Improving catch estimation methods in mixed stock fisheries with sparse sampling of the species composition of the landed catch using Bayesian methods.

Nicholas Grunloh[1], E.J. Dick[2], Don Pearson[2], John Field[2], and Marc Mangel[1]

In order to effectively manage exploited populations, accurate estimates of commercial fisheries catches are necessary to inform monitoring and assessment efforts. In California, the high degree of heterogeneity in the species composition of many groundfish fisheries, particularly those targeting rockfish (*Sebastes*), leads to challenges in sampling all market categories or species adequately. Limited resources and increasingly complex stratification of the sampling system inevitably leads to gaps in sample data that require the "borrowing" of species composition or other derived variables across strata (such as ports and gear types), often based on historically derived protocols that are somewhat ad-hoc, in order to provide point estimates of species compositions. In order to move from the current, but admittedly rigid sampling design, we have continued previous exploratory efforts to develop and apply a Bayesian approach to estimating species compositions of landing, by modeling the relationships among strata in a hierarchical model to improving the estimation procedure. *Expand a bit on modeling framework here?*

Biase-Variance trade off
predictive accuracy

Our results indicate that this approach is likely to be more robust than the current approach, particularly in the face of sparse sampling, and our results should also help to inform and prioritize future sampling efforts. Perhaps more significantly, this approach can provide estimates of uncertainty around species-specific catch estimates, not currently possible under the existing estimation system.