

HYDROACOUSTIC ASSESSMENT OF THE RESOURCE HORSE MACKEREL REALIZED IN

IMARPE- PERU

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The development of methodology hydroacoustic assessments of fisheries resources have been significantly improved with the development of technological developments, their application in Peru began in 1983, led to the species anchovy, sardine, horse mackerel and mackerel. Since that date have been conducted over 55 cruises Hydroacoustics Assessment of Fisheries Resources, the majority of pelagic resources.

The application is a direct method Hydroacoustic evaluation of fish that enables the distribution and biomass of fishery resources, mainly pelagic resources, such as jack mackerel, anchovies, sardines, mackerel or other resources of commercial importance. It also enables you to update the knowledge of the oceanographic conditions of the marine environment.

This project is formed by a working group from different areas of research IMARPE, with the aim of their ecosystemic.

METHODOLOGY

In each cruise Hydroacoustic assessment of pelagic resources in the Peruvian sea is an implementation plan that includes the study area and period of implementation.

The vessels used for surveys are the BIC José Olaya Balandra, BIC SNP-2 and the BIC Humboldt, equipped with pelagic trawls, echointegration-detection system and oceanographic equipment, and as support for biological sampling and acoustic in the coastal zone to the L/P IMARPE VI and L/P IMARPE V.

Sampling Design

Hydroacoustic assessment is performed using a sampling design for systematic rate (profiles parallel and equidistant to one another) with a separation of 12.5 nm between each transect. (RIVOIRARD ET AL., 2000; PETITGAS, 1991, FRANCIS, 1984, MACLENNAN AND SIMMONDS 1992).

Acoustic sampling

Each transect is discretized in intervals of core sampling (ESDU) for 1 nautical miles. Evaluation with more than two vessels were held simultaneously in the same area, so that progress is set.

Fishing for acoustic and biological sampling

Hauls pelagic trawl can identify the records of the echosounder and make the biological sampling.

Echointegration system

The system comprises the echointegration scientific echosounder SIMRAD EK-60 with frequencies of 38, 120 and 200 kHz split-beam transducers. This system is calibrated according to the procedure described by its manufacturer (SIMRAD, 1991), which follows the recommendations made thereon by the ICES (FOOTE ET AL., 1987) for the use of quantitative acoustic measurements.

Calibrations of each acoustic research vessel are held in a protected place, usually on the island Lobos de Afuera, Island San Lorenzo or Matarani. In cases involving more than two vessels is an intercalibration between them according to the methodology described by Simmonds and MacLennan (2005).

Data Analysis

For the analysis of acoustic data using a program called Echoview post-processing, which includes modules for detecting shoals, and other virtual echogram, which facilitate the extraction of information for the schools of the species studied (HIGGIMBOTTOM et al, 2000). Echotraces identification is performed according to records and the typical results of the catch in each haul.

Estimation of biomass

Estimating the abundance of pelagic resources was conducted by the method of stratification by isoparalitorales areas. The mathematical formulation is described by Simmonds and MacLennan (2005).

We present three equivalent processes with each other and that are used in the assessments leading acoustic IMARPE. This requires knowing the following variables:

Nautical Coefficient of Dispersion Medium Area: $\langle sA \rangle$ (in m^2/mn^2)

Area of the stratum in which the measurement: A (Mn^2)

Instrumental constant of the echo: C_i

Average length of fish caught: $\langle L \rangle$ (cm)

Average weight of fish caught $\langle w \rangle$ (g)

TS-specific equation for the species evaluated: $TS = 20 \log \langle L \rangle - b_{20}$

Based on the estimation of a constant C Echointegration

$$TS_{Kg} = TS - 10 \log (\langle w \rangle / 1000)$$

$$\sigma_{Kg} = 4\pi 10^{TS_{Kg}/10}$$

$$C = C_i / (1000 \sigma_{Kg})$$

$$\text{Biomass} = C.A. \langle s_A \rangle$$

Based on the estimated of σ_{Kg}

$$\sigma = 10000 [4\pi 10^{TS/10}]$$

$$\sigma_{Kg} = 10000 \sigma / \langle w \rangle$$

$$\rho = 10 C_i \langle s_A \rangle / \sigma_{Kg}$$

$$\text{Biomass} = \rho A$$

Based on the estimated of σ (number of fish n)

$$\sigma = 4\pi 10^{TS/10}$$

$$\rho = 10000 C_i \langle s_A \rangle / \sigma$$

$$n = \rho A$$

$$\text{Biomass} = n \langle w \rangle / 1000000$$

Spatial distribution of resources

The spatial distribution of each resource evaluated, is presented as a map of contours, where they represent curves that connect points of equal density, and to show the areas of greatest concentration of resources (Simmonds and MacLennan, 2005). The maps of the spatial distribution of each species are made using the grid module and mapping program Surfer (Kleckner, 1996). As interpolation method is used kriging,

EXPECTED RESULTS

Estimating the biomass of mackerel and other pelagic species escorts in the area to be evaluated.

Knowing the distribution of concentration levels of mackerel and other pelagic species.

Increasing knowledge about the formation of shoals in relation to the daytime.