

A challenge to investigate environmental factors which determine spawning migration variability of Pacific saury

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Spawning migration is one of the most difficult behavior to represent by a numerical model. For example, Pacific saury make a wide spawning migration from the subarctic to subtropical regions, while the detailed mechanism of the spawning migration has not been elucidated. Based on the synoptic survey of Pacific saury as realistic initial condition, an Euler-type model of Pacific saury was applied to investigate environmental factors which determine spawning migration variability. As realistic boundary conditions, satellite derived environmental conditions were used as forcing; sea surface temperature (SST), prey density estimated from surface chl-a concentration and surface current velocity fields. Growth of Pacific saury was calculated based on a fish bioenergetics model (NEMURO.FISH). A fitness algorithm was applied for feeding migration in which the fish are assumed to be moving towards a place with optimal growth condition. A larvae fitness algorithm was applied for spawning migration in which the spawning fish moves to a place of the optimal growth of larvae. For spawning migration, westward migration was added to reproduce realistic spawning grounds around Japan Islands. Strength of the westward migration during spawning migration was adjusted to realize observed variability of saury migration to fishing grounds. The adjusted westward migration variability was compared to the environmental factors.

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