Proposal for consideration of the Science Working Group (SWG) of SPRFMO

The draft report of the 2nd International Wokshop on assessment of Chilean Jack Mackerel stated (file SPRFMO-JM-2009-Workshop-Report-DRAFTv4.doc, page 5):

> *Acoustic indices*
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> *There was a presentation on the potential use of industry vessels to gather additional acoustic data to that provided by standard scientific surveys (SP-07-JM-SA-08). These data could provide information at times between surveys and in more detail for the times and locations when fishing was occurring. It could also provide information not only on jack mackerel but also on their predators and prey, other species and environmental conditions.*
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> *There was general support for this proposed use of industry vessels in this way and it was suggested that a more specific proposal be developed for submission to the Science Working Group (SWG) for its consideration.*
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> *There was also acknowledgement that this proposal, while useful in the future, would not assist with the immediate task of providing advice on the status of jack mackerel this year.*

Accordingly an outline of the asked specific proposal is presented in the next paragraphs under the following title:

Industry (Fishing) Vessels to collect acoustic data for providing ecological indicators for sustainable integrated management of the living resources of the SPRFMO area

Digital echosounders are being progressively deployed as standard equipment aboard fishing vessels. It is an opportunity to collect data for qualitative and quantitative purposes regarding ecosystem functioning. This relatively new technological generation of sounders includes hard disks for data file storage and/or Lan ports for external data archiving.

Some acoustic indicators of ecosystem functioning can be extracted from digital echograms (data files) using analysis software:

- Precise location (date, time, lat./lon., depth) of all detected fish schools and zooplankton and midtrophic micronecton aggregations.
- Backscattering strength for every target, which is a proxy of weight/abundance, and statistical indexes of internal structure such as skewness, kurtosis, fractal dimension etc.
- Depth of thermocline.
- Depth of oxycline.
- Internal waves dimensions.

These sources of information can be used for:

- Fish behavior.
- Inter species interactions.
- Index of habitat range suitability for groups of species.
- Target Strength measurements.

- Prey-predator relationships.
- Ocean dynamics when data is related to satellite information (e.g. altimetry).
- Availability/catchability indexes.
- Dyel dynamics of species.

The possibility of using industry vessels for building up time series on indicators is not intended to replace scientific surveys but to be a complement of it since fishing vessels operate over longer time and range scales compared to research vessels. Therefore it is needed to achieve two basic conditions regarding the use of fishing vessels as platform of opportunity:

- (1) The availability of technical protocols to ensure minimum conditions aboard to gather quality data under certain standards (calibration, noise measurement, biological sampling etc).
- (2) The availability of protocols and formats for logistics of data management and exchange.

In the first case it has been published by ICES its Cooperative Research Report N°287 on the Collection of Acoustic Data from Fishing Vessels (ICES. 2007. Collection of Acoustic Data from fishing vessels. ICES Cooperative Research Report No. 287. 83 pp., see annex for a list of key topics). It contains a relation of all aspects to be evaluated prior to an intensive use of fishing vessels as platforms of opportunity, and detailedly describes the data processing and further analysis. **It is then specifically recommended to adapt it to the particular condition of the SPRFMO area**.

In the second case they already exists some specific protocols which are being using to collect acoustic data aboard fishing vessels regarding the logistics of these actions (at least in Australia, Norway, USA, Peru). For example, about how and when to proceed to data recording, how to launch data compression and storage, how to stamp identities and other basic aspects of acoustic editing. **It is recommended to review and adapt the available protocols for make them a standard of procedure in the SPRFMO area**.

This two are tasks which might be accomplished through out a sub-Working Group.

The ICES Fisheries Acoustics, Science and Technology Working Group (FAST-WG) produced the CRR 287 under chairmanship of Dr William Karp (NOAA). The volume cites several study cases of using industry vessels for scientific purposes: Australia, Argentina, Chile, New Zealand, Canada, Norway, Scotland, Peru, Russia. Several members of FAST-WG comes from countries of the SPRFMO area, then this an opportunity of using its experience to form a sub-working group for adapting current methodologies to the particular case of the south pacific.

Dr. Rudy Kloser, chairman of the FAST-WG has been contacted on this regard and offered to introduce the subject during the annual meeting of his WG next week in Italy. Dr. Francois Gerlotto, relevant member of FAST-WG has been asked to conduce the discussion.

Although still is not possible to be guaranteed by any party at this stage, it seems to exist certain unanimity on the need of at least introducing the subject during the current sessions of the SWG. One of the current restrictions is economic since the functioning of a new sub-WG needs of financial support. However it is possible that IRD might provide support to the participation of Dr. Gerlotto as advisor or chairman of this group due to its longstanding research experience on jack mackerel and other species of Chile and Peru.

Annex: main topics of the ICES CRR 287

1.2.1 Single-species stock assessment
1.2.2 The ecosystem approach to fishery management
1.4 Example management monitoring strategies
2 Fishing vessels as sampling platforms
2.2 Detection of sound by fish
2.2.1 Hearing physiology and sensitivity
2.2.2 Behaviour in response to sound
2.3 Detection of fish by sound
2.4 Noise created by vessels
2.4.3 Vessel design features in relation to noise
2.4.4 Other sources of data degradation during collection
2.5 Noise signatures of vessels
2.6.2 Criteria for selecting vessels
3 Instrumentation
3.2.4 Calibration
3.3.5 Meteorological observations
3.3.6 Oceanographic observations
3.3.7 Direct sampling with commercial gear
3.4.1 Fishing vessel transducers
3.5 Integration of equipment
4 Data collection and management
4.2.2 Data collection in an industry setting
4.2.3 Data quality
4.2.4 Survey settings
4.2.9 Data exchange
5 Biological sampling
6 Data processing and analysis
7 Cooperative research considerations