

ICES SGFARV REPORT 2010

SCICOM STEERING GROUP ON ECOSYSTEM SURVEYS SCIENCE AND TECHNOLOGY

ICES CM 2010/SSGESST:10

REF. SCICOM, ACOM

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

26–27 April 2010

San Diego, USA



ICES

International Council for
the Exploration of the Sea

CIEM

Conseil International pour
l'Exploration de la Mer

International Council for the Exploration of the Sea Conseil International pour l'Exploration de la Mer

H. C. Andersens Boulevard 44–46
DK-1553 Copenhagen V
Denmark
Telephone (+45) 33 38 67 00
Telefax (+45) 33 93 42 15
www.ices.dk
info@ices.dk

Recommended format for purposes of citation:

ICES. 2010. Report of the Study Group on Fish Avoidance of Research Vessels (SGFARV), 26–27 April 2010, San Diego, USA. ICES CM 2010/SSGESST:10. 10 pp.

For permission to reproduce material from this publication, please apply to the General Secretary.

The document is a report of an Expert Group under the auspices of the International Council for the Exploration of the Sea and does not necessarily represent the views of the Council.

© 2010 International Council for the Exploration of the Sea

Contents

Executive Summary 1

1 Opening of the meeting.....2

 1.1 Structure of the Cooperative Research Report3

2 Conclusions4

3 Recommendations4

Annex 1: List of participants.....5

**Annex 2: SGFARV Resolution for an ICES Internal Publication (Approved
at ASC 2009).....6**

Executive Summary

The Study Group on Fish Avoidance of Research Vessels (SGFARV) met in San Diego, USA on 26–27 April 2010. The SGFARV meeting was held under the co-chairmanship of Julia Parrish and François Gerlotto and gathered 13 participants.

The final structure of the draft of a Cooperative Research Report titled “Causes and Consequences of Fish Reaction to Fisheries Research Vessels” was presented and discussed. Some major changes were approved in the content (addition of a completely new chapter on fish physiology) and in the structure (organization of Chapters 1-2 and 3-4). The final draft represents 155 pages. A peer reviewing was decided and the final manuscript will be transmitted to chairs of WGFAST and SSGESST in August.

As expected, the final version of the manuscript will be transmitted for publication to ICES in September, 2010.

1 Opening of the meeting

The Study Group on Fish Avoidance of Research Vessels met in San Diego, USA, on 26–26 April, 2010 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 2009.
- 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 13 participants (François Gerlotto, Julia Parrish, Patrice Brehmer, Nils Olav Handegard, Alex De Robertis, Chris Wilson, Mariano Gutierrez, John Horne, Bill Karp, Rudy Kloser, Lars Andersen, Toby Jarvis, Stephane Gauthier, and Anne Lebourges).

1.1 Structure of the Cooperative Research Report

The meeting had as major activity to evaluate and agree on the final version of the Cooperative Research Report to be delivered before September 2010 to ICES. Some important changes were approved, and especially the Chapter 3 (Fish hearing and physiology) was completely written in a new version by A. Hawkins; Chapter 1 was split into two chapters by D. Wood (Chapters 1 and 2); Chapter 4 (conceptual model of fish avoidance) was rewritten in order to avoid any overlapping with Chapter 5 (fish behaviour). It was decided that the names of the chapter authors would be specified at each chapter. The final content of the CRR is expressed as below.

- **Introduction. Why this work – issue(s) creating the need**
(F. Gerlotto and J.K. Parrish)
- **Chapter 1. Brief review of the problem**
(R. Wood)
- **Chapter 2. The Platform and Possible stimuli**
(R. Wood)
- **Chapter 3. Fish hearing and Physiology**
(A. Hawkins)
- **Chapter 4. Towards a conceptual model of fish avoidance**
(A. Fernø)
- **Chapter 5. Fish behavioural responses to approaching research vessel**
(A. De Robertis and N.O. Handegard)
- **Chapter 6. Effects of fish avoidance on measurements and assessments of fish**
(N.O. Handegard, A. De Robertis, E. Jones, M. Dorn, J. Simmonds)
- **Chapter 7. Designing experimental to evaluate fish reaction**
(F. Gerlotto and E. Josse)
- **Chapter 8. Conclusions and recommendations**
(F. Gerlotto and J.K. Parrish)
- **Literature review**
- **Annexes**

The final draft represents around 155 pages. During the presentation of the SGFARV works to WGFAST at San Diego, it was agreed by WGFAST that because of its importance in terms of implications in the recommendations for the building of silent research vessels, and although this was not required in the CRR series, the document was worth a peer reviewing, which would need some extra delay, and the final draft will be delivered at the end of August to the chairs of WGFAST (Rudy Kloser) and SSGESST (Bill Karp).

The second major activity was to agree on general conclusions and recommendations to be submitted to ICES concerning the recommended policy on the building of silent vessels. No general agreement was obtained during the former SGFARV meeting held in Ancona, Italy in May 2009, and work was done during the year to reach to an agreeable text, which was done in San Diego, April, 2010. The main conclusions and recommendation of the Study group are the following.

2 Conclusions

Above 1kHz, within the frequency range of acoustic survey equipment, this report does not draw a conclusion, as these are frequencies out of the detection range of most fish. Arguments in favor of maintaining this standard therefore come from other quarters than fish reaction, and are not considered here.

Initial experimental results indicate that the variability of fish response to noise-reduced vessels is broad, bracketing observed responses to older survey vessels. Thus the application of a simple threshold below 1kHz across all species and systems is not sufficient to eliminate fish avoidance in all cases. We stress that these experimental results are preliminary, and – although well performed – are by no means comprehensive.

3 Recommendations

- 1) *There is a great need for basic research (including both laboratory and field experimentation) on sound (including vessel sound) as a physiological as well as a behavioral stimulus. The variable experience with noise-reduced vessels clearly demonstrates that the seemingly logical approach based on the 30 dB criterion was not sufficient. More knowledge of which aspects of sound fish actually react to is critical to understanding the differences between existing vessels and newly constructed vessels.*
- 2) *Implicit in a more complete understanding of the reactions of fish to vessel-radiated sound is a standardized and comprehensive description of the survey platform.*
- 3) *Because there are so few experimental results analysing the effects of noise-reduced vessels on fish reactions, additional experiments must be designed as a function of both environmental and biological parameters in order to determine the degree of avoidance within each survey system. These are necessary to evaluate the significance of the variability of fish response that has been observed to date. If possible, temporary use of an existing noise-reduced vessel assessed relative to existing vessels, is advised.*
- 4) *In some cases, avoidance is much lower during certain seasons/periods during the 24-h-cycle or in certain habitats, sometimes connected to different depth distributions. Surveys should then ideally be limited to these periods and locations, and thereby exclude biased data from the assessment.*
- 5) *The meta-analysis begun in this report (Chapter 4) is a nascent description of species-specific responses and must be augmented if we hope to build even a rough classification of avoidance response. Should additional experimental evidence reveal taxon or environment-specific pattern, these classifications may be used when assessing the need for noise-reduced vessels.*
- 6) *Placing these results in a larger ecological and behavioral context, such as predator-prey interaction, may be useful in defining and predicting response.*
- 7) *Vessel avoidance does not necessarily equate to significant biases in abundance. In some cases, correct factors can be developed.*

The SGFARV has concluded its work and no additional activity is required in the future, once the final CRR manuscript delivered to ICES in September, 2010.

Annex 1: List of participants

NAME	COUNTRY	EMAIL
François Gerlotto Chair	France	francois.gerlotto@ird.fr
Julia K. Parrish Chair	USA	jparrish@u.washington.edu
Patrice Brehmer	France	patrice.brehmer@ird.fr
Nils Olav Handegard	Norway	nilsolav@imr.no
Chris Wilson	USA	chris.wilson@noaa.gov
Alex De Robertis	USA	Alex.derobertis@noaa.gov
Bill Karp SSGESST Chair	USA	bill.karp@noaa.gov
Mariano Gutierrez	Peru	mgutierrez@tasa.com.pe
John Horne	USA	jhorne@u.washington.edu
Rudy Kloser	Australia	Rudy.Kloser@csiro.au
Lars Andersen	Norway	lars.nonboe.andersen.simrad.com
Anne Lebourges	France	anne.leourges.dhaussy@ird.fr
Stephane Gauthier	New Zealand	s.gauthier@niwa.co.nz
Toby Jarvis	Australia	Toby.jarvis@echoview.com

Annex 2: SGFARV Resolution for an ICES Internal Publication (Approved at ASC 2009)

2009/1/SSGESST04 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 SSGESST, 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.

SGFARV 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 finalize this draft.
Secretariat facilities	About one month of the services of Secretariat Professional and General Staff will be required.
Financial	Cost of production and publishing of a 100-page CRR.
Linkages to advisory committees	This product has been endorsed by SSGESST.
Linkages to other committees or groups	None
Linkages to other organizations	None