

**Title: Asymmetric Externalities of the Tuna Longline and Tuna Purse-Seine Fisheries in the Eastern Pacific Ocean**

**Authors:** Chin-Hwa Jenny Sun (Author), National Taiwan Ocean University / IATTC (USA)  
Mark N. Maunder, Inter-American Tropical Tuna Commission (USA)  
Alexandre Aires-da-Silva, Inter-American Tropical Tuna Commission (USA)  
William H. Bayliff, Inter-American Tropical Tuna Commission (USA)

**Abstract:** Paper scheduled to present in the Special Session: Global economics of tuna fisheries

Yellowfin and bigeye tuna in the eastern Pacific Ocean (EPO) are not managed optimally with respect to their economic value. Both species are caught at sizes too small to take full advantage of their individual growth and the higher price obtained for large fish in the sashimi market. Large bigeye and yellowfin destined for the sashimi market are caught in the longline fishery, while smaller bigeye, yellowfin, and skipjack destined for the canned tuna market are caught in the purse-seine fisheries. We evaluate the economic and biological trade-offs that might be considered when managing tropical tunas in the EPO. We also discuss methods to implement management (e.g. tradable property rights and compensation) that may address the social and equity issues. It is assumed that if the catches of small bigeye and yellowfin were reduced, the gains to the biomass of those species due to growth would exceed the losses to it due to natural mortality. This would increase the availability of large bigeye and yellowfin to the longline fishery, which, in turn, would increase the total catches of those species, provided there was sufficient fishing effort by longliners. It is further assumed that bigeye and yellowfin are well mixed within the EPO, in which case reductions in the catches of small tunas anywhere in the EPO would be beneficial to longliners operating anywhere in the EPO. It is further assumed that the purse-seine and longline fisheries could be managed in such a way that the spawning biomasses of the two species were maintained at optimum levels. Three analyses are conducted to evaluate the economic and biological tradeoffs of different levels of purse-seine and longline fishing effort. The first evaluates the different combinations of effort that could produce the target biomass level. The second evaluates combinations of effort that optimize equilibrium (long-term) yield and economic value. The third evaluates the dynamic (short-term) effect of different combinations of effort. The analyses are based on the current stock assessment models for yellowfin and bigeye tuna and recent average catch levels for skipjack tuna. The economic value is determined from the landings value for purse-seine- and longline-caught tuna of each species. In order to resolve the conflicts of interest among different countries and fishing gears that utilize the tuna resources, we propose the establishment of either a compensation scheme to create incentives to purse-seine fishermen to reduce their catches of juvenile bigeye and yellowfin tuna or a transferable property right system. The subtleties of such a system still need to be worked out to address the complexities of the fishery, but the potential benefits are such that the possibility of implementing such a system should not be ignored.