Trophic Level Study with Stable Isotope Analysis of Set-net Catch Species in Rayong, Thailand

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ABSTARCT

For evaluating the sustainability of Japanese-type set-net introduced to Rayong province, Thailand, the mean trophic level (TL_m) of the set-net catch was analyzed by means of the stable isotope analysis and annual catch amount of major species during the period 2003-2013.

The samples of muscle tissue and stomach content (48 species, 1030 individuals in total) were collected from the set-net and other gears in December 2012-March 2013, October-November 2013 and March 2014, in Rayong, Thailand. The environmental samples including the particulate organic matter (POM), the sedimentary organic matter (SOM), phyto/zoo-plankton and benthos were also collected. Stable isotope ratios were analyzed by Delta V advantage and Flash EA 1112 at Research Institute for Humanity and Nature, Kyoto. The TL_m were calculated with catch composition data of 2003-2013.

The stable isotope ratios of muscle tissues varied among fish species, with the range from 6.5 to 12.6‰ for $\delta^{15}N$, and -19.0 to -14.5‰ for $\delta^{13}C$. The

widespread trend of $\delta^{15}N$ values suggested that wide range of trophic levels was included in the set-net catch species. The highest $\delta^{15}N$ of muscle tissue was found in *Trichiurus lepturus*, and the lowest in *Aluterus monoceros*. The highest $\delta^{13}C$ of muscle tissue was found in *Taeniura lymma*, and the lowest in *A. monoceros*. The highest $\delta^{15}N$ (10.0‰) of diets from stomach content was found in *Tylosurus acus melanotus*, and the lowest (5.1‰) in *Himantura imbricate*, respectively. The highest $\delta^{13}C$ (-16.8‰) of stomach content was found in *Carangoides fulvoguttatus*, and the lowest (-21.4‰) in *H. imbricate*. Through the comparison of muscle and diet $\delta^{15}N$ for each species, the nitrogen isotopic enrichment factor was identified to be 2.29±1.04‰ (Meanin±S.D.) ranging from 0.42 to 3.79‰. Which was much lower than the general value(3.4‰) in the previous studies. The trophic levels were calculated by the local $\delta^{15}N$ enrichment factor and $\delta^{15}N$ of primary producer (POM for the most of species but SOM for *T. lymma* and *H. imbricate* according to the Cluster Mapping). Consequently, the TL_m of set-net catch was identified to be in the range of 3.59-3.78 during the period 2003-2013, suggesting the stable trend in a higher level, which was different with the fishing down trend reported with survey trawl catch in the Gulf of Thailand. The TL_m must be good index to evaluate the sustainability of set-net in comparison with the other gears for long-term analysis, toward the establishment of the ecosystem–based fisheries management in Eastern Gulf of Thailand.