

# ICES SGFARV REPORT 2009

ICES FISHERIES TECHNOLOGY COMMITTEE

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## Report of the Study Group on Fish Avoidance of Research Vessels (SGFARV)

16–17 May 2009

Ancona, Italy



**ICES**

International Council for  
the Exploration of the Sea

**CIEM**

Conseil International pour  
l'Exploration de la Mer

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## **Executive summary**

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The Study Group on Fish Avoidance of Research Vessels met in Ancona, Italy on 17–18 May 2009. The SGFARV meeting was held under the co-chairmanship of Julia Parish and François Gerlotto and gathered 11 participants.

The draft of the CRR (provisional title "Causes and consequences of fish reaction to fisheries research vessels") written during the year was submitted to the SG with the following structure:

- Introduction
- Chapter 1. A Historical Review of Underwater Radiated Noise Related to Fisheries
- Chapter 2. Platform Emissions, with Particular Attention to Sound
- Chapter 3. Fish Physiology Related to Hearing
- Chapter 4. A Review of Fish Reaction to Research Vessels, with an Emphasis on Sound-Quieted Vessels
- Chapter 5. Effects of Fish Avoidance on Assessment
- Chapter 6. Further Experiments Needed to Evaluate Fish Reaction to Research Vessels
- Chapter 7. Summary Findings and Recommendation
- Literature Review
- Annexes

The draft was revised by the SG and consistent additions were recommended. A completed version will be presented at the 2009 ASC. The final draft will be prepared for approbation at the WGFAST in 2010, in preparation for submission as a CRR manuscript to the ICES Publication Committee.

The SG updated the literature review and prepared a questionnaire to be sent to the authors of papers on fish avoidance to research vessels.

## 1 Opening of the meeting

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The Study Group on Fish Avoidance of Research Vessels met in Ancona, Italy on 17–18 May 2009 to:

- a) produce a review and develop recommendations for the ICES community on methods for the study of physical stimuli produced by fisheries research vessels (platform related stimuli - PRS) and evaluation of reactions by survey-targeted fish;
- b) update the literature review on fish reactions and vessel produced stimuli;
- c) recommend experiments to further examine the causes of fish reactions to PRS;
- d) review progress of the SG according to the agenda defined in 2008.
- e) review the draft of an ICES Cooperative Research Report on fish response to vessel produced stimuli, and in particular radiated sound, that will be finalized during the coming year and submitted to ICES in 2010.

The SGFARV meeting was held under the co-chairmanship of Julia Parrish and François Gerlotto and gathered 11 participants (François Gerlotto, Julia Parrish, Patrice Brehmer, Nils Olav Handegard, Dick Wood, Paul Winger, Ken Cooke, Chris Wilson, Marianna Giannoulaki, John Horne, Emma Jones).

## 2 CRR draft review

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The draft of the CRR (provisional title "*Causes and consequences of fish reaction to fisheries research vessels*" ) written during the year was submitted to the SG with the following structure:

- Introduction
- Chapter 1. A Historical Review of Underwater Radiated Noise Related to Fisheries
- Chapter 2. Platform Emissions, with Particular Attention to Sound
- Chapter 3. Fish Physiology Related to Hearing
- Chapter 4. A Review of Fish Reaction to Research Vessels, with an Emphasis on Sound-Quieted Vessels
- Chapter 5. Effects of Fish Avoidance on Assessment
- Chapter 6. Further Experiments Needed to Evaluate Fish Reaction to Research Vessels
- Chapter 7. Summary Findings and Recommendation
- Literature review
- Annexes

The draft was revised by the SG and consistent additions were recommended. A completed version will be presented at the 2009 ASC. A final draft will be prepared for approbation at the WGFAST in 2010, in preparation for submission as a CRR manuscript to the ICES Publication Committee.

A table listing all publications and relevant findings has been provisionally prepared and will be sent to the authors of papers on fish avoidance in addition to the Study Group members in order to complete the observations on the different types of experiments produced in the last 30 years.

Based on work to date, research priorities were defined and listed as below:

- Research to identify which elements of the sound signature, or other vessel-produced stimuli, result in fish avoidance, both within and among systems, including but not limited to: directivity; tonality; particle motion; gradients; light; multiple stimuli; ambient noise, etc.
- Research to identify the type(s) of avoidance response and the particular environmental, ecological, and biological conditions under which response occurs, including but not limited to: habituation; cycles; species interactions; density (abundance); avoidance patterns, etc.
- Definition of avoidance indicators

The report was presented for discussion at the WGFAST meeting on 20 May 2009.

### **3 CRR draft review at the ASC 2009**

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The Study Group will work by correspondence to submit at the ASC in Berlin, September 2009, the complete draft of an *ICES Cooperative Research Report* on fish response to fishery research vessels with particular attention to radiated sound, which includes:

- an updated literature review on fish reactions to vessel produced stimuli;
- an updated review of behavioural reactions of fish to a survey vessel;
- a review of methods and experiments designed for analysing fish behaviour;
- the design of explicit experiments to further examine the causes of fish reactions to research vessels;

**Annex 1: List of participants**

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<b>NAME</b>	<b>COUNTRY</b>	<b>EMAIL</b>
François Gerlotto	France	francois.gerlotto@ird.fr
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Emma Jones	NewZealand	e.jones@niwa.co.nz

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## **Annex 2: SGFARV Draft Resolution for an ICES Internal Publication**

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The report on the **Avoidance of fish to research vessels**, edited by François Gerlotto (France) and Julia Parrish (USA), as reviewed and approved by the Chair of the FTC Committee, will be published in the *ICES Cooperative Research Report* (or in the *ICES Techniques in Marine Environmental Sciences series*) series. The estimated number of pages is 100.

The Study Group FARV agrees to submit the final draft of the proposed publication by September 2010.

### **SUPPORTING INFORMATION**

Priority:	This has a high priority for various reasons. Fishing research vessels have been built following ICES CRR 209 recommendation for the use of silent vessels, and the surveys from some of them already working show contradictory results as far as avoidance is concerned. The question whether it is necessary to proceed with the "silent ship recommendation" must be urgently answered by this CRR
Scientific justification:	The forthcoming ICES Cooperative Research Report represents a synthesis of the results and analyses of fish reactions to a research vessel. Such synthesis has not been done so far. The effect of fish reaction has an impact on the abundance estimates of fish stocks by acoustics. Therefore there is a need to describe in details the different scenarios that may exist in fish avoidance reactions, and understanding as much as possible the behavioural mechanisms induced by sound stimuli emitted by the vessels.
Resource requirements:	The material in the report is fairly straightforward, and therefore no specific additional costs are necessary.
Participants:	Approximately one month's work is required by the editor to finalise this draft.
Secretariat facilities:	About one month of the services of Secretariat Professional and General Staff will be required.
Financial:	Cost of production and publication of a 100-page CRR.
Linkages to advisory committees:	This product has been endorsed by FTC.
Linkages to other committees or groups:	None.
Linkages to other organizations:	None

### Annex 3: SGFARV Terms of Reference for 2010

The **Study Group on Fish Avoidance of Research Vessels** [SGFARV], co-chaired by Julia Parrish (USA) and François Gerlotto (France), will work by correspondence in 2010 and will meet in San Diego, USA on **DATE** [to be determined] April 2010 to:

- a) Prepare the final manuscript of the CRR and submit it to FAST for a final submission to ICES in September 2010 for publication
- b) Present a list of recommendations for the use of research vessels with the need of producing the smallest avoidance effect.

SGFARV will report by **DATE** [to be determined] for the attention of the SCICOM.

#### Supporting information

Priority	The current activities of this Group will update the ICES CRR 209 on fish behaviour in relation to conventional and quiet fisheries research vessels, and the resulting uncertainty in survey and stock assessment results. The countries and Institutes which are in the process of renewing their research fleet need this information. Consequently, these activities are considered to have a very high priority.
Scientific justification	<p>Term of Reference a)</p> <p>Several countries are conducting or have recently completed significant studies in this area using both noisy and quiet vessels and the subject would benefit from a review of progress and an evaluation of the results obtained. The last review on fish reaction to vessels was done in 1995 by the ICES Study Group on Underwater noise of research vessels. A review of more recent work and especially of the effects of quiet vessels will determine the need for revision and update on the existing recommendations on this subject.</p> <p>Term of Reference b)</p> <p>Fish behaviour is a key parameter in fisheries research, especially in acoustic observations. It is a more complex process than assumed in 1995 and a more detailed analysis of fish reactions have to be performed. For such goal a series of experiments are analysed and propositions are given. This should allow for a more standardised research and comparative analyses..</p>
Resource requirements	None for the study group. Resources from the Publication committee will be required in 2010–2011 for the publication of a Cooperative Research Report
Participants	The Group is normally attended by some 15–20 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to advisory committees	There are no obvious direct linkages with the advisory committees.
Linkages to other committees or groups	There is a very close working relationship with all the groups of the Fisheries Technology Committee. It is also very relevant to the Working Group on Ecosystem Effects of Fisheries.
Linkages to other organizations	None