Stock impact of exogenous hatchery-produced abalone in Japan(Sustainable Yield and Population Conservation for Marine Organisms from the Point of View of Genetic Resources,International Workshop in Faculty of Agricultural Science and Field Science Center in Tohoku University 2008)

Stock impact of exogenous hatchery-produced abalone in Japan

Motoyuki HARA

National Research Institute of Aquaculture, Fisheries Research Agency, Japan

The Pacific abalone *Haliotis discus* species, including a cold-water distributed type called Ezo-abalone (*H. discus hannai*) and a warm-current inhabited type called Kuro-abalone (*H. discus discus*), is widely distributed in coastal areas of East Asia. Ezo- and Kuro-abalone are the most important abalone species for commercial fisheries resources owing to its high market value. Recent annual landing of these species have been reduced to about the 30% volume compared to the maximum catch level. This has led to an increase in hatchery abalone production from the 1980s, and a lot of hatchery abalone has been stocked intensively in coastal areas across Japan every year. Techniques for artificial production of Ezo-abalone juveniles are well established, but the production of Kuro-abalone juveniles has been pampered due in large part to the high mortality of seedlings caused by infectious disease. A growing concern underlies whether the mass-release of Ezo-abalone seedlings into the habitat of Kuro-abalone so as to increase the abalone resource is acceptable in the sense of the ecology, biology, and genetics of the resource. We studied the impact of releasing exogenous hatchery-reared juveniles on populations in Pacific abalone based on genetic markers at the population and individual level. Standard measures of genetic variation (R_S and H_E) for collections from Ezo- and Kuro-abalone habitats did not differ. However, samples from Ezo- and Kuro-abalone habitats, respectively, were clearly divided into genetically distinct clusters; a result that was consistent with the F_{ST} analysis. In population-assignment testing, most individuals collected from Kuro-abalone habitats, where intensive release of hatchery-reared Ezo-abalone juveniles have been carried out, were assigned to a genetically defined Kuro-abalone group, suggesting that most of exogenous hatchery-reared Ezo-abalone had difficulty reproducing successfully in Kuro-abalone habitats. However, in the warm-water sampling area stocked with the greatest number of exogenous Ezo-abalone hatchery-reared juveniles, the numbers of misassigned individuals were highest. This suggests that the reproductive contribution of stocked hatchery-reared Ezo-abalone cannot be ruled out completely. Therefore, hatchery-mediated introgression of exogenous Ezo-abalone genes into the Kuro-abalone subspecies remains a possibility. To support the goal of a genetically fit and sustainable abalone fishery, further detailed studies and evaluation of the potential impact of introgression are needed.