Conclusions

Balancing human well-being with ecological integrity, and finding ways to measure these trade offs is one of the central issues facing natural resource management. These tradeoffs exist in all social-ecological systems, be it range lands, forests or fisheries. Figuring out how to include people in food webs is still a surprisingly thorny issue and remains largely unresolved. Commercial fisheries are a particularly compelling system in which to address these tradeoffs, and in my dissertation I addressed many aspects of this issue by taking a diverse set of approaches to examine commercial fisheries generally and the US west coast commercial fisheries in particular.

In chapter one I add to the small, but growing literature that demonstrates the importance of considering resource-users’ dynamics when attempting to predict outcomes for biophysical systems. I show that the interactions between harvest and range shifts are approximately additive, but that the results are sensitive to the assumptions about harvesting reallocation of effort.

Despite conceptual advances in linking human-wellbeing to biophysical dynamics, a major challenge exists in operationalizing these conceptual framings. In my second chapter I take advantage of a unique dataset collected by fisheries manages on the US West Coast. Using these data I developed a novel network approach of linking the social system (i.e. fishing communities) to the ecological system (the fish). Because this approach made use of data collected by management, making it immediately operational for all managed fisheries in the US. Such a conceptual framework represents a major step forward for mapping and quantifying these linkages between social and natural systems. I add to this work by analyzing these resultant networks to show that the topological structure and modularity varied non-randomly, providing additional features that may be useful for mangers seeking to balance human well-being with sustainable populations of fish. Specifically, I find that Dungeness crab may represent a “keystone fishery” and linkages among that are counter-intuitive from a solely ecological perspective.

In my third chapter I analyzed patterns of participation across the US West Coast commercial fisheries before and after a major management change in a single fishery. Using individual and fishing community level analyses, using the framework described above, I show that the policy affected how fishermen shift their effort across fisheries at the individual level, but community level attributes remain unchanged. This work demonstrates how such social-ecological system level policy analysis may be conducted.

In this thesis I present theoretical models, a conceptual framework and empirical analyses focused on the question of how to quantitatively and comprehensively include people in food webs. This work helps move us towards a set of tools managers can use to evaluate policy efficacy in commercial fisheries social ecological systems in the face of rapid environmental change while balancing the need for ecological integrity and human well-being.