# Conspecific comparison on the swimming and metabolic performance of Pacific chub mackerel (*Scomber japonicus*) distributed in different area

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Pacific chub mackerel (*Scomber japonicus*) is a small pelagic fish species widely distributed throughout the coastal areas of Pacific, and this study focused on the Northwest stock (distributed in the Pacific side of Japan) and Northeast stock (distributed along the coastline from Washinton to Baja California). Both of these two stocks showed large biomass fluctuation but not in a completely same pattern. Biomass was usually related to growth, which was decide by the difference of prey consumption to dissipation in a general bioenergetics budget. Since the swimming ability could be an indicator of availability to consumption (wider migration area for searching food and higher speed for preying), while metabolism was the main energy dissipation term. Comparing swimming performance and metabolism of each stock could be helpful for understanding differences on the bioenergetics budget and then the potential mechanism on biomass fluctuation and life strategy.

To explore the abiotic (e.g., temperature, current speed) and biotic (fish size) effects on swimming performance and metabolism, the wild-caught juvenile as well as aquaculture-reared young juvenile and immature of Northwest stock were measured under various temperatures (14˚C, 18˚C and 24˚C) using a variable-speed swim-tunnel respirometer. Then these data compared with the previous findings from the wild-caught Northeast Pacific stock measured under same temperatures to determine differences in their traits among these stocks.

On the temperature of 18˚C, the maximum sustainable swimming speeds ($U_{max}$) increased with fish size showed no significant difference among stocks, suggesting these stocks have similar swimming ability. Meanwhile, the mass-specific oxygen consumption rate ($M_{O2}$) of wild-caught Northwest stock increased exponentially with swimming speed ($U$, in cm $s^{-1}$) with same increase rate of aquaculture-reared Northwest stock and wild-caught Northeast stock. These results were further parameterized that $M_{O2}$ increased with temperature at a given speed and fish mass, and this relationship was consistent with previous studies of Northeast stocks. At the same temperature, Northwest stock took more $M_{O2}$ than Northeast stock, but temperature dependency of $M_{O2}$ was lower . This indicated that the metabolism of Northwest stock was less sensitive to temperature fluctuation, which may related to wider migration area, higher habitat temperature and more variated environment in Kuroshio transition compare to the California current.

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