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Popular Article

Applications of Underwater Cameras in Fisheries

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Summary

The use of self-contained underwater camera systems to observe and quantify such behaviour began in the 1960s and today underwater camera systems are ubiquitous across all major research institutes, government agencies, and large fishing companies. Various methods have been developed to gain a better understanding of finfish and shellfish behaviour during the capture process by mobile and static fishing gears. Depending on the fishery and application, these techniques can provide critical behavioural information needed to make informed decisions about fishing gear modification. underwater camera systems used on demersal trawls and the types of cameras required in low light environments. This article delves into the various Application of Underwater cameras in the fisheries sector.

Introduction

Underwater cameras have become indispensable tools in modern fisheries management and research. These devices provide critical insights into aquatic environments, allowing scientists, conservationists, and fishery managers to observe, record, and analyse marine life with detailed manner. The underwater cameras used in the monitoring of sea-based fish farming facilities, especially those which are permanently submerged, reducing mortality and stress due to fish sampling and limiting divers' intervention. By these advances in camera technology, underwater cameras have transformed the way we monitor fish populations, assess habitat health, and ensure sustainable fishing practices. Accurate information on size and shape of wild and cultured fish populations is fundamental to the management of harvesting and is essential in aquaculture facilities to enable effective management of feeding regimes, grading times and ultimately the optimum time to harvest the stock. Monitoring of length and age permit estimates of recruitment to fished populations, fishing intensity and rates of recovery from fishing or other disturbances. Technological advances in underwater video recording are providing novel opportunities for monitoring wild fish. Individual fish species were combined into groups and

analyzed for reactions, orientation toward the camera, nearest approach to the camera, and swimming speed.

Underwater cameras as an electro monitoring system in operating fishing vessel:

Vessel electronic monitoring (EM) systems used in fisheries around the world apply a variety of cameras to record catch as it is brought on deck and during fish processing activities. Electronic monitoring (EM) system technology continues to evolve and gain momentum as an onboard fisheries dependent sampling tool for obtaining permanent video documentation of a vessel's fishing efforts and catch as costs decrease. Depending on the vessel application and camera configuration, conventional EM cameras are used to document catch as it is brought onboard, during processing, and when fish are discarded. The use of EM can enhance data collection in these circumstances by recording information about gear, targeted catch, incidental catch, and discards, along with catch handling, processing and /or fishing effort (location and time fished) to produce reliable and verifiable information for fisheries managers consideration in stock assessments for improving sustainable fishing practices.

Types of Underwater Cameras

1. Static Cameras

Static underwater cameras are fixed in one location and used to capture images or video footage of the surrounding environment over time. They are ideal for long-term monitoring and can be deployed to observe specific areas of interest, such as spawning grounds or coral reefs.

2. Rov Cameras

Remotely Operated Vehicle (ROV) cameras are attached to underwater drones or vehicles, allowing researchers to capture high-resolution video from various depths and locations. These cameras offer mobility and flexibility, making them suitable for exploring diverse marine habitats.

3. Baited Camera

Baited Remote Underwater Video (BRUV) systems involve placing bait in front of a camera to attract fish and other marine species. This method provides valuable information about species composition, behavior, and abundance in an area.

4. Multibeam Sonar Cameras

Multibeam sonar cameras combine sonar and visual imagery to provide detailed 3D maps of the seafloor and underwater structures. These cameras are particularly useful for habitat

mapping and understanding the physical characteristics of marine environments.

Applications in Fisheries

1. Fish Population Assessment

It plays a crucial role in estimating fish populations. By capturing video footage of fish in their natural habitats, researchers can use image analysis techniques to count and identify species. This method can complement traditional fishery surveys, offering a non-invasive alternative that reduces the stress on fish populations (Hordyk et al., 2015).

2. Behavioural Studies

Understanding fish behaviour is essential for effective fisheries management. Underwater cameras allow scientists to observe interactions between species, feeding habits, and movement patterns. Such behavioural insights can inform strategies to protect critical habitats and manage fishing pressures (Løkkeborg, 2011).

3. Habitat Monitoring

Healthy ecosystems are vital for sustainable fisheries. Underwater cameras enable the monitoring of coral reefs, seagrass beds, and other critical habitats. By assessing habitat conditions and changes over time, researchers can identify areas in need of protection and measure the impacts of environmental changes (Boström et al., 2011).

4. Bycatch Reduction

Bycatch, the capture of non-target species, is a major concern in fisheries. Underwater cameras help evaluate bycatch rates and identify factors contributing to bycatch incidents. This information can guide the development of fishing gear and practices designed to minimize bycatch and its impact on marine biodiversity (Løkkeborg et al., 2016).

5. Regulatory Compliance and Enforcement

Effective fisheries management requires adherence to regulations. Underwater cameras can be used to monitor fishing activities and ensure compliance with rules such as size limits, catch quotas, and protected areas. This technology provides objective evidence that can support enforcement efforts and reduce illegal fishing activities (Parker et al., 2019).

Uses of underwater cameras in fisheries

Underwater cameras are a tool of choice for *in situ* observations of the behaviour of deep-water species. The use of camera technology can yield important information for conservation. The advances in recent years have opened up the opportunity to develop their potential use for studying fish behaviour and fishing gear [Favaro et al., 2011].Although developed

for behavioural research on bottom trawls, the camera system is highly flexible and can be applied to stationary gear, such as pots or traps, and other forms of mobile gear.

Conclusion

Underwater cameras have revolutionized the field of fisheries science by providing valuable data that enhances our understanding of marine ecosystems. Their applications range from population assessments and behavioural studies to habitat monitoring and bycatch reduction. As technology continues to advance, underwater cameras will undoubtedly play an increasingly significant role in promoting sustainable fisheries and preserving marine biodiversity. It indicates that small improvements in the upgrade of a camera system will significantly improve the image quality.

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