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Final report of the SPRFMO task group on
Fishing Vessels as Scientific Platforms

IREA

SPRFMO TASK GROUP ON FISHING VESSELS AS SCIENTIFIC PLATFORMS

Final report

IREA, July, 2017

INTRODUCTION

In 2008 scientists of different countries presented a proposal to take into consideration the data collected aboard fishing vessels, and particularly acoustic data. They based their proposal on the fact that many industrial fishing vessels were equipped with updated acoustic instruments, e.g. the SIMRAD ES70 echo sounder, which characteristics are similar to those of the scientific echo sounder EK 70 from the same manufacturer. This proposal was based upon the large series of works performed in this area, particularly inside ICES (e.g. CRR ICES # 144; 187; 209; 235; 287). Between 2008 and 2014, SPRFMO asked for more information, and especially on the acoustic characteristics of fishing vessels, the type of data collected, the methods for collecting, processing and analyzing the data, etc. and a series of meetings were organized, inside and outside SPRFMO. It was particularly important to get the advices of the international scientific community and the questions were transmitted to the ICES WGFASST (Working Group on Fisheries Acoustics Science and Technology) which represent the most important world forum in this discipline. Among other interactions, we may cite those reported to SPRFMO during the scientific meeting in Viña del Mar (Viña del Mar, 21-28 October 2010): Meeting in San Diego before ICES WG FAST working group, April 2010 (8 participants present among the 15 members of the group) and a Communication presented at the ICES International Conference on Fishery dependent data, Galway, June 2010 (see SWG-09-JM-05). The organization of a formal group was submitted to the Scientific Committee in Hawaii in 2014 (annex 1).

During its 2nd meeting in Honolulu (Hawaii) in September 2014, the SPRFMO Scientific Committee recommended to SPRFMO to create a dedicated Task Group, and the final decision was the following:

Enhanced use of fishery dependent acoustic data.

The SC was requested to establish a Task Group on the Standardization of Acoustic Data from commercial fishing vessels with the following objectives:

- *Establish common protocols (settings of the instruments and calibration procedures; definition of indicators; etc.)*
- *Develop collaborative approaches for providing contributions to an ecosystem approach to stock assessment and the provision of ecological and fishing information to SPRFMO;*
- *Develop a “methodological package” to allow potential users to process their own data under an agreed international format.*

The Task Group was proposed for three years under the chairmanship of François Gerlotto (IREA). Participation would be open to all interested Members, CNCPs and Observers. Specialists in acoustics would also be encouraged to join.

The working programme of the Task Group would follow the recommendations of the workshop on “Fishing vessels as scientific platforms”. The Task Group would set up an annual workshop and work intersessionally through remote communication means. For the first year, it was recommended that the Task Group work on the development of a protocol for vessel calibration. The Task Group should report to the SPRFMO Scientific Committee and work in collaboration with the ICES WGFASST and the International Advisory Committee of IREA to avoid any duplication and to ensure the scientific quality of its work.

The activities of the Task Group would be supported by IREA (through its regular work) and by already committed contributions from fishing companies. Other sources of funding would be explored. Travel expenses would be covered by participants.

ACTIVITIES ACHIEVED DURING THE 3 YEAR PERIOD

Following this decision, IREA organized the activities with the support of different Institutions, and particularly the SNP (Sociedad Nacional de Pesquerias, Lima, Peru) and IMARPE (Instituto de Recursos Pesqueros, Lima, Peru), and with the sponsoring of several companies and manufacturers (SIMRAD, IXBLUE, WWF, Oceana, TNC, etc.).

FIRST WORKSHOP. Lima, September 2015: Protocol for calibrating echo sounders aboard fishing vessels

The activities followed the recommendations of the Scientific Committee, and a first workshop was organized in Lima in 2015 to establish a protocol for acoustic calibration of echo sounders aboard fishing vessels. Calibration is the preliminary action to perform before any data collection be performed, and it was logically the first priority for the Task Group.

This meeting was organized by SNP and a document was produced under the leadership of Dr Adam Dunford (NIWA, New Zealand). This document was later submitted to the ICES WG FAST and approved after some corrections and edition. It was transmitted to SPRFMO. Taking advantage of this first meeting, IREA submitted to the scientific journal Fisheries Research the edition of a special issue on "Fishing Vessels as Scientific Platforms" which was accepted and published in 2016. A report of activities of the Task Group was submitted to the Scientific Committee during its 3rd meeting in Port Vila, Vanuatu. Participants came from Peru (IMARPE, SNP, Univ. Federico Villareal, IREA), New Zealand (NIWA), Chile (IFOP), Canada (DFO), USA (NOAA), Netherland (IMARES).

SECOND WORKSHOP. Lima, November 2016. Definition of a common equation of Target Strength for the Chilean Jack Mackerel.

After calibration, using a common equation (or set of equations) was also critical. Indeed the objective of gathering all the acoustic information from the different fleets exploiting CJM requires that all of them are transformed from acoustic value to biomasses using a common method.

This meeting was organized by SNP and the University Federico Villareal in Lima. It gathered scientists from Peru (IMARPE, SNP, Univ. F.V., IREA), Chile (IFOP, INPESCA), Canada (DFO), Norway (IMR). Two major results were obtained:

- There are no significant differences between the TS equations in the different parts of the South Pacific Ocean, with the exception of New Zealand where results differ significantly from the other areas: but it is likely that these differences are the results of methodological choices as NZ calculated a common TS value for all the different species of jack mackerel in its fishing area, the CJM being the less represented. Some future research was suggested by the T.G. Therefore a single equation was agreed by all the participants for the whole South Pacific, both for 38 and 120 kHz frequencies. Actually the 38 kHz equation is already the one mostly used by the different laboratories. The 120 kHz equation was calculated by the T.G. and it is recommended that more measurement be performed in order to confirm the result.
- A discussion was developed during the workshop to discuss on the use of this new source of data.

Due to the delays for organizing the workshop, it has not be possible to report to the Scientific Committee during its 5th meeting in Netherland, and the report will be submitted at the 6th meeting in Shanghai.

THIRD WORKSHOP. Lima, September 2017. Study of data management methods and techniques.

This workshop was also delayed, because of availability of invited keynote speakers. Its objective is to evaluate methods and tools applicable for management of data collected aboard fishing vessels, and more generally to establish a general protocol for data, metrics and indicators to be defined and used for an environment and habitat monitoring. The amount of data from fishing vessels is orders of magnitude higher than the conventional sources of data, and there is need to organize and synthesize them.

The workshop is open to all the scientists from the SPRFMO area who could be interested. Some foreign scientists have been invited, under the condition that funding be obtained by Institutes and sponsors.

The objectives of the workshop are:

- To receive experienced scientists (Dr John Horne from the University of Washington, Seattle, and Ing. Jeremy Habasque, from IRD, France) who will present their own experiences and how they could be adapted to the case of SPRFMO data;
- To define the necessary metrics to be collected, the data structure and to build indicators likely to describe properly the evolution of the major fish populations in the SPRFMO area (beginning with the case of CJM).

A draft report will be presented to the SC and a final version transmitted to SPRFMO.

GENERAL CONCLUSIONS

The three major activities listed by the SC have been performed during this 3 year period. Except for the 3rd activity (data management) which is not yet finalized, reports have been submitted to the international community and to the SPRFMO Scientific Committee.

These results demonstrated the efficiency of acoustic data from fishing vessels. It was confirmed that echo sounders from fishing vessels could be calibrated in the same way as those aboard research vessels and that the data can be aggregated to other scientific data and indicators. This has been performed by the SNP since 2011 through the organization of workshops organized by the SNP Scientific Committee to study the yearly status of the CJM stocks and provide a report to the Peruvian delegation to the SPRFMO Scientific Committee. Results concerned fish abundance, distribution, biology, behaviour and ecology. They have shown their utility for the Peruvian delegation for preparing the official scientific report on CJM in Peruvian fisheries.

We can safely conclude that acoustic data from fishing vessels are fully usable for research. This conclusion was supported by the international community and was confirmed in the articles published in the special issue of Fisheries Research edited by IREA. A series of obvious recommendations to develop research on fisheries acoustics, to continue studying target strength, to improve the calibration procedure in order to follow the improvements of the techniques, have been listed in the different reports, and conclusions on the data management will be submitted soon to SPRFMO.

Another conclusion from the Task Group is that it becomes possible nowadays, through the addition of these new data and indicators to those already used by the scientists (mostly

research surveys, fisheries data, biological experiments and analyses, and satellite data), to perform an ecosystem approach to the main SPRFMO fisheries and particularly to evaluate the possibility of using the habitat as a general indicator. A proposal has been written and submitted to the SPRFMO Scientific Committee during its 6th meeting.

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ANNEX 1

PROPOSAL FOR THE ORGANIZATION OF A TASK GROUP ON “FISHING VESSELS AS SCIENTIFIC PLATFORMS”**IREA, 2014**

After 7 years of tests and experiments, the scientific validity of the acoustic data collected by the fishing vessels has been demonstrated. The results can improve significantly the understanding and the analysis of the populations of jack mackerel in the South Pacific. Nevertheless this source of information cannot extend to all the members of SPRFMO before a common methodology of collection and processing of the data and a protocol of calculation for the indicators be establish. This must be promoted by the SPRFMO in order to get approval of all. In order to fulfill such activities, the SPRFMO counts on a tool: the “Task Group” (T.G.). Until now two T.G. were established: the first T.G., elaborated to make an evaluation of the population of jack mackerel with simulated data, was cancelled when was a common methodology of evaluation that finally was in the JJM. The second was created to standardize the readings of otholiths of jack mackerel (Rodolfo Serra, IFOP, Chile), and is still in course. It is suggested to the SPRFMO to create a new T.G. on the standardization of the acoustic data.

OBJECTIVES

A first technical goal it is to establish common protocols (to select settings of the instruments and calibration procedures; to define a common methodology to calculate indicators; etc.).

A second, scientific, objective, is to develop common analyses common between the different fisheries to describe to the populations and their dynamics (through international workshops) and to provide to the SPRFMO ecologictheiral and fishing information to improve its models of dynamics of populations.

The third objective, of cooperation, is to put in hands of any potential users a “methodological package” to allow process their own data, under an international format. This can be considered at national level (harmonization between the fishing companies) as well as at international levels.

Note: the objective of the T.G. is strictly methodological; it is not to exchange or to share data nor to create a data base.

BENEFITS

For the fishing companies, to receive a clear protocol established and guaranteed by the scientists of the SPRFMO, allowing them to routinely extract reliable information of the data of their vessels under a format making the exchange of information possible.

For the countries: the partners of the SPRFMO will be able to take advantage of more complete studies and therefore to produce or obtain sound recommendations.

For the SPRFMO, it will allow to obtain a base of intercalibrated observations to monitor the complete exploited ecosystem covered by the different countries and the different fleets, in order to incorporate this information in assessment models.

For the scientists in general, to get a methodology validated by the SPRFMO to monitor the observed ecosystem and to make ecosystem approach of the populations, with the objective to improve the predictive capacities of the models in a situation of climatic change.

ORGANIZATION AND COSTS

The T.G. it will be created under the direction of Dr François Gerlotto (IREA), with a limited duration (non less than 3 years). It must be a structure opened to all, gathering ideally specialists in acoustics from all the Institutes or organizations which use this technique (i.e. IFOP, INPESCA, INPESNOR, CORPESCA of Chile; IMARPE and SNP of Peru; CSIRO of Australia; NIWA of New Zealand; IRD, IMARES of the UE; etc.). The T.G. working program is represented by the recommendations of the workshop on “Fishing vessels as scientific platforms”.

The activities will be of two types:

- exchange by mail between the members of the T.G. during the course of the year;
- An annual workshop for common research on analysis/test of the methods and protocols.

The activities will have as on bases the recommendations of workshop fishing vessels ace scientific platforms. For the first to year, it is recommended to produces to protocol for vessel calibration.

The T.G. will report to the SPRFMO Scientific Committee during its annual meeting. It will be in connexion with the ICES WGFAST and the International Advisory Committee of IREA in order to guarantee the scientific quality of its works.

Fundings:

- Current activity covered by IREA
- Workshop cost to be covered by the fishing companies (e.g. via SNP in Peru), travels at expenses of participants.
- (... or funded by any other sponsor which will be warmly welcome)