

004 EPA STAR Graduate Fellowship Conference Next Generation Scientists—Next Opportunities

Using Ecological Theory to Predict Invasion Dynamics in a Pacific Northwest Marine Fouling Community

ENVIRONMENTAL ISSUE

pluced species have been proven to alter ecosystem processes, vectors of human disease, cause millions of dollars in loss to ercial industries and are considered the second largest threat to resity behind habitat loss and degradation (1).

sions are particularly rampant in marine systems, with 298 nonnous species identified in U.S waters. Of these, 187 occur on cific coast (2). Fouling communities associated with pilings ers are especially prone to invasions because of close ation with human activities.

ecological theory predict invasions and their effects in fouling unities? Can we extend this to implement strategies to ensure ommunities will be resistant and/or robust to invasions?

indigenous Species in the Makah Marina Fouling Community



rylloides violaceous) a non-indigenous ascidian ("sea squirt") nmon in PNW fouling communities

SCIENTIFIC APPROACH

HYPOTHESES

- Non-indigenous species are strong interactors in the fouling community that are able to pre-empt space and exclude other species.
- Diverse communities will be more resistant to invasion.

• If invaded, diverse communities will be more robust to invaders (meaning that fewer species will go locally extinct).

METHODS

- Employ PULSE experiments and dynamic regression analysis to estimate per capita species interaction strengths.
- Simulate community dynamics under different scenarios using a food web model based on estimated interaction strengths.

• Reconstruct these scenarios in experimental communities on replicate 20cm X 20cm plots. Scenarios will included the reduction in the diversity of competitors (done manually) and reduction in predation pressure via cage exclosures.

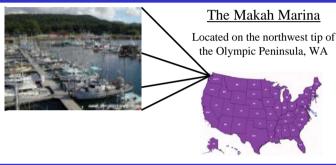


Include feather duster worms, native ascidians, sea anemones, bivalves, & others

Include the kelp crab, *Pugettia* producta, and the common tidepool sculpin, *Oligocottus maculosus*

•Test the food web model predictions of non-indigenous species abundance with experimental results.

RESEARCH SITE



IMPACT

•This study will test the utility of food web models based on ecological theory and empirically measured interaction strengths in predicting invasion resistance in communities.

• This study will also provided crucial baseline data on non-indigenous marine fouling organisms, especially the recently-introduced ascidians *Botrylloides violaceous* and *Styela clava*, in the Pacific northwest region.

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 International Union for Conservation of Nature and Natural Resources (IUCN). (1996).Compiled by Mick Clout, Sarah Lowe, and the UCN/SSC Invasive Species Specialist Group
Ruiz, G.M et al. (2000). Invasion of coastal marine communities in North America: aparent patterns processes and biases. <u>Annual Review of Ecological Systematics</u>, 31:481-531

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