WGISUR 2017 REPORT

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Report of the Working group on integrating surveys for the ecosystem approach

16-18 January 2017

IJmuiden, the Netherlands

ICES International Council for the Exploration of the Sea

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Contents

Executive summary **1**

1 Administrative details **2**

2 Terms of Reference a) – z) **3**

3 Summary of Work plan **5**

4 List of Outcomes and Achievements of the WG in this delivery period **6**

4.1 Terms of reference and work plan description for 2017-2019 6

4.2 Evaluation and reflection on the WKPIMP 2016 report 6

4.2.1 Monitoring of processes 6

4.2.2 Reasoning behind the choices of sampling method 9

4.2.3 Quantification of choices 10

4.2.4 End-user 10

4.2.5 Recommendations by WKPIMP 11

4.3 Other topics 11

4.3.1 Finalization of a CRR: Development of Ecosystem Monitoring 11

5 Progress report on ToRs and workplan **13**

6 Next meetings **14**

7 References **15**

Annex 1: List of participants **16**

Annex 2: Recommendations **17**

Annex 3: Multiannual Resolution and work plan for the next period **18**

Executive summary

The 2017 WGISUR meeting took place on 16–18 January 2017 in IJmuiden, the Netherlands. Eight participants joined the meeting, representing Belgium, Canada, Denmark, England, Germany, the Netherlands, and Norway.

The group finished its formal multi-annual term in 2016, SCICOM did not agree on the proposed terms of reference for the next period and decided to extend the group mainly to carry out two tasks: develop a way forward for WGISUR and review the Workshop to Plan an Integrated Monitoring Program in the North Sea in the 3rd quarter. Thus, no multi-annual terms of reference applied to the 2017 meeting.

The group considered its role in near future and decided to let every meeting in the next years be focused on a specific topic. The proposed topics are: integrating Canadian and USA survey; moving from (integrated or topical) surveys to an integrated monitoring programme in the North Sea; evaluation of the Norwegian Sea ecosystem survey. It is a big step forward from working on a conceptual basis in the previous period towards working with real cases in the next period, and the only way to move towards integrated monitoring.

The Workshop to Plan an Integrated Monitoring Program in the North Sea in the 3rd quarter (WKPIMP) has been evaluated. WKPIMP provides a proof of concept on how to monitor the relevant processes in the North Sea using the ship time of the 3rd quarter IBTS. The main topics discussed by WGISUR were (a) if and if yes, how monitoring of processes takes place in this proof of concept, as WGISUR questioned the possibility of monitoring processes rather than state, (b) the reasoning of the choices for the techniques proposed for the survey, (c) the quantification of the proof of concept, e.g. how many stations are required and with that what accuracy and power will be achieved, (d) the involvement of end-users. It is recommended that the Working Group on Improving use of Survey Data for Assessment and Advice (WGISDAA) and WGISUR work together to quantify the current proof of concept.

1 Administrative details

Working Group name

Working Group on Integrating Surveys for the Ecosystem Approach (WGISUR)

Year of Appointment within the current cycle

2017

Reporting year within the current cycle (1, 2 or 3)

Extension year to previous cycle of three years

Chair(s)

Ingeborg de Boois, the Netherlands

Ralf van Hal, the Netherlands (Acting chair)

Meeting venue

Wageningen Marine Research, IJmuiden, the Netherlands

Meeting dates

16–18 January 2017

The 2017 WGISUR meeting took place on 16–18 January 2017 in IJmuiden, the Netherlands. Eight participants joined the meeting, representing Belgium, Canada, Denmark, England, Germany, the Netherlands, and Norway.

2 Terms of Reference a) – z)

The group finished its formal multi-annual term in 2016, SCICOM did not agree on the proposed terms of reference for the next period and decided to extend the group mainly to carry out two tasks: develop a way forward for WGISUR and review of WKPIMP 2016. Thus, no multi-annual terms of reference applied to the 2017 meeting.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2014	21-23 Janaury	Nantes, France	Interim report by 1 April 2014 to SSGESST (SSGIEOM)	
Year 2015	27-29 January	ICES Headquarters	Interim report by 17 March 2015 to SSGIEOM	Meeting will be a joint session with the ICES Data Centre
Year 2016	26–28 January	Hamburg, Germany	Final report by 17 March 2016 to SSGIEOM, SCICOM and ACOM	
Year 2017	16-18 January	IJmuiden, Netherlands	Report by March 2017 to SSGIEOM, SCICOM and ACOM	Group extended for one year to develop a way forward.

The WGISUR ToRs for 2014–2016 are listed below.

ToR	Description	Background	Science Plan topics addressed	Duration	Expected Deliverables
a	Provide guidance on the adaptation of existing surveys to provide ecosystem data	a) Science Requirements b) Advisory Requirements c) Requirements from other EGs	1.2, 1.4, 1.5, 1.7, 2.1, 2.4, 2.5	3 years	1 guidance document, either as a SISP manual or as part of the TIMES series
b	Provide guidance on the development of an ICES ecosystem survey approach	a) Science Requirements b) Advisory Requirements	1.2, 1.4, 1.5, 1.7, 2.1, 2.4, 2.5	Year 2	
c	Identify issues common to all surveys, set up workshops and manage them as appropriate	a) Science Requirements c) Requirements from other EGs	1.2, 1.4, 1.5, 1.7, 2.1, 2.4, 2.5	yearly	Workshop Report

d	Liaise with IEA groups, and others as appropriate (e.g. CWGMSFD), over data product needs and specification	a) Science Requirements b) Advisory Requirements c) Requirements from other EGs	1.2, 1.4, 1.5, 1.7, 2.1, 2.4, 2.5	yearly	List of data product needs

3 Summary of Work plan

As 2017 was an extension of the previous period to develop a way forward to the group, no formal work plan applied.

4 List of Outcomes and Achievements of the WG in this delivery period

4.1 Terms of reference and work plan description for 2017-2019

The terms of reference and work plan for the next period are in Annex 3. The group considered its role in near future and decided to let every meeting in the next years be focused on a specific topic. The proposed topics are: integrating Canadian and USA survey; moving from (integrated or topical) surveys to an integrated monitoring programme in the North Sea; evaluation of the Norwegian Sea ecosystem survey.

As for the specific topics dedicated experts will be needed, the proposal is that the core WGISUR group (members appointed by delegates) meets for 3.5–4 days, and experts will be invited for two days of the meeting. In this way, on one hand the expertise of WGISUR will be used for specific requests, and the specific topics will have to be transformed into a more generic approach for e.g. developments of plans, monitoring programmes and strategies by WGISUR.

It is a big step forward from working on a conceptual basis in the previous period towards working with real cases in the next period, and the only way to move towards integrated monitoring.

4.2 Evaluation and reflection on the WKPIMP 2016 report

WGISUR initiated the Workshop to Plan an Integrated Monitoring Program in the North Sea in the 3rd quarter (WKPIMP) to extend the knowledge developed for ToR a and b. During the 2017 WGISUR meeting the workshop, its outcomes and the presentation of the workshop have been evaluated. The WKPIMP report (ICES, 2016a) was presented to the International Bottom Trawl Survey Working Group (IBTSWG) and the Working Group on Integrated Assessments of the North Sea (WGINOSE), and their comments were considered as well.

WGISUR was encouraged by the attendance of experts with a variety of environmental roles and expertise as the focus on a fish-survey might otherwise have limited the scope to interests in fish. As WGISUR considers it vital that end-users other than the ICES/DCF participate in the process of developing fish surveys into ecosystem surveys, the attendance of people with a background in the Water Framework Directive (WFD) and OSPAR/MSFD was welcomed. Despite this, the limited participation of people involved in the fish stock and integrated ecosystem assessment was disappointing. Changes to a fish survey are likely to have consequences for the data provided to stock assessments, and could benefit the development of IEAs through the provision of relevant data.

WGISUR compliments and thanks WKPIMP on the realistic proposal for developing the IBTS Q3 survey into an ecosystem survey and on the good readable report. The choice for the stratification is welcomed by WGISUR, as well as by the IBTSWG. The subsequent sections provide an elaboration and clarification of the principles of the plan as well as addressing comments and feedback from IBTSWG.

4.2.1 Monitoring of processes

WKPIMP describes that the new design monitors ecosystem processes. This raises the question if processes can actually be monitored by a survey design that collects data only at one moment in time or that such a design only allows for monitoring states which might be correlated to infer on processes. Furthermore, the question was raised how the current proposed monitoring activities actually contribute to process knowledge.

WKPIMP participants clarified that indeed no processes are measured, but the survey is process-based monitoring (box definitions). A more detailed consideration on this is given in the following paragraphs.

Term	Definition Kupschus *et al.*, 2016	WGISUR's definition
Indicator	Quantitatively defined metric representative of an ecosystem state	Quantitatively defined metric representative of an ecosystem state with respect to a specified objective, e.g. Good Environmental Status (GES).
Time-series	Comparably collected set of monitoring data with defined periodicity used to calculate a specific index or indices	Comparably collected set of monitoring data with defined periodicity used to calculate a specific index or indices.
Index	Coherent series of indicators evaluating variability in space or time	Coherent series of indicators evaluating variability over time
Index-based monitoring	Conventional monitoring designed around the purpose of detecting a change in a specific metric through time	Monitoring designed around the purpose of detecting a change in a specific metric through time
Process-based monitoring		Monitoring of states that are linked by direct and indirect processes with the expressed intent to ascertain the understanding of the relationship between different states. **
Ecosystem monitoring	Monitoring of one or more components of the ecosystem	Monitoring of one or more components of the ecosystem
Coordinated ecosystem monitoring	More efficient ecosystem monitoring by sharing platforms to collect the necessary ecosystem components according to independent sampling designs	More efficient ecosystem monitoring by sharing platforms to collect the necessary ecosystem components according to independent sampling designs
Integrated ecosystem monitoring survey	Data collection on more than one ecosystem component, explicitly considering the processes that link the sampled components	Data collection on more than one ecosystem component, explicitly considering the processes that link the sampled components in the sampling design.
Integrated ecosystem monitoring programme	The combination of multi-platform, multi-scale integrated data collection, evaluation of ecosystem status and the monitoring programme	The combination of multi-platform, multi-scale integrated data collection, evaluation of ecosystem status and the monitoring programme

1. Low levels of Chl *a* do not necessarily mean low primary production. If graz-

**** Current monitoring looks at states at points in time. For example, primary productivity may be judged by the mg of Chl *a*/litre. The difference between this measure from one year to the next says virtually nothing about the process of primary production for two reasons.**

ing of phytoplankton is also high, then the Chl *a* state would remain low despite high rates of production of phytoplankton. At low Chl *a* states the potential for fixing carbon is low compared to high states of Chl *a*. It only informs on the maximum rate. It provides little information as to the actual carbon fixed.

2. And we need these data at the appropriate time-scale. Taking annual samples it is possible to derive rates of change in Chl *a* in a purely theoretical delta Chl *a*/delta t formula. But this has no scientific meaning, because the rates of change intra annually are much bigger than the annual ones.

The only way around this problem is to monitor in a different way. Our attempts at getting at process using only states are over parameterized. We need input and output states at comparable temporal and spatial scales to assess the rate appropriately. We can provide reasonable estimates of carbon fixing rates based on information on light, nutrients, temperature etc. We know about cell division rates so can predict future states of Chl *a* in the absence of grazing. The difference between that estimate and the observed state is what is being removed. If this estimate has a good relationship with the consumption rate of zooplankton*abundance of zooplankton then it is likely that most of the removal is by zooplankton. If not we could try to see if a lot of it is settling on the seabed supporting secondary productivity there.

In short, our aspiration to measure process based on states is invariably over parameterized. We do however have the knowledge and/or opportunity to estimate some rates. Ensuring that we can link different processes together appropriately means we can then also estimate those rates if over time the inputs into the process vary randomly in relation to each other. Say temperature and nutrients affect carbon fixing. If neither changes or both change in unison it will never be possible to disentangle those effects. We cannot manipulate this in the ocean. We would need an experimental design that keeps one constant while changing the other and vice versa. Independence of temperature and nutrients will provide the necessary data over time to approximate the assumptions of 'control of independent variables' made by regression/ANOVA methods. This applies only to the central tendency, not the variance estimate. The uncertainty in such correlative estimates is always underestimated but we do not usually know by how much. Using random designs means we reduce the risk of ignoring effects that we do not measure/know about. For fixed station designs we may have the same unknown covariates each year so they tend to carry additional risks of misinterpreting the data.

Stratification can help maximize the contrast in the analysis where variability process is spatial rather than temporal. Assuming that areas that have a number of states that are similar and vary in concert within that area suggests at least that process rates in these areas are similar even if we do not know what the processes are. The fact that states differ between areas implies that the process rates are different also. This means we can ensure that we have independent replicates at each process rate ensuring we get a balanced set of samples (maximizing the contrast in both the dependent and independent variables) maximizing our chances of detecting the process rate most accurately for the fewest samples.

One way or other some uncertainty will remain, but we can reduce it by looking at the major processes, the ones that have large effects and are known to vary a lot. The subsequent responses should also be large and therefore easier to recognize. In fact, without first explaining the variation due to the major processes it becomes very difficult to understand and estimate the smaller ones.

4.2.1.1 Prioritizing ecosystem monitoring by process and space

Fundamentally the ecosystem's state is the reflection of the integration of all the ecosystem processes that have gone before so that process is the ideal unit of measurement for the ecosystem approach to management. *In situ* observations of process rates however are difficult to attain, instead measuring state a known time or spatial interval apart achieves the same aim, but it is important to ensure that both samples are representative of the same status unit. However processes that occur on different spatial scales from millimetres to basin-wide and temporal scales from seconds to decades means a single sampling design for all processes needs careful consideration. For processes that occur on fine scales it is not possible to ensure that the two state measurements are of the same unit, but if the process occurs homogenously over larger scales because the conditions are identical then they are still representative so that it is still possible to estimate process rates at larger scales than the process itself. In space this representation can often be preserved through the use of stratification, but variability of process rate through time is more difficult to establish for a survey conducted at a fixed point in the annual cycle when process periods are smaller than the sampling interval.

Ecosystems are not organismal, i.e. there is no inherent cooperation between components in order to achieve common goals. Unlike an organism that is evolutionarily adapted to strive towards an optimal state by controlling its various components, ecosystems do not have such a finite endpoint against which we can measure the current state. The reason for this is that ecosystem processes are passive in the sense that they occur based on energetic gradients set up by the state of the system. Consequently there has been much debate over whether it is state or process that best defines the ecosystem (ICES 2012, WGECO) and it seems there has not been a universally recognized conclusion to that argument (Rosberg, pers. comm.). In reality of course state is merely the integral of all previous processes, while the process rate is merely the derivative between states, but both contending views are helpful for the development of ecosystem monitoring programs.

4.2.2 Reasoning behind the choices of sampling method

WKPIMP describes a list of sampling techniques, the methods and parameters collected in the survey. However, less clear is why specifically these techniques are proposed and how these link to the concept of process-based monitoring. In one of the presentations given after WKPIMP the table below was included. This provides a better link between the method and reasoning behind it. Still the descriptions are very broad. WGISUR would prefer a more detailed description of how the data collected will contribute to the understanding of the relevant processes. When possible the choices should be supported by studies where the specific data are actually used in better understanding of the relevant processes. It is expected that this is required to get the Proof of Concept accepted by a broader audience.

Topic	Goal	Method	Parameter
foodweb relation macrobenthos	provide information to fish stock assessment	GOV	Fish
foodweb relation demersal fish/macrobenthic infauna		GOV/2 m BT	Macrobenthic epifauna
foodweb relation demersal fish/macrobenthic epifauna	add information to habitat maps; contribute to MSFD D1, D4, D6	grab	Macrobenthic infauna
foodweb relation phytoplankton/fish	non-indigenous species	MIK	Gelatinous zooplankton
life cycle herring and sprat	provide information to fish stock assessment	MIK	Large fish larvae (her, spr)
primary production in foodweb		NISSKIN bottle	vertical phytoplankton sample
foodweb relation phytoplankon/macrobenthos/fish	add information to continuous surface zooplankton measurement	WP2	vertical zooplankton sample

4.2.3 Quantification of choices

Along the same line as the previous paragraph, WGISUR thinks it is needed to include quantification of the choices. For example an explanation why the proposed stratification is more suitable than the current stratification of the IBTS Q3 survey, and what is the effect of the change in stratification on the current objectives of the IBTS Q3. There is a table with relative sampling effort by stratum and component. This implies that there is some quantification behind the spatial distribution of sampling effort, however this quantification is lacking, as a result the table is questioned. WGISUR recommends that WGISDAA and WGISUR work jointly on this quantification of effects.

WKPIMP suggested changing the IBTS design (rectangle-based, each rectangle covered by two countries) to a stratified random design made up of 11 ecologically relevant strata. From a practical perspective IBTSWG suggests that this needs further deliberation since not all strata can be effectively sampled using the current GOV gear due to bottom conditions, installation from the oil industry and wind parks ect. 10 out of the 11 new strata should be sampled by 2 or 3 different countries while just the Kattegat is sampled by one country only. The new design may result in less steaming time for the participating vessels saving time for additional sampling but this would depend on the final station locations and allocation to strata and countries, and quantitative information on the benefits of the new stratified random design against the present sampling strategy is missing.

4.2.4 End-user

Chapter 7 lists a number of end-users that can benefit from the new data collected. WGISUR wondered if these end-users responded to the WKPIMP report and if they were able to understand how the new data could be of relevance for them. This is really relevant as the (financial) support of these end-users is required to implement the proposed survey. As this support is so relevant WGISUR elaborated further on this and also provides some examples of how the information of integrated ecosystem surveys is used by end-users specifically by management end-users.

Incorporation of ecosystem data, or indicators, into fisheries management advice can be achieved in several manners, which require varying levels of understanding of the impacts of these variables.

- Ecosystem data can be used directly to influence stock assessment models, for example where there is a demonstrated impact of an indicator on recruitment this can be used in calculations of projections from the model.
- Ecosystem reference points can also be developed which can influence management measures and control rules, rather than being incorporated into the assessment model.
- Ecosystem status relative to reference levels could, for example, be used to determine what level on a yield risk curve would be selected for developing harvest advice.

The Norwegian management plans are examples of end-users using output from integrated ecosystem surveys (Anon, 2006). The management plans are now developed for the Barents Sea, Norwegian Sea, and North Sea. The purpose of the management plans is to ensure long-term economic exploitation of ocean areas through sustainable use of resources and ecosystem services, while simultaneously preserving the structure, functioning, productivity and biodiversity of the marine ecosystems. A description of the management plan for the Barents Sea is found in Olsen *et al*. (2007). The management plans will be updated regularly (e.g. every fourth year in the Barents Sea). As part of the knowledge base for the plans several ecosystem components and human stressors are monitored regularly.

4.2.5 Recommendations by WKPIMP

WKIMP recommended that WGISDAA and IBTSWG analyse the effects of the new survey design on the precision of the abundance indices used in the stock assessments. Currently, this is not easily possible as the standard indices for NS-IBTS target species come routinely without estimates of its precision, and moreover, the indices are presented as number/hour. Indices in numbers per swept-area as recommended by WGISDAA should become available in the near future at least for the period 2004 to present (ICES, 2016b). The analysis could then apply the stratification suggested by WKPIMP calculating indices and corresponding coefficients of variations based on full datasets by stratum and the total survey area and the results for random selection of stations based on the percentage allocation to the single strata suggested by WKPIMP (ICES 2016a, Table. 3.4.1) and for different levels of sampling effort for fish. Finally, stock assessments could then be run with different variants of NS-IBTS 3Q abundances indices to check the effect of the change of the survey design on the assessment results.

WKPIMP recommended further analysing the vessel/country effects in the fish age data. This was probably motivated by the fact that most of the NS-IBTS participants had collected the otoliths stratified by roundfish area. This, however, has changed and the otoliths are currently collected by station (ICES, 2016b), and thus this recommendation may no longer be valid.

4.3 Other topics

4.3.1 Finalization of a CRR: Development of Ecosystem Monitoring

The final output of the past multi-annual period was hampered by a discussion on the type of product. WGISUR 2017 has decided that a CRR is the most appropriate form to compile all concepts and information developed and collected over the past

period. It is planned to finalize the CRR at the end of 2017. A category 1 resolution was handed in to the ICES Secretariat during the 2017 meeting.

5 Progress report on ToRs and workplan

As the previous term was extended by one year, and the final report was published in 2016, there is no further progress to describe on ToR and workplan.

6 Next meetings

Venue and date of the next meeting were tentatively set to Halifax, Canada, four days during the week of 30 April or the week of 28 May 2018, focusing at 'Review and provide guidance on the plans for the integrated USA/Canada ecosystem survey' next to the general ToRs. As for the specific topic dedicated experts will be needed, the core WGISUR group (members appointed by delegates) meets for 3.5–4 days, and topical experts will be invited for two days of the meeting.

7 References

Anon. St.meld.nr. 8 (2005-2006) Helhetlig forvaltning av det marine miljø i Barentshavet og havområdene utenfor Lofoten (forvaltningsplan). Oslo; 2006. Ministry of Environment (available in English from the Norwegian Ministry of Environment).

ICES. 2016a. Report of the Workshop to plan an integrated monitoring Programme in the North Sea in Q3 (WKPIMP), 22-26 February 2016, ICES HQ, Copenhagen, Den-mark. ICES CM 2016/SSGIEOM:11. 48 pp.

ICES. 2016b. First Interim Report of the International Bottom Trawl Survey Working Group (IBTSWG), 4-8 April 2016, Sète, France. ICES CM 2016/SSGIEOM:24. 292 pp.

Olsen, E., Gjøsæter, H., Røttingen, I., Dommasnes, A., Fossum, P., and Sandberg, P. 2007. The Norwegian ecosystem-based management plan for the Barents Sea. - ICES Journal of Marine Science, 64: 599-602.

Annex 1: List of participants

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Annex 2: Recommendations

Recommendation	Adressed to
1.quantify the effect of the change in stratification from WKPIMP of IBTS Q3 on the current objectives in collaboration with WGISUR (see paragraph 4.2.3 of WGISUR 2017 report)	WGISDAA

Annex 3: Multiannual Resolution and work plan for the next period

Approved by ACOM and SCICOM on 27 March 2017

2016/MA2/SSGIEOM1

The **Working Group on Integrating Surveys into ecosystem monitoring programmes** (WGISUR), chaired by Ralf van Hal*, The Netherlands, will work on ToRs mentioned below and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2018	29 May-1 June	Halifax, Canada	Interim report by Date Month to SSGIEOM	2 days meeting of core group only, 2 days meeting to evaluate Canada/USA ecosystem survey plans
Year 2019	TBD	TBD	Interim report by Date Month to SSGIEOM	2 days meeting of core group only, 2 days working on how to organise integrated monitoring in the North Sea
Year 2020	TBD	TBD	Final report by Date Month to SSGIEOM	2 days meeting of core group only, 2 days working on evaluation of Norwegian Sea ecosystem monitoring in relation to IEA and survey results.

ToR descriptors

ToR	Description	Background	Implementation plan topics addressed	Duration	Expected Deliverables
a	Provide guidance on the development of ecosystem monitoring surveys and/or programmes	The work of the group directly relates to goals 1, 2, and 3 of the ICES Strategic Plan (pages 14–15). Specifically, WGISUR work is strongly linked to the last bullet point under goals 1 and 2 (page 14).	20, 25, 26, 27, 28	3 (focus in year 1)	after year 3 a CRR on evaluation, use and improvement of ecosystem monitoring plans, surveys and/or programmes following up on the 2017 CRR
b	Provide guidance and advice on the shift from surveys to ecosystem monitoring programmes	The work of the group directly relates to goals 1, 2, and 3 of the ICES Strategic Plan (pages 14–15). Specifically, WGISUR work is strongly linked to the last bullet point under goals 1 and 2 (page 14), and stronger links to IEA groups.	20, 25, 26	3 (focus in year 2)	after year 3 a CRR on evaluation, use and improvement of ecosystem monitoring plans, surveys and/or programmes following up on the 2017 CRR

c	Evaluation of ecosystem monitoring surveys and/or programmes	The work of the group directly relates to goals 1, 2, and 3 of the ICES Strategic Plan (pages 14–15). Specifically, WGISUR work is strongly linked to the last bullet point under goals 1 and 2 (page 14).	20, 25, 30, 31	3 (focus in year 3)	after year 3 a CRR on evaluation, use and improvement of ecosystem monitoring plans, surveys and/or programmes following up on the 2017 CRR
d	Provide an opportunity for exchange of experiences on development and evaluation of ecosystem monitoring		26, 28, 30	3 (ongoing)	CRR

Summary of the Work Plan

Year 1	Review and provide guidance on the plans for the integrated USA/Canada ecosystem survey
Year 2	How to organise integrated monitoring in the North Sea (e.g. how to make use of the different surveys in the area and how to organise regional collaboration)
Year 3	Evaluation of Norwegian Sea ecosystem monitoring; prepare final output in CRR format

Supporting information

Priority	High. Integrated ecosystem monitoring will lead to better exosystem understanding. The topics covered by WGISUR are mentioned in the ICES Strategic Plan. The working group will provide guidance to those collecting data as well as to data users on integrated ecosysem monitoring. There is a clear momentum for guidance on evaluation of plans for and results of ecosystem monitoring as there are initiatives to set up ecosystem surveys, and results from existing ecosystem monitoring becomes more and more available. In order to optimise guidance, WGISUR will use regional monitoring from different regions in the next term. From this, a generalised overview will be created.
Resource requirements	The focus for the next period will be on providing guidance on evaluating ecosystem monitoring, and application of the current guidance by evaluating plans for new ecosystem monitoring based on plans under development and by evaluating survey results of current monitoring. Furthermore, for the North Sea it will be investigated how to move from ecosystem surveys towards monitoring.

Participants	The group is normally attended by 10–15 members and guests ('core' group). Participation from all ecoregions is important. The group likes to explicitly state that there is a strong wish to keep the current participation from Norway, Canada, and USA next to EU countries, as this prevents that the group narrows down 'ecosystem monitoring' to 'MSFD monitoring'. The following expertise should be added to the 'core' group: analytical expertise, expertise on (monitoring of) other ecosystem components than fish (e.g. zooplankton, birds, physical/chemical), integrated ecosystem assessments. On top op that, dedicated additional expertise is needed in each year during a part of the meeting, on top of the 'core' members: year 1 (2018): Additional attendance needed from WGNARS USA/Canadian experts on the survey plans. year 2 (2019): Additional attendance needed from all North Sea survey planning groups, WGINOSE and chairs of SSGIEA, SSGIEOM; and preferred attendance from WGNSSK, HAWG, OSPAR. year 3 (2020): Additional attendance of WGINOR and Norwegian Sea survey experts needed.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	In general, good linkage with groups under ACOM including the BSG is necessary as the move towards ecosystem monitoring may have implications on the survey stratification and as a result, on survey time-series used in stock assessment. Good linkage and communication is needed for survey groups moving towards ecosystem monitoring to understand the assessment needs, and for the assessment groups to understand the added value of the improved way of data collection, and to accept changes in time-series. Specific linkage in year 2 to assessment groups in the North Sea.
Linkages to other committees or groups	SCICOM, Survey planning WGs under SSGIOEM, IEA WGs under SSGIEA, WGECO and other ecology based WGs, DIG.
Linkages to other organizations	Involvement of OSPAR and HELCOM is welcomed in the work of this group.