

HOW DO WE RECOVER ABALONE RESOURCES SUCCESSFULLY BY RESEEDINGS?

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Abalone is one of the most important coastal fishery resources in Japan, and stock enhancement by means of reseeded artificially produced juveniles has been implemented in the last 30 years. However, the abalone catches have decreased rapidly since the 1970s, and has not started increasing in many areas. The causes of the decline are not fully understood, but are assumed to be mainly overexploitation and changes in marine environmental conditions. While the abalone resources and total catches have declined, the ratios of released animals in catches have increased and reached more than 50% in some areas, suggesting low natural recruitment. This suggests that reseedings in the last 30 years have not been effective at recovering abalone stocks.

It is known that the distribution of large abalone species found in Japan is concentrated, and the fertilization rate of eggs is dependant upon the distance between a male and a female. The reduction of adult densities may limit fertilization success and subsequent recruitment. Because abalone have a planktonic larval stage lasting for several days, larvae may be transported widely and settle far from their parents. An adequate supply of larvae from the limited areas with extremely high densities of broodstock may be important to maintain the population.

When the stock abundance declines because of environmental changes, using fishery management strategies such as prohibiting or reducing fishing is the best approach to accelerate the recovery speed of the stocks when the environmental conditions improve. In this case, reseedings can help to recover the broodstock abundance more quickly.

In both the diving fishery and rod hooking fishery of abalone, fishermen tend to operate in high density habitats, including the important broodstock grounds, to maximize the catch per unit of effort. Overexploitation of the broodstock rapidly depletes the whole population. According to the computer simulations, reseedings are effective accelerating the recovery if enough juveniles are released into the important broodstock grounds, and the appropriate fishery regulations are instituted. On the other hand, if overexploitation of the broodstock continued, the populations did not recover, but the proportion of released animals could increase. The recapture rate of the released animals, which was regarded as the index of reseeded success, does not correspond to successful population recovery. Thus, appropriate fishery management based on the knowledge of the abalone's reproduction and early life history is indispensable for successful reseedings.