

A Comparative Theoretical Study of Age-structured Fish Subpopulations

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Many species of harvested fish undergo changes in reproductive strategies and behaviors as a consequence of fishing pressure or changes in habitat. Many of these changes occur in subpopulations where management efforts are disproportional across large spatial scales or where the habitat of the population in a particular area is altered. This project provides a new way of modeling such populations where subpopulations are reproductively isolated and shows how using a comparative modeling approach, we can understand the processes that dictate the age structure of these populations. The model derived in this study is a discrete-time Leslie process, the components of which are functional response curves derived from modeled behaviors. Here, I present a brief overview of the derivation of the model with underlying assumptions, solvability, and a brief analysis of the solution. I also present a simplified two-stage model of a fish population in which both mature and immature individuals are present with a comparison between individuals who are reproducing in multiple spawning seasons and those who spawn in a single large burst. Finally, I present an outline of the ongoing research being done on this project as it applies to harvested marine fishes, particularly Atlantic Tarpon, Bluefin Tuna, Swordfish, and Skipjack tuna.