Apr 30th, 1:30 PM - 3:00 PM

Oyster recruitment and climate change: do higher summer temperatures mean earlier and greater settlement in Pacific oysters?

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Water properties show variability at multiple timescales

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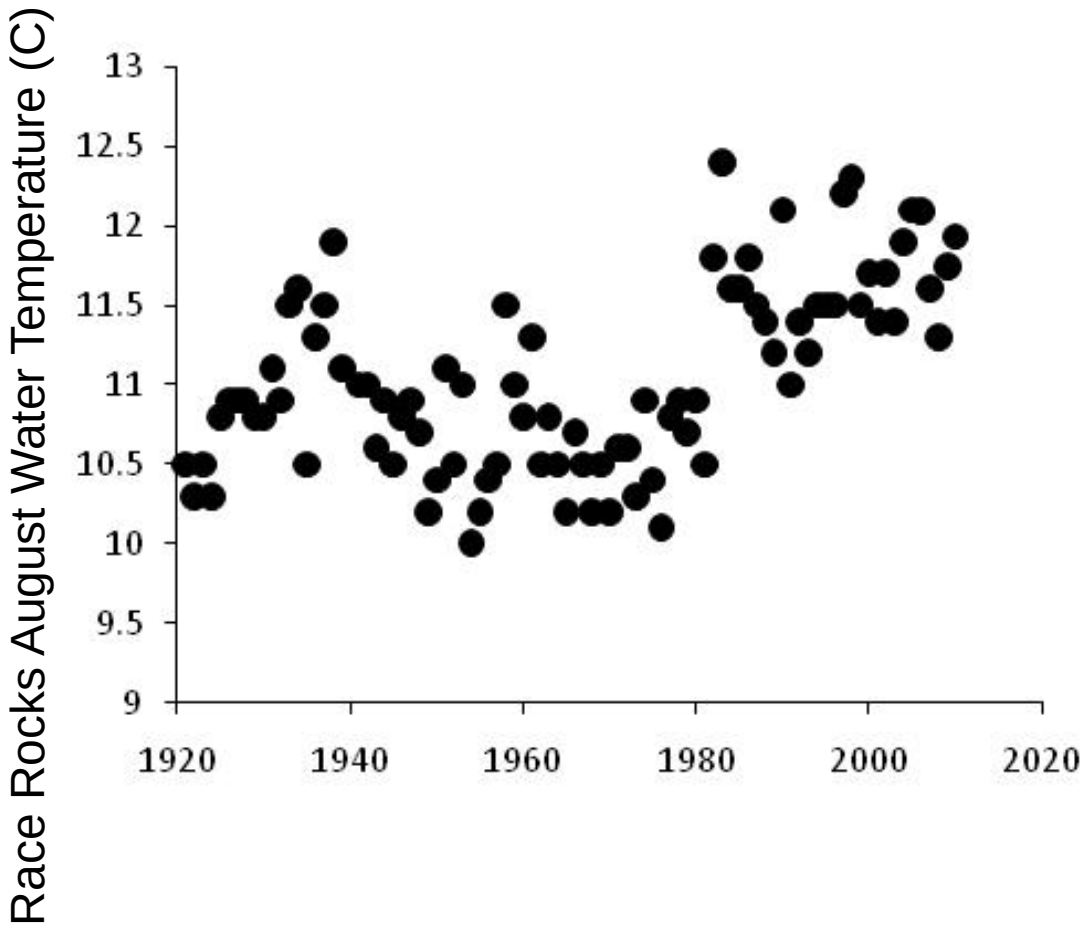
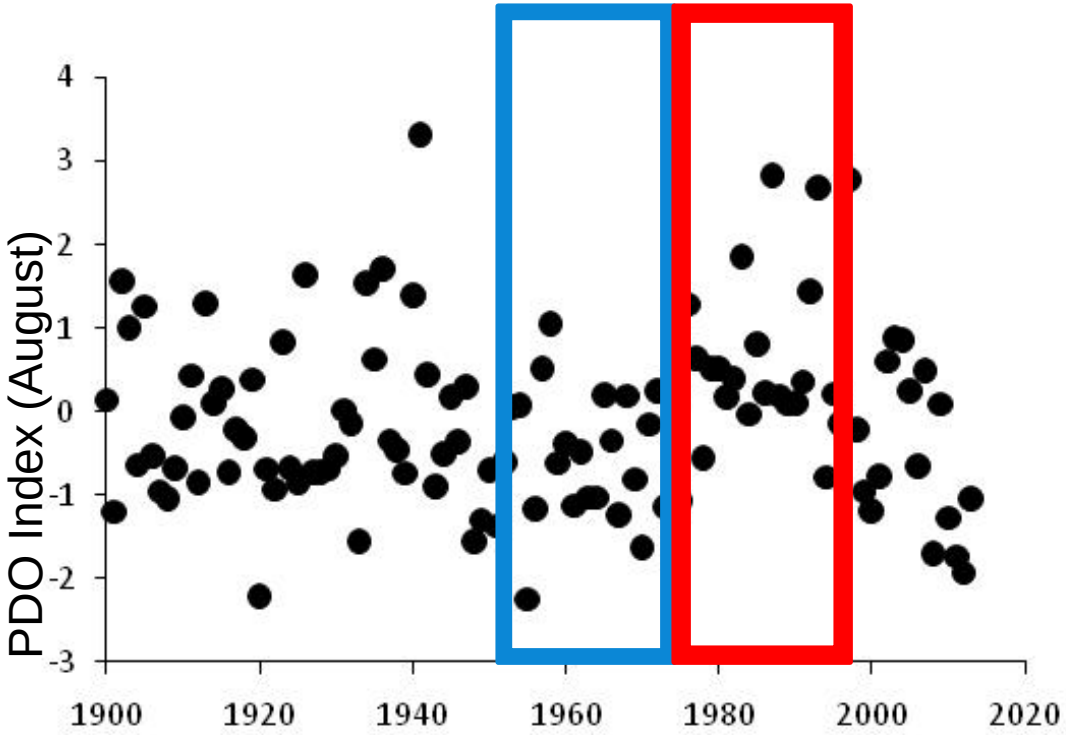


- Long-term trends

http://www.racerocks.com/racerock/data/seatemp/seatemppast.htm

Water properties show variability at multiple timescales

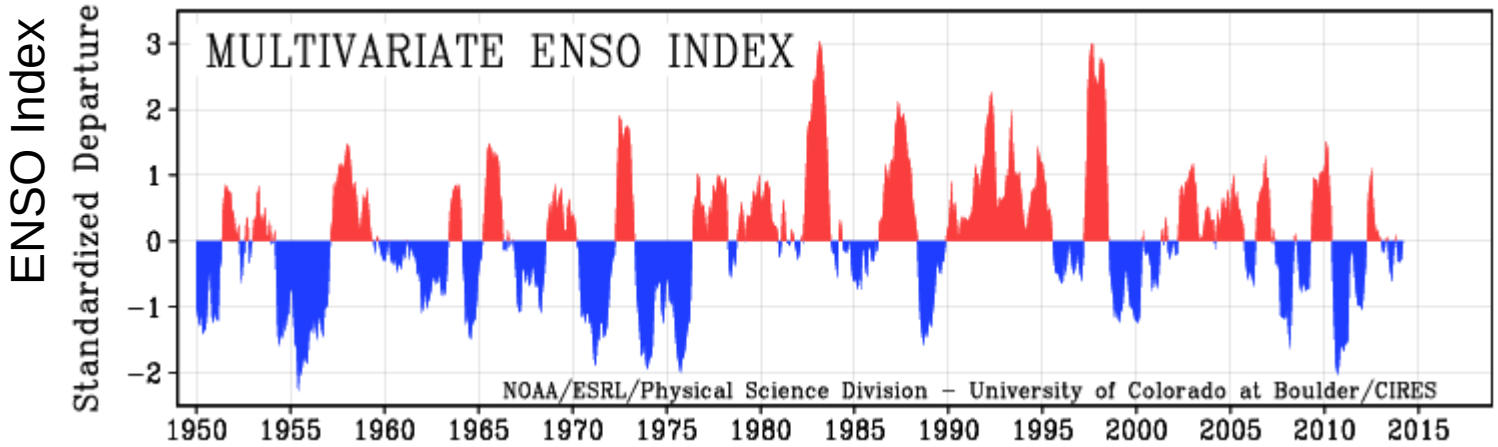


- Long-term trends
- Decadal oscillations

http://jisao.washington.edu/pdo/PDO.latest

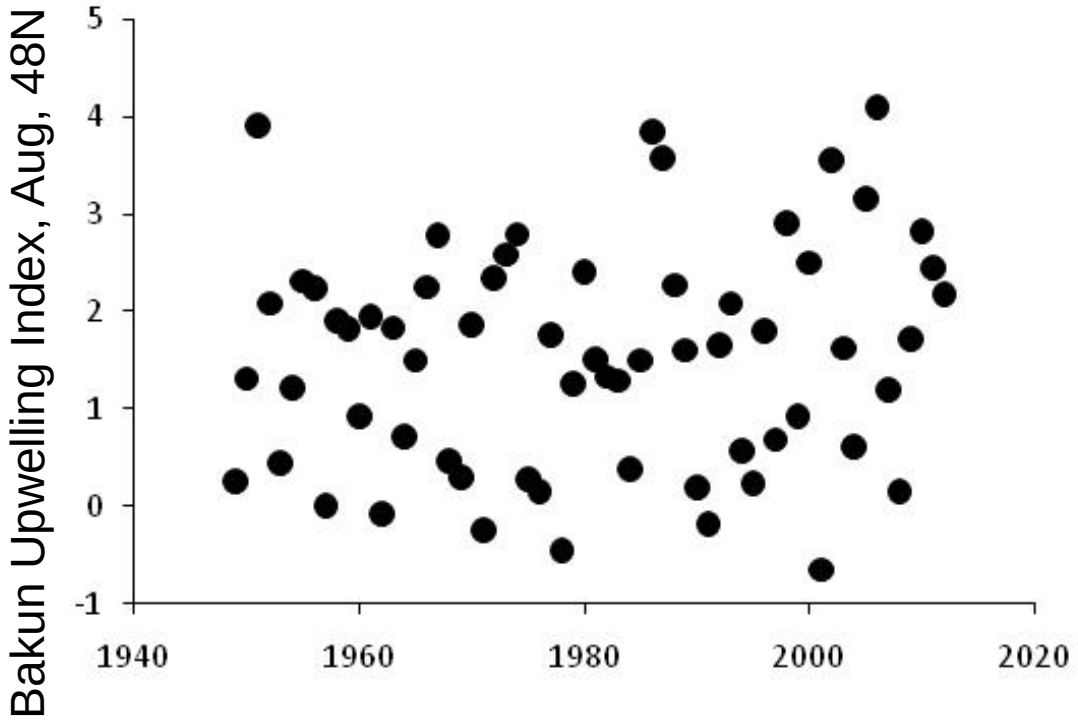
Water properties show variability at multiple timescales

- Long-term trends
- Decadal oscillations
- Extreme events



http://www.esrl.noaa.gov/psd/enso/mei/

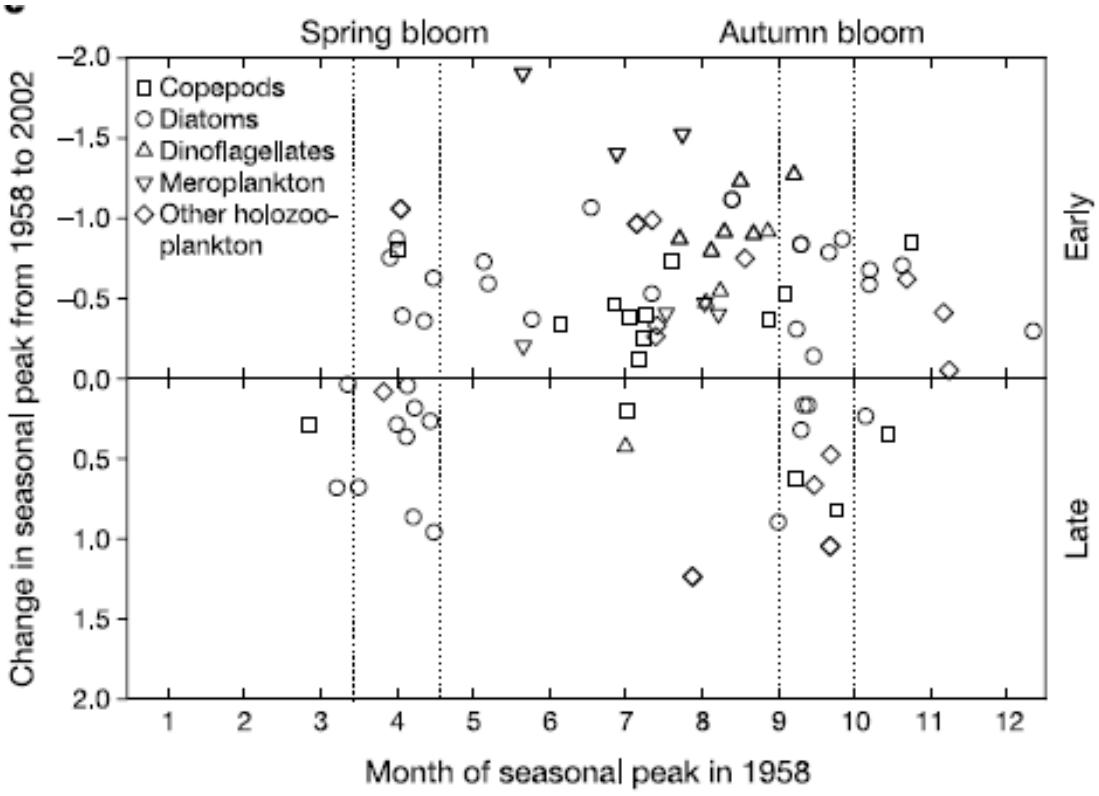
Water properties show variability at multiple timescales



- Long-term trends
- Decadal oscillations
- Extreme events
- Interannual variation

http://www.pfel.noaa.gov/products/PFEL/modeled/indices/upwelling/NA/data_download.html

Biological “fingerprints” of climate change in marine systems

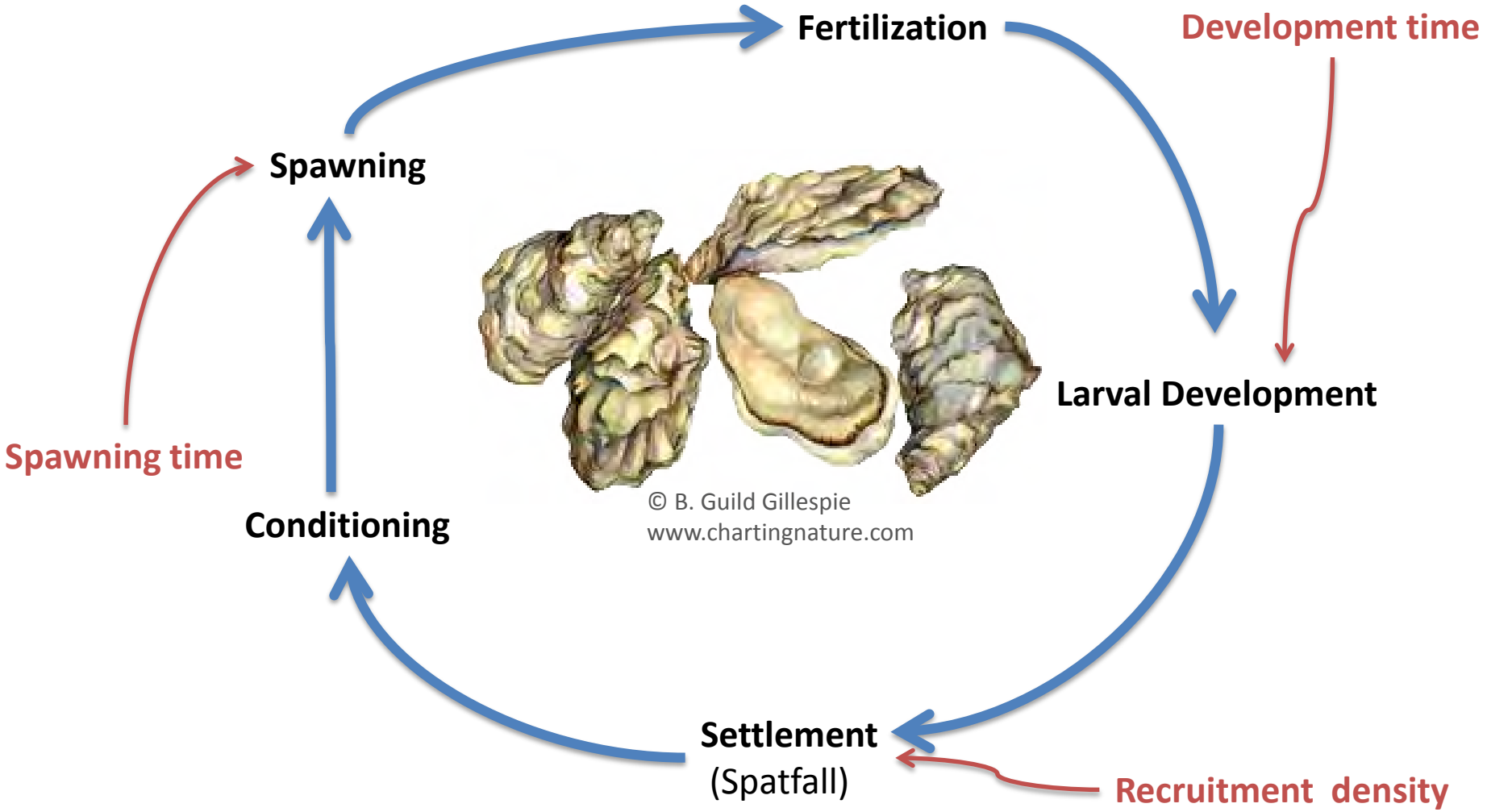


- “Responder” species shift their peaks in abundance earlier in the year
- Some species shift later

Edwards and Richardson 2004 Science

Test for a biological fingerprint of climate change in Pacific oysters (*Crassostrea gigas*), a commercially-valuable non-native species in the Salish Sea

Temperature Effects on the Pacific Oyster Life Cycle



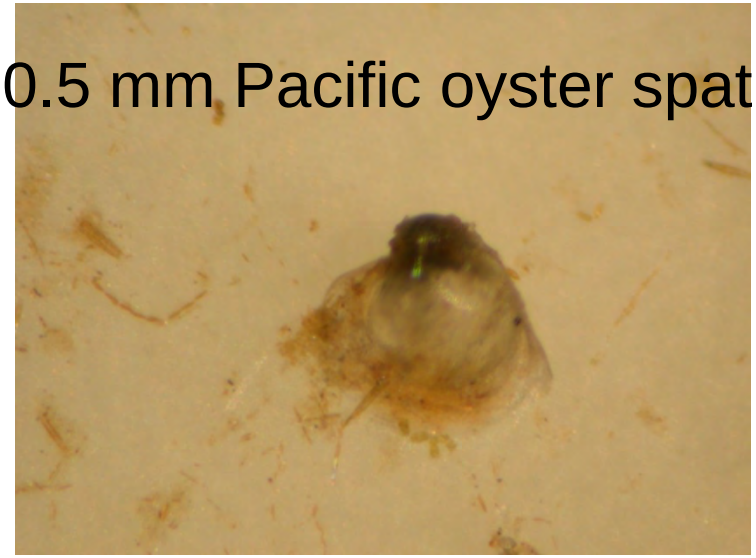
Are temperature trends distinguishable despite other scales of variability in these oyster-setting regions?

Has oyster recruitment changed over time?

Does oyster recruitment vary with temperature?

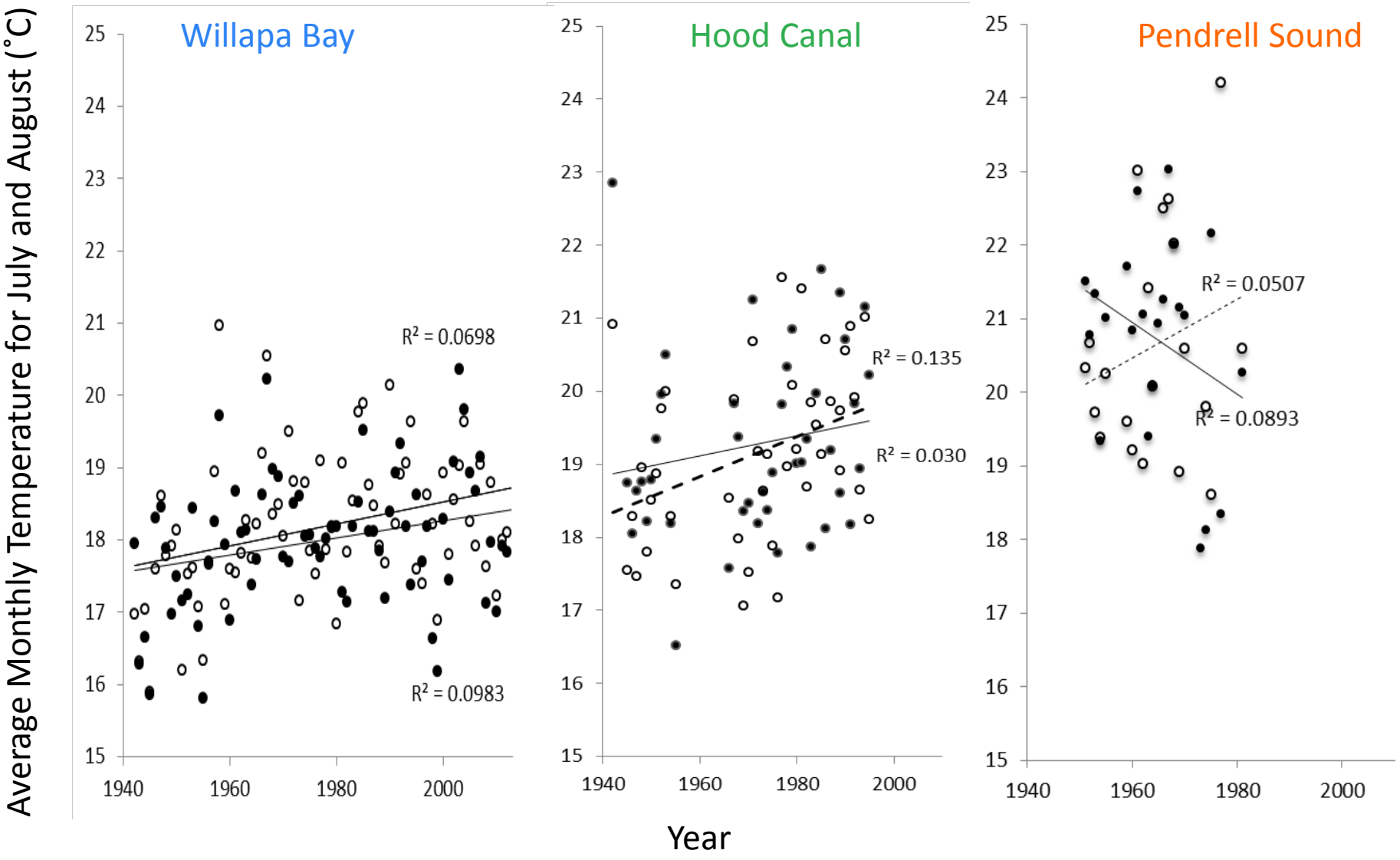
- Three main regions where Pacific Oysters are established
- Commercial spatfall has been monitored.

Fishery and aquaculture data sets extracted from historic records

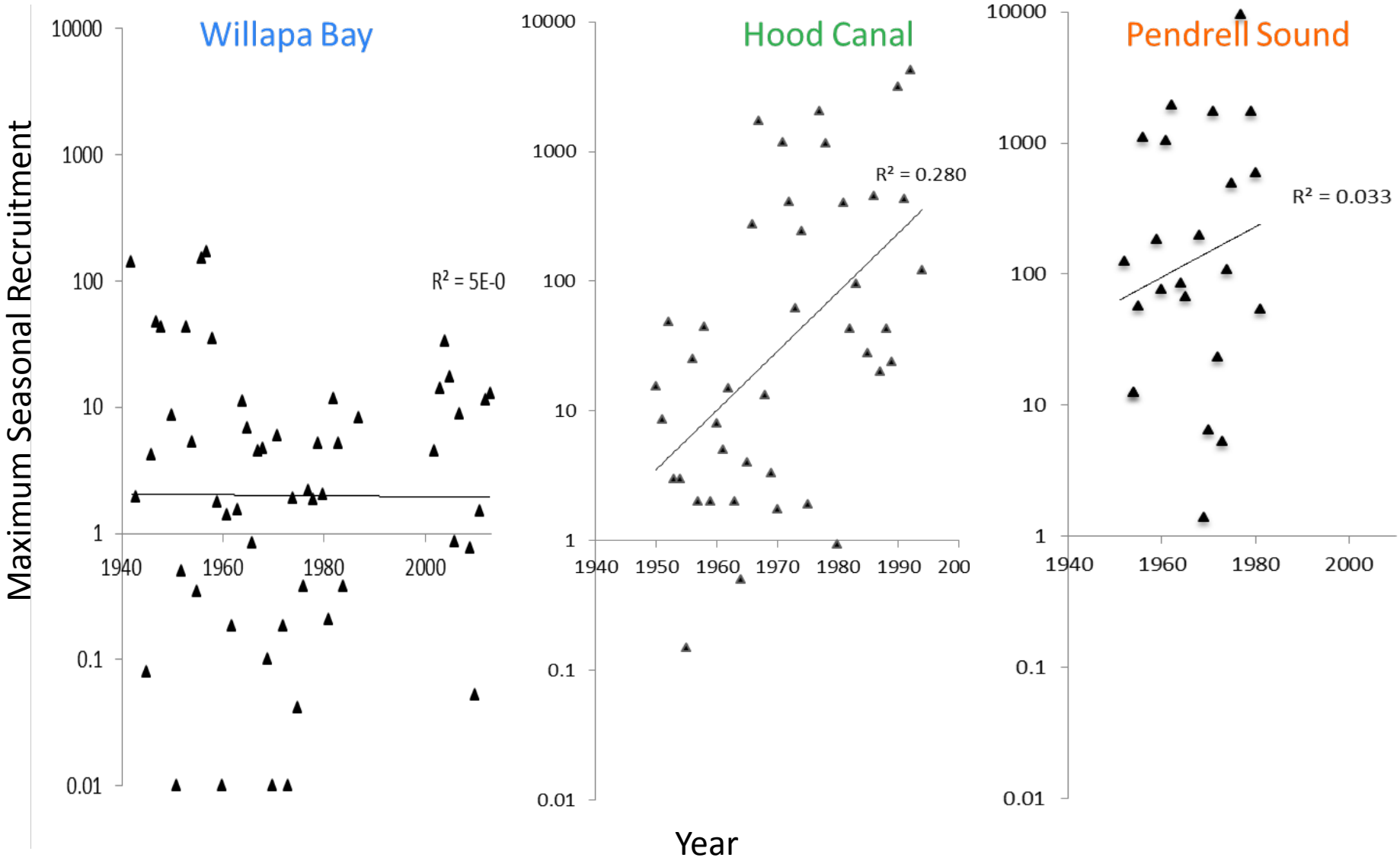


0.5 mm Pacific oyster spat

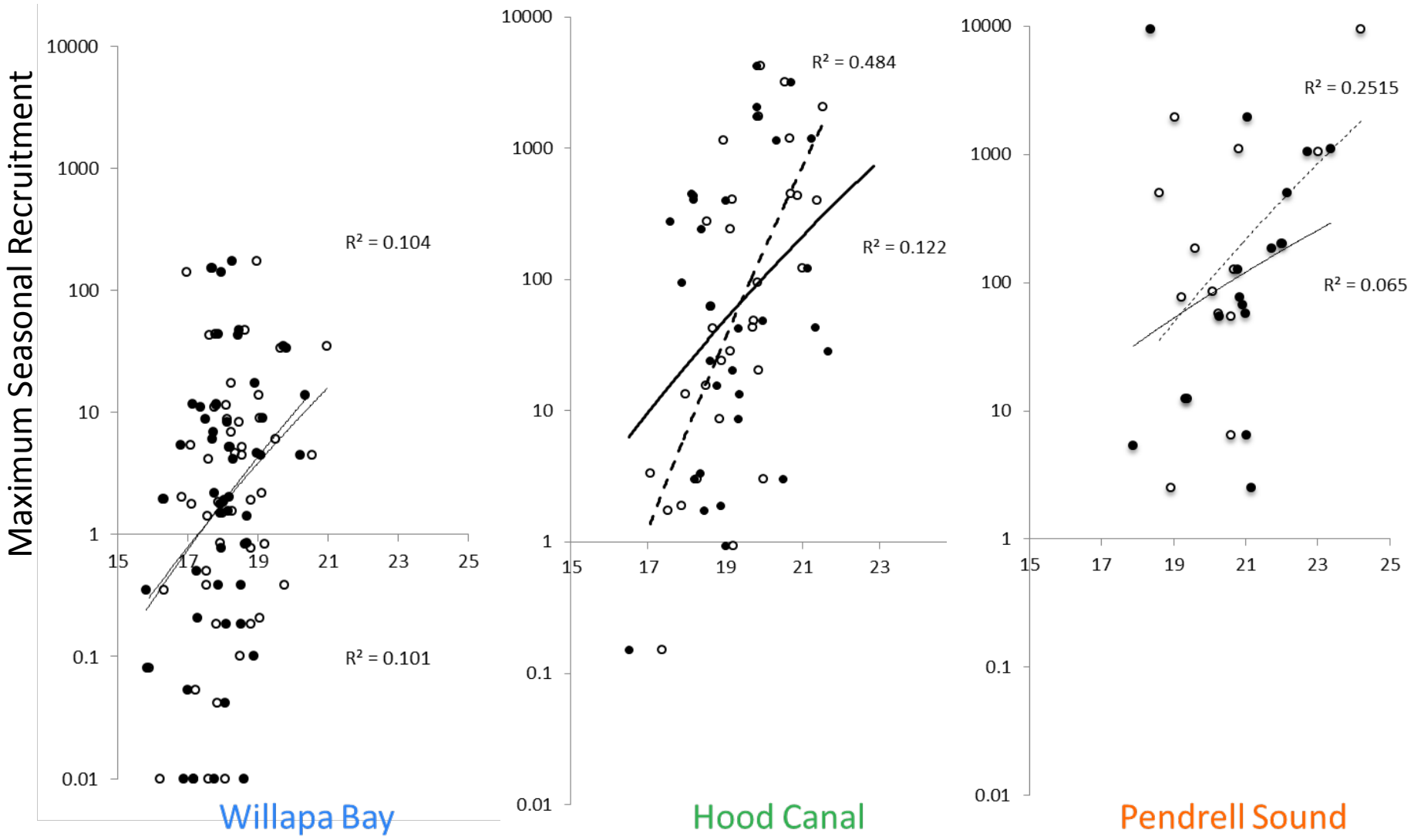
Water Temperatures Rising



Increasing or Steady Trend in Recruitment over Time



Recruitment Increases with Temperature



1) Are temperature trends distinguishable despite other scales of variability in these oyster-setting regions?

Yes, warming in Hood Canal and Willapa Bay

2) Has oyster recruitment changed over time?

Also Yes, increasing in Hood Canal and Pendrell Sound

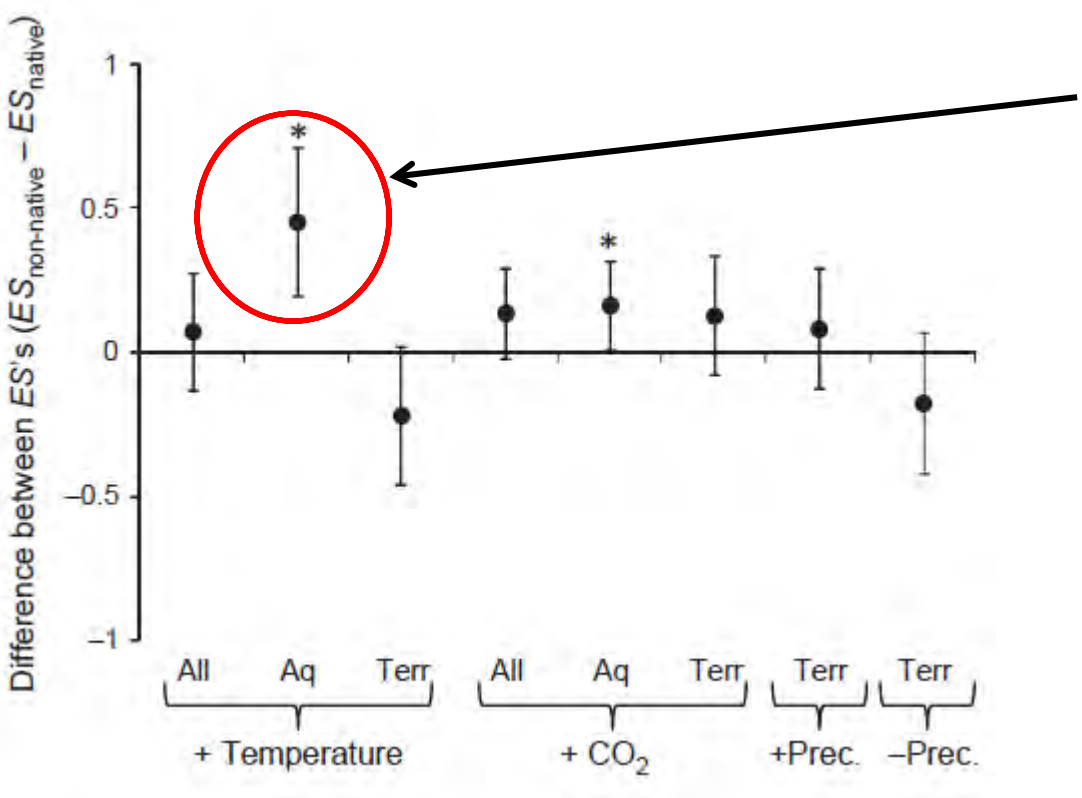
3) Does oyster recruitment vary with temperature?

Yes, higher recruitment in warmer years!

Temperature variability → easier to detect "responders" but harder to detect trends


Pendrell Sound: 21°
Hood Canal: 19°
Willapa Bay: 18°
Japan: 21-23°

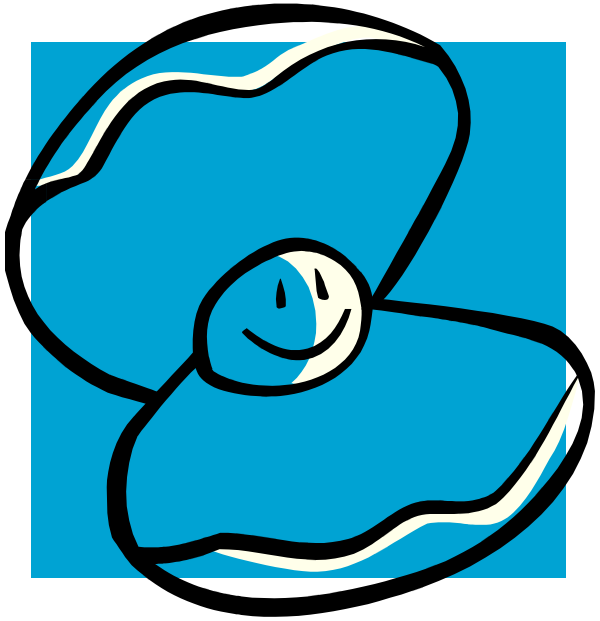
Non-native species may be better able to take advantage of warmer aquatic systems than are native species



- Non-native aquatic species respond more positively (or less negatively) than natives

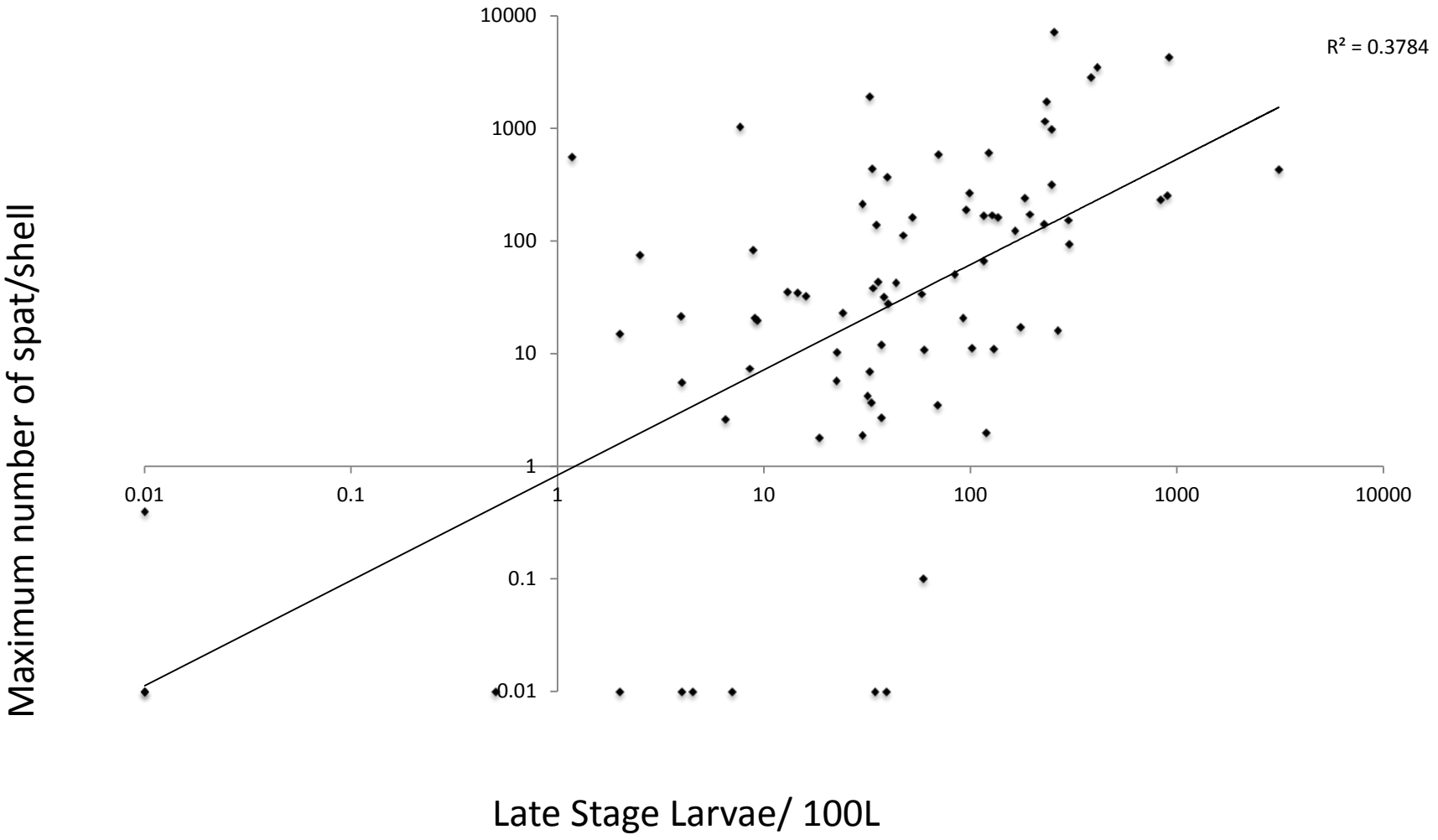
Sorte et al. 2013 Ecology Letters

Thanks!
Any Questions?

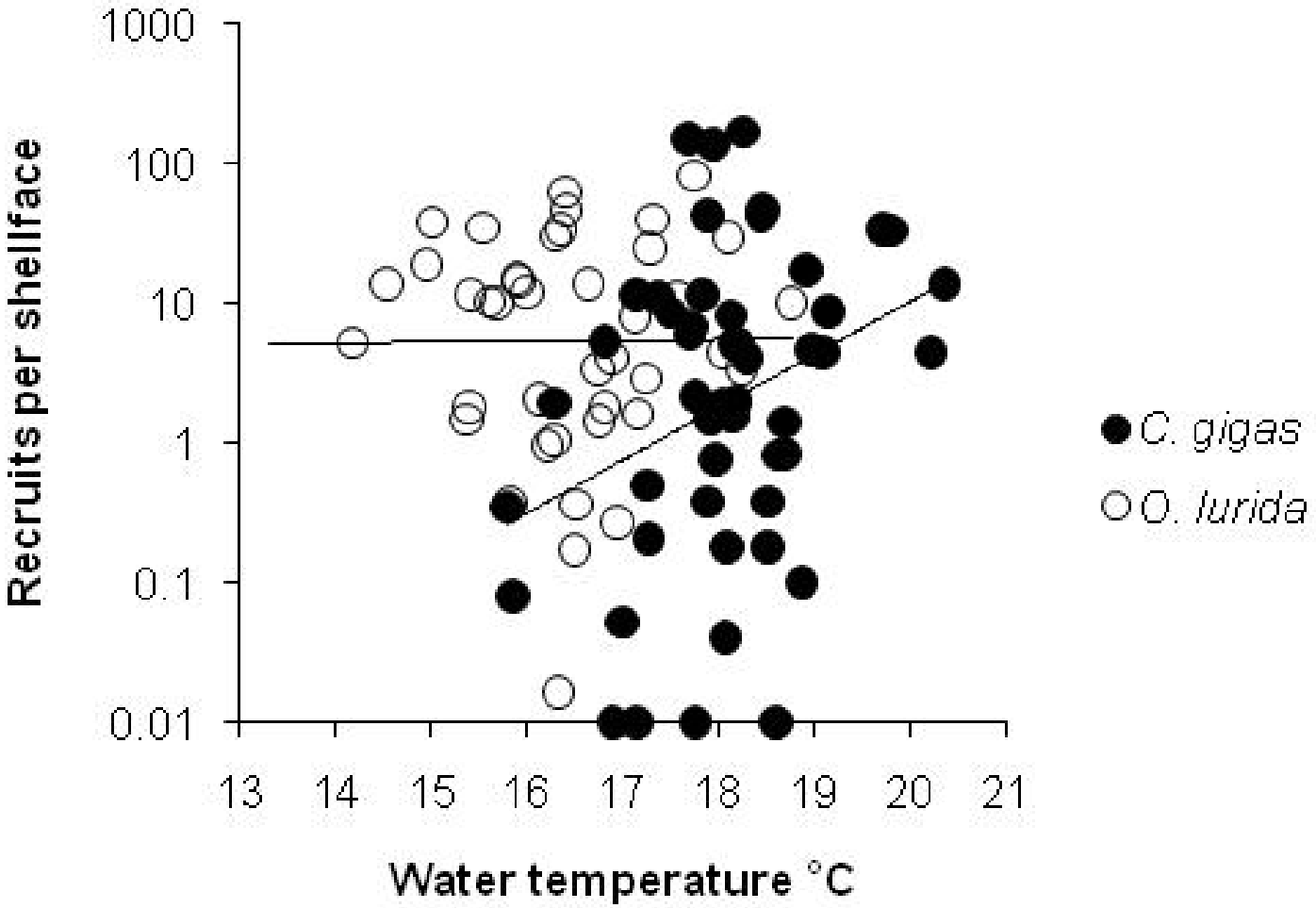


Special Thanks to Dr. Jennifer Ruesink, University of Washington
Data provided by: Washington State Department of Fisheries and British Columbia Department of Fisheries and Oceans

Positive correlation between late-stage larval counts and spatfall counts in Pendrell Sound



In Willapa Bay, native oysters have similar recruitment regardless of water temperature



In Willapa Bay, warmer years have earlier recruitment (lower day of year when “set” occurs)