

## Theme session K

How are we managing? Developing new management tools for commercially exploited sharks and rays

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This theme session addressed the future of management of elasmobranch stocks. Sharks and rays (elasmobranchs) are typically characterized by slow life history, and several species are of conservation concern in the North Atlantic. Many stocks are data-limited, with key gaps in understanding of basic life history parameters as well as exploitation status. This is the case with almost all those assessed by ICES Working Group on Elasmobranch Fishes (WGEF). Elasmobranchs are important bycatch in many fisheries and have the potential to become 'choke' species if and when they are included in the Common Fisheries Policy (CFP) landing obligation in 2019.

Current gaps in basic knowledge of sharks and rays make it difficult to fulfill ICES strategic goals 1 and 3, concerning understanding and sustainable use of ecosystems. Key issues for Goal 1 include life history, reproduction, aging and stock identity, distribution, migrations, and habitat use. Achieving aspects of Goal 3 (for example estimating or maximizing sustainable yields) is challenging, because analytical assessments cannot be conducted for most elasmobranchs. A lack of information can restrict the application of assessment methods and of biological references (such as length-based indicators, LBI) that require estimates of maturity and growth parameters.

There is increasing concern over the state of many elasmobranch species, including ensuring that depleted stocks can recover whilst also that commercially-exploited species are being harvested sustainably. Concerted action is needed to improve management of those fisheries exploiting skates, rays, and sharks, both in European waters and elsewhere.

The theme session covered the most relevant and pressing issues concerning the management of elasmobranch fisheries and provided a good platform for the exchange of information and ideas. Following an introductory presentation from the conveners there were 21 presentations and 7 poster pitches covering the issues proposed for the theme session. There was a range of speakers from scientific organisations, policy, management, non-governmental organisations (NGOs) and other stakeholders. Three themes were addressed:

1. Developments in tools for studying biology/ecology and stock structure: including tagging and telemetry, (genetic) stock structure, distribution and habitat models, microchemistry and stable isotope analysis.

There were presentations on exciting and novel ways of estimating stock size through close-kin genetics, as well as the use of genetics in identifying demographic connectivity. Demographic studies made it possible to identify a finer population

structure in some stocks and patterns of connectivity of relevance to managing exploitation. Information on elasmobranch populations from the Portuguese coast, the Azores and Iceland was presented. New morphological information on skate egg capsules from the Barents Sea provided insights into the presence of species. Presentations on habitat modelling for blue shark and tope showed how useful this approach can be in identifying bottlenecks in the life cycle and for structuring research programmes. Estimates for the recovery of spurdog showed that the stock appears not to be capable of rebuilding to a level that could support Maximum Sustainable Yield by 2020. Given this and that the fact stock straddles the exclusive economic zones (EEZs) of several EU and non-EU states, it was stressed that a future management plan requires to be measurable and achievable. A pragmatic approach that allow further recovery of the stock under a “realistic” target was presented.

An electronic and dynamic atlas based on ray and skate data from four countries (Belgium, France, Netherlands and UK) was built to highlight the main spatial and temporal patterns of skate and ray species habitat and the associated fishery dynamics in the southern North Sea and eastern Channel. This use of multiple data sources and information on bycatch species that are not otherwise included in assessments highlighted the need to develop a multispecies approach to the elasmobranch species. Skates and rays have species-specific life histories and a large range in size. With so many species being categorized as data-limited, research needs must be prioritised. A prioritization exercise was conducted to provide an evidence base to guide future research, this assessed each species in terms of conservation interest, commercial importance, importance of the UK to the species range, and biological vulnerability. Competition between species as well as predator-prey interactions, as shown in a poster on feeding and trophic ecology of the thornback ray, could influence the observed changes in abundance and distribution of the individual species.

2. Novel alliances between science, industry, policy and NGOs: including collaborative work on vitality and post-release mortality of discards, development of best practices to reduce capture mortality and initiatives to develop programmes for collecting fishery-dependent data

This theme covered the need for harmonizing international agreements and treaties such as the FAO Shark Action Plan, IUCN red-listing and how trade is managed by CITES. The value of coherence in the decisions reached through the use the best available information was emphasized. The progress made in developing a temporary high survival exemption for skates and rays in the Landing Obligation following a number of years of dialogue and discussion, showed how a successful alliance between industry, science, policy and NGOs can provide solutions and ways forward. Research on at-vessel mortality, and post-release survival from skates and rays in the Dutch pulse trawl fisheries and shark hook-and-line fisheries in the Azores respectively illustrated that survival rates of rays averaged 44-53% and that mitigation measures were possible for sharks. The option of monitoring of catches with camera's to help estimate discard rates of skates and rays in demersal fisheries was discussed. A vitality assessment protocol for skates and rays in the demersal fisheries should help underpin estimates for post-release survival of the species. The collaborative work

between fishing industry and scientific partners was shown to be essential for the improvement of knowledge of stocks and fleet dynamics.

3. Emerging assessment methodologies: including use of life-history information in developing MSY/proxy reference points, methodologies for monitoring stock recovery and management decision tools, including spatial approaches and Management Strategy Evaluations

Four presentations were given on how assessment models (as SPiCT) and length-based indicators (LBIs) could inform the assessment process. Management strategy evaluations to compare the performance of harvest control rules based on LBI were evaluated under different assumptions. The use of these emerging methodologies in the assessment process still needs to be validated. The EU toolbox for skate and ray management and the need to take the next steps in regional management were highlighted.

To make progress towards (regional) management it was suggested to explore alternative management options such as size restrictions and spatial management, especially for skates and rays. It was also suggested to use the information on sensitive areas in the life-cycle of skates and rays (e.g. egg-laying areas) to identify areas for special protection; to use habitat modelling to identify bottlenecks in the life-cycle; and to analyse existing management measures for their effectivity. The ICES workshops “Seventh Workshop on the Development of Quantitative Assessment Methodologies based on LIFE-history traits, exploitation characteristics, and other relevant parameters for data-limited stocks” (WKLIFEVII) and WKCAt3 could provide information on this and the reports should be consulted.

It is important to plan how to make the next step following recommendations from the 2017 STECF report on skate and ray management. The European Commission is currently working with Member States and stakeholders to discuss the current TAC system further communication with the European Commission is needed to decide the way forward.

Although there seems to be a need for concerted actions to move some of the issues forward, it was not deemed opportune to explore the options for a large, collaborative European project. Several new alliances were formed during the session and the new insights gained from the presentations will aid the ICES Working Group on Elasmobranch Fishes (WGEF) in their future work.