

## **Project Summary**

### **Summary**

The proposed work experimentally examines the theorized role of generalist predator foraging behavior as a stabilization mechanism in ecological communities. To evaluate the relationship between stability and foraging behavior, this proposal uses a predator whose prey preferences are manipulable, the whelk *Nucella ostrina* in the Oregon intertidal. The predator's preferences will be manipulated to replicate several foraging patterns that are exhibited by generalist predators: a constant preference for a single prey type, variation among individuals in prey preferences, and adaptive foraging by predators, in which prey preferences respond to changes in prey densities. The system undergoes two annual perturbations due to the recruitment of the predator's preferred prey, the barnacle *Balanus glandula*, and the mussel *Mytilus trossulus*. The subsequent response of the communities to the perturbations will be used to evaluate differences among the treatments in two empirical and theoretically relevant measures of stability: the resistance and resilience of the community. Overall, this work will provide data which will determine how different foraging behaviors by predators determine patterns of predator-prey interactions and how these patterns of interactions influence the stability of ecological communities.

### **Intellectual Merit**

The concept of stability and the mechanisms which lead to stability in ecological systems have occupied ecologists since the beginning of the field. The reason for this is two-fold: 1) despite constant perturbations, ecosystems generally remain stable, and 2) when ecological systems do become destabilized, the consequent environmental and monetary costs can be devastating. Mathematical models suggest that generalist foraging behavior can be a stabilizing force in communities and food webs, but empirical data showing that generalist predators behave in a way that is stabilizing and that this behavior does indeed lead to community stability is lacking. By providing data that links generalist predator foraging behavior to patterns of predator-prey interactions and the stability of ecological communities, the proposed research will help to determine empirically whether generalist predators can stabilize systems through their behavior and which behaviors are most amenable to producing stability. In addition, this project uses metrics of stability that are both empirically measurable and rooted in ecological theory and uses realistic perturbations to the system. Therefore, this will help to close the gap between theoretical and empirical research on stability and provide a template for future empirical studies on stabilizing mechanisms in ecology to increase their relevance to theoretical investigations.

### **Broader Impacts**

The proposed work will have several impacts beyond academia and dissertation improvement. First, the majority of the budget will go to the training of two undergraduate students. The undergraduates will be trained in field work and data collection, management, and analysis and will be preferably from underrepresented groups, with hopes that this training will help them pursue a career in an ecology or another STEM field. Through collaboration with the Hatfield Marine Science Visitor Center, an exhibit will be developed that explains the concept of food webs, how food webs influence the everyday lives of the visitors, and how predator behavior relates to the strength of links in food webs. Lastly, the data derived from this project will be useful to ecosystem based management by helping managers understand the link between predator behavior and the strength of interactions and potential of generalist predators in stabilizing food webs.