Dynamic Adjustment Paths in Predator-Prey Models

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Abstract: In this paper we discuss dynamic adjustment paths towards economic optimal steady-state equilibrium in a fishery where two species interact through a traditional predator-prey relation. We set-up a general bio-economic predator-prey model based on the assumption that fishing effort is a public input applied when exploiting the fish stocks. By using specific functional forms, hypothetical parameter values and fictive starting values the general model is simulated. We show that the optimal adjustment paths can be characterized as stable-arms where a small derivation from the optimal path can lead to extinction of one or both stocks (or no fishing effort at all). The stability of the stable arms is large if fishing effort or shadow prices of the fish stocks are low. These requirements are affected by, for example, the starting value for fishing effort and the predator rate. One policy implication of these results is that traditional bio-economic predator-prey models may generate results with low practical policy relevance. However, if the models are extended to incorporate more realistically assumptions regarding economic behaviour this conclusion might change.