

Research on Acoustic Domestication Technology in Marine Ranching

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Abstract

There is no possibility that the output of fishery resources will expand further in the short and medium term. The risk of recession increases and needs to be restored. In response to this situation, China has proposed the goal of achieving "zero growth" in fishery production since 1997, and has taken a series of effective measures. However, survey data in recent years show that how to correctly develop marine fishery resources, get rid of the current dilemma, and solve the contradiction between development and sustainable development is still an important issue currently facing. Judging from the development history of Japanese fishery, marine pastures are a feasible form. The object of this article is an important technology in fish school control system-fish sound domestication technology. Ocean pastures that use fish sound domestication technology are called sound domesticated marine pastures. In this special marine pasture, the acoustic domestication technology is used in all aspects of seedling domestication, micro-baiting trapping, and acoustic trapping.

Keywords

Acoustic; Marine Ranching; Fishery.

1. Introduction

In recent years, global marine fisheries have made considerable progress. According to the statistics of the Department of Fisheries and Aquaculture of the Food and Agriculture Organization of the United Nations^[1], the world's fishery production increased by an average of 2.1 million tons per year from 2000 to 2005. The average annual growth rate of world aquaculture production from 1970 to 2004 was 8.8%.

However, the overall study of informative populations and population groups confirms that about a quarter of the populations from 1994 to 2004 were under-developed or moderately developed (3% and 20%, respectively). About half of the population (52%) is fully developed, so its production is at or near the maximum sustainable limit, and there is no room for further expansion. The other quarter are either overexploited, declining, or recovering from the decay (17%, 7%, and 1% respectively); therefore, there is no possibility that the output of fishery resources will expand further in the short and medium term. The risk of recession increases and needs to be restored.

Specifically, the delimitation of the 200-nautical-mile exclusive economic zone and the signing of relevant international fisheries agreements, as well as the increasing awareness of countries to protect their own fishery resources, are extremely detrimental to the development of offshore fisheries. Offshore fishery resources are facing exhaustion due to people's predatory fishing. As a supplement

to marine fishing, marine aquaculture has developed rapidly in recent years. However, its serious self-pollution and the huge economic losses and serious damage to the ecological environment caused by the closely related red tides are obvious to all. If the environmental pollution caused by the breeding industry is converted into the input cost of the breeding industry, the output of the breeding industry is far less than the input cost. ^[2]

In response to this situation, China has proposed the goal of achieving "zero growth" in fishery production since 1997, and has taken a series of effective measures. However, survey data in recent years show that how to correctly develop marine fishery resources, get rid of the current dilemma, and solve the contradiction between development and sustainable development is still an important issue currently facing.

Contrary to the Tragedy of the commons (Tragedy of the commons) proposed by American management scientist Garret Hardin^[3], it is a social trap that involves personal interests and public interests that conflict with resource allocation. The explanation of Aristotle's words is: the food shared by the majority of people is only given the least care.) Potential management solutions—regulation is similar to normative views. Some scholars^[4] proposed that resource management type Fishery will be the main direction of marine fishery development in the new century. The connotation of resource management fisheries is very broad, and there are many manifestations. Judging from the development history of Japanese fishery, marine pastures are a feasible form.

2. Acoustic Domestication Technology

Marine pasture is to build an artificial habitat adapted to the ecology of aquatic resources in a certain sea area. The method of multiplication and release and transplantation is adopted to release biological seedlings into the sea after intermediate breeding or artificial domestication. The natural bait in the sea area is used as The main food is a fishery model that uses fish control technology and environmental monitoring technology to manage it artificially and scientifically ^[2] to increase the amount of resources and to fish in a planned and efficient manner. It can be seen that the construction of a marine pasture with complete facilities and functions is a huge systematic project. In addition to the necessary seedling breeding bases and artificial seabed structures, it also requires a complete environmental monitoring system, fish movement monitoring system, The fish school control system is matched with it ^[5]. The object of this article is an important technology in fish school control system-fish sound domestication technology. Ocean pastures that use fish sound domestication technology are called sound domesticated marine pastures. In this special marine pasture, the acoustic domestication technology is used in all aspects of seedling domestication, micro-baiting trapping, and acoustic trapping. Japan used a 300 Hz sine continuous wave sound to acoustically domesticate red sea bream fry and release them to ocean ranch waters. The average recapture rate of fish that year was 11.64%, and the average recapture rate of first-year-old fish was 28.3%. By comparing the release effects of seedlings bred in the middle of the land facilities and the seedlings that have been domesticated by sound, it is found that the catch rate of the fish school after sound domestication is twice higher than that of the control fish school, and more than two years after the release. The catch rate is as high as 21.5% ^[6]. In recent years, Japan has established sound domestication marine ranches in many sea areas such as Oita, Nagasaki, Shimane, Shintamura, and Miyagi ^[6], and has achieved certain ecological and economic benefits.

Fish sound domestication technology can not only be applied to marine pastures. In the current aquaculture, artificial feeding and timing and quantitative automatic feeding have the problem of excessive feeding. While wasting feed, it causes water pollution and affects the growth and health of farmed animals. Increased breeding risk. Tian Tao et al. focused on the acoustic domestication of black sea bream, redfin puffer and carp, focusing on the role of acoustic domestication technology in improving the utilization of bait, and carried out environmental pollution control of this technology in cage culture. In-depth studies have shown that the application of sound domestication technology in aquaculture can effectively shorten the feeding time of fish and reduce food waste. In addition,

sound trapping using sound domestication technology may also be an effective fishing technology in the future.

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