

## Current studies on fish behavior research in the fishery

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### Abstract

The understanding of fish behavior is an important basis for studying the design of fishing methods and fishing gear. In recent years, environmentally friendly and responsible fishing has become the focus of research on fishing gear and fishing law in the world. The research on fish behavior in the fishing industry is more and more focused on Protection, domestic related research generally focuses on more basic sensory measurement, application description, no formation system, and contains great development potential.

### Keywords

Protection ; fishing methods ; fishing gear.

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## 1. Introduction

The understanding of the behavior of aquatic animals is an important basis for the study of fishing methods and fishing gear design, and the behavior of fishing objects on external stimuli such as sound, light, electricity, fishing gear and their components. It determines the efficiency of the fishing methods and fishing gear used and their environmental friendliness. Studying the behavioral responses of fish to external stimuli is not only closely related to fishing, but also plays an important role in many fields such as aquaculture, fish ecology, conservation, and bionics.

In recent years, environmentally friendly and responsible fishing has become the focus of research on fishing gear and fishing laws in various countries around the world. On the basis of studying fish behavior, scientists have developed trawling efficiency devices, catch separation devices, and by-catch reduction devices. Various selective fishing gear devices such as catch size selection device and selective shrimp catching device. The domestic research on fish behavior in the three aspects of sound, light and electricity has also been studied to some extent. Domestic related research generally focuses on more basic sensory measurements, application descriptions, and no system formation. Of course, this is also closely related to the overall status of fishing research. At a time when protection is increasingly emphasized and the fishing technology is environmentally friendly, there is a great potential for research on the behavior of aquatic organisms.

## 2. Status of international development

Major international fisheries technology conferences, such as Hamburg (1957), London (1963), Reykjavik (1970) World Fishing Gear Conference and Hamburg (1977) International Marine Work Conference, all dealing with fish behavior and The issue of fishing law. In 1992, in the academic conference on fish behavior and fishing law held in Bergen, Norway, many scholars analyzed the trawling, purse seine, fixed net, longline fishing and other fishing gear operations from the perspective

of sink test and mathematical model. The behavior of fish stocks and the need to apply fish behavior knowledge in selective fishing, resource assessment and fisheries management [1].

In recent years, environmentally friendly and responsible fishing has become the focus of research on fishing gear and fishing laws in various countries around the world. On the basis of studying fish behavior, scientists have developed trawling efficiency devices, catch separation devices, and by-catch reduction devices. Various selective fishing gear devices, such as catch size selection device and selective shrimp catching device, have played an active role in preventing shrimp trawling from catching young and mixed fish, releasing juvenile fish and sea turtles. Regarding the release survival rate after fishing, Van Der et al. studied the gill net [2] and found that water temperature, trapped time and fish size are the main factors affecting the survival rate. In terms of squid fishing in the purse seine, the survival rate is related to the catch density and trapped time in the purse seine [3]. Survival rates in longlines depend on species, treatment methods and fishing gear. In general, the depth of the hook, the position of the hook and the removal of the hook from the hook have a major impact on the subsequent survival of the fish released after harvesting [4]. Swallowing hooks can be more likely to cause damage than hooks. The design of the hook may affect the survival rate, for example, the round hook is more protective than the traditional J hook. Using the characteristics of the dolphin's perceived frequency higher than that of the average fish, the ultrasonic speaker is equipped on the large-scale spur network. This kind of ultrasonic alarm sound is generally inaudible to fish, so it does not affect the fishing effect, and the dolphins are affected by high-frequency sound waves. Stay away from it, thus protecting the dolphins from touching the net [5].

### 3. Status of domestic development

Domestic research on the behavior of aquatic animals can be summarized from three aspects: sound, light and electricity:

The Fish Behavior Laboratory of Dalian Ocean University focuses on acoustic signal research. In 2002, Zhang Guosheng et al [6] conducted a sound acclimation study on juvenile larvae, Zhang Peidong et al [7-8] conducted acoustic acclimation tests on alfalfa and grass carp and experiments on the follow-up effect of alfalfa and grass carp on moving sound sources. Has achieved good results. In 2003, Zhang Peidong et al [7] conducted a behavioral test on the simulated eight-character net under the sound stimulation of carp and grass carp. In 2003, Jiang Shaoyang [9] conducted the behavior of scorpion and grass carp in the simulated combination network under sound stimulation. Reaction test. The results show that carp and grass carp have strong positive tendency for 400 Hz sine wave continuous sound, and can be finally trapped into the designated area for aggregation, and the aggregation rate is 100%. In 2009, Xing Binbin et al [10] used a 400 Hz sine wave continuous sound to accumulate sounds of different body lengths, and explored the trapping effect of sound on different body lengths. The results showed that the sputum with smaller body length had better effect than the sputum with larger body length. In 2013, Chen Shuai et al. [11] studied the effective range of acoustic acclimation. The results showed that *Sebastes schlegeli* and *Limanda aspera* were domesticated fish species, and the individual domestication points were effective. The range of action is approximately 52.2 m and 44.5 m, respectively. The basic research on the sound behavior of these fishes provides a solid theoretical basis for the development of acoustic trapping techniques.

The Department of Oceanography of Xiamen University conducted a systematic study on the light behavior of fish. In 1979, He Daren et al. studied the photocatalytic response of the equine spectral color of the blue-spotted carp and the squid [12]. The results showed that under the dark adaptation conditions, the blue-green carp and the adult fish had a tendency to blue and green light. The highest light rate and the lowest phototaxis rate for red light. Under dark adaptation and bright adaptation conditions, squid has the highest phototaxis rate for violet and red light. In 1979 and 1980, the phototaxis behavior of Man's needleless squid and Duchen's squid was studied [13-14].

In terms of fish electrical behavior, the research is more scattered. For example, in 1989, the Huarong County Aquatic Workstation in Hunan Province studied the role of HGL-I pulse electric catching fish

traps in the fishing of the enclosure fish<sup>[15]</sup>. In 1995, the Fujian Provincial Fisheries Research Institute developed a reservoir electric catching fishing unit for reservoir fishing<sup>[16]</sup>. In 1992, Zhejiang Freshwater Fisheries Research Institute studied the reaction of carp in two-way pulsed electric field and the design of charged pocket pull net<sup>[17]</sup>, using the technical route of complementary and close cooperation between electric field and net, in the bottom of the net The plan set a reasonable electric field to prevent the fish from drilling, and the bottom line added a net pocket to block the "vulnerability" of the escape fish caused by the "lifting", and better explored the fishing technology of the bottom fish. Compared with the traditional fishing gear fishing method, the unit net catch rate of the squid is increased by more than 10 times. In 2000, Yanping District Fishery Technology Service Center of Yantai City studied the application of electromagnetic vibration drive in the catching of cultured gums<sup>[18]</sup>, which increased the disturbance rate in the bottom fish fishing process and achieved good results.

In general, domestic related research generally focuses on more basic sensory measurements, application descriptions, and no system formation. Of course, this is also closely related to the overall status of fishing research. At a time when protection is increasingly emphasized and the fishing technology is environmentally friendly, there is a great potential for research on the behavior of aquatic organisms.

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