

Theme Session R

Marine recreational fisheries: understanding impacts and consequences for management

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Worldwide, marine recreational fishing is a high participation activity of large economic and social value. In some countries, time-series of catch estimates from marine recreational fishery surveys are included in stock assessments, and fishery management advice takes into account the relative impacts of commercial and recreational fisheries (e.g. USA, Australia). In Europe, recreational fishery surveys are a relatively recent introduction, and there is currently no established framework for how the emerging data sets can be used to develop management advice for stocks shared between commercial and recreational fishers. The surveys are often complex and use different national survey designs, posing challenges for combining national estimates and evaluating the quality of the final estimates.

The ICES ASC provided an opportunity to share experiences and approaches developed across the globe, with papers presented on diverse topics by 12 scientists from 9 countries. This session explored methodologies for assessing recreational catch and release, survival of released fish, and the importance of recreational fishing removals in the context of stock assessments. A framework for management of commercial and recreational fisheries taking into account biological and economic goals was presented. The importance of working with stakeholders to development management regimes was also discussed.

There were a number of key findings that emerged from this session and the discussion session:

- Recreational harvests can be a sufficiently large component of total fishery removals (e.g. European seabass) that their exclusion from stock assessments could lead to significant bias. Recreational fishing has different fishing patterns to the commercial fishery, and can maintain stable catch levels independent of local biomass dynamics. As a result, it can also be important to take recreational fishing mortality into account in areas with low stocks, even if total harvests from a stock appear relatively low, for example if there is a large effort in or around key inshore nursery grounds.
- Design of surveys of recreational fishing activity and catch is complex and expensive, and the patchy nature of angling activity presents a further challenge. Designs should aim to maximise the number of primary sampling units rather than the number of angler interviews in order to reduce bias and improve the precision of estimates.
- Maximising the efficiency of recreational fishing surveys is difficult due to many potential biases and different methods to collect data (e.g. online, post, telephone). Hence, the method selected should be a trade-off between cost, response rates, and the potential to correct for biases. This trade-off is not simple, for example, telephone surveys are expensive but have high response rates, and online surveys are cheap but have significant biases that are difficult to correct.

- The release rates of recreationally caught fish are very high (e.g. >60% for cod in Europe), so post-release behaviour and mortality are very important in order to understand removals. Bleeding and water temperature were shown to be important determinants of post-release mortality, and changes in behaviour patterns of fish after capture indicate potential sub-lethal effects.
- Co-management of recreational and commercial fisheries is hampered by different management goals. Recreational fishers want more and larger fish to catch, whereas commercial fishers want to maximise profit in a sustainable manner. In order to co-manage stocks, comparable data on the catch, value, and social importance of each fishery are required. Frameworks that include catch and economic value have been developed and applied to the Pacific salmon fishery in Canada.
- Engaging with the angling community is very important as fisheries management practices change from a traditional top-down to more inclusive approaches. In top-down approaches, fishers often feel alienated from the decision-making process, producing strained relationships and increased levels of non-compliance. For co-management to work, it is important to involve stakeholders from the start in decision making using their experience to develop common management goals and practical management practices that implement effectively.

Recreational fishing research spans biology, statistics, ecology, economics and political science. It is important to consider many different disciplines when developing research on recreational fishing surveys. The ICES Working Group on Recreational Fishery Surveys (<http://www.ices.dk/community/groups/Pages/WGRFS.aspx>) has an important role in bringing this diverse community together to address survey methodology, assess data quality, review catch and release mortality, develop methods for co-management including economic value and catch, and identify approaches for engaging with stakeholders.

Over the next 5 years, there are a number of challenges that need to be addressed in the area of recreational fishing. The largest challenge is to convince fisheries managers and recreational fishers that recreational catches can be a significant part of the total removals, so need to be accounted for in stock assessment and fisheries management. This includes a better understanding of survival after release and sub-lethal affects of angling capture. However, development of cost-effective methodologies that account for both economic value and catch in a timely manner are needed. These methods should be set within a framework of co-management that works with stakeholders to develop and implement management measures.