

EXPERIMENTAL STUDY ON BROODSTOCK MANAGEMENT OF BARFIN FLOUNDER UNDER THE CONCEPT OF MINIMUM KINSHIP SELECTION

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A large flatfish, the barfin flounder *Verasper moseri*, is distributed from the southern Sea of Okhotsk to northern Japan. This fish is the highest-priced righteye flounder in Japan, but fishery yields have been endangered since the 1970s by its severe depletion. This reduction has rendered barfin flounder as a rare species. To correct this situation, a stock enhancement program with an annual release of approximately 1.5 million seedlings began in 1987. This program is thought to be effective because released seedlings are recaptured every year. However, the risk of losing genetic diversity from the base population is ever-present: the proportion of hatchery-born fish in the broodstock has been increasing because obtaining wild barfin flounder is almost impossible. For that reason, optimal broodstock management is necessary to avoid inbreeding and loss of genetic variation in future generations.

In this study, we applied the concept of minimum kinship selection to broodstock management of barfin flounder using three microsatellite DNA markers. The breeding plan was designed based on the kinship value, which was calculated among the broodstock individuals using microsatellite DNA markers. Moreover, individual identification and artificial insemination techniques were developed to support the breeding plan. The broodstock consisted of 37 wild and 41 hatchery-reared barfin flounders. Each individual was identified using a PIT tag. The sex was recognized according to the gonad shape, as analyzed by sonography. Artificial fertilization was performed based on the factorial mating design, excluding closely related individuals. Furthermore, the numbers of larvae used for seedling production were equalized among pairs to maximize the effective population size.

Using this procedure, we produced seedlings with high genetic variation that was comparable to that of the broodstock, showing that the concept of minimum kinship selection is useful for genetic conservation in barfin-flounder stock enhancement.