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Acoustic Survey and Research on Fishery Resources in the South Yellow Sea Reef Area

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ABSTRACT

2017.4 The project team conducted an acoustic survey of fishery resources in the fish reef area of the South Yellow Sea using a scientific fish finder (EY60, SIMRAD) to obtain acoustic images of biological resources in the sea area passed by the survey vessel. In data processing, this survey used professional fishery resources acoustic survey data processing software (ECHOVIEW 7.9, MYRIAX, AUSTRIA), in particular, the software has a special background noise processing module, according to De Robertis, Higginbottom's research results of the preparation. The results of this survey showed that the average NASC in the target area of the reef zone was 42.85 m^2/nmi^2, with the largest NASC of 249.47 m^2/nmi^2 in one section, and 28.56 m^2/nmi^2 in the southernmost control area, with the smallest NASC of 25.11 m^2/nmi^2 and the largest of 35.37 m^2/nmi^2.

KEYWORDS

Acoustic survey; Fishery resources; Sea reef

1. INTRODUCTION

2017.4 The project team conducted an acoustic survey of fishery resources in the fish reef area of the South Yellow Sea using a scientific fish finder (EY60, SIMRAD) to obtain acoustic images of biological resources in the sea area passed by the survey vessel. The acoustic assessment of biological resources is to use the scientific fish finder to emit sound waves vertically into the sea, and to understand the distribution of biological resources and their biomass in the sea by analysing the echo signals, which has the advantages of fast survey speed, long range and does not damage the resources. The data acquisition software runs on Windows system, the data acquisition and storage are all automated, and the preliminary processing is done in the field and finally brought back to the laboratory for final processing. In the survey process, if the operation of the work failure situation, the system will automatically give relevant hints, combined with hints investigators can be very fast debugging, a strong guarantee of the quality level of survey data [1, 2].

The fish finder is mounted on the side of the vessel, about 1/3 from the bow during the field survey. The transducer was about 0.5 m from the water surface, with a power of 300 W, an operating frequency of 200 kHz and a pulse width of 0.256 ms. A total of 200 m of acoustic data were collected during the survey, and each unit interval was defined as 0.5 nmi, taking into account the length of the interval and the biological survey [3].

2. MATERIALS AND METHODS

The process of acoustic survey of biological resources was carried out in strict accordance with the relevant operating procedures of the Specification for Marine Surveys, Part 6: Marine Biological Survey (GB/T 12763.6-2007). The working status of the equipment was strictly monitored during the acoustic survey, and the working parameters of the equipment were modified according to the survey environment to ensure the quality of the acoustic survey data. In the operation, the sampling depth was adjusted in time according to the changes in the acoustic image of the scientific fish finder, and the storage and backup of data were carefully completed after the data were obtained to ensure data security; different processing procedures were adopted according to the survey data in different acoustic environments, and the survey and analysis process, sample collection and operation process were all confirmed by the operator's signatures to ensure that the results were scientific and reliable.

The result of hydroacoustic survey is mainly the Nautical Area Scattering Coefficient (NASC) of biological resources per unit section (0.5 nmi in this survey), generally speaking, the larger the value of NASC of a unit section, the higher the abundance of biological resources in that section.

In data processing, this survey used professional fishery resources acoustic survey data processing software (ECHOVIEW 7.9, MYRIAX, AUSTRIA), in particular, the software has a special background noise processing module, according to De Robertis, Higginbottom's research results of the preparation, the use of which is able to remove a considerable part of the noise data, the effect of which can be found in the use of the data. data, the effect of which can be found in the use of the data. Acoustic data processing of biological resources has been carried out in strict accordance with the relevant operating procedures of the Specification for Marine Surveys, Part 6: Marine Biological Surveys (GB/T 12763.6-2007). The acoustic data collected during the survey are of good quality, with only occasional instances of higher noise, which have been specifically addressed in the processing to ensure that the processing results are scientific and effective. Data processing methods adopted in this treatment are: the first treatment process is for more noise survey data, the continuation of the previous identification of noise data and remove the workload is very large, and it is often easy to identify the normal data also identified as noise. Therefore, in this survey, a different method is used, that is, only identify the area of biological resources appearing, identified as the analysis area, in the data analysis stage, only the analysis area for analysis, all other areas are removed. This method greatly reduces the workload of data analysis and improves the accuracy of data analysis. The second process is set up for the interference noise removal module in this processing, which is to use the interference noise different from the characteristics of the noise of biological resources, and use the matrix analysis function in the software to analyse and automatically identify the noise, but the data should be resampled in the processing. However, this brings a problem, in order to ensure the accuracy of acoustic data in the expedition often have to adjust the parameters of the equipment according to the changes in ocean temperature, salinity, and this parameter change will cause a ping of the sampling point is different, and this change will result in the removal of interfering noise module can not work. In this case, the countermeasure is to turn off the module and use only the noise removal module for automatic data processing, but in this case it will often increase the workload of manual processing at a later stage.

3. RESULTS AND DISCUSSION

The results of this survey showed that the average NASC in the target area of the reef zone was 42.85 m^2/nmi^2, with the largest NASC of 249.47 m^2/nmi^2 in one section, and 28.56 m^2/nmi^2 in the southernmost control area, with the smallest NASC of 25.11 m^2/nmi^2 and the largest of 35.37 m^2/nmi^2. The distribution was relatively uniform. m^2/nmi^2. The distribution was relatively uniform.

From the results of the survey between the reef area and the control area, it can be seen that the NASC in the reef area is significantly larger than that in the control area, with the NASC value of 1.5 times that of the control area, and the maximum NASC value of 7.05 times that of the maximum value of the control area, which is a very obvious bioconcentration effect. This result can show the effect of fish reef placement to some extent. In terms of the biological image around the reefs, it can also be seen that there is a clear difference from the control area, and there is already a clear biological community image around the reefs.

The present results can be compared with the results of three surveys of this sea area before the reef placement, three acoustic surveys, in June 2015, May 2016, October 2016 and April 2017 respectively. The average NASC of the first survey was 43.70 m^2/nmi^2, the average of the second survey was 139.03 m^2/nmi^2, and the average of the third survey was 58.70 m^2/nmi^2, in which the overall view showed the distribution characteristics of lower NASC values in the west and higher in the east, especially the southeast of the whole surveyed sea area, that is, the southernmost part of the S9 cross section was divided into the entire In particular, the south-eastern part of the surveyed area, which is the southernmost part of section S9, is the most biologically rich area in the whole surveyed area, with a NASC value of 242.24 m^2/nmi^2. During the three surveys in June 2015, May 2016 and October 2016 before the reef casting, the average NASC value of the marine pasture area was the highest in May 2016, with a mean value of 139.03 m^2/nmi^2, and the difference in June 2015 and October 2016 was not much, respectively, 43.70 m^2/nmi^2, and the difference in the mean value of 139.03 m^2/nmi^2, respectively. not much, 43.70 and 58.70 m^2/nmi^2 respectively.

The relative comparison shows that the NASC situation in the whole target sea area is still in a relatively stable situation, which is due to the influence of various environmental factors on the one hand, and on the other hand, it may be due to the short time of reef placement, and the aggregation of organisms still needs some time. The project team will continue to pay attention to this in future surveys [4-5].

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