

## Session 4: Ecosystem science

Advance and shape understanding of the structure, function and dynamics of marine ecosystems — to develop and vitalize marine science and underpin its applications

### (18) Decadal changes in harmful algal events from the ICES area found in the HAEDAT database

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Scientists and aquaculturists alike are worried about an apparent increase in the size, frequency and global distribution of harmful algal blooms (HABs). Studies have shown that multiple anthropogenic pressures such as overfishing, eutrophication and global transport could interact with climate change to promote or enhance HAB occurrences. Yet, to date, it is unclear whether observed changes in HAB abundances should be attributed to environmental change or increased vigilance through improved monitoring programs. To enhance our understanding of these natural phenomena, the International Council for the Exploration of the Sea (ICES) - Intergovernmental Oceanographic Commission of UNESCO (IOC) Working Group on Harmful Algal Bloom Dynamics (WGHABD) has entered HAB-data into the Harmful Algal Event (HAEDAT) database for the last 20 years. Contained within are (only) harmful algal events that result in management actions with economic impact – such as closures of shellfish areas or touristic beaches – and events which had clear negative environmental impacts like mortality of marine organisms. These data, collected mainly from routine monitoring programmes, provide a wealth of information that is not routinely accessible for scientific assessment. Based on HAEDAT, the WGHABD is producing a HAB status report on all HAB events in the ICES area, which will contribute to the Global HAB Status report of IOC-UNESCO's intergovernmental panel on Harmful Algal Blooms (IPHAB). The HAEDAT data reveal that changes in the regional distribution of harmful algal events in the North Atlantic area have occurred over the past decades. On the east coast of the USA and Canada, the majority of issues have been caused by paralytic and amnesic shellfish toxins. In contrast, diarrhetic shellfish toxins was the dominant cause of problems in Europe while cyanobacteria events were restricted to the Baltic. Fish mortality – be it farmed or wild – appears to be uncommon within the ICES area, though some instances have been recorded. Overall, HAEDAT provides an essential source of information to legislators and scientists alike. In recent years, Flanders Marine Institute (VLIZ) ensured that the Belgian contribution to HAEDAT is up to date and promoted the use of this tool to several local stakeholders.

Work related to ICES via the WGHABD (the ICES - IOC Working Group on Harmful Algal Bloom Dynamics).

### (19) The fate of juvenile sole growth and survival in coastal nurseries under climate change scenarios

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This study shows the effect of climate change on the growth and survival of juvenile common sole (*Solea solea*) in different nursery areas in the North Sea. The climate change scenarios tested are based on IPCC scenario for 2040. Two climate change scenarios are used, one with only abiotic changes and one with also a climate driven timing of spawning. Comparisons are done between a baseline scenario, with current conditions, and the two climate change scenarios, for multiple years and multiple nursery areas.

Under climate change conditions the early arrival of fish larvae in their nurseries results in larger young of the year at the end of summer, but the initially slow growth, despite warmer winter and spring temperatures, causes higher mortality for early arrivals. The combination of arrival densities and arrival day determines which nursery has the highest absolute

numbers surviving. Overall, under climate change conditions juveniles have increased growth rates leading to larger size at the end of the first growth season yet reduced survival.

Work related to ICES via WGIPEM (the Working Group on Integrative, Physical-biological and Ecosystem Modelling).

## (20) Marine plastics: aligning national research and monitoring with international guidelines

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The project Marine Plastics, funded by the European Maritime and Fisheries Fund (EFMZV), focuses on the presence of litter at the Belgian fisheries areas and the Belgian Part of the North Sea (BPNS), comprising both macro- and microlitter. Within the part on macrolitter, the main goals are to assess the presence of seabed litter at the Belgian fisheries areas, to identify impact of specific anthropogenic sources and to detect time trends in litter pollution. The part on microlitter concerns the identification of microplastics in seafood and the initiation of a Belgian monitoring approach for microplastics in seawater and sediment of the BPNS, in accordance with MSFD descriptor 10.

Many standardization issues remain. Macrolitter data collection and reporting differs between EU countries, the use of different gears for macrolitter sampling highly affects the extraction efficiency, there is a lack of standardization of macrolitter data assessment. The same range of issues, and even more, have to be clarified before a harmonized approach for microlitter monitoring and evaluation is reached. Which methods should be applied for microplastics sampling, separation, detection, identification and reporting? What size range and classes should be considered? What quality measures should be taken and how can we align international monitoring laboratories?

The interaction with the ICES working group on marine litter and microplastics (WGML) is of primary importance for the Marine Plastics project. WGML data assessments on international macrolitter datasets, collected within the International Bottom Trawl Surveys (IBTS) and Beam Trawl Surveys (BTS), influence the Marine Plastics project assessment approach, as similar statistical methods can be used. Vice versa, Belgian data has a unique value since marine litter is collected with the same fishing gear on a large area within the Belgian BTS. Besides the BTS, a second unique dataset is obtained within Belgian environmental monitoring at the BPNS. The latter has a large sampling density in an area with many human activities.

For microplastic research, the interaction with ICES WGML is also essential, as method alignment, standardization and quality assurance for monitoring purposes are key issues of this working group. Currently, methods for microlitter monitoring are not yet fixed and it will be a big challenge to align protocols between different EU member states in order to reach comparable results for MSFD descriptor 10. The active role of Belgian researchers at ICES WGML ensures that the Marine Plastic project is in accordance with newest guidelines and state-of-the-art protocols. Finally, the Marine Plastics project will provide the first integrated environmental monitoring assessment for microplastics in Belgium. This will be the necessary knowledge base for follow-up processes and actions by policy makers, the blue economy and the marine experts.

Work related to ICES via WGML (the Working Group on Marine Litter).

## (21) Long-term changes in demersal fish abundance and distribution in the Belgian part of the North Sea

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Climate change and other anthropological influences such as fisheries have long-term effects on fish abundance and distribution. To study the combined effects of these stressors on demersal fish species in the Belgian part of the North Sea,