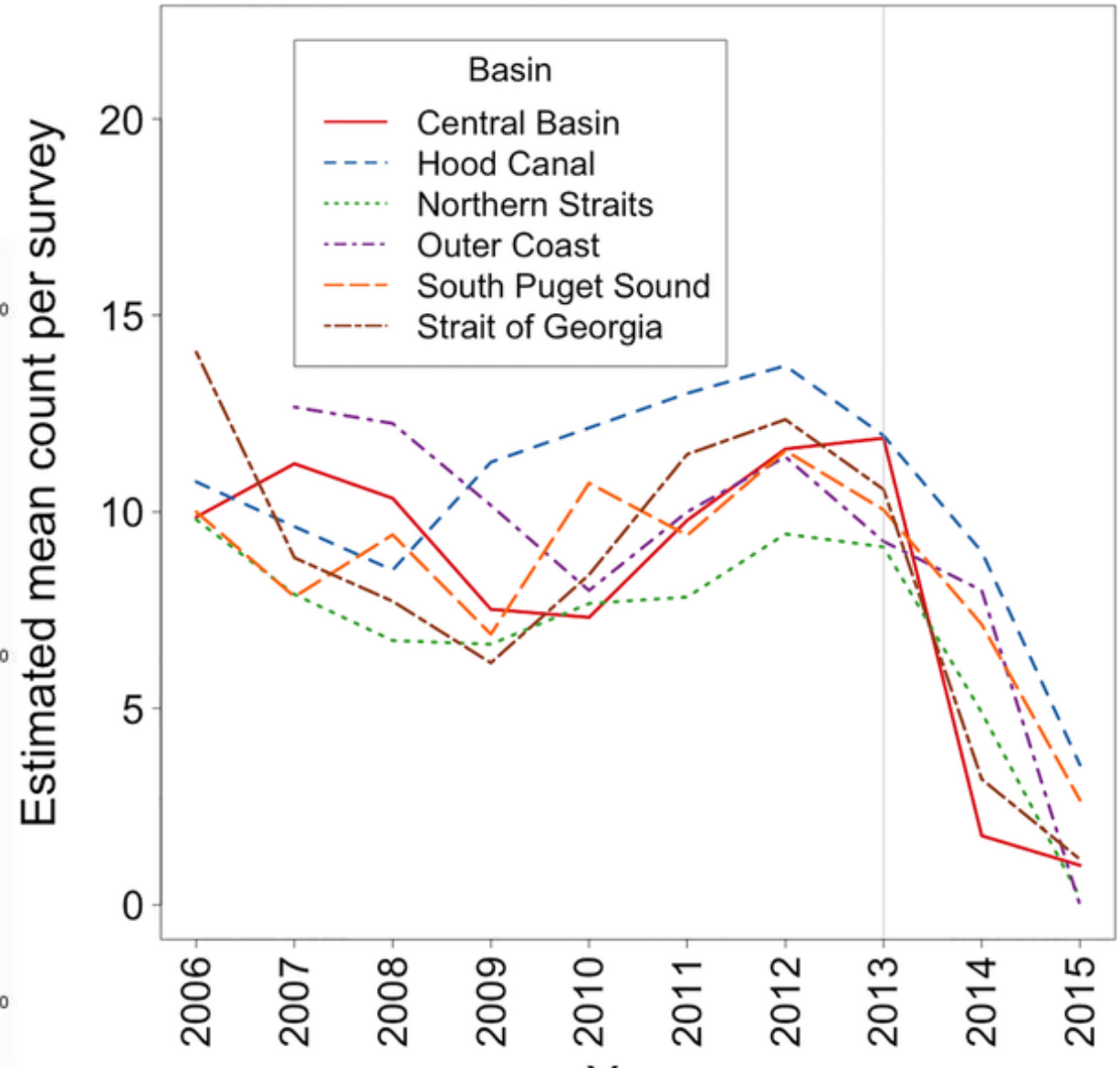
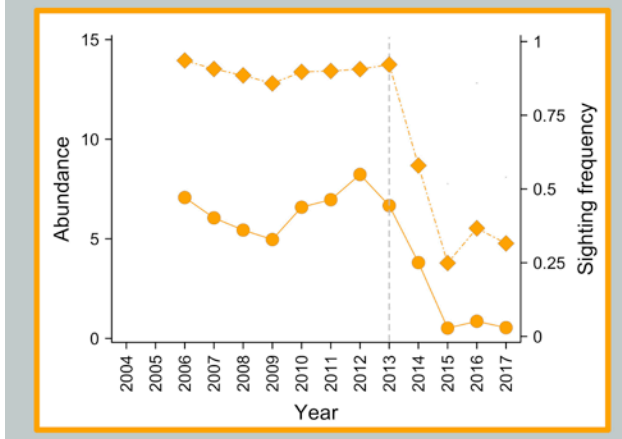




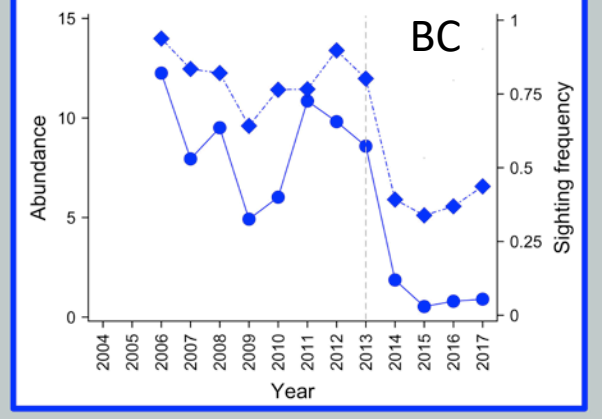
Catastrophic Continental Collapse of an Ecologically Important Predator by a Multi-host Infectious Disease (In prep)

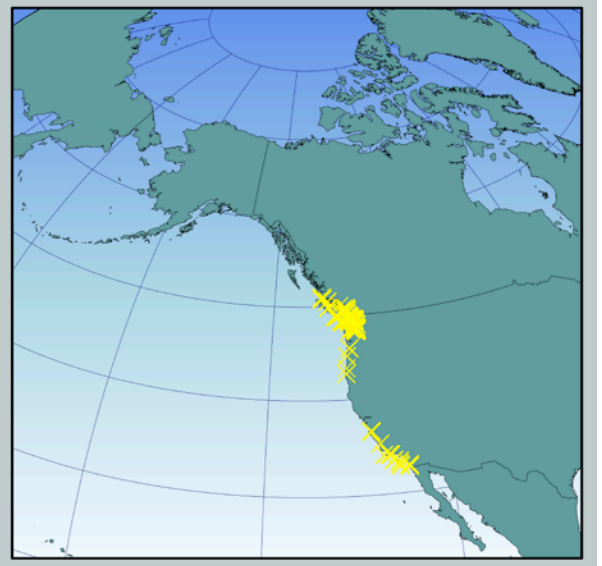
D. Harvell[1]*, D. Montecino-Latorre[2], J. Burt[3], A. Salomon[3], L. Lee[3], O. Pontier[4], K. Bosley[5], A. Keller[5], S. Heron[6], J. Caldwell[7], C. Pattengill-Semmens[8], J. Gaydos[9]

Washington

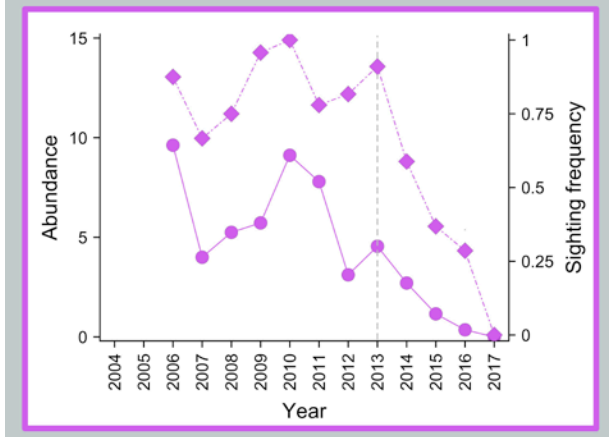


BC

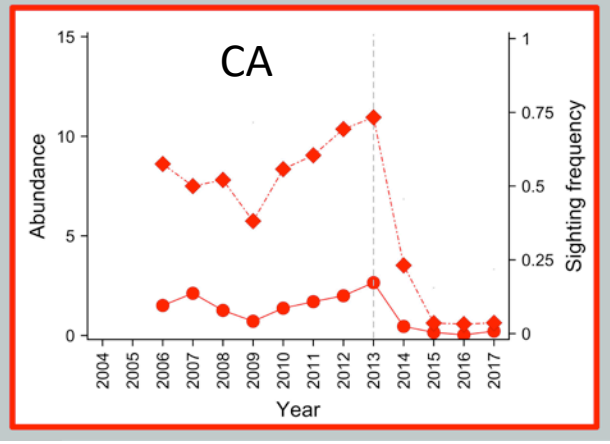




Oregon



CA



—o— Abundance

-◇- Frequency of sighting by divers

METHODS: REEF Roving Citizen Diver Surveys

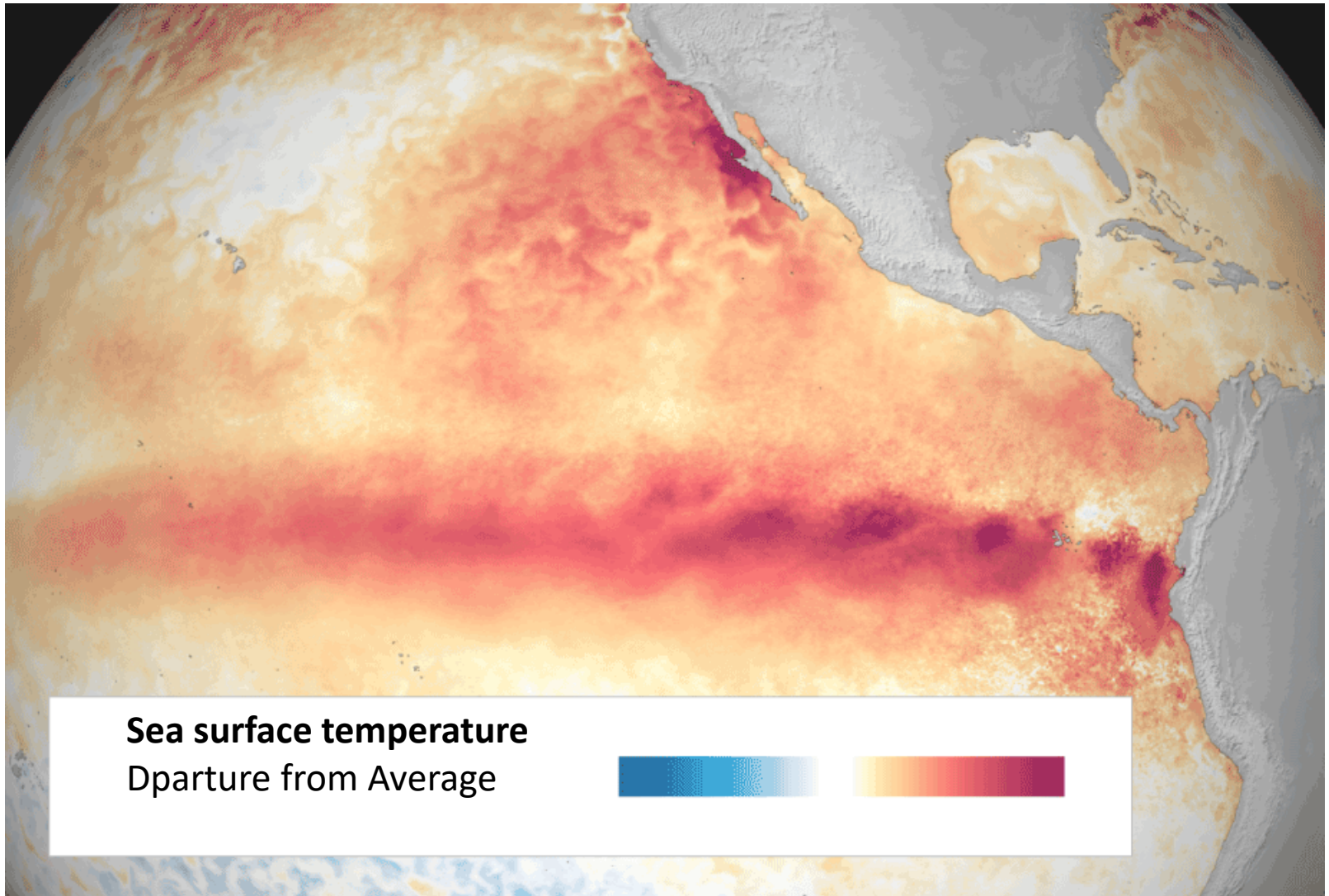
Janna Nichols and Christy Penntengill-Semmens

International New York Times | http://nyti.ms/1KSOb2m

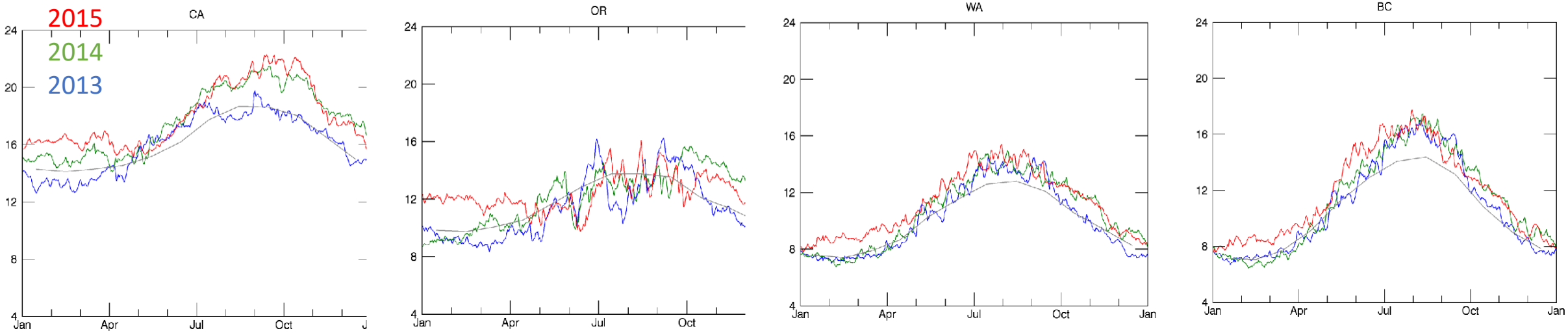
SCIENCE

The Pacific Ocean Becomes a Caldron

By JOHN SCHWARTZ NOV. 2, 2015

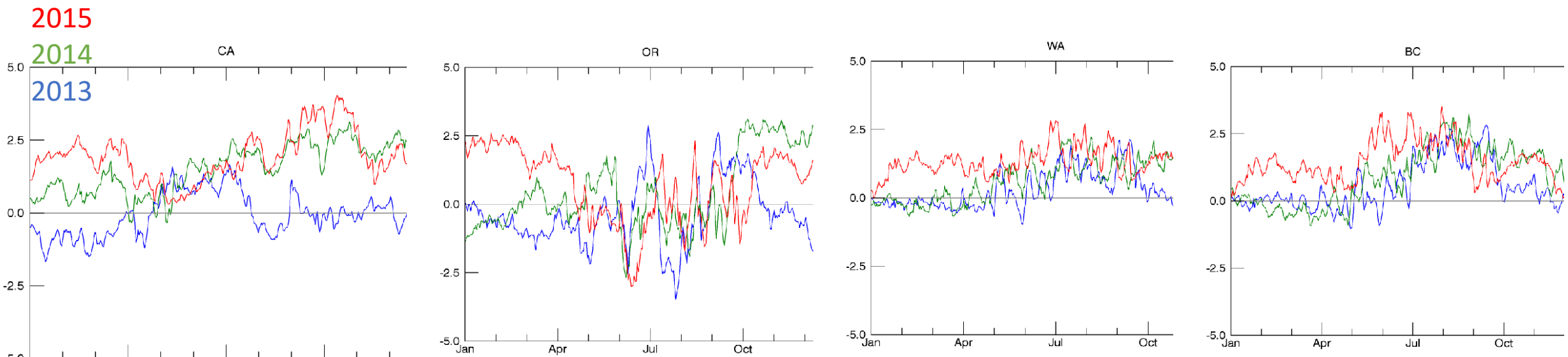


Absolute Temperature



Scott Heron
NOAA

Temperature Anomaly



Why little recovery in *Pycnopodia helianthoides* relative to *Pisaster* ochraceous?

- Subtidal vs Intertidal?
  - **No. Other subtidal stars are recovering**
- Difference in starting population density?
  - **No. Miner et al (2018) no effect of 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

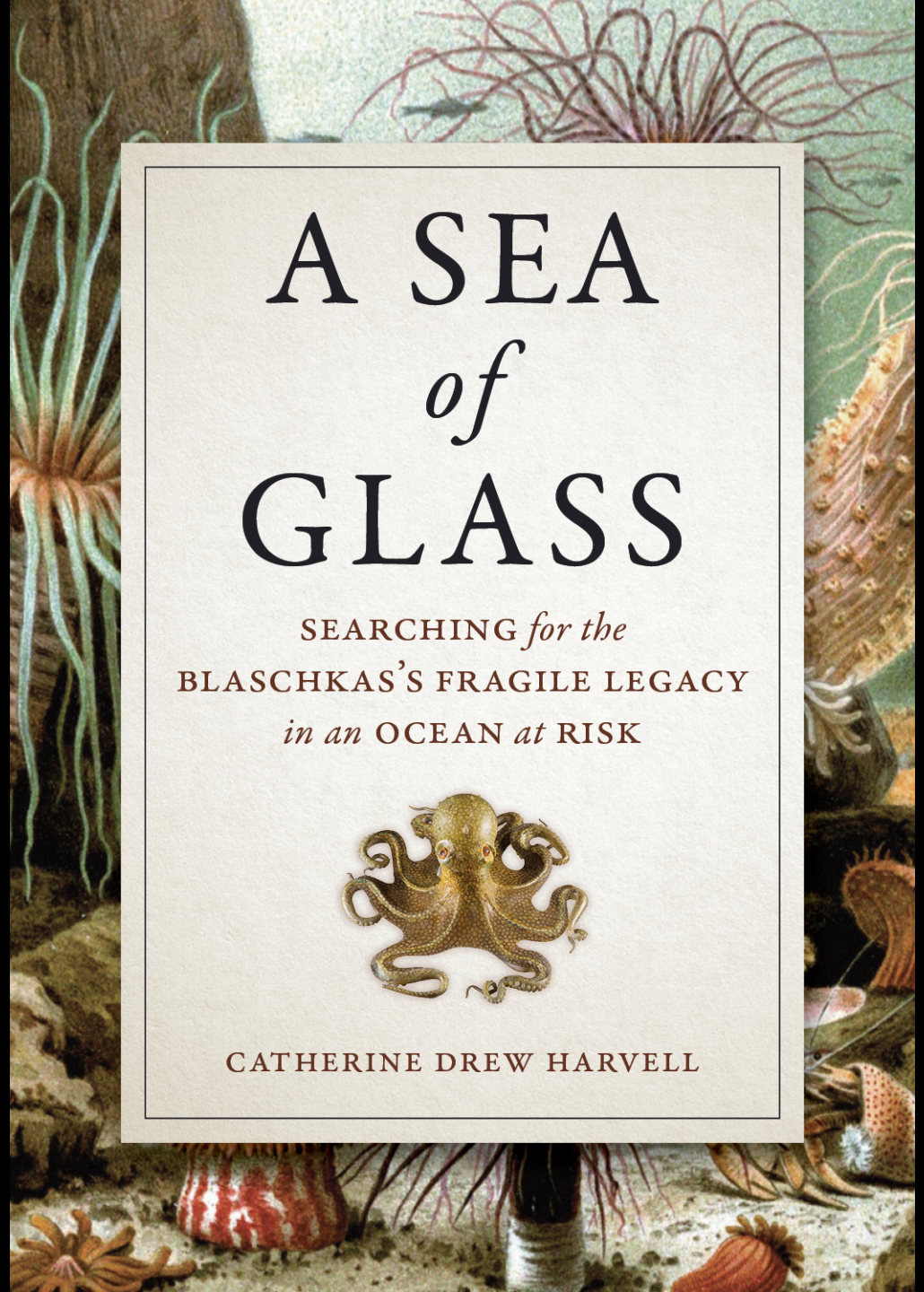
THE SEADOC SOCIETY

People and science healing the sea

CORNELL LYNCH SCHOLARS

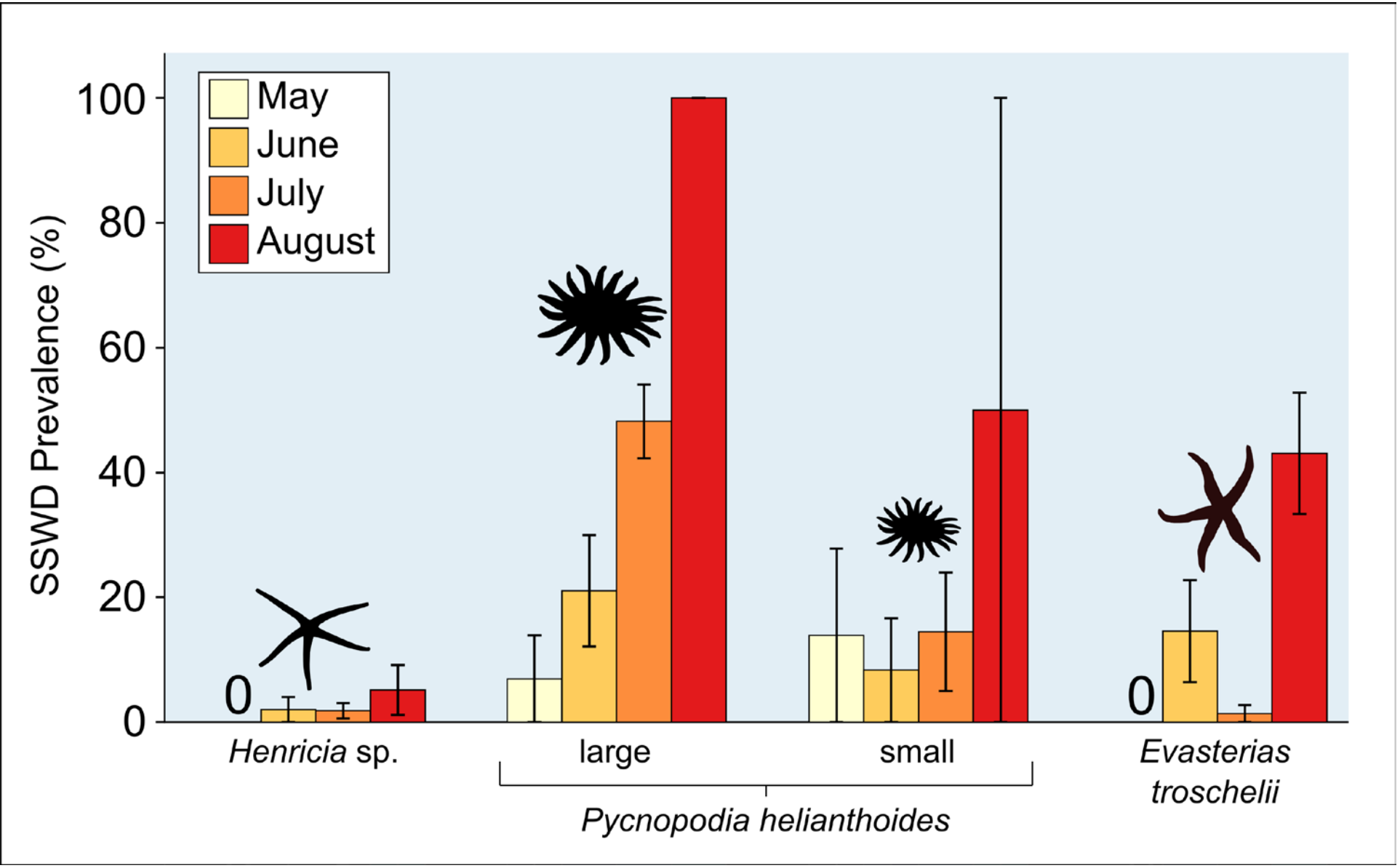
Ecology of Infectious Marine Diseases Research Coordination Network

Because marine health matters.

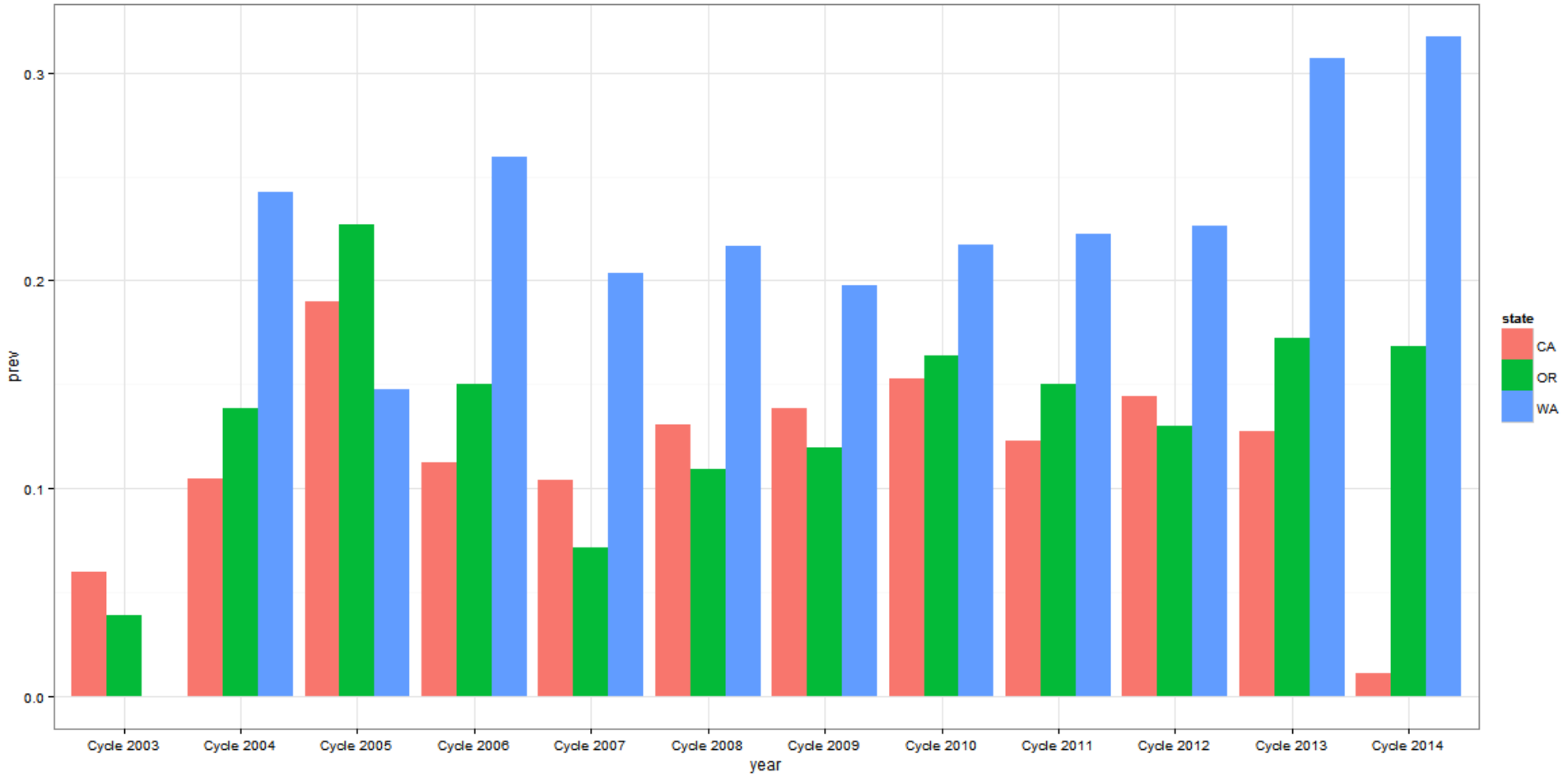


Marine Biodiversity is as Fragile as Glass

ON sale: $22


May
June
July
August
SSWD Prevalence (%)
100
80
60
40
20
0
0
Henricia sp.
large
small
Pycnopodia helianthoides
Evasterias troschelii

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