

Turning the tide: Restoration of native oysters in a highly invaded estuary

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Olympia oysters

- only native oyster on US West Coast
- in decline along range
- a major restoration challenge: non-native species



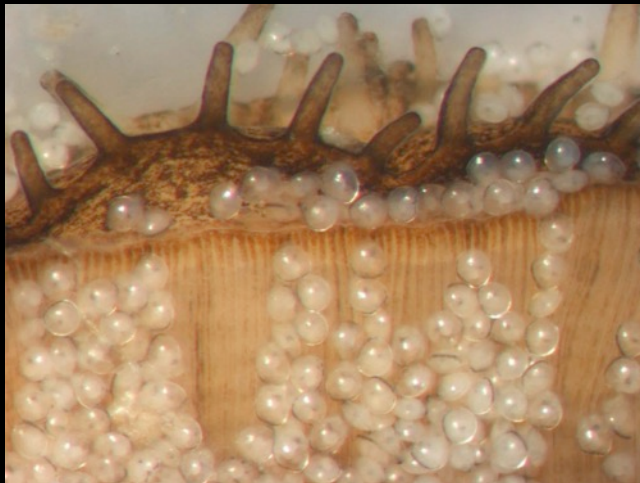
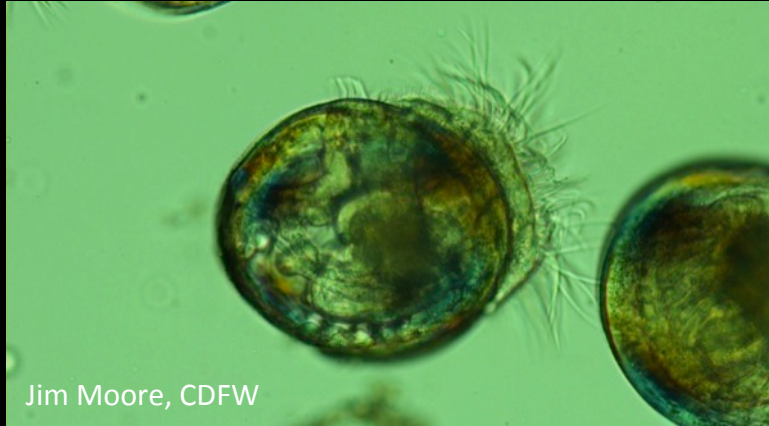
Ostrea lurida

NNS & oyster restoration

- Predators
- Competitors
- Poor habitat
- Permit issues



Oysters need hard substrate



Oysters need hard substrate



Idea from terrestrial restoration

- Use stress to reduce non-natives
 - burning, mowing, nutrients
 - do restoration in stressful locations



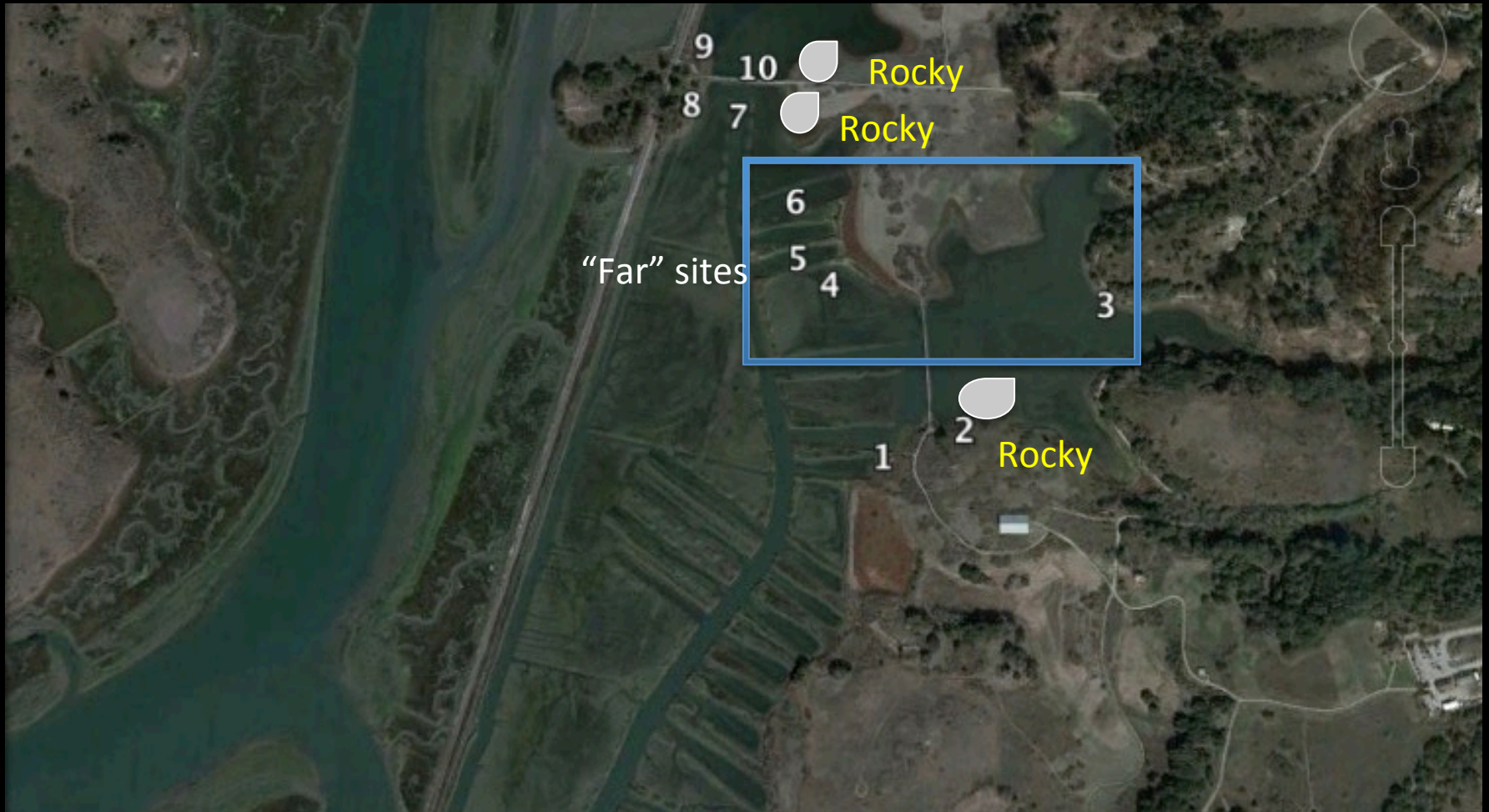
Anna Deck, SFBNERR

Hypotheses


- Oysters would do better than NNS
 - Higher tidal elevation
 - Muddy vs. rocky
 - Far vs. near source pops



Project sites



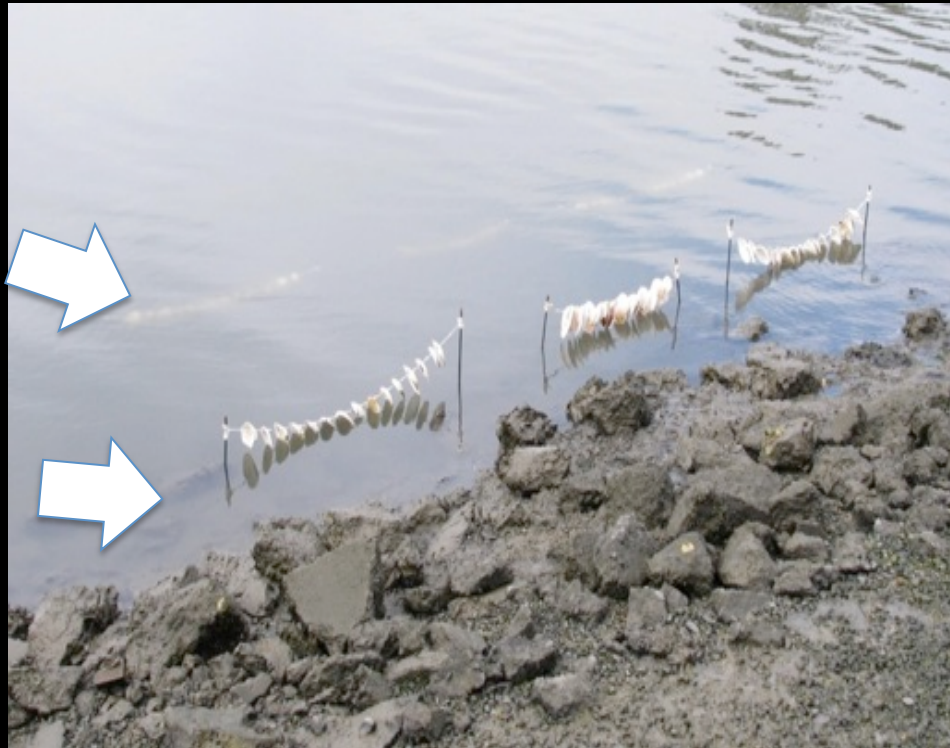
"Far": sites ~300 m from source populations

 =source population

Two tidal elevations

Low - 30 cm

High + 30 cm



Effects on oysters, NNS

- Tidal height : yes, both
- Mud vs rock: yes, oysters
- Near vs far: yes, NNS



More NNS lower

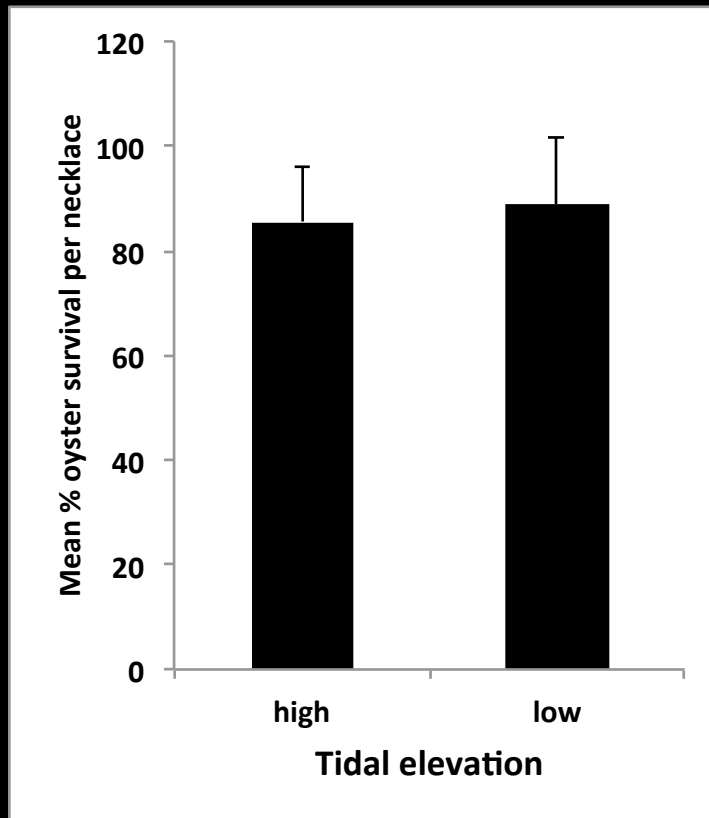


and more oysters lower!



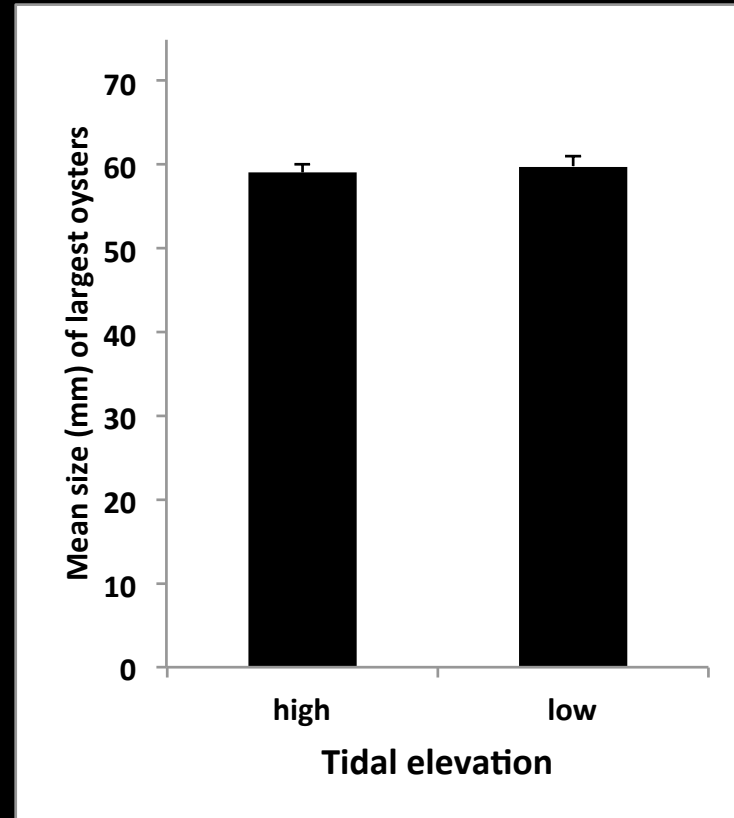
But high elevation not bad for oysters

Survival



Two-way ANOVA, no difference in survival by elevation.

Size



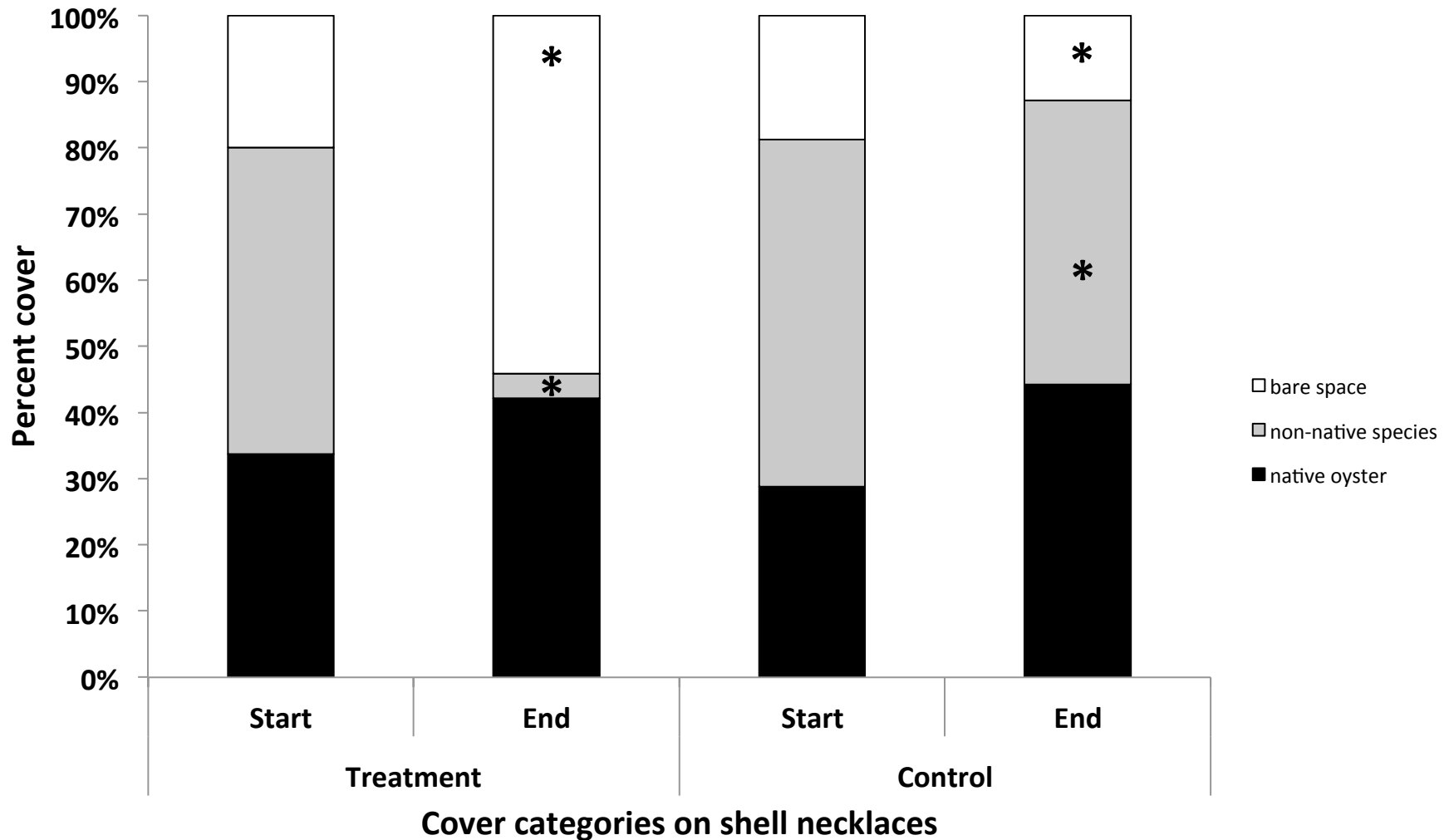
One-way ANOVA, size not different.

Can we decrease NNS?

- Four sites
- Moved necklaces from low to high
- 1 year later, compared to controls



NNS decrease at high elevation, no difference in oysters



*statistically significant difference

Summary

- Lower elevation better for native oyster recruitment, early survival and growth

(Trimble et al. 2009, Zacherl pers. comm. 2014)



Summary

- Over longer term, no difference
 - size
 - survival
- Trade-off:
 - fewer potential competitors (ES, SF)
 - lower predation (SF)



Implications for restoration

- Details vary with location
- Potential to exploit differences in stress tolerances to achieve goals
- Experimental work important!

Acknowledgements

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