

## STOCK ENHANCEMENT AND SEA RANCHING IN THE EAST CHINA SEA

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Since the 1980s, stock enhancement and sea ranching have quickly developed; artificial breeding technology has gradually matured and is widely used. The number of species cultured has increased from the traditional four (razor clam, blood clam, shell, and oyster) to more than ten species of fish, shrimp, shell, and algae.

The main stock enhancement and sea ranching activities in the East China Sea are as follows:

- Aquaculture

Instead of natural ones, the offspring of main species including fish, shrimp, shell and algae are mainly supplied by hatcheries. Except for a few species like grouper, *Sargassum fusiforme*, *Penaeus vannamei*, etc., larval production can meet the demands of culture.

- The species cultured have diversified and the number of artificially bred offspring has increased. Breakthroughs have been made in the larval culture and in stock enhancement of species like shrimp, yellow croaker, oyster, scallop, abalone, kelp, laver, porgy, perch, etc. In addition, culture methods have greatly improved; there are cage culture, net-setting culture, raft culture, line culture, etc.

- Stock enhancement is progressing.

- 1) In the early 80s', a nearshore experiment with *Penaeus orientalis* heralded the beginning of stock enhancement in the East China Sea. The activity was conducted in Xiangshan Bay of Zhejiang Province and Dongwu Ocean in Fujian Province. Until 1992, 1.49 billion shrimp ( $\geq 3$  cm) had been released in Xiangshan Bay, and 2462.8 tons had been recaptured, with recapture rates being 6.8-13.3% and input versus output being 1:5.8-7.8. In the activity, over 100,000 winter-over parent shrimps were recaptured which produced 11.5 billion of larvae. At the same period, in Dongwu Ocean, 0.682 billion of shrimp of 0.8-1.5cm larvae were released and 917.8 tons of it was harvested, with the corresponding recapturing rates being 3.08-7.76%. Other shrimp involved in stock enhancement were *Penaeus penicillatus*, *Penaeus japonicus*, *Penaeus monodon*, *Penaeus merguensis* and etc..

- 2) Over the last decade, about 10 million each of *Pseudosciaena crocea*, *Pagrus major*, *Sparus macrocephalus*, and *Epinephelus awoara* were released. The release of *Pseudosciaena crocea* has been one of the key projects in Zhejiang Province at least for a five-year plan. Annually, over 6 million fry were released in the northern part of

Zhejiang coastal waters.

- 3) Shells and crabs released included *Chlamys farreri*, *Pecten yessoensis*, big shell, ark shell, *Portunus trituberculatus*, most of the enhancement projects were successful and showed economic benefits. The recapture rate of released big shell was 20%~25%, while the recapture rate of *Pecten yessoensis* was 30%. Its culture area reached 10000 ha, and the annual production is over 4000 tons.
- 4) Jerry fish. Since 1980s, large scale releases of jerry fish have occurred in the East China Sea. Recapture rates were 0.07-2.56%. From 1992 to 1994, 200 million larvae were released annually in the southern waters of Zhejiang Province.

- Management

To strengthen stock enhancement and sea ranching, several regulations and plans have been implemented in the coastal provinces and municipalities. For example, 50 release areas have been selected for the years from 2005 to 2007 in Zhejiang Province, with an investment of 100 million RMB yuans. The municipality of Shanghai plans to spend 3-5 years to scientifically standardize stock enhancement, so that they can gradually improve the natural environment, recover fish stocks and at last reach their goal of sustainable development.