

Executive summary

The ICES-FAO Working Group on Fish Technology and Fish Behaviour (WGFTFB) met in Lorient, France from 23–27 April 2012 to address four Terms of Reference. The main outcomes related to the ToRs are detailed below.

Key Findings

ToR A: Incorporation of Fishing Technology Issues/Expertise into Management Advice (Section 10)

- As in the last previous 3–4 years fuel prices were the dominant feature in all countries that affected fleet dynamics. Rising costs were manifested in multiple ways: shifts in gear, modifications to fishing practices, changes in vessel powering. Of particular note is the shift in the Netherlands away from traditional beam trawling to the use of the pulse trawl and the Sum Wing. It is now apparent that within the Netherlands, driven primarily by the cost of fuel, there is a huge demand to use the pulse trawl and the number of vessels applying to fish under the 5% derogation far exceeds the number of licences available. Vessels not using the pulse trawl in the Netherlands are finding it increasingly difficult to get financial support from banks on economical (high fuel prices making beam trawling uneconomic) and ecological grounds (beam trawls are portrayed negatively).
- As in previous years there is very little evidence of technology creep. Most changes are related to improving fuel efficiency measures. In the Netherlands and Belgium uptake of the SumWing has increased. The development of fuel efficient trawl designs, off-bottom doors in demersal trawling and the use of Dynex warp seen in 2010 and 2011 seems to have spread to many countries.
- Uptake of selective gears continues to be limited and driven primarily by legislation. Interesting developments include the SELTRA used in Denmark and also tested in Ireland and also the Flip-flap trawl developed in the UK. Both of these devices are designed to reduce cod catches in demersal fisheries.
- Discarding due to quota closures was especially noted in Ireland and Spain. Shifts in discarding rates were linked to population changes in Ireland and France.
- A number of gear modifications have been tested and in some cases are being used to reduce the bottom impact of towed gears. As reported under Technical Creep there has also been considerable testing of trawl doors rigged to fish off-bottom, primarily driven by fuel prices. Both initiatives potentially have benefits in respect of reduced bottom impact.
- Virtually no new fisheries were been reported in 2012. Experimentation of static gears as a means for targeting fish has continued although the indications are that these fisheries are still not economically viable in most cases.

ToR B: Redfish fishing technology and physiology (Section 11)

- Terms of reference have been achieved to an acceptable level.
- Collaborations have been established between members and will continue outside the context of meetings of WGFTFB. One published paper (Herrmann, B. *et al.*, 2012. Understanding the Size Selectivity of Redfish (*Sebastes* spp.) in North Atlantic Trawl Codends. *Journal of Northwest Atlantic Fishery Science*, 44, pp.1–13) and others in development arose from the topic group.
- The group should be dissolved.

ToR C: The Use of Artificial Light in Fisheries (Section 12)

- The group reviewed the terms of reference and agreed that it would be necessary to address aims 1–3, before aims 4 and 5 could be completed. Therefore, priority should be given to tasks associated with aims 1–3 in the first year of the groups work.
- It was agreed that in order to support the activities of the group in addressing these ToRs the group would need to recruit further expertise in each of the following areas:
 - physics and measurement of artificial light in water;
 - engineering and design of artificial lights, including the development of energy efficient light sources;
 - biology of vision, in particular recognition of the natural limits and variation;
 - behavioural responses of fish to artificial light; and
 - technological application of artificial light in fisheries, including novel and innovative approaches.

Potential candidates were identified and will be contacted.

- The ICES/FAO WGFTFB Topic Group on the Use of Artificial Light in Fisheries makes the following recommendations to the ICES/FAO WGFTFB:
 - The Topic Group on the Use of Artificial Light in Fisheries should continue working by correspondence and meetings (at next WGFTFB meeting) under amended terms of reference (see below);
 - It is proposed a theme session should be held at the next ICES/FAO WGFTFB meeting on “the use of artificial light as a stimulus on fish behaviour in fish capture”; and
 - The Topic Group supports the proposal for the next WGFTFB meeting to be held in Asia. This venue will facilitate the development and work of this group, by opening lines of communication with experts in Asia currently working in the field of light fishing.
- Amended Terms of Reference:
 - *A WGFTFB topic group of experts will be formed in 2012 to evaluate present and future applications of artificial light in fishing gear design and operations. The group will work through literature reviews, questionnaires, correspondence and face-to-face discussions.*
 - *Specifically the group aims to:*

- *Describe and summarize fish response to artificial light stimuli;*
- *Describe and summarize use of artificial light in world fisheries;*
- *Describe and tabulate different light sources to attract fish;*
- *Describe challenges of current use of artificial lights in fisheries and identify/suggest potential solutions;*
- *Identify new and innovative applications of artificial light in attracting, guiding, and repelling fish in developing bycatch reduction devices and other sustainable fishing methods; and*
- *Provide guidance on conducting experiments to investigate the use of artificial light as a stimulus in fish capture.*

ToR D: Innovation in Fishing Gear Technology (Section 13)

- It was acknowledged that the working scene is changing. Fishermen have PCs too, they use Internet more and more, are aware of threats to the fishing industry, have own ideas and creativity, and are not waiting for us.
- Good incentives are needed for successful innovation, such as: cost reductions (fuel price !!!), more days-at-sea (DAS) when using selective gears, or access to fishing grounds only if selective gears are used.
- Fishermen Study Groups (as in The Netherlands) can be used help the process of innovation. They create more motivation, and a sense of problem ownership by the fishers.
- Scientists should have a role in innovation. Developments by industry alone may lead to unwanted ecosystem effects. WGFTFB has an international view and wide experience, knowledge of gears, behaviour, statistics, and suitable instrumentation (e.g. RCTV).
- Group interactions between fishers often occur, resulting in differing behaviour. Experience shows that it is sometimes better to address a single individual and work with him, and then others will follow when they see results.
- Trust building and communication are important, but trust is easily lost.
- There is a tension between the objectives of creating more efficiency and ecosystem conservation. In order to survive businesses need efficiency and income exceeding costs, but on the other hand ecosystem constraints and conservation do not ask for more efficient gears and higher catches.
- This ToR will not be continued.