

Application of Marine Pasture Environmental Resource Monitoring System

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Abstract: China's current research and construction of marine pastures have begun to get on the right track. At the same time, China has paid more and more attention to the monitoring of environmental resources of marine pastures. Therefore, the construction of marine pasture environmental resource monitoring system has attracted more and more attention. Based on this situation, this paper studies the construction of marine pasture environmental resource monitoring system, and hopes to play a certain role in the monitoring of marine pasture environmental resources.

Keywords: Marine pasture, Environmental resources, Monitoring system, Construction

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1 Introduction

In the process of monitoring the environmental resources of marine pastures, the rational construction of the monitoring system will play a key role. Based on the production characteristics of marine pastures, a cabled submarine monitoring system should be established for the flow profile, salinity, pH, temperature, and dissolved oxygen in the marine pastures, and the biological movements and living habits of the marine pastures. In this way, real-time continuous monitoring and control of marine pasture environmental resources can be realized.

2 The importance of the application of marine pasture environmental resource monitoring system

With the continuous development of the current

mariculture industry, the pollution of the marine environment is becoming more and more serious. Marine pollution will not only bring about a large degree of adverse impact on the economic benefits of the mariculture industry and the development of this industry, but also impose a serious burden on the natural environment. Therefore, in the continuous development of the current aquaculture industry, the environmental and resource issues of marine pastures should be highly valued by people.

The construction of the marine pasture environmental resource monitoring system will solve the problem of offshore environmental pollution and the decline of fishery resources, so that the construction of marine pastures can jump out of the traditional marine aquaculture field and improve the ecological environment of the offshore^[1]. Applying the marine pasture environmental resource monitoring system to today's mariculture industry, through engineering, mechanization, informationization and intelligent means to achieve good management and control of marine pastures, so that the fishery resources in marine pastures can be obtained. Good protection and improvement of the ecological environment in marine pastures have a very positive effect on the development of today's aquaculture industry and the sustainable development of marine environmental resources.

3 Principles to be followed in the application of marine pasture environmental resource monitoring system

3.1 Modernization of the concept

For the construction of marine pasture environmental resource monitoring system, a primary principle is

to adhere to the modernization of the construction concept. In the process of construction, we should not only comprehensively consider the current problems of the marine environment, but also conduct a comprehensive assessment of the development trend of marine environmental issues. In this way, a marine pasture environmental resource monitoring system suitable for today's marine environmental resources can be constructed to effectively meet the management needs of today's marine environmental resources.

3.2 Modernization of equipment

Among the marine pasture environmental resource monitoring systems, the equipment used must be the most advanced scientific equipment available today. In this way, the timeliness and accuracy of monitoring can be guaranteed, and the environmental resources of marine pastures can be managed and controlled in the most modern way.

3.3 Modernization of technology

Today's scientific and technological development can be described as ever-changing. Therefore, in the construction of the marine pasture environmental resource monitoring system, it is necessary to make rational use of modern advanced science and technology, and use modern technology as a support to solve today's marine environmental resources.

3.4 Modernization of management

In the application process of the marine pasture

environmental resource monitoring system, relevant units must implement modern management. Through information technology and computer technology, the modern management and control of the marine pasture environmental resource monitoring system can effectively reduce the consumption of human resources, material resources and financial resources, and achieve a significant improvement in management efficiency and management quality.

4 The system composition of the marine pasture environmental resource monitoring system

4.1 Central control system

In the general control center of the marine pasture environmental resource monitoring system, it is necessary to install a server with high performance, and also to install a video splitter. This allows the monitoring system to receive monitoring data, store monitoring data, pre-process monitoring data, and decode data and video. At the same time, relevant control software and video monitoring software should also be installed in the total control center^[2]. The following table summarizes the main functions that can be achieved by the installation of control software and the installation of video surveillance software in the total control center of the Marine Pasture Environmental Resource Monitoring System.

Table 1. Functions that can be realized by the control software and video surveillance software installed in the control center of the marine pasture environmental resource monitoring system

Installation of related software	Achievable function
Control software installation	<ol style="list-style-type: none"> 1. Can display data in real time; 2. can remotely control the equipment; 3. The alarm parameters can be set by yourself; 4. Can view historical data in real time; 5. Can improve and optimize the service as required; 6. Makes the interface more friendly and beautiful and has strong operability.
Video surveillance software installation	<ol style="list-style-type: none"> 1. You can choose to switch to view the real-time underwater video of the base where the system is located. 2. Can achieve the function of self-recording.

4.2 Data transmission system

In the marine pasture environmental resource monitoring system, the system data is transmitted to the shore-based control system through the submarine cable, and the shore-based control system transmits the data transmitted from the submarine cable to the total control center in real time through the ground network.

Conversely, the instructions issued by the system's general control center will also be transmitted to the shore-based control system through the transmission chain, and then transmitted to the observation system through the submarine cable. Among the submarine cables, the main components are two signal lines, two power lines, and a shielding layer, an insulating layer,

and a steel wire braid. The following table shows the main functions of these components:

Table 2. Functions of the main components of the submarine cable for the marine pasture monitoring system

Component	Features
Signal line	Propagation of all pairs of electrical signals around 5Mbps.
Power line	380V DC voltage transmission.
Shield	Block interference from external signals and maintain current balance.
Insulation	Prevent leakage and ensure the full use of submarine cable functions.
Steel wire braid	Waterproof and corrosion resistant.

In addition, 10M bandwidth ground network should be independently connected to each shore-based control system, so that all monitoring data can be summarized in the system's total control center. At the same time, the 100M bandwidth fiber network should also be connected to the system's total control center, so that the transmission bandwidth can be guaranteed.

4.3 Shore-based control system

In the marine pasture environmental resource monitoring system, the shore-based control system can provide energy supply, and is also a transfer station for monitoring information and command information. The shore-based control system can supply electricity to the cabled observation system by means of utility power, and can also recover the monitoring data transmitted by the submarine cable monitoring system, and control the data quality, and monitor the data in the marine pasture. Once the quality is effectively controlled, the shore-based control system reports it to the system's general control center^[3]. At the same time, the shore-based control system can also be responsible for forwarding the instructions issued by the general control center. Through the shore-based control system, the commands issued by the general control center can be sent to each observation system on the seabed in real time.

In addition, in order to ensure the stability of energy supply and reliability, the utility and commercial UPS power can be applied to the observation network system under the sea. In this way, the marine pasture environment can be made. The power supply status

of the resource monitoring system maintains stability and reliability for a long time. Considering the long-distance transportation of underwater power, the shore-based control system should use a 380V power supply for powering underwater equipment.

4.4 Observation instruments

For the marine pasture environmental resource monitoring system, the application of the observation instrument can realize the real-time cable observation of the marine pasture environmental resources. Therefore, in the observation of marine resources, the observation instrument belongs to a core component. Through the application of the observation instrument, the observation of the water quality environment and the hydrodynamic environment can be completed in real time, which not only enables the ocean pasture to effectively satisfy the basic parameters, but also can measure the altitude and the oceans such as waves. The measurement of dynamic parameters will provide reliable and rich data support for the effective detection and forecasting of the marine environmental protection department and the marine forecasting department^[4]. Through comprehensive consideration of various factors, in the selection process of the observation instrument of the marine pasture environmental resource monitoring system, the current flow meter, underwater camera, CTD, chlorophyll sensor and dissolved oxygen sensor can be selected. The following are the main observations. The function of the instrument is summarized:

Table 3. Selection and function of main observation instruments for marine pasture environmental resource monitoring system

Main observation instrument	Features
Current meter	It is mainly possible to observe the flow profile of the marine pasture.
Underwater camera	Continuous observation of the video can be achieved for underwater environments.
CTD	Mainly for temperature measurement, water level measurement and salinity measurement of UI marine pastures
Chlorophyll sensor	Real-time online monitoring of chlorophyll can be performed on marine pastures.
Dissolved oxygen sensor	The oxygen content of marine pastures can be monitored online in real time.

4.5 Submarine observation system

Among the marine pasture environmental resource monitoring systems, the most central part is the seabed observing system. The main components of the seabed observing system are subsystems for collecting and controlling data, underwater video cameras, observation instruments, control capsules, and underwater structures. The subsystem that collects and controls the data is mainly responsible for the management and control of the power supply of each observing instrument, and collects and integrates the data, and is also responsible for connecting with the shore-based control system to realize the transmission and management of information. The main components of this system are the control module and each sensor module. There is a one-to-one correspondence between each sensor module and the integrated observation instrument. As the core part of the realization of marine pasture environmental resource monitoring, the observation instrument is mainly connected to the control warehouse of the subsystem that collects and controls the data through the submarine cable. At the same time, in this system, there are underwater lights and on-line detectors for corrosion. The application of these devices has a good auxiliary effect on the deployment and maintenance of underwater observation systems. In the underwater construction of the submarine observation system, the two-layer structure applied is made of stainless steel, and the observation instrument is installed and fixed on the upper pedestal layer, and the system is covered with anti-off-net. The material used to control the sealed cavity is made of titanium alloy and can maintain a life of 10a under water. In addition, considering the different consumption of the sensor, in the design process, the fan-shaped heat dissipation zone and the common grid zone can be applied to design the front and the back, and the actual needs of the marine pasture environmental resource monitoring system are used as the basis to increase or decrease the sensor module.

5 Conclusion

In summary, the good design and construction of the marine pasture environmental resource monitoring system will enable marine pastures to be better monitored and managed. This paper studies the design and construction of a marine pasture environmental resource monitoring system, and analyzes the application of this system in the monitoring of marine pasture environmental resources. It is believed that with the continuous development of science and technology in the current era, the marine pasture environmental resource monitoring system will continue to improve the value in terms of technology and functions, and thus exert more advantages in the monitoring and control of marine pasture environmental resources.

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