

ICES Fisheries Technology Committee
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Report of the Study Group on Unaccounted Fishing Mortality (SGUFM)

By Correspondence

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1 INTRODUCTION

1.1 Terms of reference

In accordance with ICES resolution 2003/2B09, a Study Group on Unaccounted Fishing Mortality [SGUFM] (Chair: Mike Breen, UK) will be established and will work by correspondence in 2004 to:

- a) consider issues relating to the sources of fishing mortality other than those that can be accounted for by the reported catch;
- b) report on the current knowledge of unaccounted mortality;
- c) review and make recommendations on methods used to estimate escape mortality from towed fishing gears.

1.2 Participants

Mike Breen (Chair)	UK
Marianne Farrington	USA
Alain Frechet	Canada
Norrie Graham	Norway
Irene Huse	Norway
Olafur Ingolfsson	Norway
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Graham Sangster	UK
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1.3 Background

The problem of unaccounted fishing mortality has been recognised since Holt's early work in the 19th century (Harley *et al.*, 2000). Ricker (1976) first categorised the various potential sources of unaccounted mortality with his review of mortality in the Pacific salmon fishery. These subcategories of fishing mortality were then formalised into a simple unifying model by the ICES Sub-group on Methodology of Fish Survival Experiments (ICES, 1994) which has been further developed by subsequent ICES Study Groups on Unaccounted Mortality (ICES, 1995 and 1997) and other authors (Chopin *et al.*, 1996). There have been a number of recent reviews which have discussed the concept of unaccounted mortality, but these have generally concentrated on one particular aspect, usually bycatch and discards (Alverson and Hughes, 1996; Alverson, 1998; Chopin and Arimoto, 1995; and Hall, 1996).

The Study Group on Unaccounted Mortality in Fisheries (ICES, 1995) defined Fishing Mortality (F) as “The sum of all fishing induced mortalities occurring directly as a result of catch or indirectly as a result of contact with or avoidance of the fishing gear”. They further recognised the following definable sub-components of F:

$$F = F_c + F_b + F_d + F_e + F_o + F_g + F_a + F_h$$

Landed Catch (F_c): Catch mortality should include all reported or estimated commercial fishing landings, plus landings from recreational fisheries and subsistence fisheries. This subcomponent was not considered in any detail by the previous study groups on unaccounted mortality and it will not be discussed in this report.

Illegal, misreported and unreported landings (F_b): is the mortality of fish that should be accounted for in F_c but is not because the records of landings are: not reported; underestimated; or misreported with respect to area and/or species.

Discard mortality (F_d): is the mortality of fish actively released by fishermen after capture.

Escape mortality (Fe): is defined as the mortality of fish that actively escape from a fishing gear, prior to the catch being landed on deck.

Drop out mortality (Fo): is the mortality due to captured fish dying and dropping out of the gear, prior to the catch being landed on deck. Examples include fish washed out of a codend during trawling or haulback, or fish lost from hooks and gillnets.

Ghost fishing mortality (Fg): is the death of fish being caught in ghost fishing gear. Where ghost fishing gear is lost or discarded gear that continues to fish for an indefinite period after its initial loss or discarding.

Avoidance Mortality (Fa): is the mortality directly or indirectly associated with the stress, fatigue and injuries of fish actively avoiding fishing gear.

Habitat degradation mortality (Fh): is any mortality associated with the degradation of an aquatic environment as a direct result of fishing activity.

In addition to these eight sub-components of fishing mortality (Fy), a number of other sources may be considered as subsets of at least some of these sub-components, for example mortality as the result of enhanced risk of Predation (Fp) and Infection (Fi).

One of the main reasons why these potential sources of fishing mortality have not been accounted for in the management of fisheries, both globally and in ICES, has been the absence of good scientific information (ICES 2000). However, as more investigations have been directed at understanding and quantifying these unaccounted sources of fishing mortality, the problem now is that much of this data is unavailable and, in some cases, unintelligible to policy makers, fisheries managers and the fishing industry itself.

The aim of this study group will be to collate all available data on each 'sub-component' of fishing mortality, building on the work of previous ICES Study and Topic Groups on this subject (ICES, 1995, 1997 and 2000). This will then be summarised in a final report, which will attempt to highlight the relative impact of each 'sub-component' of fishing mortality in key commercially important fisheries, by fishing method. In addition, the group will highlight key areas for further research and make recommendations on methodologies.

2 ACTIVITIES TO DATE

The SGUFM was formed on 1 January 2004, since then the main activities of the group have been identifying and recruiting members and planning future work activities. To date 13 members have been recruited from a variety of fields and disciplines, including: fisheries biology, marine ecology, fishing gear technology, fisheries management, stock assessment modelling and fisheries protection.

SGUFM is affiliated to the ICES Working Group on Fishing Gear Technology and Fish Behaviour (Chair: Dr N. Graham) and FAO. On 22 and 23 April 2004, the Working Group on Fishing Technology and Fish Behaviour (WGFTFB) will be holding a meeting in Gdynia, Poland. This meeting will be used to further promote SGUFM and recruit additional expert membership. The WGFTFB has in the past been an important source of expert advice and information on unaccounted fishing mortality.

Finally, a website is currently under construction to promote the activities of SGUFM and recruit further sources of information and data on unaccounted fishing mortality.

3 PROPOSED WORK PROGRAMME 2004 – 2006

To meet the Terms of reference and aims of the study group the following work items will be undertaken over the next three years:

- 1) A comprehensive literature review will be conducted, building upon the work of the previous Study and Topic Groups. Working by correspondence.
- 2) Two workshops will be conducted in 2005 and 2006 to address the following issues:
 - a) Identify measurable components of unaccounted fishing mortality and define comparable indices for assessing their relative impacts, for different capture methods, in key fisheries; and

- b) Collate available data on sources of unaccounted fishing mortality and produce a comparative summary of their relative impacts, for different capture methods, in key fisheries.
- 3) A sub-group will review and make recommendations on methods used to estimate escape mortality from towed fishing gears. They will work by correspondence and report in April 2006.
- 4) A final report will be compiled, based on items 1 and 2, summarising the relative impacts of each 'sub-component' of fishing mortality upon key commercially important species, by fishing method. The final report will be submitted to ICES in December 2006.

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