

Greg Ardini  
Marine Policy Seminar Abstract  
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### **The Development of a Multispecies and Multi-fleet Model to Simulate Quota Implementation**

This seminar will present the development of a model using two species and two fleets to analyze fishermen behavior under open access and Total Allowable Catch (TAC) regulations. For clarification, an open access fishery is a scenario where vessels may enter a fishery as they choose and catch as much as they want. A TAC regulation places a limit on how much of a species can be caught in a given year, thereby restricting fishing effort. The model, to be created in Excel, is to be based off the Loligo squid and butterfish fishery of the Mid Atlantic.

The butterfish, no longer a commercially profitable species, is believed to have suffered significant population decreases over the last decade. As butterfish bycatch is a common occurrence in the Loligo fishery, a butterfish mortality cap was implemented in 2010. This cap specifies mortality levels of butterfish in the Loligo fishery that will result in a closure.

In the model, the two fleets will both be targeting the same stock (representing the squid), based on the higher price. One fleet will be more efficient at harvesting the target stock, but will also catch more of the secondary, or bycatch stock (representing the butterfish). The other fleet will not harvest at the same speed, but will have a catch ratio ( $Y1/Y2$ ) that is closer to the quota ratio ( $Q1/Q2$ ). By having a catch ratio equal to the quota ratio, it allows a fleet to maximize use of both quotas. The model is also to be based on technological interdependency between the two species, although biological interdependency may be introduced later on.

The hypothesis is that the more efficient harvesters of the target stock will win out in an open access fishery, and fleet two will be forced to exit. However, with the introduction of TACs on both species, the less-efficient but more "ecosystem-friendly" fleet will continue to operate, due to the binding constraint of the TACs. Different fishing areas will also be introduced in order to better understand the behavior of fishermen under a two quota management system. Quota trading may also be introduced after further development in the model.