Theme session A

Fisher Collected Acoustic Data (FCAD)

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In 2003 through 2005, the ICES Study Group on the Collection of Acoustic Data from Fishing Vessels (SGAFV) evaluated the approach and provided recommendations on future use. This work resulted in an ICES Cooperative Research Report 287 in 2007 summarizing SGAFV's findings and providing guidelines for the proper collection of acoustic data from commercial fishing vessels. This theme session was aimed at taking stock of the developments that have taken place in this field over the past 10 years. The session was intended to address issues specific to planning and communication necessary for proper implementation of collaborative acoustic projects and highlight technology that allows such projects to be successful.

The session consisted of 16 papers covering a diverse array of topics like the counting of bluefin tuna, describing species assemblages in Australia, improving biological understanding of the wide ranging stock of Pacific Jack mackerel (T. murphii), potential applications of opportunistic acoustic data from commercial vessels and best practices for a sustainable cooperative effort for industry and science. Almost all presenters managed to adhere to the tight session framework of presenting for 12 minutes and having 2 minutes for questions. The main themes from the submitted papers can be summarized as:

- Realized and potential applications of acoustic data from commercial fishing vessels
- Improved biological understanding of Pacific jack mackerel (*Trachurus murphii*) and anchovy (*Engraulis ringens*), their behavior and relation to habitat and hydrography
- Best practices in sustained cooperation between industry and science

Realized and potential applications of acoustic data from commercial fishing vessels

Ten years since the ICES Study Group on the Collection of Acoustic Data from Fishing Vessels (SGAFV), we can see that the application of industry collected data is increasing in different parts of the world. Several examples of realized applications were presented in the session (e.g. A571, A613, A404, A233, A436, A548, A466, A633 and A608) with examples from around the globe, from Chile and Peru, to Alaska, to the Bay of Biscay, and the North Atlantic. The diversity of projects using acoustic data collected from commercial fishing vessels was also highlighted in a special issue of Fisheries Research (Melvin et al., 2016). The most powerful application of using industry vessels as platforms for scientific acoustic surveys was demonstrated in the simultaneous use of multiple vessels to conduct synoptic abundance surveys of anchovies (*Engraulis ringens)* and jack mackerel (*Trachurus murphyi*) in both Peru and Chile (e.g. A571, A613, A404, A608). Honkalehto *et al.* (A436) demonstrated the use of data collected opportunistically from commercial fishing vessels contracted to do bottom trawl surveys in the development of an index of abundance for Eastern Bering Sea walleye pollock (*Gadus chalcogrammus*) that is currently being used in the annual stock assessment. Although the application of opportunistic acoustic data collected during normal fishing operations is currently not (yet) part of any formal stock assessment processes, Sascha Fässler *et al.* (A633) presented a promising approach of

merging opportunistic data with regular scientific survey data. There was one paper that demonstrated the application of sonar data from commercial fishing vessels in counting bluefin tuna (*Thunnus thynnus*) in the Bay of Biscay (A466).

In order to address the question "Could industry acoustic data be used for applications that are currently not considered ?," Verena Trenkel *et al.* (A193) provided new directions for the use of opportunistic data from commercial vessels. Next to the combination of opportunistic acoustic data with regular scientific survey data (similar to A633), an important new development would be to use opportunistic data where no other data exists (e.g. for greater Argentines).

Improved biological understanding of Pacific jack mackerel (Trachurus murphii) and anchovy (Engraulis ringens)

In the Pacific region, both Chili and Peru have a long history of using commercial vessels for regular or specific survey that aim to enhance the understanding of the biological characteristics of jack mackerel and anchovy (A571, A613, A548, A585, A602, A343, A552 and A341). A particular long history is associated with the Eureka survey that was already initiated in 1966 as an initiative of the fishing industry to survey the abundance of anchovy with many fishing vessels simultaneously (e.g. A613). Overall, these contributions demonstrated that in offshore areas like in the Pacific, in many cases data collected from fishing vessels are the only source of information on the health of certain stocks.

Best practices in sustained cooperation between industry and science

The presentations on best-practices in sustaining cooperation between industry and science (A404, A436, A608 and A609) highlighted the need to think beyond the technical or scientific aspects of the industry-science collaboration. Several authors highlighted the need for frequent and direct communication between fishers and scientists at all stages of any cooperative project including planning, development of objectives, defining roles, collection of data, and dissemination of results. This multi-way communication also involved the management of expectations both within science and industry. This is especially needed to maintain commitment and to foster a sense of ownership within the fishing industry and to develop a deeper understanding within the scientific community of the knowledge and expertise of fishers.

Conclusions

The session set out to explore the developments of industry acoustics after the ICES Study Group on the Collection of Acoustic Data from Fishing Vessels (SGAFV, 2003-2005). The session demonstrated unequivocally that acoustic data collected from commercial fishing vessels according to appropriate scientific protocols (either as planned surveys or through opportunistic data collection) can be an efficient means of collecting useful data on fish stocks, particularly in areas that are remote, for stocks that inhabit a large area or are highly mobile. Such approaches are also becoming increasingly important at times of reduced monitoring funding, as a way to provide additional information on fish distributions and measures of their quantities. Fishing vessels and the practical knowledge of skippers about, for example, spawning locations and time, is also highly relevant for targeted industry surveys on spawning components. Sustained commitment of industry and science for joint data collection processes requires an open and frequent communication between scientists and fishers. The utility and efficiency of acoustic data collection from commercial fishing

vessels was well demonstrated during this session. There is no doubt that commercial fishing vessels and commercial acoustic systems will continue to be a useful tool for fisheries scientist and managers. Remaining challenges are related to the standardization of opportunistically collected data, by use of for example model-based approaches. For now, design-based monitoring approaches remain the underlying basis, however, the potential of data collection from opportunistic platforms such as fishing vessels in a way to complement monitoring programs and provide additional ecosystem data should be further pursued. Once such combined monitoring structures can be operationalized, the next step is to address their inclusion in the advice and assessment process.

References

Melvin, G. D., Gerlotto, F., Lang, C., and Trillo, P. 2016. Fishing vessels as scientific platforms: An introduction. Fisheries Research, 178: 1-3.