

## **Technological Management on Size-selective Catch in Tropical Tuna Purse Seine Fishery**

### **ABSTRACT**

This research studied the size-selective catch by fishing gear and operation technique in tuna purse seine fishery in order to develop capture practices to avoid small-sized individuals of tropical tunas (i.e., skipjack, yellowfin and bigeye tunas) in catches, which were concerned by the tuna Regional Fishery Management Organizations (tRFMOs).

In Study I, size compositions of the three species captured by purse seine operation with fish aggregating devices (FADs) were analyzed to clarify the size distribution and proportion of small-sized individuals using data obtained by the cruises of M.V. SEAFDEC in the Eastern Indian Ocean from 1995 to 2003. Results indicated that most catch in these three species were commercial size, while a large proportion of immature yellowfin and bigeye were included.

In Study II, size compositions of the three species and selectivity curves of purse seine net calculated by a new established selectivity model were compared to assess the degree of selective capture in tuna purse seining around FADs using the same database as in Study I. It was indicated that purse seine net contributes to size selectivity, and the selectivity curve explains well the size distribution. From the results, it was concluded that exclusions of immature yellowfin and bigeye tunas in multi-species tuna purse seine fishery are difficult by the selectivity of the net.

In Study III, size-selective fishing by operation techniques was analyzed using fishing data from Thai tuna purse seiners operated in the Western Indian Ocean

during 2005-2007. Fishing operation was classified into four operation types, including free school (FS), FAD, natural log, and other floating objects. FS operation was found to be the most size-selective technique, which caught the fewest small-sized individuals, while the associated operations were less size-selective.

In Study IV, skippers' fishing strategies in operation type combinations was analyzed using the same fishing data as in Study III. Fishing strategy analysis showed that success rates represent the difficulty and differences between optimistic and actual values represent economic risk. Skipper's skills are believed to affect a skipper's fishing strategy, and specialist and generalist skippers were both identified in this analysis. FS operation holds the highest risk; however, it represents potentially high revenue fishing because of its ability to catch large-sized individuals and high-priced species. A specialist achieved high revenue by overcoming the risk of FS operation, while generalists distributed fishing efforts over operation types to avoid risks. Simulation results suggested that high- and moderate-skilled skippers can shift to FS operation with no revenue decline to respond to policies of tRFMOs, which increasingly promote FS operation.

This research suggested that size selectivity model is useful to regulate catch of small-sized individuals for resource utilization. The future study of school behaviour during the hauling procedure is needed to clarify the fish-net encounters for improving the accuracy of selectivity. FS operation is a highly recommended fishing technique for resource management.