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Acoustic Equipment of the Purse Seine Fleet of Central-South Chile

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PO Box 3797, Wellington 6140, New Zealand
P: +64 4 499 9889 – F: +64 4 473 9579 – E: secretariat@sprfmo.int
www.sprfmo.int

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Nicolás Alegría

Instituto de Investigación Pesquera

INTRODUCTION

Acoustic instruments have been used for scientific and fishing applications since the middle of the 20th century, in both cases the objective is to visualize biological objects in the water column. For example, fishermen use the information from their sonars and echosounders to catch fish more effectively, while fishery scientists use similar acoustic information to study fish distribution and estimate stock abundance. The major difference between fishing and scientific applications of acoustics is related to the quality and level of interpretation of the acoustic data (ICES, 2007).

The use of fishing vessels as research platforms has become increasingly common, which has allowed obtaining a large amount of both acoustic and biological information, as well as environmental and oceanographic parameters of organisms of commercial importance during almost all the year (Ryan *et al*., 2005, Macaulay *et al*., 2019, Alegría & Sepúlveda, 2020). The acoustic information is commonly used to estimate the abundance and biomass of commercially important organisms, however, acoustic data provide much more information, which allows the majority of the components of an ecosystem to be observed continuously and simultaneously throughout the water column: predators, prey, substrate, etc; that is, from zooplankton to larger fish and the relationship between them and the environment (Reid *et al*., 1998, ICES, 2007), allowing to obtain biological indicators on a regional and local scale.

The echosounder is the most used acoustic equipment to collect information at the sea, which operates under a windows environment and incorporates the internal calibration function, therefore, it is especially suitable for installations onboard vessels for both fishing and fishing research. Among its qualities, the echosounder allows integrating the echo in real time with the analysis of the intensity of the same, in an unlimited number of layers. In addition, it facilitates the storage of raw acoustic data, which can later be retrieved for treatment with various post-processing data packages. The collection of scientific information directly from very accurate and stable sensors makes it ideal for research purposes to obtain information on the distribution, volume, and shapes that schools take (Simrad, 2000).

Since the year 2000, the Fishery Research Institute (Instituto de Investigación Pesquera, INPESCA) records acoustic information from fishing vessels for research purposes and since 2012 maintain a register of acoustic equipment in use by vessels of the industrial fishing fleet that operates in the area off Central-South Chile targeting mostly on small pelagics and Chilean jack mackerel, which is updated annually.

ACOUSTIC EQUIPMENT BY VESSEL

The vessels were separated according to their acoustic equipment based on the type of echosounder. There are 29 vessels corresponding to 8 fishing companies, where most have acoustic equipment, mainly echosounders, which allow the recording and subsequent analysis of this information.

With the purpose to identify fishing platforms able to collect ecological data, we provide an inventory or updated list of the acoustic equipment in use by vessels participant in the Chilean jack mackerel fishery of Central-South Chile.

Vessels with scientific echosounder

In this category we have to all vessels that have a scientific eco-integration system, SIMRAD model EK60, equipped with 38 and/or 120 kHz transducers, and this echosounder allows internal calibration.

Also, 5 of the 6 vessels are equipped with a SIMRAD model SX90 (scientific) or SP90 sonar, which also allows the recording of information through a special module.

		ECHOSOUNDER			SONAR	
COMPANY	VESSEL	MARK	MODEL	FRECUENCY (kHz)	MARK	MODEL
LOTA PROTEIN	SANTA MARIA II	SIMRAD FURUNO	EK60 FCV292	38 38	FURUNO	FSV24
FOODCORP	CAZADOR	SIMRAD FURUNO	EK60 1200L	38 y 120 50/200	SIMRAD KAIJO DENKI	SX90 KCS228Z
FOODCORP	DON MANUEL	SIMRAD SIMRAD	EK60 ES60	38 120	SIMRAD JRC	SP90 JFS3380
FOODCORP	RUTH	SIMRAD SIMRAD	EK60 ES60	38 120	SIMRAD	SX90
ORIZON	DON JULIO	SIMRAD FURUNO	EK60 FCV1150	38 28/50	SIMRAD KAIJO DENKI	SX90 KCS2200Z
BLUMAR	DON EDMUNDO	SIMRAD SIMRAD FURUNO	EK60 ES60 FCV295	38 120 50	SIMRAD KAIJO DENKI	SX90 KCS2200Z

Vessels with semi-scientific echosounder

In this category, we include all boats that have SIMRAD model ES60 echo sounders installed, in which although they are not scientific echosounders and therefore the raw data from this echosounders are modulated with a triangle-wave error sequence (TWES) with a 1-dB peak-to-peak amplitude and a 2720-ping period, this information can be externally corrected and calibrated in post-processing software. We identify 7 vessels in this category.

		ECHOSOUNDER			SONAR	
COMPANY	VESSEL	MARK	MODEL	FRECUENCY (kHz)	MARK	MODEL
CAMANCHACA	CORSARIO	SIMRAD SIMRAD	ES60 EQ55	38	SIMRAD	SX90
CAMANCHACA	BUCANERO	SIMRAD KAIJO DENKI KODEN	ES60 KSE300 CVS-852	38 38 28/50	SIMRAD FURUNO	SX90 CSH55
CAMANCHACA	PELICANO	SIMRAD FURUNO	ES60 FCV1000L	38 38	KAIJO DENKI KAIJO DENKI KAIJO DENKI	KCS220Z KCS3000 KCH3180
ALIMAR	QUERELEMA	SIMRAD FURUNO FURUNO	ES60 FCV582 FCV552	38 38 38	KAIJO DENKI FURUNO	KCS207 CSH5L
ALIMAR	PANILONCO	SIMRAD FURUNO	ES60 FCV585	38 38	KAIJO DENKI FURUNO	KCS2200Z CSH5
BLUMAR	RAPANUI	SIMRAD FURUNO	ES60 FCV295	120 50	KAIJO DENKI SIMRAD	KCS2200Z SU93
BLUMAR	DON ALFONSO	SIMRAD FURUNO FURUNO	ES60 FCV1200L FCV1150	38 50/200 28/50	SIMRAD KAIJO DENKI	SX90 KCS2000

Vessels with broadband echosounders

Here we include all the vessels that have SIMRAD model ES80 broadband fishing echosounders, 5 of the 6 vessels are equipped with 2 WBTs and their respective 38 and 120 kHz transducers.

		ECHOSOUNDER			SONAR	
COMPANY	**VESSEL**	**MARK**	**MODEL**	**FRECUENCY (kHz)**	**MARK**	**MODEL**
ORIZON	SAN JOSE	SIMRAD	ES80	38 y 120	SIMRAD	SP90
		KAIJO DENKI	KSE200	38	FURUNO	FCV30
		FURUNO	FCV1100L	38	KAIJO DENKI	KCS2200Z
ORIZON	VENTISQUERO	SIMRAD	ES80	38 y 120	SIMRAD	SX90
		SIMRAD	ES60	18	KAIJO DENKI	KCH2180
		KAIJO DENKI	KSE300	38	KAIJO DENKI	KCS2000
		FURUNO	FCV1100L	38		
ORIZON	LIDER	SIMRAD	ES80	38 y 120	SIMRAD	SP90
		FURUNO	FCV1150	28/50	KAIJO DENKI	KCS2200Z
		KAIJO DENKI	KMC110			
ORIZON	LONCO	SIMRAD	ES80	38 y 120	SIMRAD	SX90
		FURUNO	FCV1000	28/50	SIMRAD	SN90
		FURUNO	FCV1150	28/50	KAIJO DENKI	KCS227
ORIZON	VESTERVEG	SIMRAD	ES80	38 y 120	SIMRAD	SP90
		JRC	JFV250	38	KAIJO DENKI	KCS2000
BLUMAR	YELCHO I	SIMRAD	ES80	120	KAIJO DENKI	KCS2200Z
		FURUNO	FCV1000	28/50	KAIJO DENKI	KCS2500

Vessels with fishing echoSounder

This category is made up of 10 boats that have an echo sounder equipped with other brands like Furuno or Kaijo Denki as their main acoustic equipment and that most of them do not allow the recording of acoustic information (raw data), with the exception of the Cobra that has a Kaijo Denki echosounder, model KSE200.

		ECHOSOUNDER			SONAR	
COMPANY	VESSEL	MARK	MODEL	FRECUENCY (kHz)	MARK	MODEL
CAMANCHACA	MARIA JOSE	FURUNO	FCV-1000	28/50	SIMRAD	SX90
		KODEN	CVS-852	28/50	FURUNO	CSH55
CAMANCHACA	PEHUENCO	FURUNO	FCV292	28/50	SIMRAD	SP90
BAHIA CORONEL	FRANCISCO	FURUNO	FCV551	38	SIMRAD	SP90
BAHIA CORONEL	JAVIER	FURUNO	FCV292	38	SIMRAD	SX90
ALIMAR	VICHUQUEN II	FURUNO	FCV582	38	FURUNO	CSH5 MK2
LANDES	DON BORIS	FURUNO	FCV551	38	KAIJO DENKI	KCS3000
					SIMRAD	SP90
LANDES	DON TITO	FURUNO	FCV552	38	KAIJO DENKI	KCS3000
					SIMRAD	SP90
LANDES	CORAL I	FURUNO	FCV553	38	KAIJO DENKI	KCS3000
					SIMRAD	SP90
BLUMAR	ERIKA	FURUNO	FCV780	50/200	KAIJO DENKI	KCS2500
		FURUNO	FCV1200L	50/200	FURUNO	FSV24
BLUMAR	COBRA	KAIJO DENKI	KSE200	38	SIMRAD	SX90
		FURUNO	FCV292	50	KAIJO DENKI	KCS2200Z

REFERENCES

G. Macaulay, G. Skaret, T. Knutsen, O.A. Bergstad, B. Krafft, S. Fielding, S.G. Choi, S. Chung, K. Demianenko, V. Podhornyi, K. Vishnyakova, L. Pshenichnov, A. Chuklin, A. Shishman and M.J. Cox. 2019. Preliminary results from the International Synoptic Krill Survey in Area 48, 2019. WG-EMM-2019/47. CCAMLR. 17pp.

ICES. 2007. Collection of acoustic data from fishing vessels. ICES Cooperative Research ReportNo. 287. 83 pp.

N. Alegría & A. Sepulveda. 2020. Habitat Monitoring of Chilean Jack Mackerel based on acoustics from fishing vessels 2020. SPRFMO. SC8-HM08. 12 pp.

Reid, D. G., Fernandes, P. G., Bethke, E., Couperus, A., Goetze, E., Hakansson, N., Pedersen, J., *et al*. 1998. On visual scrutiny of echograms for acoustic stock estimation. ICES. CM 1998/B: 1.

SIMRAD. 2000. Instruction manual. SIMRAD EK-60 Scientific Echo Sounder. 180 p.

T.E. Ryan, R.J. Kloser, G. Geen, M. Lewis. 2005. Development of a sustainable industry-based observation system for blue grenadier at the primary spawning sites. FRDC Project – 2003/044. CSIRO. 46 pp.