

Estimating sea cucumber resource abundance in the Seychelles using spatially-explicit fishery-dependant data

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The highly-valuable sea cucumber resources in the Seychelles have been exploited by 25 licensed vessels operating over ~43,000 km² and using scuba diving equipment. To prevent resource depletion, fishers must report daily catch per species and per dive and fishing spots to the Seychelles Fishing Authority (SFA) as part of a co-management agreement. However ecological indicators of the resource abundance are currently lacking. To inform management decisions, we investigated the use of fishery-dependent data to estimate resource abundance. An experimental fishing survey was conducted in 2017, involving three professional divers and SFA officers. Divers were asked to collect sea cucumbers during 30-minute dives within a delimited 1-ha area, that was populated by a range of sea cucumber densities (10 to 300 individuals/ha). These conditions were assumed to be similar to commercial fishing activities and representative of the variability of the resource density over the fishing grounds. The relationship between experimental catches and sea cucumber density was investigated through modeling approaches. Results showed that, at the same level of fishing effort, divers' catches were proportional to experimental sea cucumber density level regardless of divers. Given the approximate duration of fishing dives in fishing areas, according to their respective depth, we estimated the density distribution of main target species over the Seychelles shelf in 2015 using logbook data. Abundance maps showed that sea cucumber resources are heterogeneously distributed and highlighted densely and lightly populated fishing grounds. Overall results indicate that routine spatially-explicit fishery-dependant data could be used to monitor the abundance of these resources over the Seychelles shelf. Such monitoring might contribute to the design of an adaptive co-management strategy at the sea cucumber fishery scale.