WORKSHOP ON IMPACTS OF PLANNED CHANGES IN THE NORTH SEA IBTS (WKNSIMP)

VOLUME 1 | ISSUE 67

ICES SCIENTIFIC REPORTS

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ISSN number: 2618-1371 I

ICES Scientific Reports

Volume 1 | Issue 67

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Recommended format for purpose of citation:

ICES. 2019. Workshop on Impacts of planned changes in the North Sea IBTS

(WKNSIMP). ICES Scientific Reports. 1:67. 25 pp. http://doi.org/10.17895/ices.pub.5609

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Contents

i Executive summary

The Workshop on Impacts of planned changes in the North Sea International Bottom Trawl Survey (WKNSIMP) objectives were to review expected short- and medium-term changes in the North Sea International Bottom Trawl Survey (NS-IBTS), evaluate the impacts of the planned changes in the NS-IBTS on data consistency for stock assessments and ecosystem indicators, and suggest strategies for the implementation of these changes with a minimum impact on future survey deliverables for data end users.

An important aim of the workshop was to identify strategies how to deal with unavoidable changes such as the replacement of survey vessel and how to implement the necessary change of the survey trawl due to its divergence from the original standard and its inability to serve future needs.

The agreed strategy to account for replacement of survey vessels was to ensure that there is a sufficient spatial overlap between a new vessel and existing ones operated by the other nations, and this should be done by revising rectangle allocation to the different countries where necessary.

Several reasons discussed within the ICES International Bottom Trawl Survey Working Group (IBTSWG) have led to the decision to replace the currently used survey net GOV, most importantly the fact that it cannot be maintained and standardized in its currently prescribed form (additional details are provided in the IBTSWG reports of recent years). A roadmap has been developed for the implementation of the change of the survey gear. A phased introduction of the new gear in both quarters prioritising vessels that spatially overlap and for which sufficient estimates of vessel effects are available is suggested.

To maximise the ability to estimate the effect of the gear change, it is critical that other potential changes to the survey are phased in at a later date or at least not until the new survey trawl is fully implemented, in order to avoid confounding effects. Hence, the possible implementation of a survey design change from a systematic to an ecologically-based stratification has to be postponed. Work should continue on developing and evaluating the costs and benefits of different stratification and/ or survey designs.

ii Expert group information

Expert group name	Workshop on Impacts of planned changes in the North Sea IBTS (WKNSIMP)
Expert group cycle	Annual
Year cycle started	2019
Reporting year in cycle	1/1
Chair(s)	Kai Wieland, Denmark
Meeting venue(s) and dates	18 – 21 June 2019, Bremerhaven, Germany (14 participants)

1 Opening of the meeting

The Workshop on Impacts of planned changes in the North Sea IBTS (WKNSIMP) met at Thünen Institute of Sea Fisheries, Bremerhaven, on 18–21 June 2019 under the chairmanship of Kai Wieland, Denmark. The workshop was attended by 14 participants representing seven different countries (Annex 1). This included most of the countries participating in the North Sea IBTS, i.e. Denmark, Germany, the Netherlands, UK England, UK Scotland and Sweden. Representatives from France and Norway were unfortunately unable to attend.

The workshop was held in conjunction with the annual meeting of the ICES Working Group on Integrating Surveys for the Ecosystem Approach (WGISUR). The adopted agenda is available in Annex 3. Five presentations were given during the workshop which are listed in Annex 4.

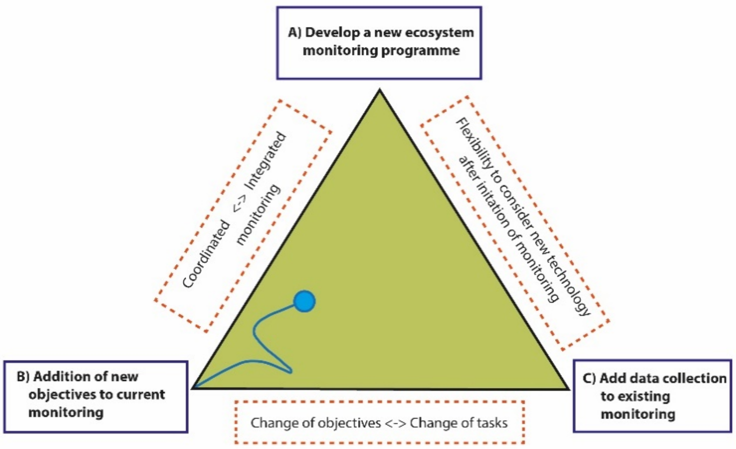
2 Perception of the current North Sea IBTS by Data End Users and Survey Scientists, and potential for changes

In general, the perception of the current North Sea IBTS was quite positive since it provides information for several purposes. Specific issues regarding data quality were seen more critically by the data collectors than by the data users, probably because details about consistency problems were not to the full extent known to the data users (see section 3.1. for examples). However, the classification of consistency issues is to a large degree use-dependent. There was cross disciplinary agreement at the workshop that that communication between data collectors and users on potential issues of data quality needs to be improved.

Many initiatives have been taken over the years to move towards ecosystem surveys. In summary, following key points where thought to be a way forward:

1. The data collection under the auspices of IBTS is driven by end user needs (in line with DCF). Therefore, it´s of importance to define what the end user needs are at the regional scale. What kind of new data and variables are needed for giving broader advice in line with moving from single stock assessment to multispecies stock assessment and further on to Ecosystem based Fisheries Management (EBFM) and how can the IBTS survey contribute to fulfil the new requirements?

2. It is important to have a common understanding on what we (i.e. the ICES community) are trying to achieve while striving for changes in IBTS. Are the changes aiming to increase precision of current collections, adding on new variables or trying to be more efficient? The discussion of moving towards ecosystem surveys is often a mix of different things. The model described by WGISUR (ICES 2016a; de Boois 2019) shown below is a good basis for the discussion, offering a visualization of the three possible alternative goals, and the room for their possible combinations. A decision needs to be taken in what area in the triangle we want to be and when and how to get there.



3. List concrete suggestions for changes: If the attempts of getting input from the end users have failed over the years and IBTSWG still wants to make changes, the suggestions that

have been raised over the years should be looked into (again). The different changes need to be evaluated and presented and considered for purpose by the end users. The overview of suggestions for changes, (approved by the end users) could be used as the basis for decisions.

4. The decision making process. The suggested changes for IBTS could be presented for the Regional Coordination Group for the North Atlantic and the North Sea (RCG NA & NSEA) in their technical meeting taking place in June 2020, where it will be compiled and put in to the RCG decision meeting taking place in September 2020. This setup of the RCGs is very new, but the idea is to have a clear path for decisions that needs to be taken to be able to move forward in a structured way. The process means that the suggested changes will be official and reflected in the national work plans.

However, any agreed evaluation what to include in a future extension of survey objectives has to be based on evidence and quantitative evaluation in terms of data use.

3 Changes to be implemented in the near future and strategies for the implementation

3.1 Replacement of survey vessels and a new survey trawl

IBTSWG has recognized an increasing divergence between countries in specification of the existing standard trawl, the GOV (chalut à Grande Ouverture Verticale), from the one original one due to historical drift and technical creep (ICES 2015). This results in pronounced differences of net geometry between the countries (Fig. 3.1.1).

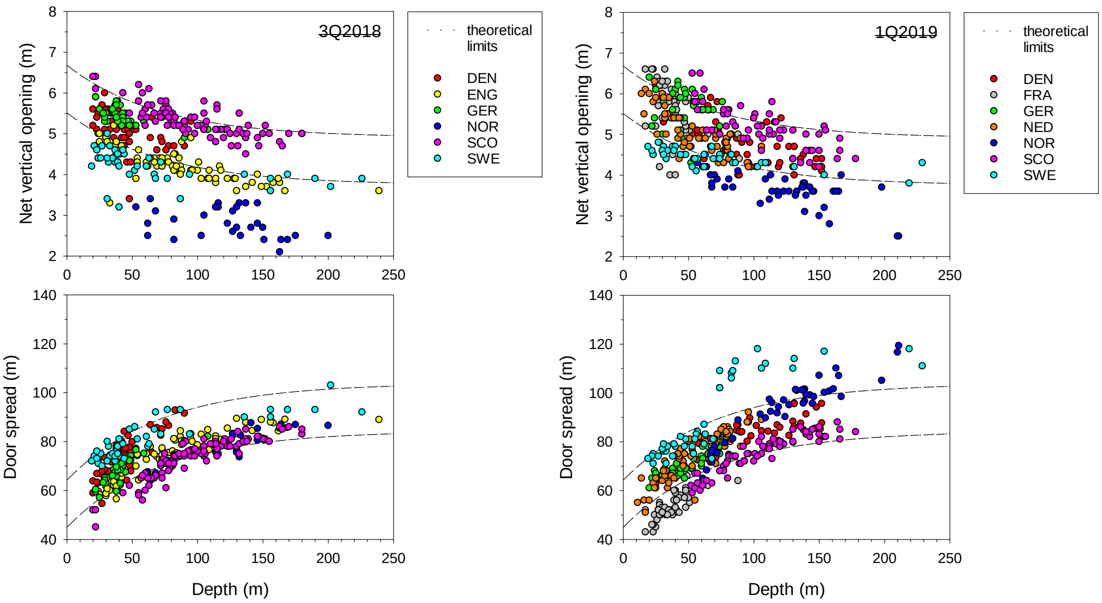


Fig. 3.1.1 Net geometry by country in 3Q2018 and 1Q2019.

Several attempts have been made for standardization of the existing data and improving consistency, e.g. by using swept area-based estimates instead of using numbers per hour, or to use model-based indices which includes a country and/or vessel effect. This process was not entirely successful or is yet not completed (ICES 2019a).

Since it is impossible to go back to the design and material used when the survey started in the 1960's and since the GOV in its current country-specific specifications causes a series of problems in respect to net damages and habitats which can't be fished, IBTSWG felt that it is time to move towards a new survey trawl (ICES 2018a).

DTU Aqua (Casper Berg) conducted an analysis on vessel and gear effects on the catches, using the following approach:

$$\begin{aligned}\log(\mu_i) =\ & f_1(\mathrm{Year}_i, \mathrm{lon}_i, \mathrm{lat}_i) \\ & + f_2(\mathrm{depth}_i) + f_3(\mathrm{timeOfDay}_i) + \mathit{offset}(\log(\mathrm{HaulDur}_i)) \\ & + f_4(\mathrm{GroundSpeed}_i) + f_5(\mathrm{DoorSpread}_i) + \mathrm{U(i)}_{\mathrm{ship}}\end{aligned}$$

where $\mathrm{U(i)}_{\mathrm{ship}} \sim N(0, \sigma^2)$ are random ship effects.

- Response (μ) is numbers-at-length in the *i* th haul in three size categories (small (-1), medium (-2), and large (-3)).
- A negative binomial distribution is used, and each size group is estimated independently of each other.
- Quarters 1 and 3 are also modelled independently.
- Since distance is the product of duration and speed, this model includes swept area as a special case.
- Estimated for 7 species (herring (HER), cod, haddock (HAD), whiting (WHI), plaice (PLA), sprat (SPR), and Norway pout (NOR)).
- Data set restricted to the period 2009–2019 (to reduce running time from days to hours).

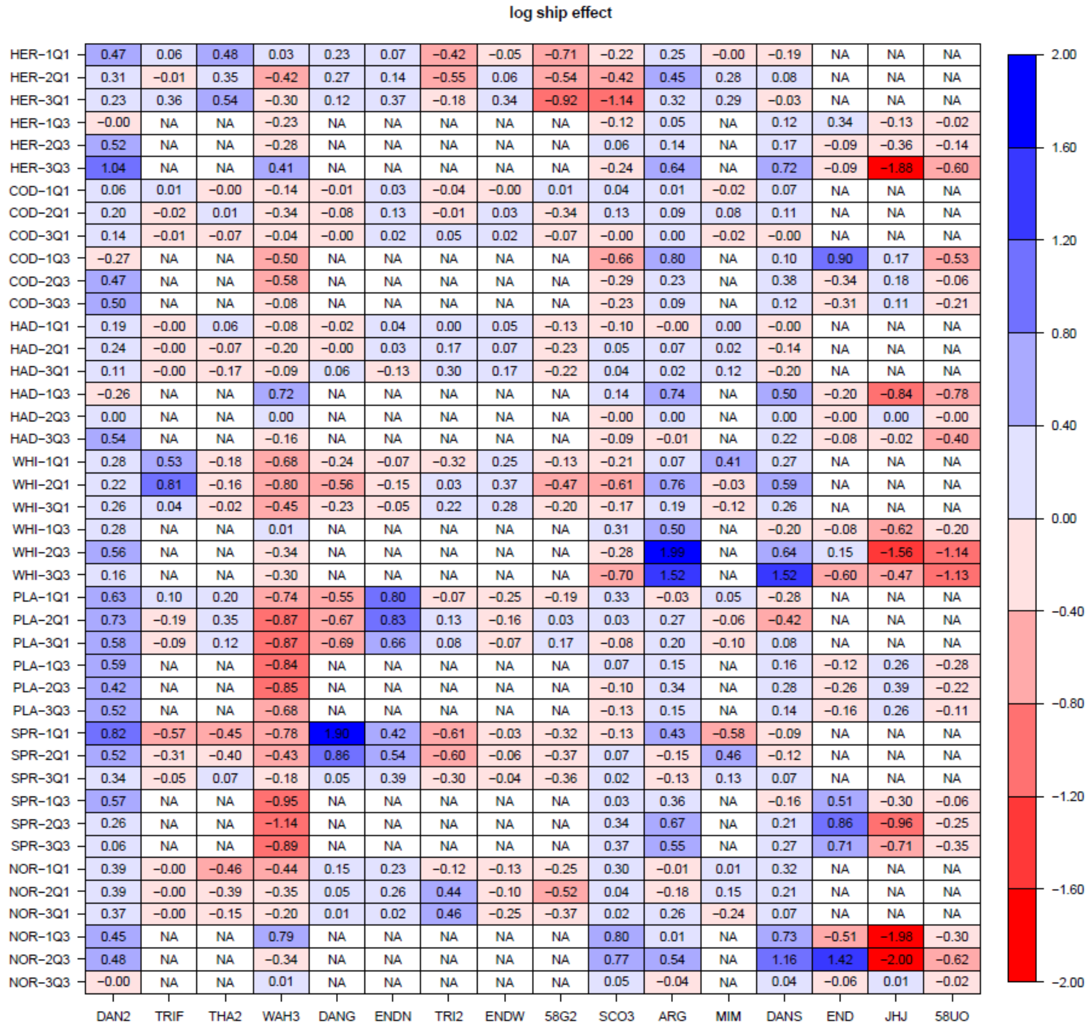
The results are summarized in tables 3.1.1 and 3.1.2 and indicate that there are pronounced vessel effects even if differences in groundspeed and door spread, i.e. swept area, between the countries are taken into account.

In general, the vessel effect was largest for Norway pout and sprat, and on average across all species and size groups, the highest positive vessel effect was found for DAN2 (Dana, Denmark) whereas the highest negative effect was found for JHJ (Johan Hjort, Norway). This may indicate that the differences in vertical opening between the two countries (Fig. 3.1.1) has a considerable effect on the catchability of pelagic species.

The uncertainty of the estimated vessel effect was highest for Sweden with ARG (Argos) and DANS (Dana charted using their own GOV and Swedish rigging), which might be related to the low overlap with other vessels, as well as for the Norwegian vessels 58UO (Kristine Bonnevie) and JHJ (Johan Hjort) mainly due to a high influence of Norway pout and sprat.

It should be noted that one vessel/country combination comprises only one survey year and quarter, e.g. DANG (Dana with German team and their own GOV) while others such as DANS (Dana with Swedish team and GOV) covers more years and both quarters. Swapping of vessels and gears between countries could help to differentiate between area, vessel and crew effects which otherwise tends to be confounded. It is in particular problematic that only Sweden covers area 3a (Skagerrak and Kattegat) and a higher degree of spatial overlap with e.g. Norway and/or Denmark would be beneficial.

Tab. 3.1.1 Vessel effect (DAN2: Dana with Danish team, TRIF: Tridens chartered by France, THA2: Thalassa with French team, WAH3: Walther Herwig with German team, DANG: Dana chartered by Germany, ENDN: Endeavour chartered by the Netherlands, TRI2: Tridens with Dutch team, ENDW: Endeavour chartered by Norway, 58G2: GO Sars with Norwegian team, SCO3: Scotia with Scottish team, ARG: Argos with Swedish team, MIM: Mimer with Swedish team, DANS: Dana chartered by Sweden, END: Endeavour with English team, JHJ: Johan Hjort with Norwegian team, 58UO: Kristine Bonnevie with Norwegian team.)

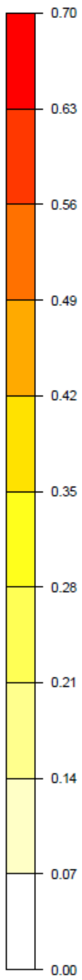

log ship effect

	DAN2	TRIF	THA2	WAH3	DANG	ENDN	TRI2	ENDW	58G2	SCO3	ARG	MIM	DANS	END	JHJ	58UO
HER−1Q1	0.47	0.06	0.48	0.03	0.23	0.07	−0.42	−0.05	−0.71	−0.22	0.25	−0.00	−0.19	NA	NA	NA
HER−2Q1	0.31	−0.01	0.35	−0.42	0.27	0.14	−0.55	0.06	−0.54	−0.42	0.45	0.28	0.08	NA	NA	NA
HER−3Q1	0.23	0.36	0.54	−0.30	0.12	0.37	−0.18	0.34	−0.92	−1.14	0.32	0.29	−0.03	NA	NA	NA
HER−1Q3	−0.00	NA	NA	−0.23	NA	NA	NA	NA	NA	−0.12	0.05	NA	0.12	0.34	−0.13	−0.02
HER−2Q3	0.52	NA	NA	−0.28	NA	NA	NA	NA	NA	0.06	0.14	NA	0.17	−0.09	−0.36	−0.14
HER−3Q3	1.04	NA	NA	0.41	NA	NA	NA	NA	NA	−0.24	0.64	NA	0.72	−0.09	−1.88	−0.60
COD−1Q1	0.06	0.01	−0.00	−0.14	−0.01	0.03	−0.04	−0.00	0.01	0.04	0.01	−0.02	0.07	NA	NA	NA
COD−2Q1	0.20	−0.02	0.01	−0.34	−0.08	0.13	−0.01	0.03	−0.34	0.13	0.09	0.08	0.11	NA	NA	NA
COD−3Q1	0.14	−0.01	−0.07	−0.04	−0.00	0.02	0.05	0.02	−0.07	−0.00	0.00	−0.02	−0.00	NA	NA	NA
COD−1Q3	−0.27	NA	NA	−0.50	NA	NA	NA	NA	NA	−0.66	0.80	NA	0.10	0.90	0.17	−0.53
COD−2Q3	0.47	NA	NA	−0.58	NA	NA	NA	NA	NA	−0.29	0.23	NA	0.38	−0.34	0.18	−0.06
COD−3Q3	0.50	NA	NA	−0.08	NA	NA	NA	NA	NA	−0.23	0.09	NA	0.12	−0.31	0.11	−0.21
HAD−1Q1	0.19	−0.00	0.06	−0.08	−0.02	0.04	0.00	0.05	−0.13	−0.10	−0.00	0.00	−0.00	NA	NA	NA
HAD−2Q1	0.24	−0.00	−0.07	−0.20	−0.00	0.03	0.17	0.07	−0.23	0.05	0.07	0.02	−0.14	NA	NA	NA
HAD−3Q1	0.11	−0.00	−0.17	−0.09	0.06	−0.13	0.30	0.17	−0.22	0.04	0.02	0.12	−0.20	NA	NA	NA
HAD−1Q3	−0.26	NA	NA	0.72	NA	NA	NA	NA	NA	0.14	0.74	NA	0.50	−0.20	−0.84	−0.78
HAD−2Q3	0.00	NA	NA	0.00	NA	NA	NA	NA	NA	−0.00	0.00	NA	0.00	−0.00	0.00	−0.00
HAD−3Q3	0.54	NA	NA	−0.16	NA	NA	NA	NA	NA	−0.09	−0.01	NA	0.22	−0.08	−0.02	−0.40
WHI−1Q1	0.28	0.53	−0.18	−0.68	−0.24	−0.07	−0.32	0.25	−0.13	−0.21	0.07	0.41	0.27	NA	NA	NA
WHI−2Q1	0.22	0.81	−0.16	−0.80	−0.56	−0.15	0.03	0.37	−0.47	−0.61	0.76	−0.03	0.59	NA	NA	NA
WHI−3Q1	0.26	0.04	−0.02	−0.45	−0.23	−0.05	0.22	0.28	−0.20	−0.17	0.19	−0.12	0.26	NA	NA	NA
WHI−1Q3	0.28	NA	NA	0.01	NA	NA	NA	NA	NA	0.31	0.50	NA	−0.20	−0.08	−0.62	−0.20
WHI−2Q3	0.56	NA	NA	−0.34	NA	NA	NA	NA	NA	−0.28	1.99	NA	0.64	0.15	−1.56	−1.14
WHI−3Q3	0.16	NA	NA	−0.30	NA	NA	NA	NA	NA	−0.70	1.52	NA	1.52	−0.60	−0.47	−1.13
PLA−1Q1	0.63	0.10	0.20	−0.74	−0.55	0.80	−0.07	−0.25	−0.19	0.33	−0.03	0.05	−0.28	NA	NA	NA
PLA−2Q1	0.73	−0.19	0.35	−0.87	−0.67	0.83	0.13	−0.16	0.03	0.03	0.27	−0.06	−0.42	NA	NA	NA
PLA−3Q1	0.58	−0.09	0.12	−0.87	−0.69	0.66	0.08	−0.07	0.17	−0.08	0.20	−0.10	0.08	NA	NA	NA
PLA−1Q3	0.59	NA	NA	−0.84	NA	NA	NA	NA	NA	0.07	0.15	NA	0.16	−0.12	0.26	−0.28
PLA−2Q3	0.42	NA	NA	−0.85	NA	NA	NA	NA	NA	−0.10	0.34	NA	0.28	−0.26	0.39	−0.22
PLA−3Q3	0.52	NA	NA	−0.68	NA	NA	NA	NA	NA	−0.13	0.15	NA	0.14	−0.16	0.26	−0.11
SPR−1Q1	0.82	−0.57	−0.45	−0.78	1.90	0.42	−0.61	−0.03	−0.32	−0.13	0.43	−0.58	−0.09	NA	NA	NA
SPR−2Q1	0.52	−0.31	−0.40	−0.43	0.86	0.54	−0.60	−0.06	−0.37	0.07	−0.15	0.46	−0.12	NA	NA	NA
SPR−3Q1	0.34	−0.05	0.07	−0.18	0.05	0.39	−0.30	−0.04	−0.36	0.02	−0.13	0.13	0.07	NA	NA	NA
SPR−1Q3	0.57	NA	NA	−0.95	NA	NA	NA	NA	NA	0.03	0.36	NA	−0.16	0.51	−0.30	−0.06
SPR−2Q3	0.26	NA	NA	−1.14	NA	NA	NA	NA	NA	0.34	0.67	NA	0.21	0.86	−0.96	−0.25
SPR−3Q3	0.06	NA	NA	−0.89	NA	NA	NA	NA	NA	0.37	0.55	NA	0.27	0.71	−0.71	−0.35
NOR−1Q1	0.39	−0.00	−0.46	−0.44	0.15	0.23	−0.12	−0.13	−0.25	0.30	−0.01	0.01	0.32	NA	NA	NA
NOR−2Q1	0.39	−0.00	−0.39	−0.35	0.05	0.26	0.44	−0.10	−0.52	0.04	−0.18	0.15	0.21	NA	NA	NA
NOR−3Q1	0.37	−0.00	−0.15	−0.20	0.01	0.02	0.46	−0.25	−0.37	0.02	0.26	−0.24	0.07	NA	NA	NA
NOR−1Q3	0.45	NA	NA	0.79	NA	NA	NA	NA	NA	0.80	0.01	NA	0.73	−0.51	−1.98	−0.30
NOR−2Q3	0.48	NA	NA	−0.34	NA	NA	NA	NA	NA	0.77	0.54	NA	1.16	1.42	−2.00	−0.62
NOR−3Q3	−0.00	NA	NA	0.01	NA	NA	NA	NA	NA	0.05	−0.04	NA	0.04	−0.06	0.01	−0.02

Tab. 3.1.2 Uncertainty of estimated vessel effect (Vessel codes as in Tab. 3.1.1).

log ship effect SD (~CV)

	DAN2	TRIF	THA2	WAH3	DANG	ENDN	TRI2	ENDW	58G2	SCO3	ARG	MIM	DANS	END	JHJ	58UO
HER-1Q1	0.03	0.15	0.06	0.04	0.11	0.07	0.05	0.16	0.08	0.06	0.14	0.14	0.09	NA	NA	NA
HER-2Q1	0.03	0.15	0.05	0.04	0.11	0.07	0.04	0.15	0.06	0.05	0.14	0.15	0.10	NA	NA	NA
HER-3Q1	0.04	0.21	0.05	0.04	0.13	0.07	0.05	0.14	0.05	0.05	0.18	0.19	0.10	NA	NA	NA
HER-1Q3	0.05	NA	NA	0.06	NA	NA	NA	NA	NA	0.06	0.08	NA	0.07	0.05	0.09	0.10
HER-2Q3	0.04	NA	NA	0.05	NA	NA	NA	NA	NA	0.04	0.07	NA	0.07	0.04	0.06	0.08
HER-3Q3	0.10	NA	NA	0.12	NA	NA	NA	NA	NA	0.10	0.21	NA	0.19	0.10	0.11	0.14
COD-1Q1	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	NA	NA	NA
COD-2Q1	0.01	0.04	0.02	0.01	0.04	0.03	0.02	0.03	0.02	0.01	0.03	0.04	0.03	NA	NA	NA
COD-3Q1	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	NA	NA	NA
COD-1Q3	0.12	NA	NA	0.18	NA	NA	NA	NA	NA	0.13	0.22	NA	0.19	0.11	0.16	0.27
COD-2Q3	0.03	NA	NA	0.04	NA	NA	NA	NA	NA	0.03	0.06	NA	0.05	0.03	0.03	0.04
COD-3Q3	0.02	NA	NA	0.03	NA	NA	NA	NA	NA	0.02	0.05	NA	0.04	0.02	0.02	0.03
HAD-1Q1	0.01	0.02	0.01	0.01	0.02	0.02	0.01	0.02	0.01	0.01	0.02	0.02	0.02	NA	NA	NA
HAD-2Q1	0.01	0.03	0.02	0.01	0.03	0.03	0.02	0.03	0.01	0.01	0.03	0.03	0.03	NA	NA	NA
HAD-3Q1	0.01	0.04	0.02	0.01	0.03	0.03	0.02	0.03	0.01	0.01	0.03	0.03	0.03	NA	NA	NA
HAD-1Q3	0.07	NA	NA	0.10	NA	NA	NA	NA	NA	0.06	0.13	NA	0.12	0.06	0.07	0.09
HAD-2Q3	0.00	NA	NA	0.00	NA	NA	NA	NA	NA	0.00	0.00	NA	0.00	0.00	0.00	0.00
HAD-3Q3	0.02	NA	NA	0.04	NA	NA	NA	NA	NA	0.02	0.04	NA	0.04	0.02	0.02	0.03
WHI-1Q1	0.02	0.10	0.02	0.02	0.06	0.03	0.02	0.07	0.02	0.02	0.08	0.09	0.05	NA	NA	NA
WHI-2Q1	0.03	0.17	0.04	0.03	0.09	0.05	0.04	0.11	0.04	0.04	0.12	0.12	0.07	NA	NA	NA
WHI-3Q1	0.01	0.06	0.02	0.01	0.04	0.03	0.02	0.04	0.02	0.02	0.04	0.05	0.03	NA	NA	NA
WHI-1Q3	0.03	NA	NA	0.04	NA	NA	NA	NA	NA	0.03	0.07	NA	0.06	0.03	0.04	0.05
WHI-2Q3	0.12	NA	NA	0.13	NA	NA	NA	NA	NA	0.13	0.24	NA	0.19	0.12	0.14	0.16
WHI-3Q3	0.09	NA	NA	0.10	NA	NA	NA	NA	NA	0.09	0.16	NA	0.14	0.09	0.10	0.11
PLA-1Q1	0.02	0.12	0.03	0.03	0.07	0.04	0.03	0.15	0.05	0.03	0.08	0.08	0.05	NA	NA	NA
PLA-2Q1	0.03	0.18	0.04	0.03	0.07	0.04	0.03	0.15	0.04	0.03	0.09	0.09	0.06	NA	NA	NA
PLA-3Q1	0.02	0.15	0.03	0.02	0.05	0.03	0.02	0.08	0.03	0.02	0.07	0.07	0.04	NA	NA	NA
PLA-1Q3	0.03	NA	NA	0.04	NA	NA	NA	NA	NA	0.03	0.08	NA	0.06	0.03	0.07	0.12
PLA-2Q3	0.03	NA	NA	0.03	NA	NA	NA	NA	NA	0.03	0.06	NA	0.05	0.03	0.04	0.06
PLA-3Q3	0.02	NA	NA	0.02	NA	NA	NA	NA	NA	0.02	0.05	NA	0.04	0.02	0.02	0.03
SPR-1Q1	0.08	0.42	0.12	0.10	0.23	0.14	0.10	0.58	0.19	0.13	0.34	0.39	0.19	NA	NA	NA
SPR-2Q1	0.04	0.20	0.04	0.05	0.12	0.07	0.05	0.24	0.10	0.06	0.18	0.19	0.11	NA	NA	NA
SPR-3Q1	0.02	0.07	0.03	0.02	0.06	0.04	0.02	0.08	0.05	0.03	0.07	0.07	0.05	NA	NA	NA
SPR-1Q3	0.12	NA	NA	0.15	NA	NA	NA	NA	NA	0.15	0.24	NA	0.23	0.13	0.33	0.37
SPR-2Q3	0.16	NA	NA	0.19	NA	NA	NA	NA	NA	0.19	0.31	NA	0.29	0.17	0.42	0.55
SPR-3Q3	0.10	NA	NA	0.13	NA	NA	NA	NA	NA	0.12	0.22	NA	0.20	0.11	0.22	0.33
NOR-1Q1	0.03	0.12	0.05	0.03	0.10	0.07	0.04	0.07	0.03	0.03	0.10	0.10	0.07	NA	NA	NA
NOR-2Q1	0.03	0.12	0.04	0.03	0.09	0.07	0.04	0.07	0.03	0.03	0.08	0.10	0.06	NA	NA	NA
NOR-3Q1	0.03	0.09	0.04	0.03	0.08	0.06	0.04	0.07	0.03	0.03	0.07	0.08	0.06	NA	NA	NA
NOR-1Q3	0.20	NA	NA	0.29	NA	NA	NA	NA	NA	0.16	0.36	NA	0.33	0.16	0.18	0.23
NOR-2Q3	0.37	NA	NA	0.51	NA	NA	NA	NA	NA	0.33	0.68	NA	0.64	0.33	0.38	0.41
NOR-3Q3	0.01	NA	NA	0.01	NA	NA	NA	NA	NA	0.01	0.01	NA	0.01	0.01	0.01	0.01



Carrying out special vessel/gear calibration experiments is almost impossible due to high effort needed and such an approach is unlikely to provide conclusive conversion factors, especially if based on too few observations. Furthermore, owing to the technical creep it is unclear to what a new vessel/gear should be calibrated to last years specific rigging or to the rigging in earlier years which is often unknown. Hence, WKNSIM favours a pragmatic approach using the advantage that two different vessels/gears are/can be allocated to each rectangle.

The new Swedish research vessel SVEA will be delivered in July 2019. The following months will be used for training the crew, tests and calibration of acoustic equipment. SVEA is scheduled to be operational in time for the Baltic international acoustic survey (BIAS) in October 2019. The first time SVEA will be used in IBTS is during Q1 2020. SVEA will use the Swedish GOV trawl that has been used on DANA since 2012 and on Argos before. Because neither trawl nor trawl doors will be changed the group agreed that no dedicated vessel calibration is needed as long as the gear geometry remains stable, i.e., that the gear parameters during fishing operation are similar to those observed on DANA. However, the spatial overlap between SVEA and other vessels should be increased to improve the estimation of vessel effects in the index calculations.

For 2020, WKNSIMP strongly suggest that Sweden can provide a minimum of 2 days for rectangle swap between Sweden/Norway and Sweden/Denmark (additional steaming time) and 2-3 days for additional stations in each, Q1 and Q3 2020 for vessel comparison.

3.2 Revision of survey area and stratification

Stratification can be used to design the sampling or data analysis for a survey, with the goal of reducing variance in the survey data by division into spatial subunits (strata), where variance within a stratum is greatly reduced, compared to the variance between strata. In several studies, a stratification of data products from the North Sea IBTS has been tested, which is based upon the spatial division developed for the ecosystem model "Atlantis" (Hufnagl et al. 2014). The purpose of this stratification has been to segregate ecologically relevant subregions of the North Sea, which can be expected to be rather stable over time, and which would affect the distribution of multiple taxa at once.

In the EU tender JMP (Towards a Joint Monitoring Programme for the North Sea and the Celtic Sea), the "Atlantis" stratification has been used to develop tools for survey planning (see www.informatiehuismarien.nl/projecten/joint-monitoring). Subsequently, in the ICES workshop WKPIMP (ICES 2016), as well as in the IBTSWG (ICES 2017a) and ICES WGISDAA (ICES 2018b), slightly modified versions of the stratification have been tested. Post-stratification was applied to the survey data, either in order to investigate options for deriving survey products of higher quality, or to evaluate possibilities of an improved survey design.

Post-stratification of existing survey data can be used as a basis for the planning of future sampling. In this, alternative options of allocating sampling effort to the individual strata can be investigated, comparing e.g. a proportional allocation (number of stations proportional to the size of a stratum) with an optimized allocation (taking both, the stratum size and the variability of its data into account). Analyses based on optimized allocation using "Atlantis" stratification have been presented at the IBTSWG (2017a), highlighting that optimization for one target species of the IBTS would lead to poorer data products for other target species at the same time. A general conclusion has therefore been that optimized sample allocation (and a possible alteration of future IBTS sampling) would not be appropriate for a survey as the NS-IBTS, which provides data for the stock assessment of multiple target species, aside from abundance data for a multitude of other groundfish species.

Cefas (Sven Kupschus) presented a combined community analysis of the quarter 1 and 3 IBTS surveys from 2001 to 2016 with the aim to determine the major spatial and temporal patterns in the ecosystem structure. The main purpose was to examine the scale of variability to assess options for more effective stratification suitable for assessing both, the trends over time consistently, and elucidating the important ecological and anthropogenic processes that affect the fish communities.

Cluster analysis of the log-transformed abundance data of the 65 most abundant species demonstrated a high degree of ordering of the data with 16 clusters reducing the within cluster dissimilarity by more than 80% (Figure 3.2.1). At this level of aggregation, the dissimilarity within clusters were comparable between clusters, but the number of samples in each cluster were unequal. Particularly cluster 1 and 7 occurred more frequently than other clusters with cluster 11 being the least frequently observed community. The species best discriminating the clusters at the various levels of aggregation appeared to be the numerically dominant species and around 50% of those species were of interest to fisheries management.

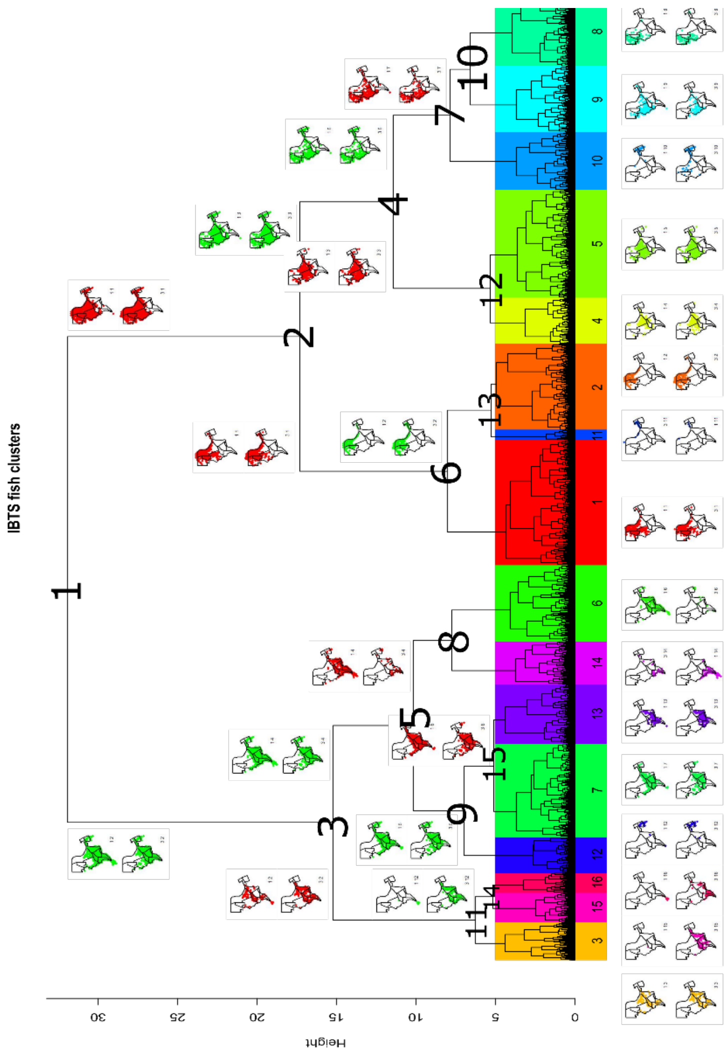


Figure 3.2.1 Dendrogram of 16 cluster cluster analysis showing the spatial distribution of samples in each division (red / green) and in each quarter (top bottom. Terminal clusters are shown in the colours used in the rest of the study. Clusters 15, 16, 14 and 8 are the dominant clusters indicating seasonal differences in community. Other clusters particularly in the southern part of the North Sea show more subtle seasonal shifts in distribution.

Little interannual variation in the spatial distribution of clusters was observed when the clusters were plotted spatially. This suggests that there has been little change in the demersal fish communities in the North Sea at this level of disaggregation. Such clusters would be suitable as a stratification scheme to investigate ecosystem changes at increased levels of precision compared to random sampling scheme. Although the clusters demonstrate some spatial overlap they demonstrate strong spatial fidelity particularly in the north of the survey area. In the southern region, there is an increased degree of overlap between clusters spatially. However, the spatial overlap is significantly reduced when examining the distributions by quarter suggesting that there are intra-annual changes in the communities between quarter 1 and 3.

The clustering method, the transformation, the species considered all have the potential to affect the assignment of a sample to a cluster complicating the derivation of strata from the analysis as different strata are likely to be more appropriate for different evaluation purposes. The IBTS is a multi-purpose survey used in both, stock and environmental assessments, as well as scientific investigations where a balanced consideration of variance across many objectives is desirable. It is, therefore, important to consider the effects of the afore mentioned choices.

Many species were present in multiple clusters and the difference in abundance ('ratio' in the simper analysis) between clusters were comparatively close to 1 leading to the conclusion that the cluster represent gradients in species distribution rather than specific changes in habitat. Indeed, a detrended correspondence analysis demonstrated that the identified clusters represented smooth transitions between communities as opposed to distinct differences. Therefore, the choice of clustering method and the number of clusters used in stratification are largely arbitrary, as is the exact position of the stratum boundary when considering the spatial location of clusters as long as they are perpendicular to the underlying ordination gradients.

While clustering is driven by the more abundant species, there is concern that a survey design based on such clusters could be weak at resolving changes in abundance of rarer species, which may be of high ecological relevance. Incremental exclusion of abundant species from clustering indicated that rare species were largely absent from the central areas of the North Sea while dominating in the coastal regions and in the transition zones between North Sea adjacent marine ecosystems: the Atlantic in the north, the Baltic in the east and to a lesser degree the English Channel in the south. With each reduction in the number of abundant species the analysis was applied to fewer samples, but the level of splitting was retained at 16 so that effective resolution of clustering increased while the impact of sampling variability on the clustering was likely to decrease. The spatial structure of clusters remained coherent with the original clusters demonstrating that stratification may serve the analysis of rare and abundant species equally.

Examination of species richness as a metric of biodiversity (not corrected for small variations in sampling effort / tow duration) indicated that species richness and the clusters of rare species were strongly correlated, suggesting that species richness could be equally well monitored using the strata (Figure 3.2.2). In addition, it is clear that areas of high fish biodiversity in the North Sea are driven by species being shared in the transition zones to adjacent seas and the inshore coastal waters. As such these areas represent ecotones so it may be at least questionable basing meaningful conservation measures on the existing species diversity. These habitats are likely to be marginal rather than core habitats for many of the species found here.

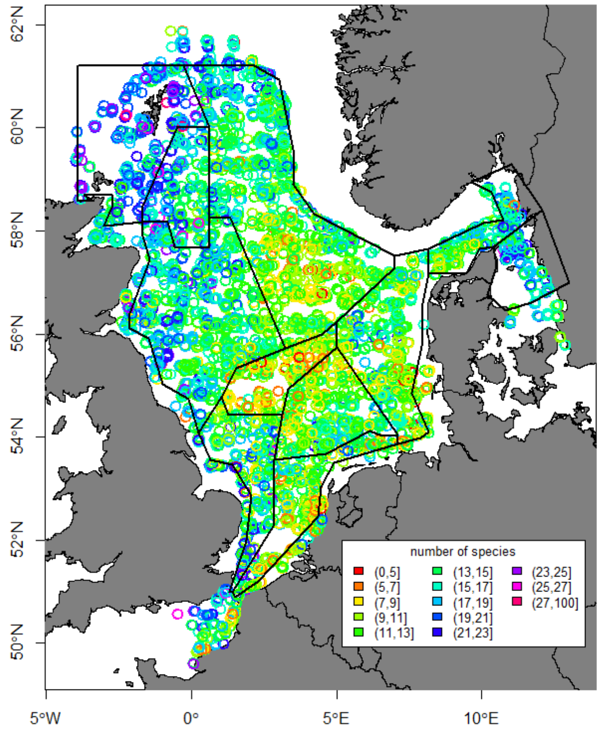


Figure 3.2.2 Spatial plot of species richness in number of species showing higher values in the coastal and marine transition zones. Also plotted are the modified Atlantis strata used in ecosystem modelling which were found to be similar to the community structures indicated by the cluster analysis (Figure 1)

The analysis indicated that clustering of the IBTS fish communities presented a useful approach to deriving spatially distinct strata as part of an efficient stratification system irrespective of the metric examined. Many of the spatial features described matched well with what is known about the hydrography of the area and the origins of the water masses in the different parts and could therefore be reasonably expected to also apply for pelagic, particularly planktonic, organisms although one would likely expect a much stronger seasonal signal than observed in the demersal communities. The spatial distribution of the epibenthic commun ities (invertebrates) from the Dutch beam trawl survey were also found to closely resemble the observed spatial structures, indicating that less mobile organisms (at the adult phase) could also be efficiently assessed with a similar design.

The main conclusions were:

- Existing data from the IBTS surveys contains a lot of internal consistency and is highly structured with regards to the community structures in the samples.
- Spatial structure / design largely independent of objectives.
- Temporal and spatial consistency of communities provide confidence in the ability to detect change.
- Sampling levels suggest high levels of replication by systematic design, better stratification leads to higher precision / spatial scale of variability is less than scale of sampling.
- It raises a number of questions regarding our status-based monitoring approaches for ecosystem status without considering underlying processes.

3.3 Tools for evaluating survey effort options

3.3.1 MIK sampling of herring larvae in Q1

The MIK sampling is carried out during the Q1 IBTS and aims at the distribution and abundance of large herring larvae (i.e. > 18 mm SL). Sampling is carried out during the night with a 2-m-midwater-ring-trawl down to a maximum depth of 100 m. Each participating nation is responsible for carrying out 2 MIK hauls per each ICES rectangle, which would ideally result in a total of 4 hauls per rectangle. The resulting total abundance of herring larvae in the North Sea, eastern Channel, and Kattegat and Skagerrak is used as a recruitment index in the assessment of the North Sea herring stock. While IBTSWG is providing the platform for carrying out this survey, most of the methodological issues have been increasingly dealt with in the ICES working group on cod and plaice egg surveys in the North Sea (WGEGGS2) and will be fully supported by its successor, the working group on surveys on ichthyoplankton in the North Sea and adjacent seas (WGSINS).

The announcement of the agenda for WKNSIMS raised concerns within members of WGEGGS2/WGSINS, that changes in the survey design of the Q1 IBTS could negatively impact the night time MIK sampling. In order to investigate those impacts, the following possible reductions in sampling effort on the results of the MIK survey were tested (Matthias Kloppmann, Thünen Institute of Sea Fisheries):

1. Effort reduction by rectangle
2. Overall reduction of sampling over the entire North Sea, irrespective of sub-area or rectangle
3. Overall reduction of sampling per each sub-area, irrespective of rectangle

Reduction was done by randomly selecting a subset of the stations per year from the currently available time series of MIK herring larvae data from 1992 to 2019. For each setup, 100 runs of calculating the index time series were done, and the mean, minimum and maximum values per each year were plotted for the resulting time series. Sub-setting by rectangle and calculation of the index was done by either selecting 1 or 2 hauls, or by an overall reduction to 50 % of the available hauls.

Overall reduction of sampling by either the entire area or by subarea was done by randomly selecting 30, 50 or 70 % of all available hauls in those regions per year. For those setups, also two different methods of index calculation were selected: either by first aggregating the hauls by rectangle and then by sub-area, according to the manual (ICES 2017b), or by aggregating by sub-area only before raising the herring larvae abundance to the entire survey area.

Apart from the early years, 1992 – 1998, where the number of available stations was the lowest (230 – 400 hauls), a reduction of survey effort down to 50 % didn't appear to change the perception of the trends in the MIK index. MIK index trends appear to be relatively robust to effort reduction, irrespective of whether samples come from a systematic, stratified or non-stratified design, and how data are aggregated for index calculation. Furthermore, systematic sampling by rectangle didn't appear to have advantages over stratified sampling with respect to reduction in total variability (Figure 3.3.1.1)

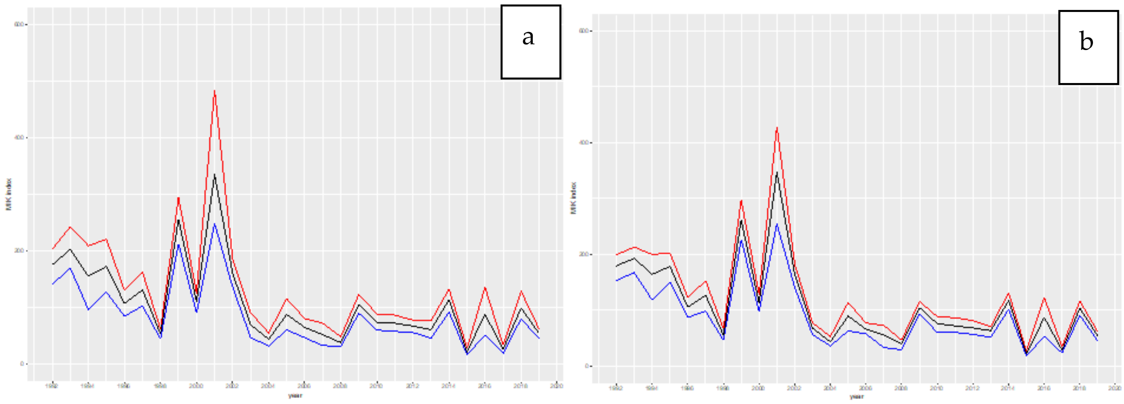


Figure 3.3.1.1 MIK index by randomly selecting 50 % hauls per subarea (a) and by randomly selecting 50 % hauls per rectangle (b), aggregated by subarea only; blue line minimum, red line maximum and black line the mean. Mean value also corresponds to the valid index time series.

The results indicate that the effort in MIK sampling could be reduced if survey time is needed for other purposes without risking to impair the time series. A reduction of plankton samples could also enable participants to fully work up the ichthyo- or other plankton species from the samples thereby producing additional valuable ecological information, and/or allow for the analysis of the accompanying MIKeyM-net sampling (ICES 2018c).

The consequences of this exercise, however, needs to be further investigated by WGSINS who should also evaluate and redefine the objectives of the MIK survey. The outcome of WGSINS's considerations need to be discussed and for the herring larvae approved with and by the herring assessment working group (HAWG).

3.3.2 GOV trawl sampling for abundance indices of cod, haddock and whiting: Reducing number of station vs reducing tow duration

Cefas (Sven Kupschus) has developed a framework for evaluating survey performance at the assessment level for North Sea gadoids. This had been presented the first time at the IBTSWG 2019 meeting (ICES 2019b) and an update of this work was discussed during WKNSIMP.

Two methods of halving the sampling effort were compared, the first halving the tow duration, the other halving the number of stations fished in both the Q1 and Q3 NS-IBTS surveys for cod, haddock and whiting. Two different methods of index calculation (the current ICES indices used for haddock and whiting in so far as could be replicated and the delta-gam method used for cod) were applied to each of the species. For simulations using only 50% of the stations, stations were randomly subsampled from a post stratification scheme based on ecological strata.

The results suggest that:

- The impact of using different methods for survey index calculation had a bigger effect on the assessment outcomes than did the reduction in sampling effort.
- Reducing the number of stations is preferable to reducing tow duration under the condition that a random selection of stations i.e. from biological meaningful strata is possible (Figs. 3.3.2.1).

For further methodological details are given in the IBTSWG 2019 report (ICES 2019b).

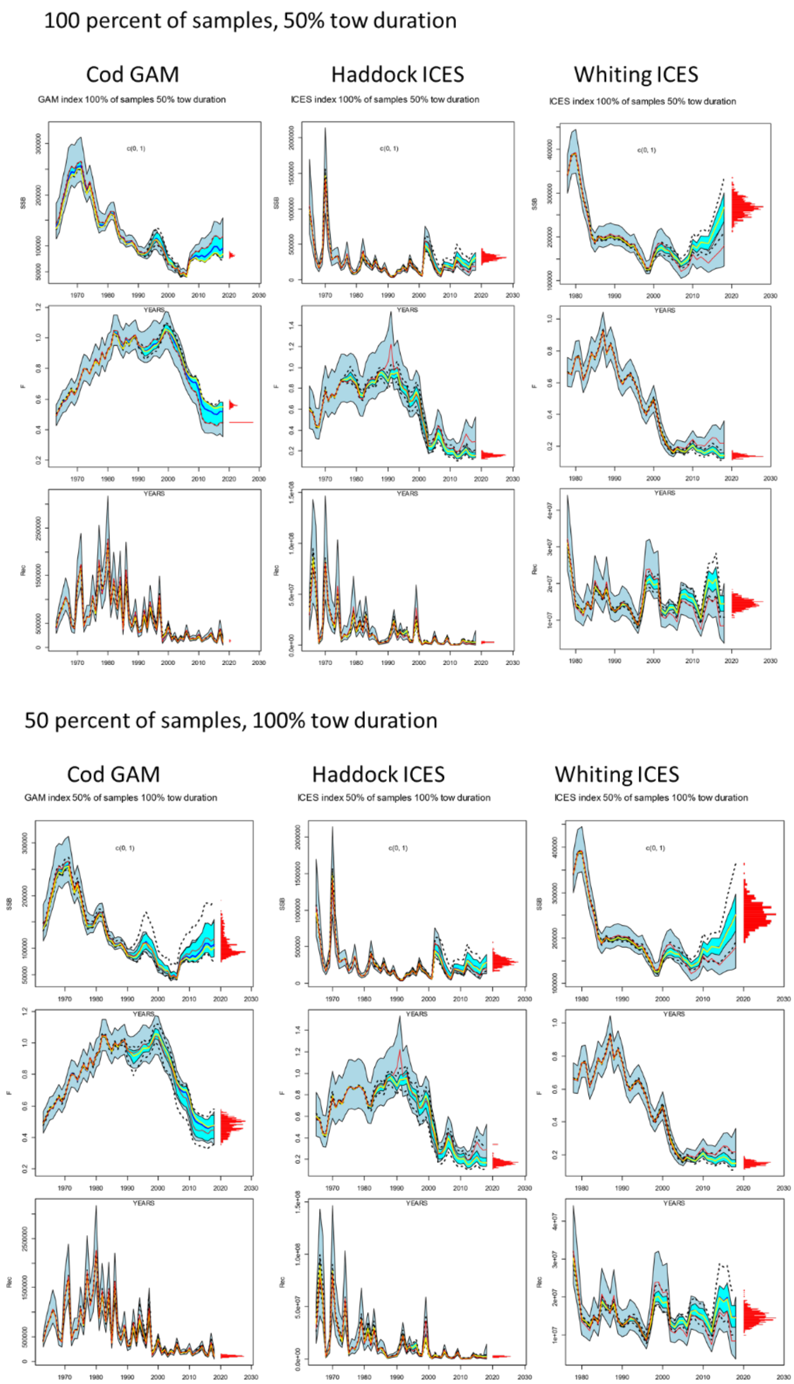


Figure 3.3.2.1: Stock assessment output for three species (NS cod, haddock, whiting left to right, SSB, F, recruitment top to bottom) compared to the current stock assessment as performed by WGNSSK 2018 using the approved index method for each assessment (Red line and grey-blue polygons indicate the estimate and the uncertainty according to the current stock assessment. Yellow and blue lines show the median and mean of the 500 simulations, with cyan polygons and dashed lines indicating 95% ci and min and max. Red histograms indicate the distribution of the 500 results).

4 Roadmap for implementing changes

4.1 Vessel comparison Svea/Dana and Svea/GO Sars

WKNSIMP concludes from past experiences that in order to be effective, inter-ship calibration experiments would need to be very extensive covering multiple habitats and a large number of samples. The resources for an effective calibration exercise are unlikely to be available. In addition, the IBTS survey design lends itself to estimating ship effects due to the overlap inherent in the survey design.

WKNSIMP suggests the following:

Increase the overlap in the existing survey design by swapping some rectangle allocations between countries (minimum 2 extra days for additional steaming associated with the swaps) and by adding extra tows that increase the habitats covered and the number of ships that are involved in the "vessel comparison".

- Sept 2019: meeting Sweden, Norway and Denmark to agree on change of rectangle allocation to increase overlap and placing of additional tows
- Feb 2020: conduct Q1 survey with increased overlap
- Apr 2020: present initial results to IBTSWG
- Aug 2020: conduct Q3 survey with increased overlap
- Sept/Oct 2020: analyses of data, present to WGISDAA and decide whether to continue with the increased overlap between Sweden and Denmark and Sweden with Norway in 2021
- Apr 2021: present final results to IBTSWG and report

4.2 New survey trawl

Implementing the new gear on the IBTS surveys should follow a similar approach as suggested for the introduction of new vessels for the same reasons as the ships approach. A phased introduction of the new gear in both quarters prioritising ships that spatially overlap that have precise estimates of ship effects (actually combined ships and gear effects).

- Nov/Dec 2019: Scotia gear trials
- Apr 2020: IBTS WG decides on gear
- May 2020: Workshop with scientists in charge and fishing masters
- June 2020 – Feb 2021: Gear tests by every country/vessel
- Apr 2021: IBTSWG discuss results, define minimum and maximum limits for vertical opening and door spread for valid tows and prepare final manual on the new gear

- Feb 2022: structure phased implementation of new survey gear by all countries in the Q1 survey

WKNSIMP strongly encourage participation of NS-IBTS members in the Scottish gear trial survey in Nov/Dec 2019. Contact for details are Robert Kynoch and Finlay Burns, Marine Science Scotland.

4.3 Change of stratification

WKNSIMP suggests the following:

- No change of the a priori stratification before the implementation of the new gear is completed, to avoid confounding effects.
- Avoid designs that are not attempting a random station allocation within a stratum.
- In order to maintain time series consistency, do not use an adaptive design, where e.g. effort is placed in areas where e.g. cod is abundant one year, and then sample more there in the consecutive year.
- Continue with post-stratification analyses, i.e. based on example / target species (reduction of survey CV's) and/or biodiversity indices (theoretically exploring 'optimal' allocation of stations to strata; once done keep it stable i.e. do not change from one year to the next).

5 References

de Boois, I. J. (Ed). 2019. Moving towards integrated ecosystem monitoring. ICES Cooperative Research Report No. 347. 44 pp. http://doi.org/10.17895/ices.pub.4703

Hufnagl, M., Fulton, E.J., Gorton, R., Keth, A., Kempf, A., Le Quesne, W.J., Kreus, M., Garcia-Carreras, B., Savina-Rolland, M., Pinnegar, J.K., Peck, M. (2014). Atlantis 1 - North Sea. In: Holistic framework(s) for assessing multiple drivers. Deliverable 5.1.3 of the EU project VECTORS. www.marine-vectors.eu.

ICES. 2015. Report of the International Bottom Trawl Survey Working Group (IBTSWG), 23-27 March 2015, Bergen, Norway. ICES CM 2015/SSGIEOM:24. 278 pp.ICES. 2016a. Working Group on Integrating Surveys for the Ecosystem Approach (WGISUR), 26-28 January 2016, Hamburg, Germany. ICES CM 2016/SSGIEOM:27. 45 pp.

ICES. 2016b. 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. 2017a. Interim Report of the International Bottom Trawl Survey Working Group. IBTSWG Report 2017 27-31 March 2017. ICES CM 2017/SSGIEOM:01. 337 pp.

ICES. 2017b. Manual for the Midwater Ring Net sampling during IBTS Q1. Series of ICES Survey Protocols SISP 2. 25 pp. http://doi.org/10.17895/ices.pub.3434

ICES. 2018a. Report of the International Bottom Trawl Survey Working Group (IBTSWG), 19 - 23 March 2018, Oranmore, Ireland. ICES CM 2018/EOSG:01. 233 pp.

ICES. 2018b. Report of the Working group on improving use of Survey Data for Assessment and Advice (WGISDAA). 3-5 July 2018. Copenhagen, Denmark. ICES CM 2018/EOSG: 15. 30 pp.

ICES. 2018c. Manual for egg survey for winter spawning fish in the North Sea. Series of ICES Survey Protocols SISP 13. 19 pp. http://doi.org/10.17895/ices.pub.5225

ICES. 2019a. Workshop on Methods to develop a swept-area based effort index (WKSABI). ICES Scientific Reports. 1:3. 24 pp. http://doi.org/10.17895/ices.pub.4902

ICES. 2019b. Report of the International Bottom Trawl Survey Working Group (IBTSWG), 1 - 5 April 2019, Den Helder, The Netherlands.159 pp. 10.17895/ices.pub.5596

Annex 1: List of participants

Name	Institute	Country	
Ralf van Hal	Wageningen Marine Research	The Netherlands	
Donald Clark	Fisheries and Oceans	Canada	
Sven Kupschus	CEFAS	UK England	
Rob Kynoch	Marine Scotland Science	UK Scotland	
Jim Drewery	Marine Scotland Science	UK Scotland	
Kai Wieland (chair)	DTU Aqua	Denmark	
Casper Berg	DTU Aqua	Denmark	part time, remotely
Patrik Börjesson	SLU	Sweden	
Maria Hansson	SLU	Sweden	
Anne Sell	Thünen Institute of Sea Fisheries	Germany	
Matthias Kloppmann	Thünen Institute of Sea Fisheries	Germany	
Alexander Kempf	Thünen Institute of Sea Fisheries	Germany	
Nikolaus Probst	Thünen Institute of Sea Fisheries	Germany	
Christoph Stransky	Thünen Institute of Sea Fisheries	Germany	part time (day 3)

Annex 2: Resolutions

2017/2/EOSG10

The **Workshop on Impacts of planned changes in the North Sea IBTS** (WKNSIMP), chaired by Kai Wieland*, DK, will meet in Bremerhaven, Germany, 18–21 June 2019 to:

a) Review expected near future changes in the North Sea IBTS (Science plan codes 3.1);

b) Evaluate the impacts of the planned changes in the NS-IBTS on data consistency for stock assessments and ecosystem indicators (existing and potential future indicators where expertise are available) and examine options to minimise the impacts (design based and model based approaches) (Science plan codes 5.1);

c) Advise on the implications of different change-options on future survey deliverables and how to minimise the impact of necessary changes (Science plan codes 3.2).

WKNSIMP will report by 5 August 2019 for the attention of the ACOM and SCICOM.

Supporting information

Priority	The NS-IBTS is an important source of fisheries independent information for stock assessements of several North Sea stocks and provides additional information on biodiversity and marine litter. Changes of the survey, howeverer, cannot entirely be avoided (e.g. change of vessels and survey gear in the future due to technical reasons but it is crucial that the consistency of the time series is impaired as less as possible.
Scientific justification	Term of Reference a) Several countries will replace their research vessels in the near future. The current survey gear (GOV) is old fashioned and it becomes more and more difficult to get the material for repairs. Furthermore, ideas have been discussed in the recent years to modify the NS-IBTS towards an ecosystem survey, and there may be other changes the various survey participants may wish to implement e.g. a new stratification, random station position selection and allocation of sampling areas to the different countries. Term of Reference b) All the expected changes will potentially impact the quality and consistency of the time series provided by the NS-IBTS but its magnitude may likely differer depending on the purpose for which the data area used. Term of Reference c) There different ways to implement the unavoidable or wanted changes: - Implementation in both the 1Q and 3Q NS-IBTS at the same time, - Abrupt implementation of all change in the 3Q IBTS, or - Gradual implementation in the 3Q IBTS over an perido of several years, and advice is needed which approach would minimize the impact on the suitability of the data to be used for the various purposes .
Resource requirements	The research programmes which provide the main input to this group are already underway, and resources are already committed. The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	Is that the workshop will be attended by 10–20 survey and stock assessment expert group members and guests.
Secretariat facilities	None.
Financial	No financial implications.

Linkages to advisory committees	There are no obvious direct linkages with the advisory committees.
Linkages to other committees or groups	There is a very close working relationship with many of the groups of the SSGIEOM Committee. It has relevance to WGNSSK and end-user workshops with the RCGs
Linkages to other organizations	This work is of interest to the RCGs and the national governments in developing their monitoring programs. The workshop is also of interest for MSFD groups related to OSPAR. Both these groups will be contacted ahead of the workshop to ensure

Annex 3: Agenda

Day 1

ToR	Topic description	Activities	
Tuesday, June 18th , 12:30-19:00*, together with WGISUR			
	Setup of computers, projector and internet connections		
	Welcome, practical issues, Introduction of participants and their roles, name cards		Kai, Anne
	Painting the appearance of the current NS-IBTS - How do you see the survey? - What is the data quality? - Who is responsible? - Who are the (main) stakeholders? - Who can change the survey and to what extent?	Interactive session getting input from all the participants	
a), b)	The real picture of the current NS-IBTS seen by the IBTSWG	Presentation	Kai
	Do the already 'implemented' unavoidable adaptions in the survey change the view of data end users?	Interactive session	
	When we have to change, we should then change for the better! - Improve consistency (how?) - Extending areas and depth range to follow species distributions - Cover additional habitats - Monitoring in an ecosystem context Wish list - What should be part of the NS-IBTS according to you? - What must be maintained? - Is there anything which can be left out or can effort for the current routine tasks be reduced?	Work session in subgroups	
	Welcome address by Gerd Krauss, Director of Thünen Institute of Sea Fisheries	Plenary	
	Plenary explaining each subgroup's wish list	Plenary presentations	

*: meeting room is available in the morning for preparatory work,

Coffee/tea break 15:30 – 16:00

Day 2

ToR	Topic description	Activities	
Wednesday, June 19th , 8:30 - 14:00*, together with WGISUR			
a), b)	What requirements should be met before the change can be implemented? - Replacement of the survey trawl Do we need gear calibration experiments and if so, how many? - Replacement of research vessels Do we need vessel calibration experiments and if so how should they be design or can we 'survive' without such experiments being pragmatic (increasing rectangle overlap between incoming and existing vessels)? - Change of survey stratification (ecological strata instead of rectangles) Is it desirable? (Pro's and Con's) What information/analysis is needed before we can consider such a change? - Statistical analysis showing the impact on data products for end users Who is doing or can do what?	Discussion session Presentations / Poster / Working documents / Background documents (may include experience and examples from other surveys and regions)	
		Assignment of tasks to write sections for the report	

*: Coffee/tea break 10:30–11:00, summer party at the institute, after 14:00

Day 3

ToR	Topic description	Activities	People
Thursday, June 20th , 9:00-13:00*, together with WGISUR			
c)	Strategies for implementation of changes in the North Sea IBTS - considering that we have 2 annual NS-IBTS (Q1 and Q3) and that Q3 includes - 1 national survey which covers the entire North Sea The road ahead - What should be done first? - How to arrange buy-in/support? - Potential funding options if needed Drafting of recommendations and action list	Work session in subgroups Discussion in plenary	

	14:30-17:30*		
a), b), c)	Outstanding issues	Discussion, Adoption of recommendations and actions, Report writing	

*: Coffee/tea breaks 10:30–11:00 and 15:30-16:00, Lunch break 13:00-14:30

Day 4

ToR	Topic description	Activities	People
	Friday, June 21st , 9:00-10:30*		
a), b), c)	Draft report	Presentation of draft report sections, Adoption of recommendations and actions, Adoption of draft report	
	Final wrap up and closure.		Kai

*: Coffee/tea break 10:30 -11:00

Annex 4: List of presentations

Kai Wieland: The North Sea IBTS - Current state and future challenges.

Matthias Kloppmann: The MIK survey for large herring larvae - What are the consequences of effort reduction in the MIK survey.

Casper W. Berg: Model based survey indices - gear and ship effects.

Sven Kupschus & Matthias Kloppmann: Ecosystem structure analysis of the North Sea IBTS data 2001-2016.

Sven Kupschus: Comparison of sampling levels across different index calculations for North Sea gadoids.

Annex 5: Action list

- Sweden (Maria, Patrik) organize a meeting with Norway (Erik) and Denmark (Kai) for planning Q1 sampling in Skagerrak / North-eastern North Sea for increasing overlap (swapping rectangles) and additional Swedish/Norwegian tows for comparison with the new Swedish vessel Svea (preferred time: Sept 2019, possibly in conjunction with ICES ASC), Kai/Barbara to prepare draft maps, report back to Q1 coordinator (Ralf)
- Scotland (Rob) distribute trawl drawings to IBTS members
- Scotland (Rob) distribute invitation for participation in Scottish gear trial survey(s) in Nov/Dec 2019 to IBTS members
- National IBTS representatives to explore funding possibilities for the implementation of the use of the new IBTS trawl, e.g. for additional gear trials at the different research vessels in 2020/2021 (ship time, quality assurance, staff exchange)
- NS-IBTS Q1 and Q3 coordinators (Ralf, Kai) to draft a plan for a structured phased implementation of the new IBTS trawl prior to IBTSWG meeting in Apr 2020.
- EOSG chair (Sven) / IBTSWG chair(s) to inform RCG North Atlantic and North Sea and Eastern Artic (NANSEA) chairs on expected changes of the NS-IBTS
- IBTSWG (Ralf/Sven) to organize a workshop (Scientist in charge/gear technologists, fishing masters) on deciding on the future IBTS trawl in 2020.
- IBTSWG (Anne, Sven) continue with post-stratification analyses, i.e. based on example / target species (reduction of survey CV's) and/or biodiversity indices ('optimal' allocation of stations to strata).