

Abstracts of the BICEpS19 Colloquium

BICEpS Colloquium, an opportunity to share Belgian contributions to
and experiences with ICES as an inspiration for future work

2 December 2019 (ILVO, VAC building, Ghent)

The aim of BICEpS Colloquium is to attract Belgian scientists that are not yet involved in ICES to become involved - create a better insight in the Belgian contribution to ICES – create opportunities for collaboration that may not yet exist - highlight the role of ICES to the wider scientific and policy communities in Belgium. Therefore, scientific presentations are combined with an update on the new developments under the ICES Council, the Advisory Committee (ACOM) and the Science Committee (SCICOM) and is concluded by an indispensable social gathering to promote networking among (new)members. The colloquium is hosted in alternance by RBINS and ILVO while other institutions are welcome to take a turn in the organisation.

Session 1: Updates on ICES working with a special focus on Belgium's contribution

(1) Latest news from ICES Council and feedback on BICEpS initiative

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ICES Council meeting: Every year, in October, ICES holds its council meeting with two delegates of each member country attending. An update on the ICES Strategic plan has been given with, amongst others, the status on the UN observer status of ICES, ICES' engagement in the Arctic and participation of ICES in science projects. The financial status has been reviewed and strategic decisions have been taken to modernise ICES in order to cope with new challenges in the advisory process, using ICES' equity financial reserve. Furthermore, an update has been given on the advisory and science plan, plans for the ASC, Data and Information Services and the ICES CO2 footprint.

BICEpS Initiative: Even though the activities of BICEpS are just at the start, the initiative has already raised interest in other Member States. The BICEpS community encompasses Belgian scientists involved in the work of ICES, contact persons in marine research institutions and universities and a few policy makers, totalling now about a hundred persons. Launched in November 2018, the aim of the initiative is to offer a platform to get to know each other, to improve collaborations and to share information, and to promote ICES to the wider scientific community in Belgium. The presentation will give an overview of the diversity of topics where we are active and those we are not and shed light on

newly nominated experts. We will come back to the ideas identified during the brainstorming session of the 2018 BICEpS colloquium and priority actions. Since then, a website hosted by ICES has been created. It serves as a central node for information for our community. There, you can find the annual report of activities, announcement of our activities, the newsletter and soon, a compilation of mini CV's of our experts. At the end of 2018, a reflection was initiated on the opportunity for Belgium to take her turn in hosting the ICES Annual Science Conference. The group will also be invited to position himself on this opportunity. No doubt the 2019 edition of the colloquium will raise new ideas, set priorities and get more researchers in ICES sphere!

(2) Good to know from ACOM – ICES Advisory Committee

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The **Advisory Committee (ACOM)** translates ICES science into advice on the sustainable use and protection of marine ecosystems. All advice produced is based on the precautionary principle and the ecosystem approach, and is reached by consensus. During 2018, ICES gave advice on fishing opportunities for 224 stocks, which represents approximately 90% of all fish catches in the North East Atlantic and Baltic Sea. 38 special requests & 9 technical request were additionally taken in by ICES, on impact of fisheries, in-year advice of fishing opportunities, F_{msy} ranges, MSFD guidance, pressures and impact on bycatch, mixed fisheries, fishing footprints, data quality, MSFD, VMEs&MPAs, biodiversity, etc. Additionally, 45 Advice Drafting Groups (ADG) and 51 ACOM WebEx took place. The ADG attendance has improved in 2018, mostly due to the new development of allocating nations to ADGs. Communication between the expert groups and ADGs is seen to be a perennial issue that could still be improved.

In 2019, a discussion started within ACOM, different from past ones aiming at the creation of a framework for ecosystem advice, not fisheries advice but advice that concerns the whole picture and has a fisheries part. Assessing the impact of the implementation of the advice becomes clearer when considering that this framework will be used to advise on management of human activities. Presenting ecosystem risks and trade-offs to management is different to including ecosystem parts into fisheries advice.

The new ICES Strategic Plan consists of a Science Plan and an Advice Plan. The Advice Plan has the objective to translate the knowledge created on science. ICES advice aims to **effectively meet** societal needs based on credibility, legitimacy, trust & transparency, quality and relevancy & reachability. For the new Advice Plan, six priority areas are proposed: assuring quality, incorporating innovation, profiling benefits, sharing advice, evolving advice and revealing needs.

The key areas to be further developed on the short term for ACOM are:

Mixed-fisheries and multi-species: the work on mixed fisheries is an important direction for ICES and is progressing.

Fisheries and Ecosystem Overviews new Fisheries and Ecosystem Overviews need to be highlighted further to show how important these are to the stakeholders. A clearer direction for the Ecosystem Overviews is needed, whilst the Fisheries Overviews are more on track.

Benchmarks, ADGs and guidelines. The importance of the benchmark system is fundamental to ACOM. There are still difficulties in explaining the big changes in advice after a benchmark and this needs to be properly addressed.

ICES need to work further on the technical guidelines, particularly concerning what is a rule and what is a guideline.

The ICES community: there is a need to train new alternates to support a national ACOM member. This requires the investment of considerable time and it is not always evident to find experts willing to become alternates, as there is quite some workload required for an alternate, as well.

(3) Some thoughts from a SCICOM representative

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Attending ICES Scientific Committee (SCICOM) meetings always makes me start reflecting on the diversity of ICES; this from a content point of view but not surprisingly even more so from a participant point of view. With more than 5000 scientists from over 700 marine institutes in 20 member countries and beyond allocated to 200+ expert groups and committees, ICES unites a huge diversity in expertise, expectations and viewpoints. You can hence imagine it is quite a challenge to overview ICES' complexity and grasp it with both hands, but that is exactly what SCICOM tries to achieve. Questions like how to best integrate all that into a logic Science Plan without losing focus on the ICES Mission, how to best organise an Annual Science Conference that is appealing to the whole community, how to stimulate interest and particularly participation in what we are doing, how to balance the top-down advice-oriented and the unrestrained bottom-up workload of expert groups, how to balance fisheries and wider ecosystem-level work, how to position the Community in the international science, management and policy landscape,... are all fundamental to SCICOM's work. Worth some further consideration, I would say, and that is exactly what I want to share with you...

(4) Working Group on Methods for Estimating Discard Survival (WGMEDS): How discard survival research is shaping European policy?

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With the phasing in of the Landing Obligation law between 2015 and 2019, and its exemption rule of "high survival", a need was established for stakeholders to scientifically demonstrate whether any species that is commercially caught-and-discarded stands a chance to survive this process. To guide practitioners in the field with collecting data, an ICES workshop (now working group, WGMEDS) was set up upon request by the European Commission. Since 2015, exemptions are being put forward by member states, judged and put into legislation within discard plans and delegated acts. How does this matter for European fisheries management?

[Work related to ICES via WGMEDS \(Working Group on Methods for Estimating Discard Survival\)](#)

(5) Working Group on Fisheries Benthic Impact and Trade-offs (WGFBIT): Trading off benthic impacts and fisheries through integrative modelling

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For striving towards a more sustainable fishery, one of the major challenges, i.e. flatfish-directed beam trawling, is to comply to the requirements to achieve Good Environmental Status (GES) of the seafloor (D6, seafloor integrity), as defined in the Marine Strategy Framework Directive (MSFD D6 on Seafloor integrity). Potential fisheries measures to achieve GES of the seafloor may include gear-based technical measures (e.g. alternative catch stimulation, less-bottom contacting gear components), habitat quota regulation or spatial management measures. The assessment of the effectiveness of management scenarios requires both a quantitative assessment framework to assess the benthic impact of bottom-contacting fishing gears as well as an approach to evaluate the impact on the fisheries.

A quantitative framework to assess benthic impact by bottom-contacting fishing gears was developed in the EU BENTHIS project and further developed in the ICES Workshops WKBENTH, WKTRADE and WKSTAKE and working group FBIT (2018 onwards). Three main components are taken into account: fishing pressure (footprint) and benthic habitat sensitivity. Fishing pressure is assessed on a fine-scale spatial grid (0.05 by 0.05 degrees). Pressure is estimated from the fishing effort (swept area ratio) in combination with abrasion (characterised by penetration depth). Penetration depth directly relates to

benthic mortality which is combined with community recovery potential (based on longevity or population dynamics). The resulting benthic impact is characterised by a change in the relative benthic state. The assessment framework is developed for four generic gear groups, including beam trawls.

The quantitative framework of the FBIT tool is developed from a biological perspective. The trade-off between the protection of benthic communities with fisheries, however, necessitates the effect of these management measures on the fisheries itself. The trade-off is currently based on the assumption that most fishing effort is located in the most profitable areas. The 'value of an area to fisheries' is therefore based on swept area ratio as a approximate indicator. The ICES workshop WKTRADE2 has suggested a series of social and particular economic factors to improve this estimate, as well as a series of predictive (bio-economic) modelling approaches (dynamic or static) that take the displacement of fishing activities into account following fishing measures and how these may affect both benthic communities as well as the fisheries itself through feedback loops in the long term. These scientific approaches may be complemented with stakeholder engagement processes. The assessment of the socio-economic value of areas to fisheries is currently developing.

Work related to ICES via **WGFBIT**, co-chaired by **Gert Van Hoey** (ILVO, B), **Tobias Van Kooten** (WMR, NL) and **Ole Eigaard** (DTU, DK) **WKTRADE2**, co-chaired by **Jochen Depestele** (ILVO, B) and **François Bastardie** (DTU, DK)

(6) Working Group for the Celtic Seas Ecoregion (WGCSE): Drafting advice for 40 demersal stocks across the Celtic Seas Ecoregion.

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The submitted abstract is related to the ICES Working Group for the Celtic Seas Ecoregion (WGCSE). Belgian fisheries data are submitted by ILVO to the WGCSE and other assessment working groups (WGNSSK, WGBIE, HAWG, WGEF). The WGCSE is yearly attended by ILVO where we conduct the assessment of 2 sole stocks. Moreover, for the period 2019-2021, **Sofie Nimmegeers** (ILVO) is co-chair for WGCSE. In this abstract, the advice drafting process is clarified.

The Common Fisheries Policy (CFP) is the EU policy for managing EU fishing fleets and for conserving fish stocks. This management relies on data collected and supplied by EU countries under the Data Collection Framework (DCF). For Belgium, the ILVO Fisheries Biology unit is responsible for collecting these data, which include age and length composition of the catch sampled by observers at sea onboard commercial vessels, data on fish landings and fishing effort, etc.

ILVO provides the Belgian data to several ICES expert groups (i.a. WGCSE) where they are used in stock assessments. Besides experts from Belgium, also France, Ireland, the Russian Federation and the UK have scientific representatives in the WGCSE. These ICES scientists compile the national data to investigate the size and condition of the fish stocks and their exploitation patterns. This allows them to forecast catches and evaluate the stock status against reference points to formulate advice following the maximum sustainable yield (MSY) principle. For stocks with a limited amount of data, precautionary advice on future fishing opportunities is provided.

The WGCSE is tasked to update fisheries data and assessments, and to draft advice for 40 demersal stocks across ICES subareas 6 and 7. Among these stocks there are gadoid species (cod, haddock, whiting, saithe and pollack), flatfish (sole, plaice and megrim), Norway lobster, sea bass and anglerfish.

Of the 40 stocks assessed, 13 had an unknown status and approximately 60% met the MSY targets (fishing mortality and spawning stock biomass) in 2019.

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Session 2: Sea food production

Generate evidence and advice for management of wild-capture fisheries and aquaculture — to help sustain safe and sufficient seafood supplies

(7) VISTools - Fishing vessels as automatic data-gathering platforms – a win-win for fishers and scientists

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A skipper of a fishing vessel has access to various sources of information that help him manage his work. Sensors track the location (e.g., GPS/VMS), monitor any fishing activity (e.g., towing force, depth), fuel use and register landed catch (i.e., via an electronic weighing scale). These sensors gather valuable data, but none of that are of any use, if data are not integrated, stored or processed.

By automating data collection from conventional equipment on-board and coupling this information with economic parameters (e.g. fish prices and fuel prices), the VISTools-project aims to (1) develop a business intelligence tool for fishers and (2) evaluate the possibility of sharing this information for research purposes. With this approach, we hope fishers gain new insight in the economic performance of their fishery. This could trigger behavioural changes that increase the efficiency of the vessel and simultaneously reduce the impact on the environment. Additionally, the business intelligence tool incentivizes fishers to keep gathering information that have great scientific relevance, and share this information under clearly defined conditions. This data could open new research possibilities including catch prediction models, decision support tools, avoidance of sensitive areas, and real time closures. This high resolution of spatial information can also lead to better advice to fisheries management and governmental bodies (e.g., real time monitoring of quota usage).

The first results of this project have led to the development of a proof-of-concept business intelligence tool that logs the landings of a single test vessel and automatically tracks economic performance. With this tool, a vessel owner can evaluate the economic performance and catches of a vessel at haul level. Since all sensor data have a geographic component, all landings data can be tracked to a certain location and provide insights in the economic performance of the fishing grounds (heat map). The six months' worth of data have already proven to provide interesting insights for the skippers and vessel owner, and is very promising for scientific research.

Work related to ICES via WK SCINDI (Workshop on Science with Industry Initiatives)

(8) Scientific surveys: the backbone to fisheries science

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Within the EU Data Collection Framework, Belgium is responsible for 2 scientific surveys, both supported by ICES: the Belgian beam trawl survey (BTS) and the demersal young fish survey (DYFS). The surveys occur in the third quarter and serve as a data gathering platform to increase knowledge on the marine ecosystem.

During the BTS, 62 stations are sampled along the south-east coast of the UK by RV Belgica. The initial purpose of this survey is to monitor trends in demersal fish stocks, especially sole (*Solea solea*) and plaice (*Pleuronectes platessa*) by collecting information on length, weight, age, sex and maturity. The Belgian BTS survey index is used in the assessments of both North Sea sole and plaice. However, all fish species are weighted and measured and since 2009 also epi-benthos is collected, counted and weighted by species. Since 2011, marine litter is collected, categorized and weighted and this data is supplied to OSPAR and WGML.

The DYFS is concentrated in the Belgian Part of the North Sea where 33 stations are sampled by RV Simon Stevin. The purpose is to monitor trends in mainly juvenile flatfish such as sole (*Solea solea*), plaice (*Pleuronectes platessa*), dab (*Limanda limanda*) and round fish such as whiting (*Merlangius merlangus*) and brown shrimp (*Crangon crangon*). Catch

numbers are used as input for the assessments of both North Sea sole and plaice. Since 2018 also age information of sole and plaice is collected. Since 2018, marine litter is collected, categorized and weighted.

Besides biological information, also a series of abiotic parameters are collected in both surveys: temperature, salinity, wind speed, etc. Due to the wide range of data on a diversity of species and environmental parameters, the data can be used as input for the Marine Strategy Framework Directive (MSFD), OSPAR, the ecosystem approach or research about fish adaptation to climate change.

The key value of survey data lies in the fact that data are collected every year, same period of the year with the same protocol, same area. This very valuable long-time series does not only serve many ICES working groups but also acts as the backbone in diverse science projects (e.g. EMFF project IRIS2, Pulsvisserij Vlaamse Kust Deel 1, Marine Litter), MSc theses and PhDs.

Work related to ICES via SCICOM, ACOM, EOSG, WGBEAM, WGNSSK, WGISDAA, WGISUR, DATRAS, WGCNAN, PGDATA, WGBIOP, WKREO, WKBECOSS, WKPETSAMP, WKSHARK, WGEF, WGCSE, WGDG, WKICDAT, WGTIFD, WGBYC, WGMEDS, WGML.

(9) Some points to consider for exposed aquaculture: first experiences in Belgium

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Marine aquaculture presents an opportunity for increasing seafood production in the face of growing demand for marine protein and limited scope for expanding wild fishery harvest. With the convergence of environmental and aesthetic concerns, aquaculture, which was already competing for space with other more established and accepted uses, is having an increasingly difficult time expanding in nearshore waters. Farming in offshore marine waters has been identified as one potential option for increasing seafood production and has been a focus of international attention for more than a decade. Investment in robust technologies and investigation in system designs for high energy environments has started but is still in its infancy. Despite the technical challenges for farming in the hostile open ocean environment, there is sufficient rationale for pursuing the development of offshore farming.

When mapping the existing human uses, the ocean is a crowded place. Therefore, it is worthwhile to explore possibilities for co-location of facilities, like in this case wind turbines and shellfish farms. Although not obvious, one benefit to be gained is the reduction of the overall footprint of human uses in the ocean. Meeting challenges of multi-use facilities in the open ocean definitely requires innovation. The concept is intriguing however and is consistent with the goals of the Belgian Marine Spatial Plan (2020-2026).

The project “Edulis” (FIVA/EFMZV 16/UP2/05/Aqua) was the first pilot in the world to explore the possibilities to grow blue mussels inside the concession of windfarms in the Belgian part of the North Sea. It was coordinated by Ghent University and involved partners from the private and public sector. Besides the technical challenges, possible synergies were looked at between the production of sustainable seafood and renewable energy as well as the economic reality to grow seafood under exposed conditions in windfarms.

Work related to ICES via WGOOA (newly created Working Group on Open Ocean Aquaculture)

(10) Hakaton: An interactive fish stock assessment tool

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Built as a web application, the interactive fish stock assessment displays a map and allows the user to choose the fish species and the timeline. Once these are chosen, the advice for that time will display with a traffic light system, by displaying an area as green, orange, or red. If there are many years of data available, the data series can be displayed as an animation. If the user clicks on a certain stock, the data that the advice is based on appears. The tool is based on ICES

advice, and the user could link through to the actual advice or the Advice drafting group report if they wanted more information.

(11) Understanding vessel ownership and firm organization in French Atlantic fisheries: a typology

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The European fishing industry is largely perceived as existing of a multitude of individually owned, locally operated fishing vessels, despite growing evidence of concentration through vertical integration and companies owning fishing vessels across multiple Member States. The drivers behind capital accumulation and concentration in the fishing sector remain poorly understood, however. Most studies on investment behaviour have looked at entry and exit of vessels from two angles. First, they consider that investment decisions depend on current economic incentives (e.g., anticipated levels of returns, current profits, stock-dependent costs of harvesting). Second, they consider that changes in the regulatory environment may shift these economic incentives, causing new investment patterns. Widely studied examples of such changes are government interventions aimed at reducing excess capacity: subsidies, buyback programs and access regulations. However, reducing this question to a matter of investment behaviour is limiting, and it has been suggested that the organizational structure of fishing firms must be taken into account to better understand the strategies behind vertical integration and the investment in multiple fishing vessels. In this paper, we analyse multi-ownership in the light of the characteristics and strategies that lie at the basis of the organizational structure of French Atlantic fishing firms (i.e., fishing strategy, firm management, vessel maintenance, marketing strategy, ownership structure, etc.). Research questions include: (1) which organizational forms exist (and co-exist) today in the French Atlantic fishing sector (2) what defines them, (3) how did they emerge and (4) what can be expected from them in the future (in terms of their evolution and persistence). A typology was constructed based on 80 semi-structured interviews with vessel owners along the French Atlantic coast, in which both qualitative and quantitative information was collected. Multiple Correspondence Analysis (MCA) in combination with hierarchical clustering was used to construct the typology.

Work related to ICES via WGECON (Working Group on Economics)

(12) Genetic structure of sole in the Irish and Celtic Sea

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Sole (*Solea solea*) is a species with a complex life cycle evolving between the spawning grounds where adults release gametes, nursery grounds where juveniles settle and metamorphose, and feeding grounds where (sub)adults feed. Spawning stock biomass in the Irish Sea (ICES area 7a) and Celtic Sea-Bristol Channel (ICES area 7g) has reached an all time low leading to concerns for its recruitment and future viability. We address here the connectivity of adult and juvenile sole based on an intensive sampling campaign between 2003 to 2009 (adults) and 2016 (juveniles). Fish were genotyped either with 426 gene-linked single nucleotide polymorphisms or with 5000 Single Nucleotide Polymorphisms (SNPS) obtained through ddRAD (double digest Restriction site Associated DNA markers) sequencing. Irish and Celtic Sea sole represent a distinct genetic group, identifiable at specific loci. The results point to limited connectivity between the area and adjacent waters. It allows to trace Irish and Celtic Sea sole with molecular markers. In addition, juveniles of Liverpool Bay, Cardigan Bay and Bristol Channel represent distinct subpopulations, again pointing to restricted gene flow within the area, linked to

the local physical oceanography. In conclusion, the rebuilding of the Irish and Celtic Sea stocks of sole will depend to a large extent on local recruitment dynamics.

Work related to ICES via Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGSSK).

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Session 3: Conservation and management science

Develop tools, knowledge, and evidence for conservation and management — to provide more and better options to help managers set and meet objectives

(13) Providing ICES advice to OSPAR – an impression of the process

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One of the core tasks of ICES is to provide scientific advice on the marine ecosystem to governments and international regulatory bodies that manage the North Atlantic Ocean and adjacent seas. At the end of 2018, ICES received a ‘Request for advice on the current state and knowledge of studies into the deployment and environmental impacts of wet renewable technologies and marine energy storage systems’, a request subsequently passed on to the Working Group on Marine Benthic Energy Developments (WGMBRED) and the Working Group on Marine Renewable Energy (WGMRE). Due to a restructuring process at ICES, and a shift in chairs in both WGMBRED and WGMRE, and the strict deadline, this proved to be a challenging process. The ICES secretariat supported the process by providing a suitable workspace (both physical and digital) and convened a specific workshop (WKWET, chair: Jan Vanaverbeke) attended by WGMBRED and WGMRE (Belgian) members, and external specialists in the field. This workshop was used to create a conceptual framework to unify the assessment of a wide range of wet renewable energy devices on a wide variety of marine receptors. The assessment showed that key receptors constraining the deployment of wet renewable devices are marine mammals, seabirds and fish. In addition, the review revealed that cumulative impact assessments with regards to wet renewables are in a very early stage of development causing a lot of uncertainty in decision making processes. The report provides the strong recommendation to move towards receptor-based assessments that consider both the ecological links between the abiotic and biotic components of the marine ecosystem and the feedback links between the different biotic components. This should be achieved by hypothesis-driven research, taking into account the link between structural components and the functioning of marine ecosystems, as this ultimately determines the provisioning of marine ecosystem services to society. This calls for cross-border coordination and cooperation in setting standards for data collection, sharing information, and setting research agendas.

Work related to ICES via WGMBRED (Working Group on Marine Benthic and Renewable Energy Developments), WGMRE (Working Group on Marine Renewable Energy), WKWET is chaired by Jan Vanaverbeke (RBINS).

(14) Highlighting EARS: putting data and operations in the global environmental context Highlighting the EARS software

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The Eurofleets Automatic Reporting System (EARS v2) software is a set of services that allows the Principal Investigators or any person authorised to do so, to log their sampling events in a way that is helpful both for the scientific goals of the programme and for the data management that follows the cruise, for instance the OSPAR data reporting to ICES. The software has been available on the R/V Belgica since 2017-2018 for users wanting to test the software. Its software development has restarted thanks to the H2020 Eurofleets+ project, and the problems discovered during test runs dating

from 2017-2018 have been solved in the meantime. An explicit outcome of Eurofleets+ is to enable the creation of complete CSRs based on the cruise and full event details any PI enters into EARS. This removes the burden of manually creating the CSR by the cruise Chief Scientist, and finding out the sampling details of other PIs partaking in the cruise. This, and other improvements, will be released in EARS v3 by the end 2020. CSR creation for instance relies on using international standards from the start and providing a summarising view on the events. The R/V Belgica will function as a test environment for the Eurofleets+ software developments. A newer version of the EARS v2 software will be installed on the ship in December 2019. The goal of our contribution to BICEpS 2019 is to encourage attendants to use the software (both EARS v2 and especially EARS v3 later on) on the R/V Belgica. A training is foreseen in the first quarter of 2020.

Work related to ICES via DIG – the Data and Information Group.

(15) Towards a coherent and coordinated monitoring of marine mammals?

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For marine mammal populations, it is generally agreed that ideally a coherent and coordinated monitoring is in place across their area of distribution. Such an approach is especially required in the frame of our reporting obligations under the European Commission (EC) Marine Strategy Framework Directive (and consequently also under OSPAR: IA 2017, QSR 2023), possibly leading to conservation and management action. Especially countries such as Belgium, with small marine areas and small marine mammal populations, can hardly provide stand-alone assessments.

Member States of the European Union and Parties to OSPAR only recently initiated efforts to streamline indicators, targets and monitoring methods. Data on marine mammals collected within the North Sea, and jointly assessed, include those on population abundance, distribution and bycatch. Apart from (inherent) methodological and reporting difficulties, an additional complication to the data collection and assessment is the fact that many similar initiatives are being taken, or obligations exist, in several fora, including those of EC Environment, EC Mare, ASCOBANS, OSPAR and ICES Working groups (WG MME and WG BYC). This not only means a dilution of effort (eg. replicate data calls), but also the possibility of deviating conclusions being made and a lack of responsibility.

We will present, specifically for Belgium, an overview of the data requirements on marine mammals and of the fora that use such data for assessments.

Work related to ICES via WGMME (Working Group on Marine Mammal Ecology) and WG BYC (Working Group on Bycatch of Protected Species).

(16) Genetic tools for Ecosystem health Assessment in the North Sea Region (GEANS)

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To conserve and manage seafloor ecosystem health, proper management measures need to be taken, which depend on fast and accurate monitoring. Appropriate measures should be based on joint, standardized monitoring, using cost-effective, early-warning and accurate methods. Traditional benthic assessments are often time-consuming, labor-intensive and expensive: seafloor samples are taken, sediment washed out, animals fixed in formalin and then sorted, identified and counted using microscopes, requiring trained experts and taking up to a couple of days per sample. Quality assurance is often not guaranteed due to different analyst expertise, surely when comparing results from different institutes or countries. The use of DNA-based tools can circumvent many of these shortcomings. DNA-based monitoring promises faster and cheaper methods to assess environmental health, as animals are not processed individually and allow simultaneous analysis of tens to hundreds of samples. In addition, DNA-based methods can be standardized across institutes and countries through standard operating procedures (SOPs), being less subject to expert judgement.

Currently, several institutions experiment with genetic approaches, but a concerted, harmonized, routine implementation in biological monitoring and management is lacking. Within the GEANS (Interreg-North Sea region) project, 7 countries from around the North Sea collaborate for the moment, with an overall aim:

1. To develop joint time- and cost-reducing genetic monitoring tools that feed into existing indicators to assess ecosystem health

2. To implement standardised genetic tools and SOPs in routine biological assessments
3. To develop a framework to apply and implement DNA-based tools in policy and transnational management of the NSR.

To this end, field pilots have been set-up to clearly demonstrate the benefits and/or added value of DNA-based methods and to validate the SOPs. The final output integrating all outputs will be a decision support framework for application of genetic tools in routine biological monitoring, and implementation of the outputs in ecosystem health assessment in support of policy and transnational management. ICES has endorsed this project at the start as they see a clear advancement into the current benthic monitoring for seafloor ecosystems. Furthermore, the ICES network can be used to further spread the developed methods by for instance publishing the SOPs in the ICES TIMES series in which state-of-the-art description of methods and procedures relating to chemical and biological measurements in the marine environment are presented.

Work related to ICES via:

- WGEXT (Working Group on the Effects of Extraction of Marine Sediments on the Marine Ecosystem);
- BEWG (Benthos Ecology Working Group);
- WGIMT (Working Group on Integrated Morphological and Molecular Taxonomy).

(17) Seascape-mediated patterns and processes of population differentiation in European seabass

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Identifying biologically relevant levels of population structure and demographically independent populations is imperative for sustainable fisheries management but challenging because of high levels of gene flow and large population sizes leading to weak genetic structure. However, increasingly good access to genome-wide variation and architecture have facilitated accurate determination of fine scale genetic population structure. Here, we studied the population structure of European seabass (*Dicentrarchus labrax* L.), a commercially exploited and farmed fish with high dispersal capacity. In addition, we examined the influence of geographic distance and abiotic environmental variables on the observed genetic structure with a seascape genomics approach. Seabass showed a largely panmictic pattern within the Atlantic Ocean, whereas several genetic clusters were distinguished within the Mediterranean Sea based on 2,549 SNP markers genotyped using ddRAD (Restriction site Associated DNA markers) sequencing. Introgression of Atlantic alleles was detected throughout the western Mediterranean Sea, but introgression of Mediterranean alleles was only found in a restricted area in the Atlantic Ocean off the Strait of Gibraltar. Seascape analysis suggested that genetic population structure is mediated by both dispersal limitation and environmental gradients, indicating local adaptation. As such the study provides key information for fisheries and conservation management of European seabass.

Work related to ICES via WKBASS (the benchmark Workshop on Seabass).

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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,

autumn beam trawl survey data from 1985-2018 were analysed. Common trends in fish density over time were identified for the most important species using complementary multivariate techniques and linked to environmental variables. Further, changes in abundances of singular species were analysed using univariate linear models, which can explain patterns over time by the addition of explanatory variables to the models. Lastly, changes in length over time were also modelled for commercially interesting species. Using such a combination of different methods and data gives a good general overview of the most important drivers of local fish abundances linked to climatic and anthropological stressors. Information about such drivers are key for better understanding the marine environment and thereby influencing policy in terms of fisheries management and climate change mitigation.

Work related to ICES via WGNSSK (Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak).

(22) Tributyltin: an aggressive bottom-up stressor in a marine multistressor environment. A quality status report

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The restrictions and the concerted action of the global ban on the use and presence of tributyltin (TBT) in marine applications to protect ecosystems in the marine environment in 2008 was mainly based on the economic impact on shellfish industries and the dramatic extinction of local mollusc populations in the past. In contrast to the vast datasets on effects on molluscs, the knowledge on impacts on species from other taxa remained in the uncertain until almost two decades ago. The assumption on a long-term TBT-mediated pernicious metabolic bottom-up regulation of the crustacean *Crangon crangon* population was provoked by the outcome of an EU-project 'Sources, Consumer Exposure and Risks of Organotin Contamination in Seafood.' This work reports high TBT body burdens in *C. crangon* in 2003, at the start of the transition period to the global ban. Experimental research on the TBT impact in *C. crangon* focused on agonistic interference with natural ecdysteroid hormones at the metabolic pathways regulating growth and reproduction and the biogeochemical distribution of the chemical. Metabolic, topical and population-relevant biological endpoints in *C. crangon* and other crustaceans are evaluated in relation to the temporal and spatial trends on TBT's occurrence and distribution in the field during and after the introduction of the tributyltin restrictions and endocrine-related incidents. Arguments are forwarded to relate the German Bight incident on growth and reproduction failure in the *C. crangon* population, despite the lack of direct evidence, to the pernicious impact of tributyltin in 1990/91 and previous years. The extreme occurrence of TBT in *C. crangon* from other parts of the southern North Sea and evidence on the high body burdens as dose metrics of exposure also feeds the suspicion on detrimental impacts in those areas. We further demonstrate the complexity of distinguishing and assessing the individual roles of unrelated stressors on a population in an integrated evaluation at the ecosystem level.

The Marine Chemistry Working Group (MCWG) is chaired by **Koen Parmentier** (RBINS). This group got considerable input from the Working Group on Biological Effects of Contaminants (WGBEC) and to a lesser extent from Working Group on Crangon Fisheries and Life History (WGCAN).

(23) Towards open science products for ecosystem science

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Ecosystem science needs to integrate a variety of (biological) data sources and to use state-of-the-art methods to improve the knowledge of complex marine ecosystems. In this talk, we demonstrate how the Data Centre of Flanders Marine Institute (VLIZ) is organizing an open science data flow from collecting data to the development of biological products on Essential Ocean Variables (EOVs) that serves ecosystem assessments.

VLIZ collects, integrates and standardizes European biological data in the framework of EMODnet Biology using the LifeWatch Species Information Backbone. ICES and other BICEpS partners provide data to expand the EurOBIS database, from which EMODnet Biology data products have been created. Since 2017 these zooplankton products have been incorporated in the ICES Operational Oceanographic Products and Services (OOPS), and the ICES WGFBIT is using the EMODnet Biology benthic products.

In the next two years, we will build further on our expertise and use machine learning methods to update our plankton products in the European Open Science Cloud. Scientific validation and ecosystem modelling will result in deeper understanding of complex plankton dynamics. These new products can be provided to ICES to be used in their advisory processes.

Work related to ICES via DIG (Data and Information Group), OOPS (Operational Oceanographic Products and Services), WGFBIT (working group on Fisheries Benthic Impact and Trade-offs)

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Session 5: Cheers & Tears

An opportunity to network, share souvenirs and pictures, learn anecdotes on our work with ICES and let know your expectations for future BICEpS activities

What do cheers and tears have to do with ICES, which is all about work, right? Well, it's not! ICES is also about the power of face-to-face interaction, about kindred spirits, about unbridled enthusiasm, about exploring new places and cultures and even about real friendship! Do you think this is a load of sentimental crap? Let's find out during this final interactive and social session.

Have a look at the [BICEpS community](https://www.ices.dk/community/groups/Pages/BICEpS.aspx) web page on the ICES website [ices.dk/community/groups/Pages/BICEpS.aspx](https://www.ices.dk/community/groups/Pages/BICEpS.aspx) and access the [BICEpS Annual Report 2018](#), [presentations](#) of the BICEpS Colloquium 2018 and a selection of [pictures](#). Fill out your [mini CV](#) and share your field of expertise with BICEpS community.