

Comparative study on respiration of Japanese anchovy (*Engraulis japonicus*) around Japan

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Japanese anchovy (*Engraulis japonicus*) is an important species not only as an exploited species but also as prey for variety of predators including marine mammals, tunas, mackerels, flounders, etc. However, the biomass of Japanese anchovy has shown large fluctuation and is one of the main actors of the fish species alternation responding to basin scale climate variabilities. From the stock management views, three sub-populations are defined in Japan: Pacific stock, Tsushima stock (also called the East China Sea stock), and Seto-inland Sea stock. The three sub-population shows difference in weights-at-age and longevity. While the three sub-populations of anchovy share their spawning grounds, the migration route and nursery grounds are divided. In addition, while Seto-inland Sea sub-populations do not show a large migration, Pacific and Tsushima sub-populations make long distance ontogenetic migrations.

All anchovy sub-populations are plankton feeders and mainly conduct filter feeding. Therefore, we hypothesized that different respiration characteristics induce different behaviors and hence growth and migration routes between the anchovy sub-populations. To test the hypothesis, we conducted laboratory respiration experiments using a 5L swimming tunnel. Since anchovy is sensitive and difficult to stabilize by individual, two anchovies were putted in the sealed tank and were measured oxygen consumption rate with various temperatures and velocities. Based on the experiment data, oxygen consumption rate dependencies on temperature, swimming speed, and body weight were determined. In addition, basic oxygen consumption rate at 0 degC temperature without swimming was estimated. Those derived oxygen consumption characteristics were different between the Pacific-stock and Seto-inland Sea stock, while the parameters of the Pacific-stock were similar to Peruvian anchoveta (*Engraulis ringens*) and South African anchovy (*Engraulis capensis*).

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