SCALLOP ASSESSMENT WORKING GROUP (WGSCALLOP)

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Contents

i Executive summary

The ICES Scallop Assessment Working Group (WGScallop) discuss the key issues surrounding scallop species and is working towards the development and improvement of appropriate stock assessment methods. The Working Group (WG) shares expertise on survey methodologies, advances in technology and recent studies on scallop species. The information and knowledge sharing is a key component of this group which improves scientific understanding of scallop populations, biology and fisheries.

The review paper on dredge efficiency is in draft and the group aim to publish next year. Surveys continue to be kept under review and the WG will attempt a staff exchange when travel is permitted.

A data call was agreed in 2019 and issued in 2020 and 2021. This allowed the collation of scallop fisheries data, and time was spent reviewing the quality of data received and making improvements to the data call. The fisheries data are reported in the annual WG reports and have been utilised for scallop stock assessments.

The WG formed a subgroup to assess king scallop stock(s) in the northern Irish Sea (around Isle of Man). The WG collated data and are developing a modelled survey index which will be used with fisheries data to assess the stock. The group discussed the merits of using Surplus Production Model in Continuous Time (SPiCT) and this work will continue through the sub group. It is envisaged that by the end of WGScallop next three-year term, the science will be sufficiently developed to allow for an ICES Viewpoint on king scallop stock status in this area to be published.

Priorities for future work include scallop stock connectivity, larval dispersal and genetics, and the WG have recruited a number of PhD students. The WG aim to collaborate with other WGs and preliminary discussions have started with the Working Group on Operational Oceanographic Products for Fisheries and Environment (WGOOFE), Working Group on Spatial Fisheries Data (WGSFD) and Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). The WG continues to work alongside the Workshop on Scallop Aging (WKSA).

ii Expert group information

Expert group name	Scallop Assessment Working Group (WGSCALLOP)
Expert group cycle	Multiannual
Year cycle started	2019
Reporting year in cycle	3/3
Chair(s)	Lynda Blackadder, Scotland, UK
Meeting venue(s) and dates	8–11 October 2019, Douglas, Isle of Man (22 participants)
	5–9 October 2020, online meeting (28 participants)
	4–8 October 2021, online meeting (31 participants)

1 List of Terms of Reference (ToRs)

a) Compile and present data on scallop fisheries in ICES subareas 2, 4, 5, 6 and 7 by collating available fishery statistics.
b) Review recent/ current stock assessment methods of the main scallop species and explore other methodologies; including comparisons with fishery dependant indicators.
c) Collate all available data and attempt to conduct a stock assessment for the north Irish Sea.
d) Review and report on current scallop surveys and share expertise, knowledge and technical advances.
e) Continue to refine stock structure using best available information on genetics and larval dispersal and look to improve current mapping of scallop stocks.
f) Keep current biological parameters under review and update when more information becomes available and report on all relevant aspects of: biology, ecology, physiology and behaviour, in field and laboratory studies.
g) Compare age reading methodologies and attempt to develop common practices and determine precision and bias of scallop age reading data derived from different readers.

2 Summary of workplan 2019–2021

Every year the WG reviewed and reported on current scallop work and shared expertise, knowledge and any technical advances and each year a WG was produced.

The first year aimed to and successfully drafted and issued a data call for landings and effort data, we collated a list of data potentially available for the Irish Sea, drafted a resolution for an age reading workshop, planned for a scientific staff exchange on surveys and discussed current scallop stock assessment methods.

In the second year we aimed to and successfully collated the available data for the Irish Sea, and held an age reading workshop (ICES WKSA). The plans for staff exchange were disrupted due to the global Covid-19 pandemic and our annual meeting was held online. Many people experienced severe disruptions to their family and work environments.

The third year aimed to conduct a stock assessment for the Irish Sea, issue scallop age reading guidelines, produce maps on genetic stock structure and larval dispersal, and further develop scallop stock assessment methods. Progress updates for each ToR are listed below.

3 Final report on ToRs

3.1 ToR a) Compile and present data on scallop fisheries in ICES subareas 2, 4, 5, 6 and 7 by collating available fishery statistics

In 2019, the WG had only limited access to scallop landings and effort data through the ICES Regional Database (RDB). A sub group evaluation noted data missing from countries with known scallop fisheries and inconsistencies in the landings when compared to national in-house data sources. The WG agreed a data call was required and ICES issued this in August 2020 and January 2021; requesting landings and effort data for scallop species in ICES areas 2, 4, 5, 6, 7 and 8. A copy of the 2021 data call is available in Annex 4 (see also ICES data call library: https://www.ices.dk/data/tools/Pages/Data-calls.aspx)

The quality of the data received through the data call process were highlighted and discussed and then the WG attempted to rectify any issues (if possible), but also considered the implications and tried to assess the scale of any issues (Table 1).

The 2002–2019 Scottish data were resubmitted in 2021 because of an error in the calculation of effort. In the 2020 submission, all the kWdays were calculated using days at sea rather than fishing days. Now we are able to calculate the fishing days for the years that iFish data are available (2017 onwards). This ensures the effort calculation aligns with the format requested in the 2021 data call. Years prior to 2017 are still calculated using days at sea. Using fishing days for the years 2017 onwards results in a decrease of kWDays of approx. 11–15 % from what was previously submitted.

In 2020, there were some issues with duplicate trips in the 2019 and 2018 iFish data, which affected the total landed weight in the 2020 WGScallop submission. In addition to this, there are additional landings as records are added/corrected/updated in iFish over subsequent years. Corrections have been made to the affected duplicate trips identified, resulting in a small decrease in the total landed weight in the resubmitted data.

For some of the years prior to 2017 a correction to the calculation of kWdays has now been made for trips with multiple gears. In the 2020 submission, the calculation of kWdays was incorrectly doubled for these trips, leading to an overall inflation of the effort by ca. 1%. This has now been corrected.

The Republic of Ireland did not submit their 2020 scallop fisheries data by the requested date but were able to provide the data during the WG. It was also noticed that there only appeared to be one metier reported (DRB_MOL). Discussion revealed this was a consequence of only providing information for the Irish scallop fleet (vessels with the permit to fish for scallops). The extraction was re-run, to include all the scallop landings, (not just for the subset of Irish scallop vessels), so landings from other metiers (typically bycatch) are included. They represent a very small proportion of the landings for king scallop.

England submitted data on behalf of England, Wales and the Isle of Man but acknowledged that there was an issue with the effort calculations and this was successfully rectified during the WG meeting and highlights the importance of the quality checking role of the WG.

Table 1. Issues identified with the 2021 WGScallop data call and steps taken to rectify them.

Country	Issue(s)	Solution(s)	Implication(s)
Belgium	No data prior to 2006. No queen scallop data.	No solution.	Minor underestimation of data. Unknown magnitude of underestimation of queen scallop data.
Denmark	All data reported with species code SCX, and therefore not species specific. No data for 2000–2002 and 2017–2020.	Data not included in any figures or tables.	Unknown magnitude of underestimation of data.
France	Large quantities of effort reported for gears unlikely to be targeting scallops.	France king scallop effort and LPUE data restricted to dredge metiers for figures and tables.	Minor underestimation of effort and overestimation of LPUE.
Guernsey	Data not provided by ICES statistical rectangle.	Data not included in any figures or tables.	Minor underestimation of data.
Isle of Man	Underestimation of data prior to 2011.	No solution.	Major underestimation of data.
Jersey	Data not provided by ICES statistical rectangle.	Data not included in any figures or tables.	Minor underestimation of data.
Netherlands	No data for 2020.	No solution.	Minor underestimation of data.
Norway	Incorrect effort units. No data for 2000–2004 and 2020. No queen scallop data.	Norway effort not included in any effort or LPUE figures or tables.	Minor underestimation of effort and overestimation of LPUE. Unknown magnitude of underestimation of queen scallop data.
Republic of Ireland	Only data from metier DRB_MOL provided for 2000–2004.	No solution.	Minor underestimation of data.
Scotland	No data prior to 2002. Data resubmitted in 2021. Potential underreporting of landings of QSC in area 6a.	Data resubmitted 2002–2019. QSC data for 6a still being investigated.	Major underestimation of data for QSC in 6a.

The WG would like the data call to continue, and acknowledge that whilst progress has been made to collate the landings and effort data, there are still issues with the process which can be improved. This year we included a list of national experts and the data submitters were requested to contact their national expert to provide further quality assurance prior to the data being submitted. We also provided further guidance on the scallop species of interest and the reporting format for gear codes to be used in the metiers.

The group discussed the possibilities of one UK institute running the scripts for the fisheries data extraction from the central iFISH database. This would ensure a single point of contact and allow for one code/set of scripts, and one checking procedure. The group discussed this but felt it was not appropriate and that each national institute should continue to submit their countries data as requested in the data call. The WG did however agree that codes and scripts used for the data extraction should be shared between institutes to ensure the same protocols for aggregation were being followed. It was highlighted that this is likely already happening for other WG and data calls but that this group should seek assurances that the scallop fisheries data are being checked, processed and aggregated following the same procedures and that this is something we could possibly highlight in the data call.

King scallop landings dominate the landings and collation of preliminary king scallop landings show the majority are from ICES subarea VII (Table 2). Total landings have increased steadily over the period from 2000 to 2012 with a peak in the time-series of approximately 64 000 t landed for the sub areas reported (Figure 1). Landings fell slightly but have been increasing again and were reported as approximately 57 434 t in 2020.

Table 2. Provisional landings (live weight (including shell), t) of king scallops for 2000–2019 by ICES subarea as submitted through the ICES data call. Data for the Isle of Man is not available prior to 2011 and data for Scotland are not available prior to 2002.

			ICES area					
Year	I	II	IV	V	VI	VII	VIII	Total
2000	0	NA	147.9	0	122.5	23964.1	783.2	25017.7
2001	0	NA	814.8	0	79.5	26965.4	1048.5	28908.2
2002	0	NA	3174.9	0	6651.1	32104.6	788.7	42719.3
2003	0	NA	4222.3	0	5968	32866.9	973.3	44030.5
2004	0	NA	5674.5	0	5145.5	40618.7	902.9	52341.6
2005	0	666.5	4916.3	0	4409.7	44238.9	1038.4	55269.8
2006	0	788	4889.9	0	3392.7	41710.6	1189.3	51970.5
2007	1.2	864.1	5458.2	0	3028.3	42888.6	1340.6	53581
2008	0	896.7	4805.4	0	3909.4	45841.5	1288.7	56741.7
2009	0	742.8	5361.4	0	3545.7	44982	906.1	55538
2010	0	748.5	4829.2	0	3438.8	51334.3	479.4	60830.2
2011	0	715.3	3800.8	0	3503	53267.7	260.7	61547.5
2012	0	664.3	5532.2	0	5300	52219.2	874.6	64590.3
2013	0	678.4	7596.5	0	4536.7	49769.1	826.7	63407.4
2014	0	747.8	7072.5	0	5306.7	41465.4	348.2	54940.6
2015	0	555.7	9027.8	0	4357.1	39803.9	496.6	54241.1
2016	0	545.6	7706.9	1.6	4737.4	43802.5	677.2	57471.2
2017	1.3	486.6	7669	0	3569.3	46145.7	716.2	58588.1
2018	0	559.2	6249.4	0	2938	50794	718	61258.6
2019	0	447.9	5642	0	2900.8	52402.1	617.1	62009.9
2020	0	NA	6469.3	0	2165.6	48121.5	678.4	57434.8

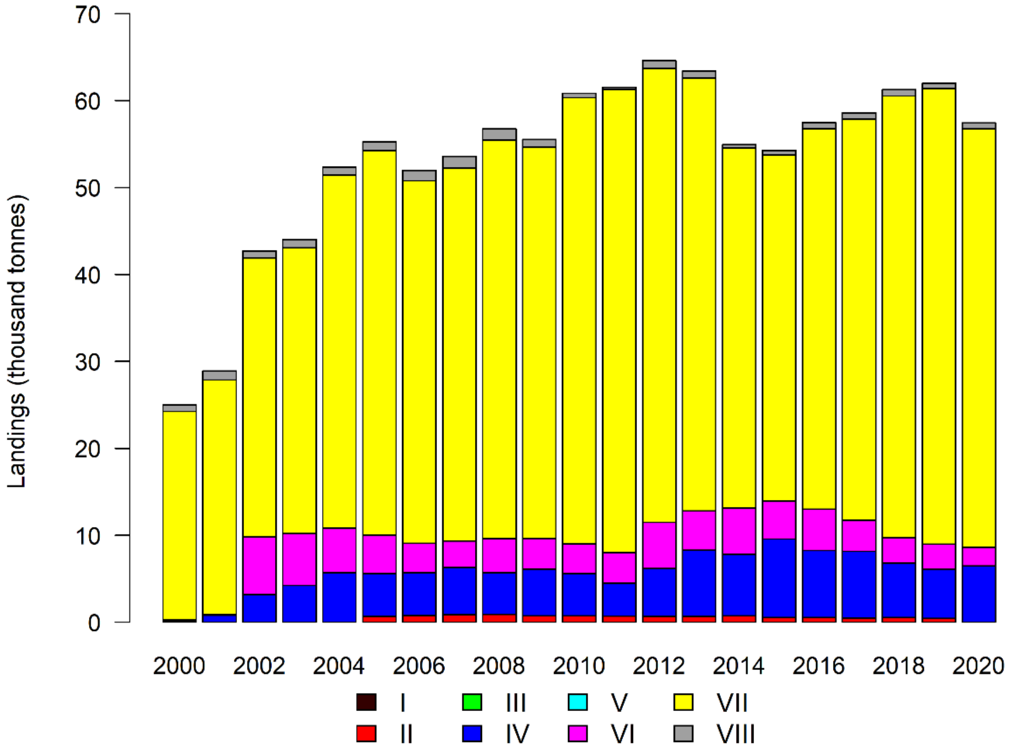

Figure 1. Annual landings (live weight (including shell), thousand t) of king scallops each year. Landings are divided by ICES Subarea within each year as coloured by the legend. Data for Isle of Man are not included prior to 2011 and Scotland are not included prior to 2002.

3.2 ToR b) Review recent/current stock assessment methods of the main scallop species and explore other methodologies; including comparisons with fishery dependant indicators

Updated scallop stock assessments are included under ToR d as many rely on surveys and the group consensus was that relevant information and data sources should be reported together for each assessment area.

The WG continue to discuss the various methodologies available and a presentation was provided by WGNSSK on the Surplus Production Model in Continuous Time (SPiCT). Further details on this methodology are provided under ToR C for the Irish Sea and the group hope to further utilise this methodology with the French scallop stock assessments next year.

The group also discussed the merits of stock annexes and a more formal review process, as many members have experienced the benefits of this in other ICES stock assessment WGs. The group will attempt to progress this over the next three year cycle but as a starting point we discussed the potential for scallop stocks to be classified under the ICES stock categories (Advice on fishing opportunities; doi: https://doi.org/10.17895/ices.advice.7720):

Category 1 – Stocks with quantitative assessments. Includes stocks with full analytical assessments and forecasts that are either age-/length-structured or based on production models.

Category 2 – Stocks with analytical assessments and forecasts that are only treated qualitatively. Includes stocks with quantitative assessments and forecasts which, for a variety of reasons, are considered indicative of trends in fishing mortality, recruitment, and biomass.

Category 3 – Stocks for which survey-based assessments or exploratory assessments indicate trends. Includes stocks for which survey, trends-based assessment, or other indices are available that provide reliable indications of trends in stock metrics such as total mortality, recruitment, and biomass.

Category 4 – Nephrops stocks where information on possible abundance can be inferred and stocks for which a reliable time-series of catch can be used to approximate MSY. This is where there are reasonable scientific grounds to use life-history and density information from functional units to provide advice.

Category 5 – Stocks for which either only data on landings or a short time-series of catch are available.

Category 6 – Stocks for which there are negligible landings and stocks caught in minor amounts as bycatch. Includes stocks where landings are negligible in comparison to discards as well as stocks that are primarily caught as bycatch species in other targeted fisheries.

Most scallops stocks are deemed to fall into category 1 or 3 (Table 3) but this is a proposed category and no assumptions should be made about the current status of any assessment available. This will be reviewed each year as assessments progress and data become available. It should be viewed as a preliminary starting point and for many stocks it is where the assessments aim to be in the future.

The development of stock assessments and reporting of studies relevant to scallop population dynamics continues to be the priority for this group. The group also acknowledge that reference points are important for management advice. This WG will continue to follow the work of other ICES working groups and follow recommendations issued with regards to reference points for scallop stocks (N.B. WGScallop is not providing advice).

Table 3. List of scallop assessment areas by species and proposed ICES stock category.

ICES subarea	ICES division	Assessment area	Species	Data support	Previous Assessments	Last Assessment	Proposed ICES stock category
2	IIa	Frøya, Trøndelag	King	Logbooks; effort	Landing size		
4	IVa	Shetland	King	Landings (sq), VIMS, 2 surveys, C at Age,	C at Age TSA, VPA, LPUE	TSA 2016	Cat 1
	IVa	North east	King	Landings (sq), VIMS, 1 surveys, C at Age,	C at Age TSA	TSA 2016	Cat 1
	IVb	East coast	King	Landings (sq), VIMS, 1 surveys, C at Age (limited)	C at Age TSA	TSA 2016	Cat 1
4 and 6	VIa and IVa	Orkney	King	Landings; VMS; C at Age (limited)	None	None	
	IVb	27.4.b.S (Cefas)	King	Swept area dredge survey, biological sampling	Biomass estimates	2018	Cat 1
		Dogger	King				Cat 1
5	V	Iceland	Icelandic	survey; landings; logbooks;	Data limited approaches	2019	Cat 3
	Vb	Feroes	Queen	Landings; logbooks	None	None	
6	VIa	Clyde	King	Landings, VMS, C at Age, annual dive surveys around Arran (since 2010), dredge survey 2019	None	None	Cat 3
	VIa	West of Kintyre (including NI)	King/Queen	Survey 3 year (K), 1 year (Q); VMS; landing; logbooks; Scottish survey, C at Age	C at Age TSA (King)	TSA 2016 (King)	Cat 1
	VIa	North west	King	Survey; landings, VMS; C at Age	C at Age TSA	TSA 2016	Cat 1
7	VIId	Bay of Seine	King	Survey; logbooks; effort; landings; VMS	Biomass estimates, population structure, TAC	2021	Cat 1
	VIId	French coast from Seine estuary to Bay of Somme	King	Logbooks; effort; landings; VMS	Survey conducted by industry (Ifremer's protocol)	2021	Cat 1
	VIId	27.7.d	King	Swept area dredge, biological sampling	Biomass estimates	2018	Cat 1
	VIIe/h	Cornwall	King	VMS, historical survey	None		
	VIIe	27.7.e.I, O, L	King	Swept area dredge and UWTV survey, biological sampling	Biomass estimates	2018	Cat 1
	VIIf	27.7.f.I	King	Swept area dredge survey, biological sampling	Biomass estimates	2018	Cat 1
	VIIg	Celtic Sea	King	Logbooks; VMS; historic survey; size data; 2018/19 survey	Trend, biomass estimates	2019	
	VIIa	Tuskar	King	Logbooks; VMS; size data; 2019 survey	Trend, biomass estimates	2019	
	VIIa	Cardigan Bay/Liverpool Bay	King	Landings from WGScallop. 9 years survey data.	Three stock assessment models currently in development, which can produce outputs.	2019	Cat 1
	(Isle of Man)	Liverpool Bay/Isle of Man/Scot coast inshore	Queen	30 years surveys(I of M); logbooks; VMS; landings	CSA for queens	2021	Cat 1

	(Isle of Man)	Liverpool Bay/Isle of Man/Scot coast inshore	King	30 years surveys(I of M); logbooks; VMS; landings	Assessment methods trialled but not formalised	2019	Cat 1/Cat 2?
	(Ireland)	Liverpool Bay/Isle of Man/Scot coast inshore	King/Queen	15 years surveys(I of M); logbooks; VMS; landings	CSA -queen, none for King		
		Liverpool Bay (separate survey from IOM until 2013)	King/Queens	Landings; logbooks; VMS; 2 years survey	Landing size, engine power, # of dredges, gear specs, closed areas		
		Northern Irish Coast	King	20 years of survey, VMS, logbooks	Survey based		Cat 3
		Northern Irish Coast	Queen	21 years of survey, VMS, logbooks	Survey based		Cat 3
	VIIe	Jersey	King	Survey, Logbooks, effort, landings	None	2021	Cat 5
	26e7, VIIe	Greater Baie de St Brieuc	King	Survey; logbooks; effort; landings	TAC	2019	Cat 1
		West Brittany	King	Survey; logbooks; effort; landings	Effort		Cat 3
		Baie de Brest	King	Logbooks; effort; landings	Effort		Cat 3
		Casquets	Queen	Logbooks; landings	None		
8	VIII	Glenan	King	Logbooks; effort; landings	Effort		
		Pertuis/Charentais	King	Logbooks; effort; landings; historical surveys	Effort		Cat 3
		Belle ile en Mer	King	Logbooks; effort; landings	Effort		Cat 3

3.3 ToR c) Collate all available data and attempt to conduct a stock assessment for the north Irish Sea

Term of Reference C has been running for the three years of the current working group terms (2019–2021) with the aim to collate all available relevant data for the North Irish Sea and then conduct a stock assessment for king scallops in this area. In Year 1 the group spent time discussing the definition of the stock area (Figure 2) and collated lists of all available and relevant data sources (including spatial and temporal extent) for each of the jurisdictions that hold relevant data within this area. This included survey data, observer and port sampling data, VMS data, logbook data, landings data and habitat data.

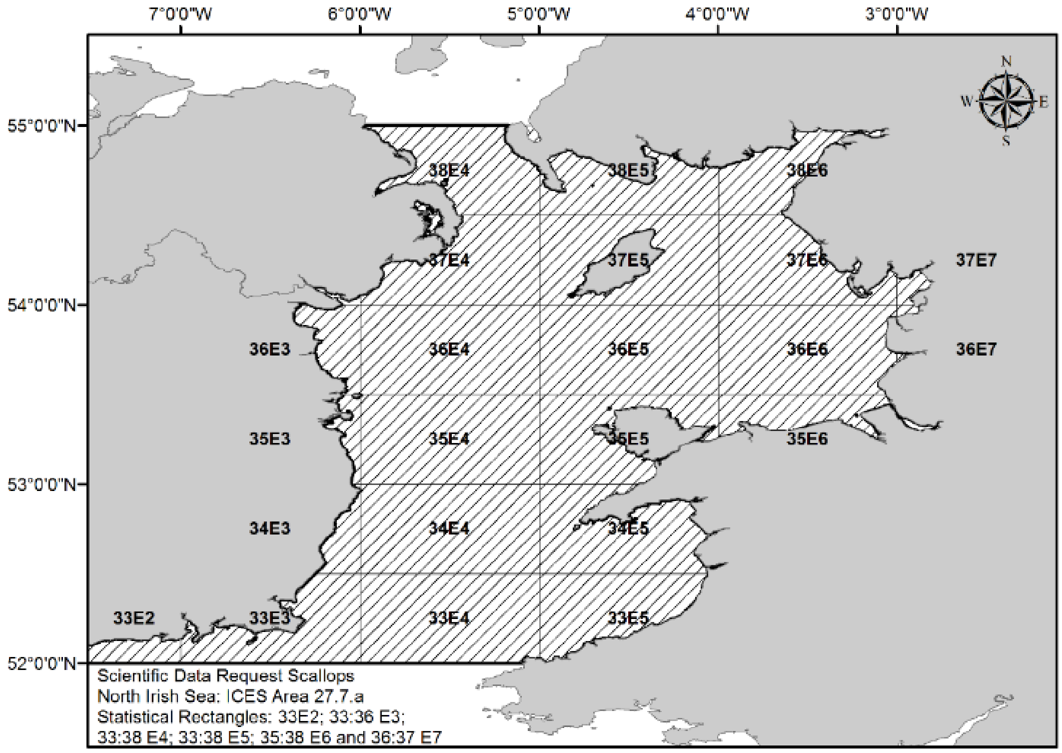

Figure 2. Map outlining the initial outer extent of the stock area defined by the working group for the purposes of collecting data for a North Irish Sea king scallop stock assessment.

In Year 2 the group moved from collating the data sources to collating the actual data for sharing among the group for initial exploration of the data quality, any issues and exploratory analysis. This involved establishing standardised templates for the survey data from the Isle of Man, Wales and Northern Ireland to be formatted at ICES Rectangle level for use by the group. Initial data explorations revealed that the aggregation of the data at ICES Rectangle level was too coarse for exploring data variability. An additional output from Year 2 was the creation of VMS polygons for king scallop fishing activity in the North Irish Sea contributed by each jurisdiction to enable the historic extent of the fishery to be mapped.

In Year 3 a formal sub-group was created to address this ToR in greater detail which included additional stock assessment experts from within the working group's institutions. The subgroup has met virtually every 2–3 months during Year 3 and progressed work towards a stock assessment. The sub-group created and agreed a formal data sharing agreement and the survey data was then provided at the raw data level. A closed Github repository for storing data and code was also established to better coordinate sharing of work and progress among the group.

Several assessment methodologies have been approved by ICES for stocks in category 3 to estimate MSY reference points (ICES, 2018). The Surplus Production Model in Continuous Time (SPiCT); (Pedersen and Berg, 2017) is a stochastic state-space model evolved from traditional biomass dynamic models. SPiCT uses observed data on landings or catches and CPUE indices either from commercial or survey data and is capable of incorporating multiple CPUE time-series. Given the long time-series of both landings and indices of abundance, and the number of potential indices that could be used within the same assessment model, members of the Sub-group decided SPiCT had the best potential to be successfully implemented for king scallop in the North Irish Sea and has thus been the initial focus of the subgroup.

The indices of abundance used within SPiCT must reflect changes in stock abundance over time. However, the use of CPUE indices as true index of abundance relies in the assumption that catchability remains constant over time. Circumstances under which this assumption is violated have been extensively discussed in fisheries literature (Campbell, 2015; Maunder and Punt, 2004), and standardisation methods to remove impacts on catch rate of changes over time of factors other than abundance have been widely developed. In this context, the Vector Autoregressive Spatio-temporal Model (VAST) (Thorson, 2019) is gaining major popularity as the choice for the standardisation of georeferenced scientific and commercial abundance indices. Besides the development of standardised indices of abundance, VAST can also provide insights about the spatial and spatio-temporal patterns of scallop stocks within the North Irish Sea.

Using the Isle of Man Scallop survey data from 2009–2019 as a case study (Figure 1), the sub-group has first attempted the index standardization using VAST. Georeferenced scallop biomass was modelled as a function of effort (Swept area (Km^2), bathymetry and dredge type (King/Queen). For the approximation of spatial and spatial-temporal effects in VAST, the user defines a priori the number of “knots”, which implicitly defines the resolution at which spatial predictions are computed (Figure 3). Several spatial and spatial-temporal configurations were implemented using the same set of covariate values described above and the resulting standardized indices visually compared. The work presented below is still preliminary, and therefore, conclusions should not be made about the results shown. Particularly, model validation diagnosis has not been conducted yet. However, the sub-group considers that important progress has been achieved and decided to present some of the outputs.

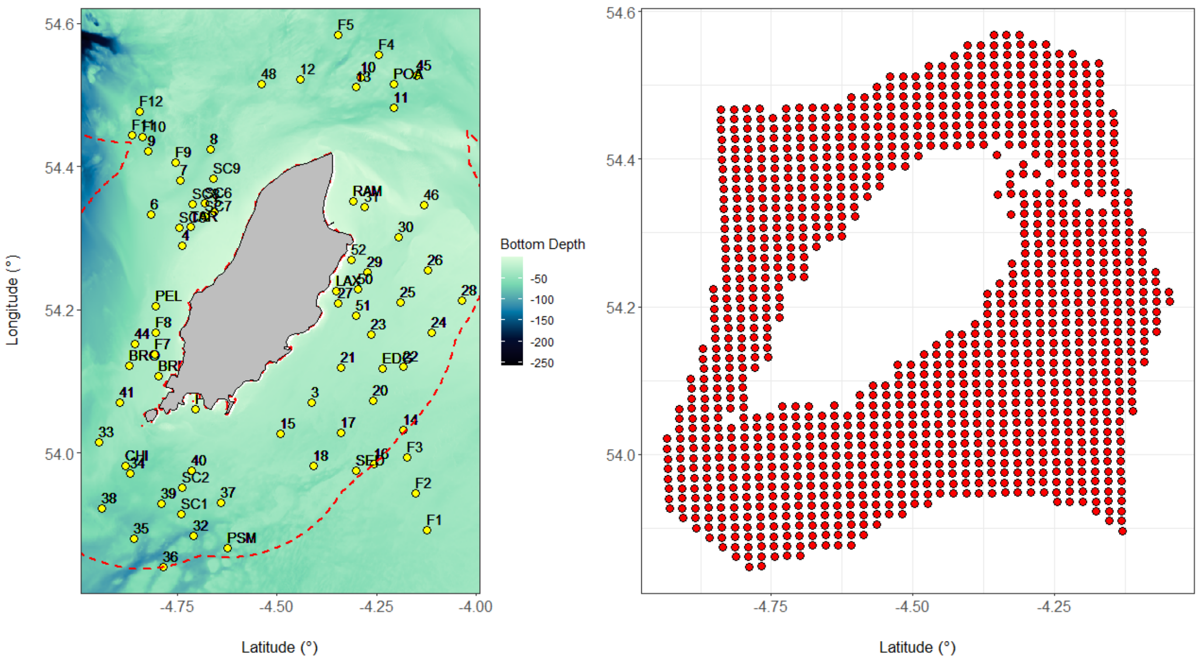

Figure 3. Isle of Man Scallop survey stations overlaid with bathymetry map (left) and location of the VAST "knots" for the estimation of spatial variation in population density (right).

Predicted densities from the most parsimonious spatial-temporal model in terms of the Akaike Information Criterion (AIC), shows clearly defined Scallop hotspots around the Isle of Man (Figure 3), particularly in the South-West and North-East limit of the island. The prevalence of these hotspots varies between 2–4 years, which follows a typical pattern of intense focused fishing on the hotspot as the scallops reach minimum landing size followed by a period of ground recovery prior to another recruitment (i.e. typically boom and bust fishing). Different areas or grounds of the fishery recruit in different years and so the appearance of high-density areas within the fishery varies both spatially and temporally. The standardized indices resulting from the different model definitions are presented in Figure 4, with the nominal CPUE from the survey. Model X5, which does not include spatial or spatial-temporal effects, differ substantially from the spatio-temporal models X1-X4, and shows more similar trends to the nominal CPUE survey estimate. Models X1-X4, reduce inter-annual variability in the nominal survey index across the time-series. The sub-group interpret these results as a consequence of the strong spatial correlation and variability in the location of the hotspots observed in the survey data from year to year (Figure 5).

Figure 4. VAST standardized survey indices from different model formulations (X1-X5) and nominal CPUE from the Isle of Man survey data (red squares). Each resulting index has been normalized by its mean for visual comparison.

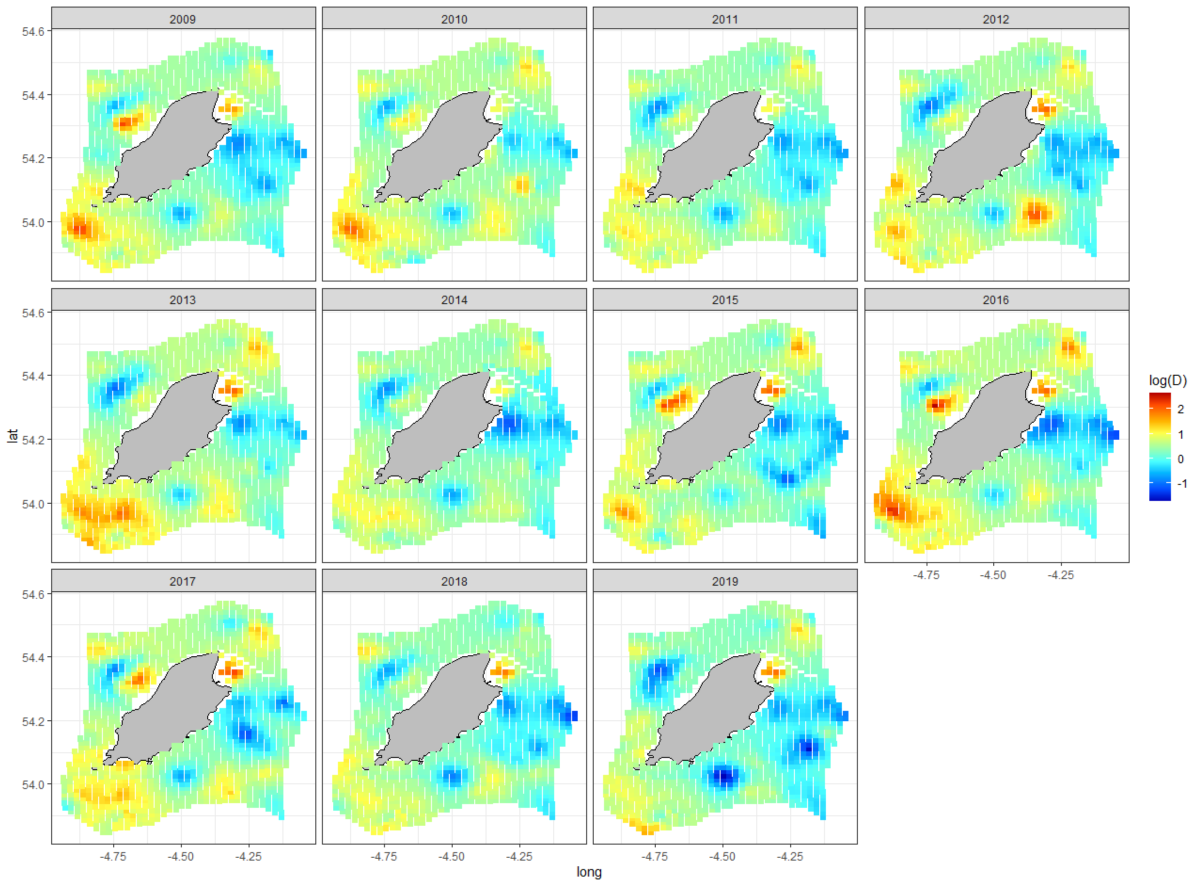

Figure 5. Predicted densities (log(Kg/km²)) from the Isle of Man Scallop survey data (2009–2019) using VAST spatial-temporal model X3.

The sub-group has already made significant progress with the above methodologies, and work will progress with the objective in mind of delivering suitable reference points for king scallops in the area in the next 3-year period. The sub-group is open to and has the capacity for the exploration of alternative assessment methods in the scenario that the above methodologies prove unsuccessful.

Table 4. King scallop landings (live weight, t) in ICES subarea VIIa (Irish Sea) by year and country.

Year	Belgium	England and Wales	France	(Rep. of) Ireland	Isle of Man	Netherlands	Northern Ireland	Scotland
2000	NA	1055	0	523.3	0	0	448.5	NA
2001	NA	954.9	0	445.4	0	0	557	NA
2002	NA	768.3	0	376.4	0	2	368.4	637.2
2003	NA	799.8	0.5	443.7	1.1	0	452	635.1
2004	NA	831.6	0.4	515.4	5.5	0	480.7	982.2
2005	NA	882.2	0	314.9	14.9	0	352.7	840.1
2006	8.6	957	0	400.6	13.1	0	273.9	732.1
2007	6.1	2162.3	0	509.1	0	13.3	360.2	958.6
2008	90.4	4495.3	0	524.1	0	277.9	523.5	1316.3
2009	8.6	3833.6	0	536	0	17.3	589.3	1676.2
2010	133.5	3197.9	0	888.3	0.5	0	771	1585.1
2011	223.4	3086.9	0	1321.9	1589.8	0	847.7	1259.7
2012	40.8	4221.3	0	1373.9	1939.6	0	999.5	1040.4
2013	1.1	2768.4	0	1502	1960.7	0	981.5	1109.9
2014	1.4	1790.6	0	1678.5	2496.1	0	1009.3	1137.4
2015	1	1339.9	0	1086.6	2406.5	0	1161.4	870.5
2016	0.4	1358.4	0	1055.3	3232.7	0	1228	1368.9
2017	0.8	763.8	0	730.7	2218.2	0	960.6	894
2018	0.8	1129.1	0	560.3	2018.3	0	744.1	916.7
2019	4	1019	0	467	1651.2	0	554.7	579.9
2020	3.1	1253.5	0	793.2	976	NA	410	677.9

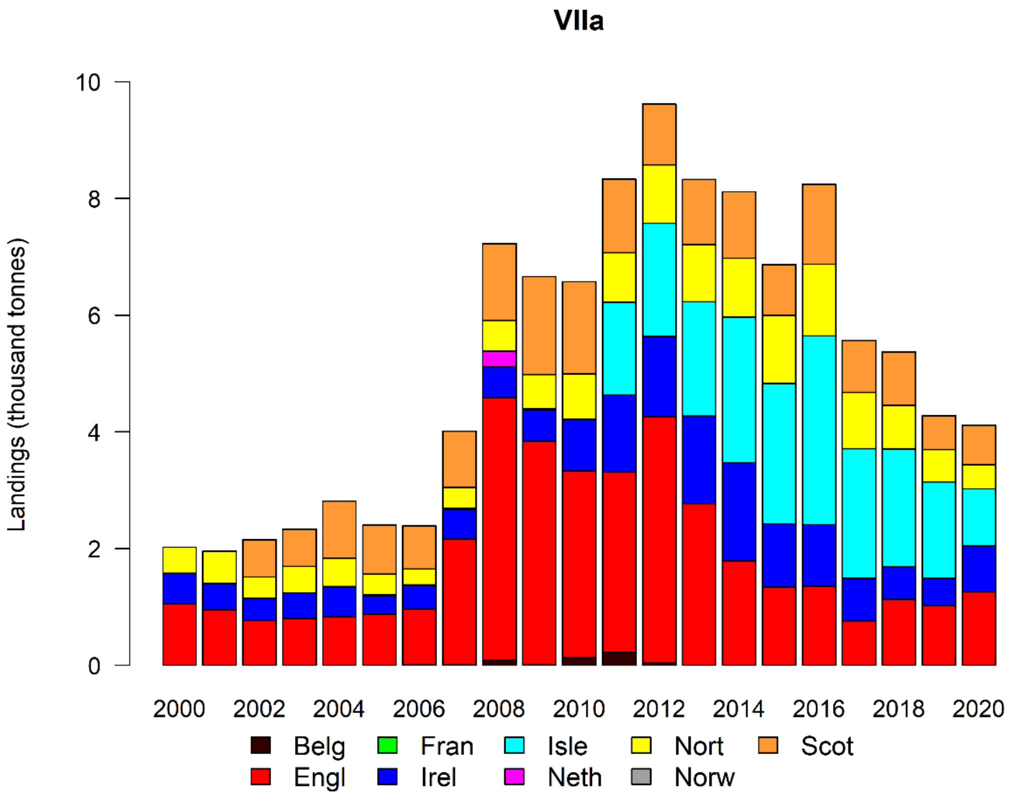

Figure 6. Annual landings of king scallops (live weight, thousand t) for ICES area VIIa, with bars coloured by country as indicated in the figure legend. Belg is Belgium, Engl is England and Wales, Fran is France, Irel is the Republic of Ireland, Isle is the Isle of Man, Neth is the Netherlands, Nort is Northern Ireland, Norw is Norway and Scot is Scotland.

3.4 ToR d) Review and report on current scallop surveys and share expertise, knowledge and technical advances

Scallop surveys continue to be an important data source for the stock assessment in many areas. In 2020, the Covid-19 global pandemic caused significant disruption for most institutes and their annual scallop surveys. In 2021, this disruption has continued for some institutes, though for the majority a survey (in some places restricted in comparison to previous years) has been possible. It is acknowledged that a break in the survey time-series (years with no data is not ideal, and in some situations may make the provision of management advice particularly difficult. A summary of surveys planned, executed, or disrupted is provided in Table 5.

Table 5. A summary of scallop surveys and any issues or disruptions in 2021.

Country	Target Species	Typical/planned surveys	2021 disruption	Other issues (weather/funding/ship/staff)
Norway	Iceland scallops	Irregular scientific survey	Cancelled	Cancelled due to lack of funding
Norway	King scallop	Irregular scientific diving survey	Cancelled	Cancelled due to lack of approved scientific divers. All diver courses were postponed to early 2022
Scotland	King scallop	Annual dredge survey - Shetland (15 days)	Reduced scientific staff and crew reduced sampling capability, vessel in port every night	2020 Four days lost to weather, but still successful
Scotland	King scallop	Gear comparison survey (7 days)	Experimental survey for one year (2020) only	2020 6 days lost to bad weather, one off survey
Scotland	King scallop	Annual dredge survey - West coast of Scotland (21 days)	Reduced scientific staff and crew reduced sampling capability, vessel in port every night	Days lost to weather and mechanical issues
Scotland	King scallop	Annual dredge survey - East coast of Scotland (20 days)	Reduced scientific staff reduced sampling capability	
Scotland	King scallop	Dredge survey - Clyde (14 days)	No disruption	
Scotland	King scallop	Annual dredge survey Orkney (12 days)	2021 survey cancelled	Lack of staff and one of the commercial vessels no longer being available.
Northern Ireland	King scallop	Annual dredge survey	No disruption (Covid-19 testing prior to commencement)	
Northern Ireland	Queen scallop	Annual UWTV and fishing survey	No disruption (Covid-19 testing prior to commencement)	
Isle of Man	King and queen scallop	Annual scientific survey	Completed. Adherence to covid-19 guidelines. Reduced scientific staff and 2 week isolation post survey	Bangor University contract extended for 5 years so survey guaranteed until 2025
Isle of Man	King and queen scallop	Annual Industry survey	Completed. Adherence to covid-19 guidelines.	Short term data set (3 years) so not available for stock assessment; no funding process in place as yet for ongoing surveys
England	King scallop	Annual dredge survey Western English Channel and Celtic Sea (selected areas)	No disruption	2021 - Survey positions inside French EEZ carried out
England	King scallop	Annual dredge survey Eastern English Channel and North Sea (selected areas)	No disruption	2021 - Survey positions inside French EEZ not carried out
England	King scallop	UWTV survey in selected unexploited areas	Relocated from English Channel to North Sea	
Wales	King and queen scallop	Annual survey	Survey had reduced scientific crews and this prevented camera sampling at night, and resulted in loss of bycatch processing at a small number of stations.	
Jersey	King scallop	Annual dredge survey, started 2021	Initial baseline survey completed, refining method for 2022	Need to ensure ongoing method is comparable to other regional surveys
France	King scallop	Annual survey, Bay of Seine (7d,27E9 and 28E9)	Reduced scientific staff	Funded by EU since 2017, partnership between scientists, fishers.
France	King scallop	Annual survey, Bay of Saint-Brieuc (VIIe,26e7)		Funding since 2017 (partnership scientists/fishing industry). Same vessel > 30 years.

Iceland update. Iceland scallop (*Chlamys islandica*)

A moratorium was established in 2003 on the scallop´s grounds in Iceland. Since 2014 the annual dredge survey targeting Iceland scallops (*Chlamys islandica*) on the main beds in Breiðafjöður was substituted by a drop frame camera survey/mapping. The full dredge survey index between 2006–2011 had dropped down to between 11–14 % of the average index of the years 1993–2000, prior to collapse of the stock. In the last two dredge surveys old scallops (~10 year) were dominant in the catches but recruitment was also evident in several areas. Between 2014 and 2019 a co-operation was established between the stakeholders and the Marine and Freshwater Research Institute to increase the research activities (partly funded by the industry in form of vessel time) and conduct experimental fishing. Prior to the experimental fishing a survey was conducted on proposed and other scallop beds. The scope of the drop frame survey was to get an absolute abundance estimate on the common grounds and to search for new beds and get a better coverage of known scallop beds. Few new beds and scallops in fishable densities at the inner part of the old common grounds have been detected in the drop frame surveys. As such between 80 (2015) and 245 (2019) drop frame camera stations have been carried out annually, with additional dredge stations for biological samples. No surveys were carried out in 2020 and 2021, due to budget constraints.

In 2014 the advice was no fishery on conventional grounds, but small-scale fishing experiment were allowed in areas outside the limits of the dredge survey. The same advice was given in 2015–2019 and fishing trials continued, mainly on new grounds, but later also on traditional grounds where scallops are found in fishable quantities. As such, 280 t were fished in southern part of the fjord during 2014. The number of areas and catches increased in the following years and reached 945 t in 2017 which were fished on six areas. The fishing effort varied between areas, but proposed harvest ratio was between 4–12%. On almost all rectangles within an area a decline in LPUE was observed during the fishing season and reduction in abundance estimates between years. The catches had reduced to 450 t in 2019, during the last year of the fishing trials.

For the fishing year of 2020/21 a total of 93 t TAC was proposed on two grounds in southern part of the fjord where abundance of scallop has been relatively stable. No commercial fishing activity was in 2020 and around 40 t have been landed so far in 2021. Due to limited fishing and no new information on biomass the advice was the same for the fishing year of 2021/22.

Norway. King scallop and Iceland scallop (*Pecten maximus* and *Chlamys islandica*)

In the past, the Institute of Marine Research (IMR) in Norway conducted regularly diver-based surveys of king scallops at the Norwegian coast and, irregularly, dredge-based survey of Icelandic scallops in the Svalbard area, supplemented more recently with underwater video cameras. Surveys on both scallop stocks were planned for 2021 but could not be executed.

For the king scallop, the main obstacles were related to COVID and new regulations on scientific surveys, causing challenges to recruit a suitable vessel and enough divers that could not be overcome. Because the Icelandic scallop survey is not part of IMR's routine monitoring program, execution relies on receiving external funding which could not be obtained this year. Both surveys are planned for 2022, and funding for an Icelandic scallop survey north of Svalbard has been granted.

Scotland. King scallop (*Pecten maximus*)

Marine Scotland Science (MSS) have conducted dredge surveys for king scallops for at least 40 years, previously using commercial boats, but more recently our own research vessel which since 2008 has been the MRV *Alba na Mara*. The survey aim is to collect catch rate data for the stock assessment process.

MSS typically conducts three annual scallop surveys per year; the east coast of Scotland, the west coast and Shetland, with 332 fixed stations. In 2019 and 2021 the Clyde was also added – so the surveys now cover six of our assessment areas but does not include Orkney or the Irish Sea.

The scallop dredge surveys follow a fixed station design, originally determined with reference to British Geological Survey charts to locate sediments suitable for scallops and also using fishers' knowledge of the fishing grounds.

At each station, dredges are towed for approximately 30 minutes at a speed of ca. 2.5 knots. Spring loaded Newhaven type dredges are fished six aside, with a total fishing width of 9 m. The starboard dredges are similar to those used in the commercial king scallop fishery and consists of 6 x 9 toothbar and 80 mm bellyrings. The port side is rigged with the scientific dredges, 6 x 11 toothbar and 60 mm bellyrings (similar to those used for queen scallop fishing), to catch undersized scallops.

All scallops are measured, aged and damage assessed. Bycatch is collected, identified, measured and damage assessed where appropriate. Data related to the tow is recorded including positions, depth sea conditions, depth, salinity etc. Any additional requests are also carried out if possible (Figure 7).

Survey objectives

Objectives	0221A	0521A	0621A	1421A
To carry out a survey of scallop stocks on the coast of Scotland.	x	x	x	x
To age, measure and assess shell damage on all scallops caught.	x	x	x	x
To collect whole scallops for heavy metal testing as part of the OSPAR assessment of hazardous substances in the marine environment.		x	x	x
To collect information on by-catch of other commercial fish and shellfish species.		x	x	x
To identify and quantify numbers of starfish species in all dredge tows		x	x	x
To record and retain marine litter obtained during the dredging process (for MSFD).		x	x	x
To deploy JOMOPANS mooring at Duncansby Head		x		
To collect samples for genetic testing				x
To collect shells for aging training	x	x	x	x
Meatweights and rings				x

marine scotland
science

X - achieved (to expected average levels)
X - partially achieved
X - not achieved
X – Planned objective

Figure 7. Proposed and achieved objectives for 2021 surveys.

The logistics of conducting surveys during the Covid-19 pandemic proved to be extremely difficult. Minimum staff and crew on board, returning to port each night, bad weather and mechanical issues meant some stations could not be completed and some objectives could not be met or were only partially achieved (Figure 7). The table below shows a summary of the total stations surveyed, scallops and bycatch caught (Table 6).

Table 6. Marine Scotland Science scallop 2021 scallop dredge survey summary.

Survey	Survey Area	Stations completed	Total king scallops caught	Total bycatch recorded	Notes
0221A	Shetland	37	7441	Bycatch not recorded	One daytime scientist One shore based
0521A	West coast	47	5636	2144	One daytime on board scientist, two shore based
0621A	East coast	81	6606	2732	Two on board scientists full time
1421A	Clyde	47 planned			Three scientists on board full time

Scotland (Orkney). King scallop (*Pecten maximus*)

Orkney Sustainable Fisheries Ltd (OSF) completed its first scallop survey in 2019 with the hopes that this would be an annual survey to collect biological data on different populations of king scallop around Orkney. The Covid-19 pandemic has restricted the data that OSF observers were able to collect, preventing the 2020 and 2021 scallop surveys and greatly reducing the observer effort. To protect observers and fisher's, observer trips were cancelled until the regulations from the government changed to allow for adequate safety protocols to be adhered to. OSF scientists were able to attend the 2020/ 2021 aging workshops and the online 2020/ 2021 Scallop working group meetings. The primary objectives for OSF's scallop project remain largely the same; to determine the relative abundance of the king scallop resource within Orkney and produce a heatmap of fishing effort. To compare survey results to environmental changes and changes in regulatory methods. To collect biological information from each of the different fisheries and to assess the differences in population dynamics. The secondary objectives include determining optimum tow duration and gear efficiency and assessing bycatch levels on different fishing grounds. OSF is focused on working with the fishing industry to protect the fishing resource within Orkney.

Northern Ireland. King scallop (*Pecten maximus*)

AFBI carried out their annual scallop survey in February 2021. During the survey, 37 stations were fished using a single tow bar fitted with four commercial sized dredges, one of which was lined with a fine mesh to retain small animals (both scallops and bycatch). Scallops were caught at all stations. Figure 8 shows the catch by tow. In 2021, 16 of the randomly selected stations were the same stations as what were sampled during the 2020 survey. Of these stations, twelve showed an increase in catches from 2020 to 2021, with the remaining four showing a decrease in catches. Examination of survey CPUE (number per 100m2 swept) between 1992 and 2021 shows that in recent years, whilst there has been a small upward turn in the 2021 survey, CPUE is decreasing from a peak in 2012–2014 (Figure 9).

During the survey, all bycatch was identified. In total 72 taxa, including Pecten maximus, were recorded. Whilst the Chordata were the most diverse group with 23 species reported, the Echinodermata were the most predominant associated group. The common starfish *Asterias rubens* was the most abundant bycatch species and was found at 26 of the stations surveyed. The edible urchin, *Echinus esculentus*, was the second most abundant species and the queen scallop, *Aequipecten opercularis*, the third most abundant. The proportion of the catch made up of bycatch species ranged from 10% to 68%.

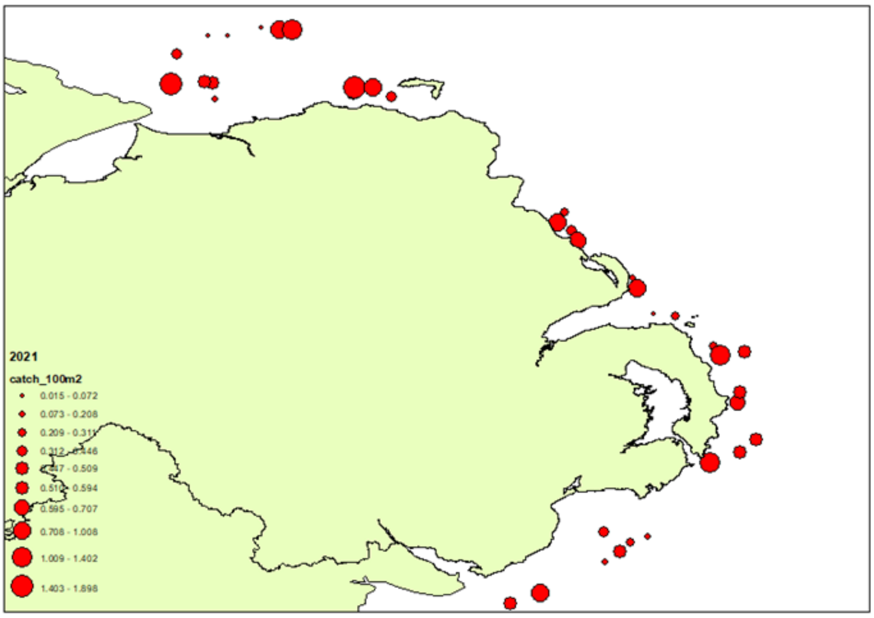

Figure 8. Position of mid-point of tows completed during the AFBI 2021 survey. The size of circle is indicative of the scallop catch 100m².

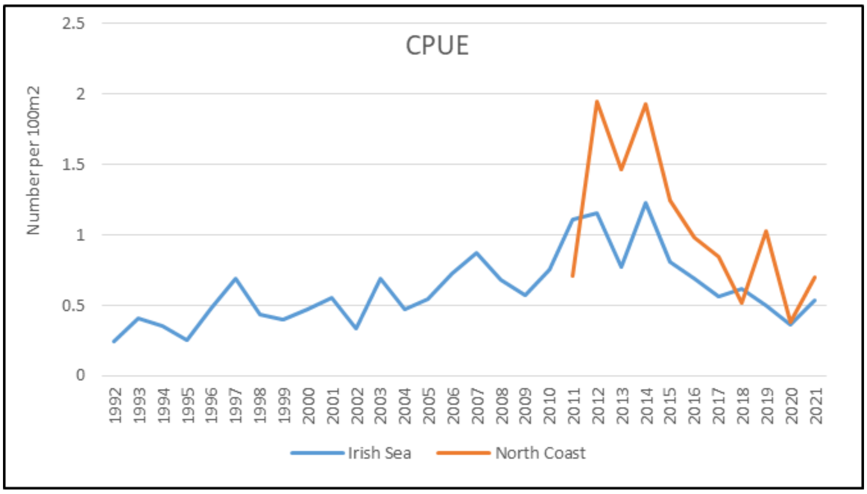

Figure 9. AFBI survey catch per unit effort (CPUE) from 1992–2021.

Northern Ireland. Queen scallop (*Aequipecten opercularis*)

In June/July 2021 AFBI completed their annual queenie survey (no survey was carried out in 2020 due to Covid-19). The survey is based on Under Water Television (UWTV). A total of 99 camera tows were carried out during the survey (52 in the Irish Sea and 47 along the North Coast). At each station the sled and camera were deployed and towed for 15 minutes at a speed of 0.8–1.2 knots. The number of queenies per minute were counted for the camera tows. Based on the results of the counts, stations were selected for fishing. These selected stations were fished using a system of dredges (fitted with two king scallop dredges, one of which is fitted with a fine mesh liner, and two queen scallop dredges) or a queenie net.

Nine stations across the survey area (2 in the Irish Sea and 7 along the North Coast) had zero counts of queenies. The highest density of queenies reported during the UWTV survey was on the North Coast, north of Rathlin Island. Based on general regions, the Irish Sea had the greatest abundance of queenies averaged over all the camera tows (46.3 per 100m2); the North Coast had an average abundance of queenies of 44.7 per 100m2 over all the camera tows (Figure 10).

Figure 10. AFBI 2021 survey, average abundance of queenies per 100m² from UWTV survey for all stations.

Using biological information (lengths and weights) collected during the fishing tows, biomass can be estimated for both regions. Whilst estimated biomass on the North Coast looks relatively stable from 2018 (no fishing survey was possible in 2019 along the North Coast due to technical issues, whilst the full 2020 survey was not completed due to Covid-19), estimated biomass in the Irish Sea has increased slightly from the 2019 survey (Figure 11).

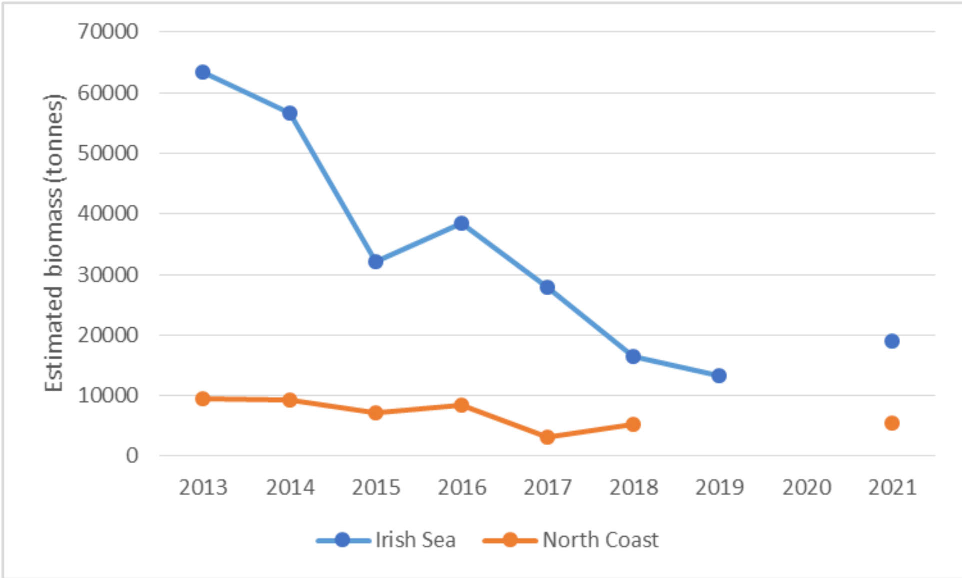

Figure 11. Estimated biomass of queenies as reported from the AFBI survey.

Isle of Man. King and queen scallop (*Pecten maximus*, *Aequipecten opercularis*)

The Isle of Man continues to run two scallop surveys in parallel. A long-term (1992–2021), coarse resolution, fixed station survey on a Research Vessel towing one side of dredges (King, Queen, King, Queen). A shorter-term (2019–2021), fine resolution, random stratified survey onboard two commercial fishing vessels each towing two sides of dredges (Side 1: King, Queen, Queen, King and Side 2: King, Juvenile Queen, Juvenile Queen, King). For king scallops, both surveys showed improvements in both the recruit (<95 mm) and post-recruit (> 95 mm) sections of the sampled population (Figure 12).

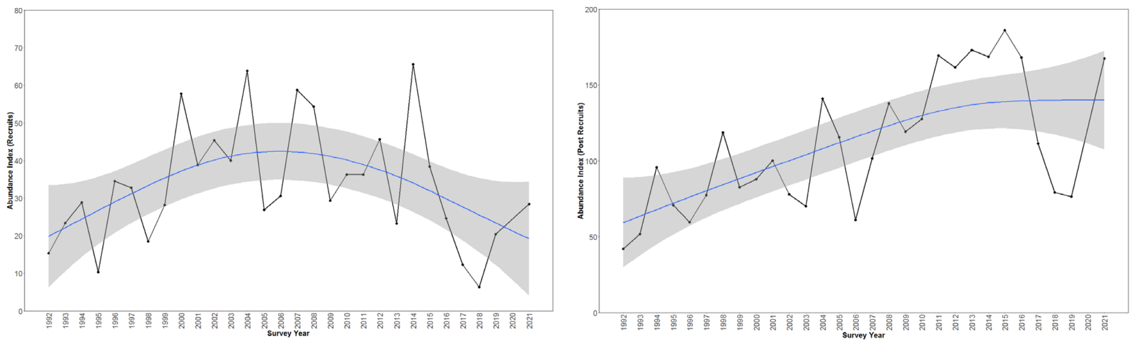

Figure 12. King scallops in Isle of Man Territorial waters. Left: Recruit (<95 mm) length abundance index from the long-term April survey and Right: Post-Recruit (>95 mm) length abundance index from the long-term April survey.

Both surveys also highlighted two areas where recruitment events had occurred (South-West and inshore East) which it would be prudent to protect for future years fisheries. An ongoing TAC of 2049 t is recommended based on the survey data for the 2021/ 2022 king scallop fishing season within the Isle of Man's territorial waters. Landings per unit effort and fishing intensity will also be monitored as potential management metrics for future seasons as part of a long-term fishery management that will be developed in 2022.

England. King scallop (*Pecten maximus*)

Assessment plans were presented for review at WGScallop (Belfast, 2017) and group recommendations implemented in assessments from 2018. Annual assessments have been presented to the group at all subsequent meetings (2018–2021).

Two annual dredge surveys were carried out in 2021. The first in May covered the Western English Channel and the 2nd in September surveyed the Eastern English Channel and North Sea. This year a new assessment area in the Central North Sea was surveyed following the discovery of resource in this region and subsequent fishing activity in the summer of 2020. In addition, an UWTV survey was carried out in the North Sea covering both the inshore grounds and that recently defined for the Central North Sea (May 2021). Data from these surveys will be used in the next assessment due early 2022.

The latest available report (Lawler, A and Nawri, N. 2021) incorporates data from surveys carried out in 2020 and a summary of the results were presented to the group.

The report describes the stock status of selected stocks undertaken annually since 2017 by the Centre for Environment, Fisheries and Aquaculture Science (Cefas) as part of a collaborative project with the UK fishing industry, the UK Department for Environment, Farming and Rural Affairs (Defra), and Seafish. International landings were made available via last years' ICES WGScallop data call but those for the last two assessment periods were not available at the time of writing of the report. Harvest rates for 2019 and 2020 are therefore provisional estimates of what will be taken from the stock over the 12 months following each survey.

In 2017, five stock assessment areas were identified as being of importance to UK fisheries: three in ICES subdivision 27.7.e (Inshore Cornwall, I; Offshore, O; Lyme Bay, L) and two in 27.7.d (North, N; South, S). In 2018 two additional areas were defined, one in the approaches to the Bristol Channel (27.7.f.I) and another in 27.4.b (North Sea South, S). These assignments are based on regional differences in growth and fishery exploitation patterns. Commercial landings data are available at the spatial resolution of ICES statistical rectangle, and their boundaries are used to describe the extent of the assessment areas (Figure 13).

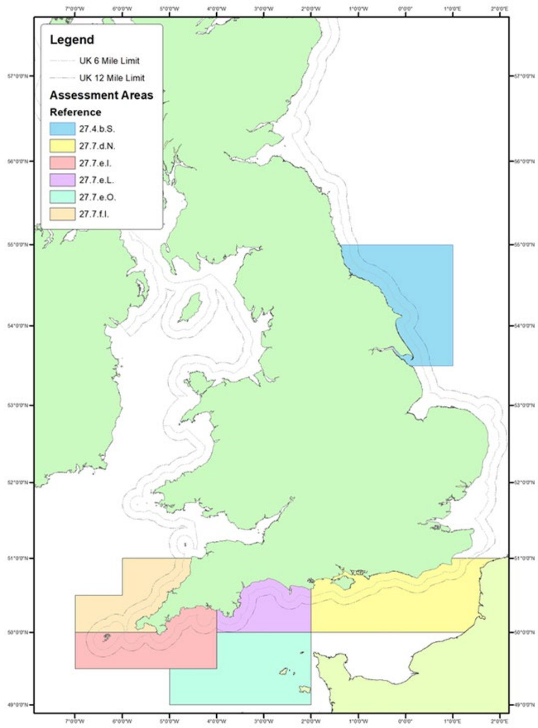

Figure 13. Stock assessment areas identified by Centre for the Environment, Fisheries and Aquaculture Science (Cefas).

Three data streams were used for the assessments described in this report: dredge surveys, UWTV surveys, and a biological sampling programme. Dredge surveys in the main fished beds of 7.d.N, 7.e.I, 7.e.L, 7.e.O, 7.f.I, and 4.b.S were used to estimate scallop biomass available to the dredge fishery. The scallop biomass in some un-dredged regions of assessment areas 7.e.I and 7.e.L was estimated from UWTV surveys in the first year (2017), and areas in 7.e.O, 7.f.I and 7.d.N in the third year (2019). No UWTV survey was undertaken in 4.b.S during 2020 due to the pandemic but the survey carried out in this region in 2021 will be available for the assessment report due early 2022.

Estimates of harvestable biomass (i.e., biomass above minimum landing size and in areas in which dredgers can operate), and the exploitation rate experienced by harvestable scallops are covered by this assessment (Figures 14–17). However, the assessment is not able to fully estimate the impact of the fishery on the wider stock, as we were unable to estimate the scallop biomass in all un-dredged areas. Dredge surveys and catch sampling only cover the portions of stock found on the main fished grounds, as identified by the areal density of Vessel Monitoring System (VMS) pings. Harvest rate estimates from dredge surveys or commercial sampling therefore only apply to the fished portion of the stock. In situations where there are significant portions of un-dredged stock that are contributing offspring to the fished areas, any estimates of Maximum Sustainable Yield (MSY) harvest rates will, in future, need to be adjusted to compensate for this.

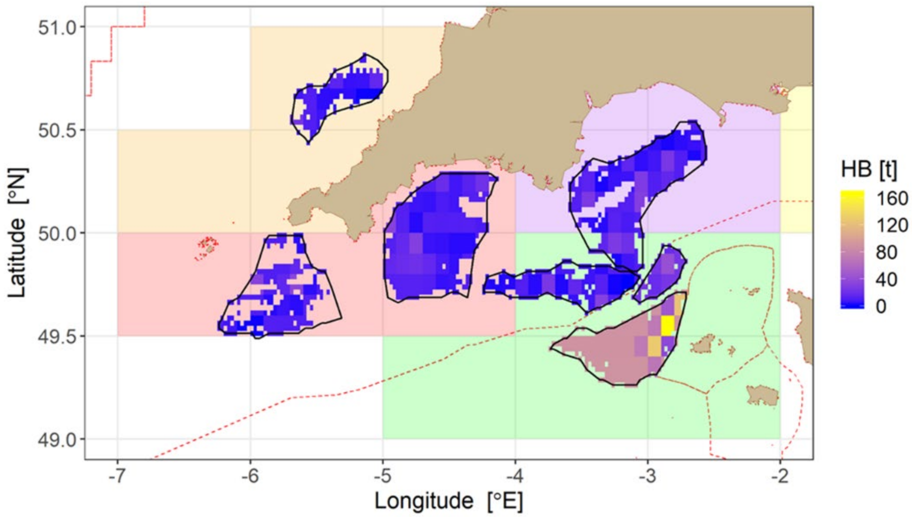

Figure 14. Harvestable biomass - Western English Channel and Celtic Sea (May 2020 dredge survey).

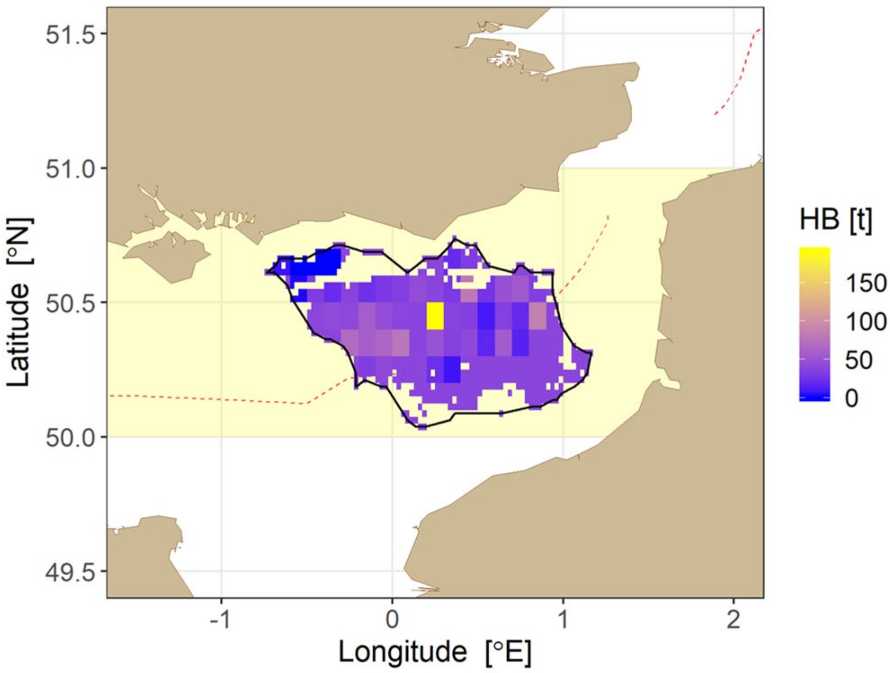

Figure 15. Harvestable biomass - Eastern English Channel (September 2020 dredge survey).

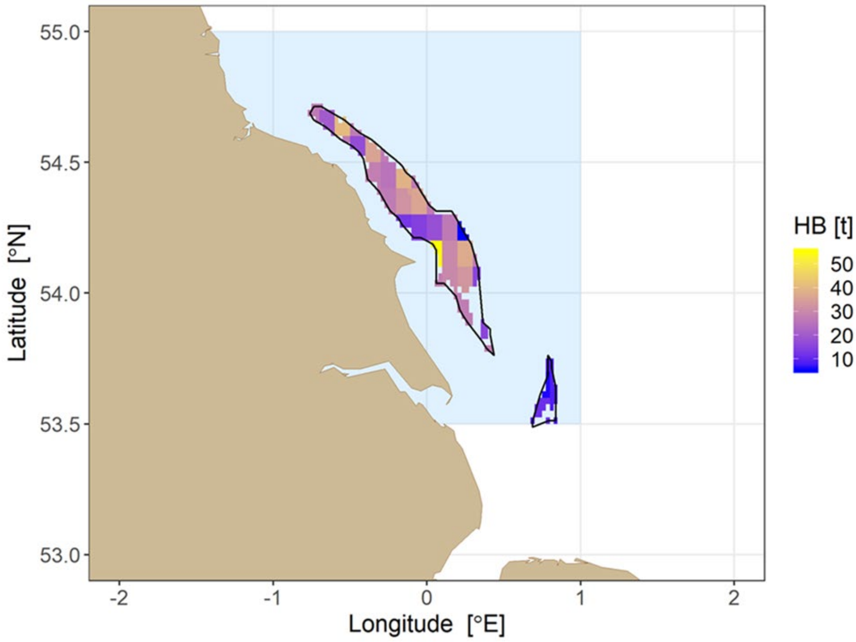

Figure 16. Harvestable biomass - North Sea (September 2020 dredge survey).

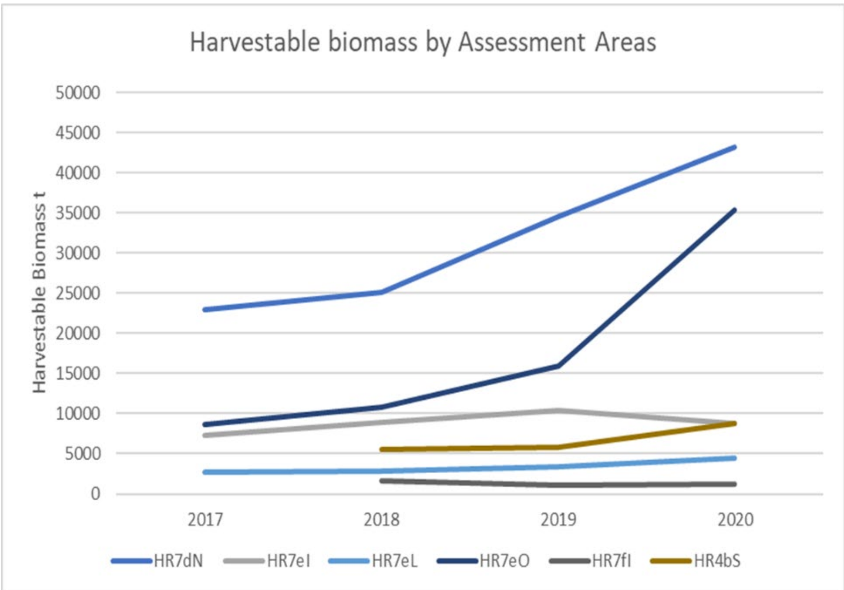

Figure 17. Trends in harvestable biomass by assessment area 2017–2020 (for 4.b.S and 7.f.I 2018–2020).

The potential harvest rates experienced by the surveyed portion of stocks were estimated by comparing international landings, or a proxy for them, to the available biomass estimates, either for the dredged area only, or also including the biomass from un-dredged areas (Figure 18).

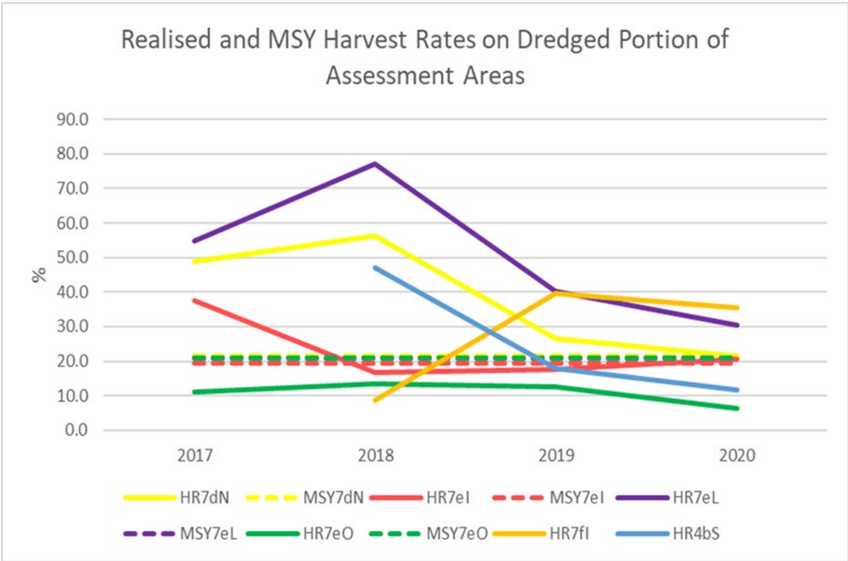

Figure 18. Trends in harvest rates by assessment area (2017–2020, for 4.b.S and 7.f.I 2018–2020). N.B. 2019 and 2020 are provisional. Harvest rates consistent with MSY are presented for 7.d.N, 7.e.I, 7.e.L and 7.e.O.

Cohort modelling was used to put realised harvest rates into context with proxies for MSY (Figure 19, 7.d.N example).

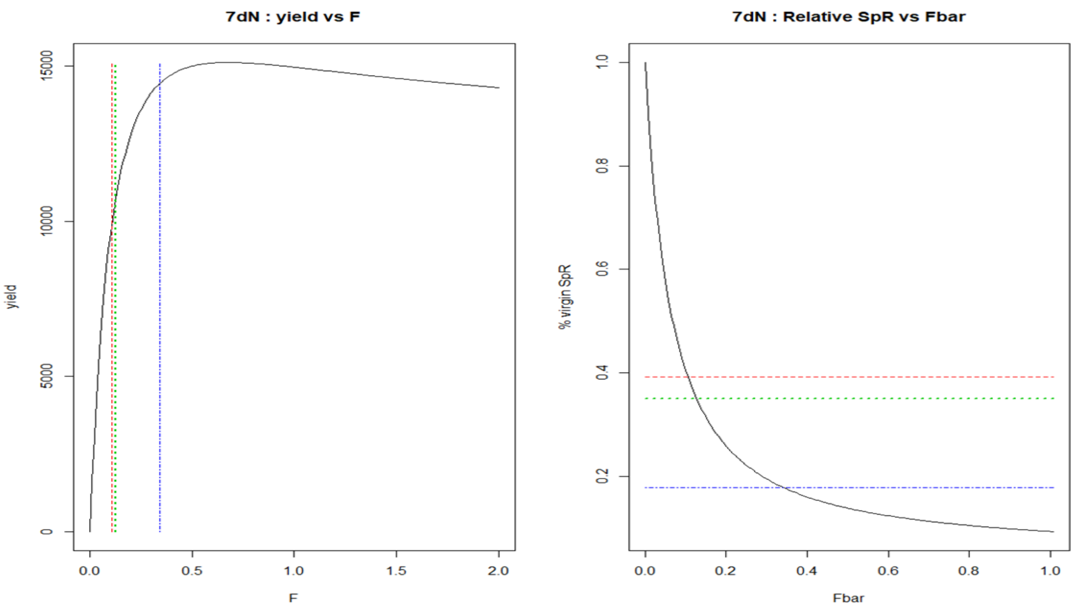

Figure 19. Relationships between Yield (LH panel) and percentage of virgin spawners per recruit with fishing effort (RH panel) from cohort modelling in assessed area 7.d.N. Reference lines - F0.1 (red dash), SpR35% (green dash) and Fmax (blue dash).

As this is only the fourth scallop stock assessment, with the short time period covered by surveys, the results presented here are still preliminary. They are the start of a long-term monitoring and assessment programme, and processes and methodologies are likely to evolve in the future. As the time-series of data develops and increases in comprehensiveness, this will in turn contribute to a more robust determination of the stock status of king scallops in this region. See report for further explanation: Assessment of scallops stocks 2019/20 - GOV.UK (www.gov.uk) and Assessment of king scallop stock status for selected waters around the English coast 2019/2020 – Annexe (publishing.service.gov.uk)

For the 2020/ 2021 stock assessment Cefas intends to use international data provided to the WG to calculate harvest rates as a measure of exploitation (Table 7).

Table 7. International landings of king scallop by selected assessment area and survey year to be used to retrospectively estimate harvest rates in the Cefas 2020/21 stock assessments. Source WGScallop data calls (2000–2020). [1] Survey year is defined as the 12-month period after each annual dredge survey.

Region	Assessment Area	Survey Year[1]	Landings (t)
North Sea	27.4.b.S	2017	2186
		2018	2594
		2019	889
Eastern English Channel	27.7.d.N	2017	11260
		2018	14041
		2019	8429
Western English Channel	27.7.e.I	2017	2773
		2018	1507
		2019	1801
	27.7.e.L	2017	1450
		2018	2192
		2019	1284
	27.7.e.O	2017	956
		2018	1460
		2019	1868
Celtic Sea	27.7.f.I	2017	251
		2018	135
		2019	395

Wales. King scallop (*Pecten maximus*)

The annual Welsh scallop survey was conducted by Bangor University in April and May 2021. This survey targets both king and queen scallops. The survey uses two types of dredges, referred to as king and queen dredges. The king dredges have nine 110 mm long teeth, with 80 mm belly ring diameter. The queen dredges have 10–60 mm long teeth, with 60 mm belly ring diameter. Like the previous year, the scientific crew size was less than 50% of the normal size due to Covid-19 restrictions. This again prevented overnight camera sampling and in rare cases resulted in bycatch data not being gathered due to high catch volume. Regardless, the survey conducted 65 hauls, and this is the second highest number of hauls achieved during any of the surveys (Figure 20). The majority of the data have still to be reviewed and processed, and stock assessment models have not yet been updated with these data.

During this survey, three commercial scallop vessels were chartered to fish alongside the research vessel for up to 35 of the surveys hauls. After analysing these data using catch comparison methods, both types of research vessel dredges caught significantly more king scallops than the commercial vessels in most cases. This was also shown to be largely driven by the research vessel dredge types catching significantly smaller king scallops than the commercial vessels. This result is expected because the commercial dredges have a 90 mm belly ring diameter, which is wider than those used by the survey dredge types and they are therefore less likely to retain smaller scallops.

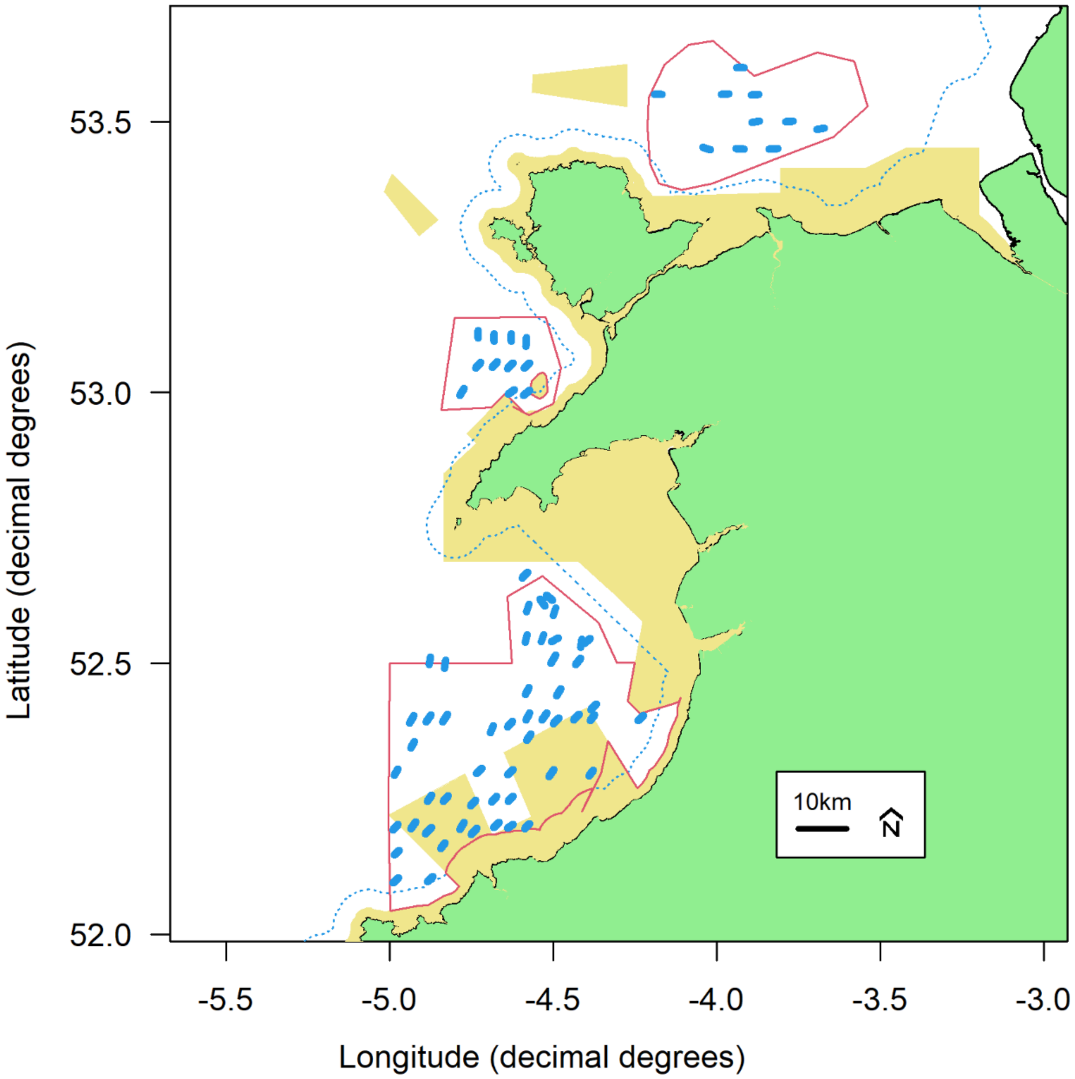

Figure 20. Map of haul positions (blue marks) conducted during the 2021 Welsh scallop survey. Green is land, beige is area of sea closed to commercial scallop dredging and white is area of sea open to commercial scallop dredging. The blue dotted line is the UK three nautical miles from the coastline line. The red lines outline the three survey areas that are aimed to be sampled each year.

An ROV has been purchased by Bangor University and is currently being tested for its effectiveness in surveying shallow, inshore populations of *P. maximus*. Two GoPros have been mounted on the ROV to obtain stereo-video and limited trials have occurred in South Wales, with further development work planned.

Jersey. King scallop (*Pecten maximus*)

Accurate data from the Jersey scallop fishery is available from 2007 onwards as since then Jersey vessels were required to submit daily landing and effort data specifying species, weight, fishing zone and metier (dredging or diving). For most the past 17 years the Jersey scallop fleet has consisted of between four and seven dredgers and eight to ten dive boats. However, in 2017 Jersey created 150 km2 (6% of waters) of MPAs where mobile gear is prohibited and, while this may be coincidental, since then the number of dive boats has increased to around 16. The nature of the fishery and local market means that fishing is often undertaken solely to fulfil orders. For this reason many vessels will only fish for short periods of time so measuring fishing effort may be better expressed using the number of tows rather than kW days.

Collaborative scallop surveys with the Normandy fishing committee were attempted in 2018 and 2019 but were prevented by weather. In 2020 Jersey planned to conduct an independent survey using the Normandy methodology but this was abandoned following the arrival of Covid-19. In March and April 2021 40 scallop beds were surveyed using both commercial (85 mm ring) dredges and experimental (55 mm ring) 'Queenie' dredges. These were deployed form the commercial fishing vessel *Progress* (J444) and more than 6000 scallops were measured (W, L & D) with subsamples being collected and frozen for aging at a later date.

The results (Figure 21) perhaps suggest there are two size class peaks: one between 60 and 80 mm shell width; and a second larger peak between 100 and 115 mm width. Scallop abundance in the 85 to 89 mm class appears low perhaps implying that a poor recruitment period may impact the fishery during the coming year. Alternatively this may be a factor of the reported rapid local growth rates and this size range falls between year classes. Aging the subsampled scallops may shed more light on this. Three of the scallop beds surveyed in the spring were re-surveyed at the end of the French scallop season in early June 2021. The results suggest an 80% decline in scallops below minimum size (10.2 cm shell width) and, while this is a small sample size, it is an issue that warrants further investigation.

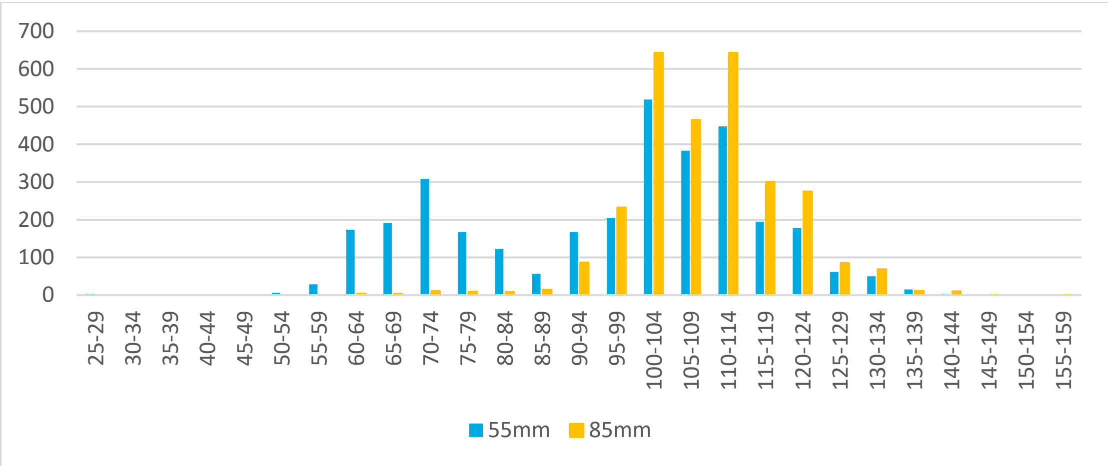

Figure 21. Jersey Scallop catch by size class from 2021 dredge survey using 55mm and 85mm bellies.

France, Bay of Seine. King scallop (*Pecten maximus*)

In 2020, due to the COVID-19 pandemic, the normal scientific survey, on the R/V Thalia, which had been scheduled for July was cancelled. It was replaced in September by an alternative survey, limited in its geographical extension to the French territorial waters of the Bay of Seine sensu stricto, and carried out on an industry vessel.

In 2021, the scientific survey took place under almost normal conditions (only limited scientific staff on board for health reasons), on the R/V Thalia from 3 to 21 July 2021. A total of 158 dredge tows were carried out between the French coast in the south and the parallel 49°50 in the north (Figure 22).

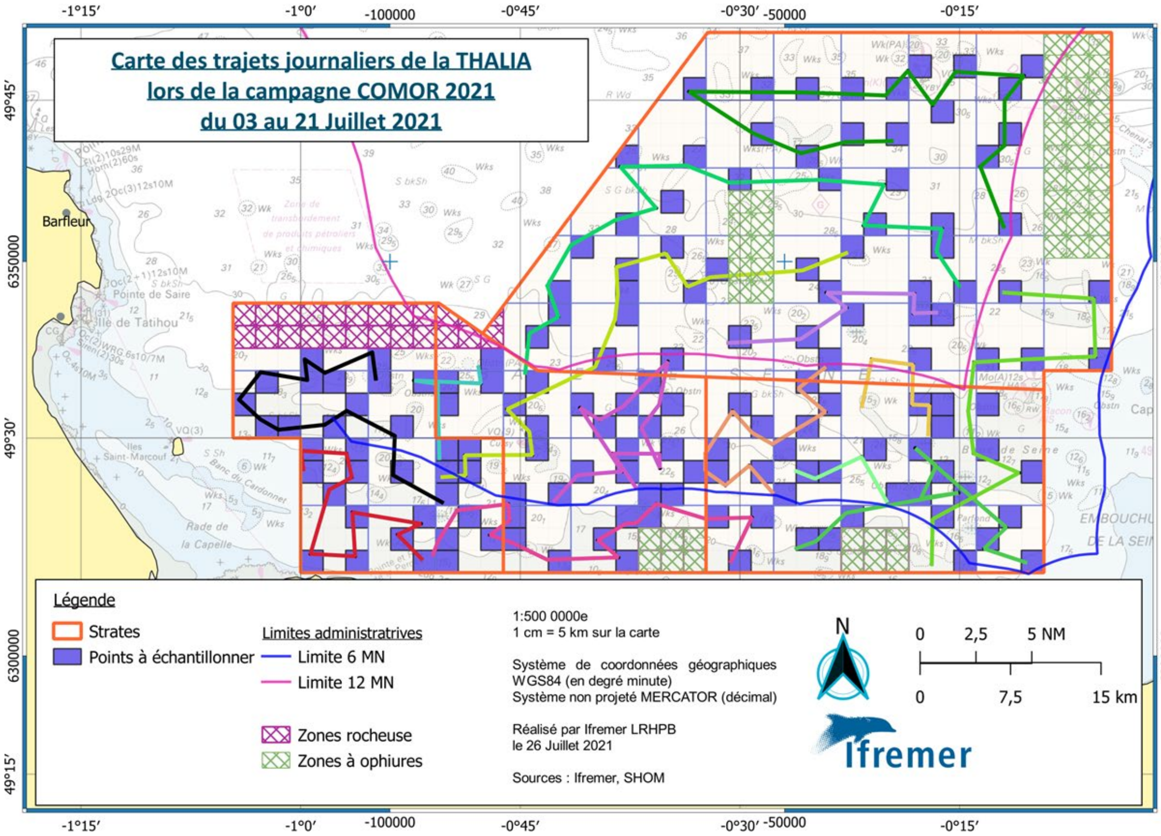

Figure 22. Sampling plan and daily hauls carried out during the COMOR2021 survey.

In the area called "Extérieur Baie de Seine" (between the limit of French territorial waters and 49°50N), the situation is improving compared to previous years: the index of abundance of 1 year old juveniles (229.16) is the best since 2016, and will augur a good level of recruitment for the year 2022 (Figure 23). For scallops that can be harvested in 2021, the 2 year olds abundance index (recruitment) is within the average of the last 12 years (144.4 in 2021, 140.49 for the 2008–2020 average). Moreover, the remainder (scallops aged 3 years and over) is much better than that observed in recent years and well above the average (59.96 compared with 29.19). The fishing effort deployed in 2020 was lower than in previous years, due to the health crisis on the one hand, and the absence of vessels from the British fleet in the other hand. The exploitable biomass present in this area is thus estimated at 13 645 tonnes (Figure 24), a clear increase compared to the 3 previous years.

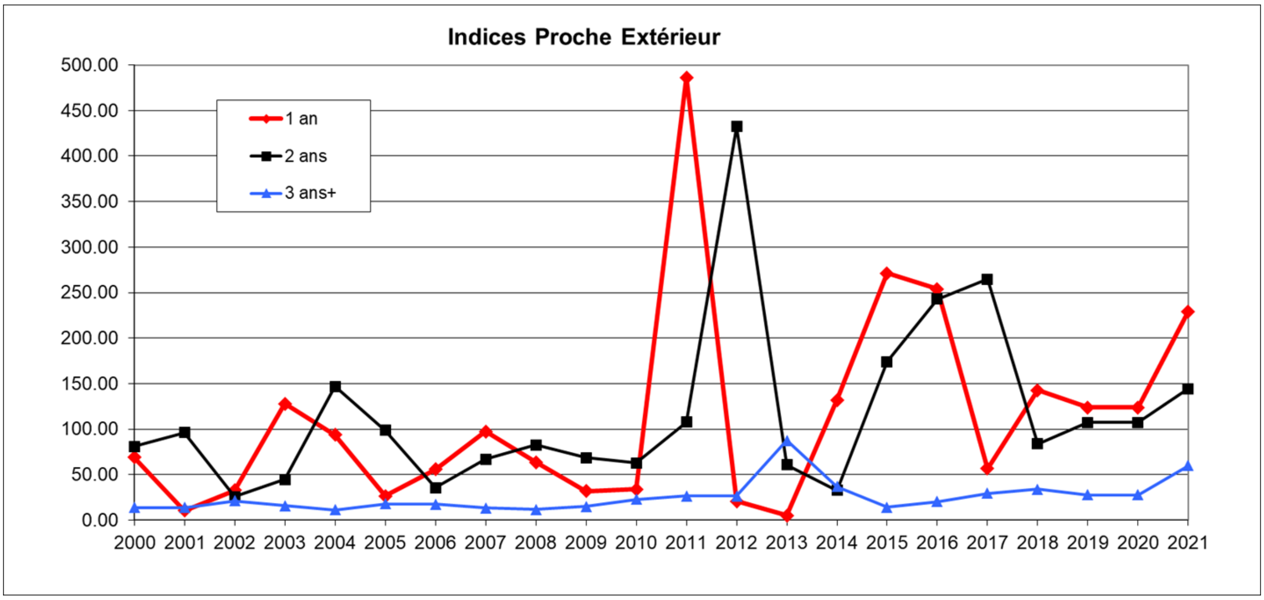

Figure 23. Trends in age-specific abundance indices in the area "Extérieur baie de Seine".

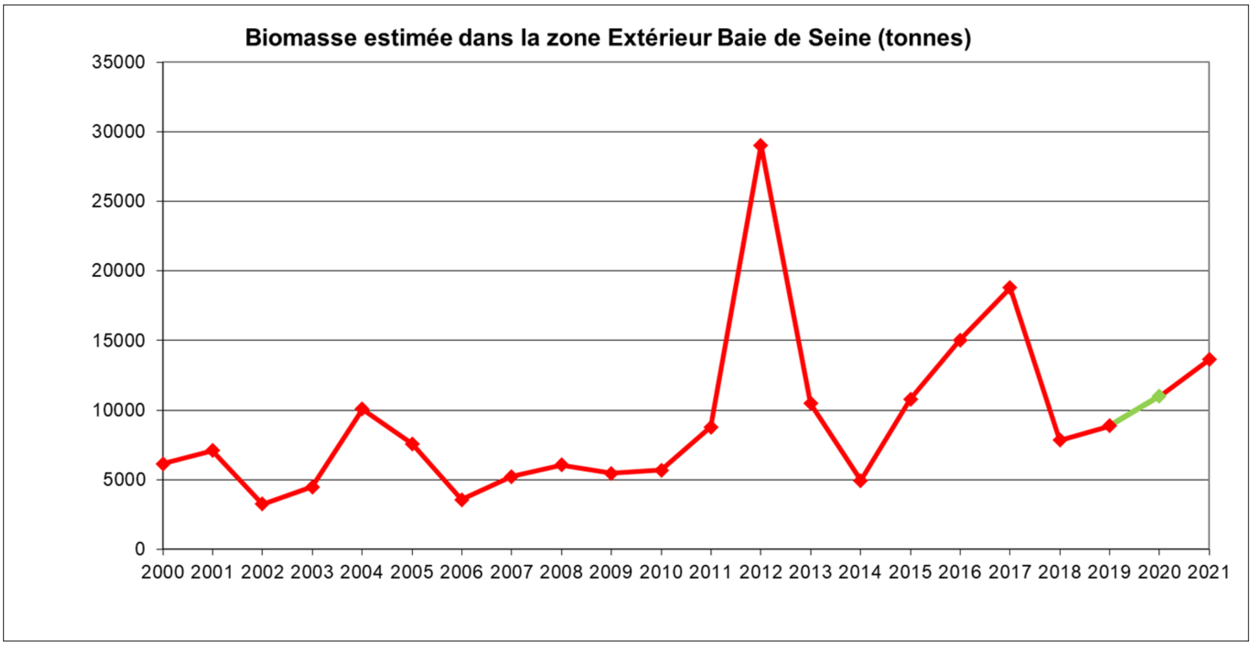

Figure 24. Evolution of exploitable biomass in the Bay of Seine.

In the Seine Bay (from the Normandy coast to the 12-mile limit), the scallop stock situation is extremely favourable. The index of abundance of 1-year-old juveniles is estimated at 440.56, the 4th highest in the historical series (Figure 25). The recruitment index (2 years) is the second highest in the historical series (748.92). For adult scallops aged 3 years and older, this is the highest index ever observed since the assessment surveys began (over 40 years ago). The exploitable biomass is thus estimated at 67 049 tonnes in the Bay of Seine, i.e. the absolute record over the entire historical series (Figure 26).

The population structure is relatively balanced this year, with adult scallops aged 3 years and older being more abundant than in previous years (Figure 27).

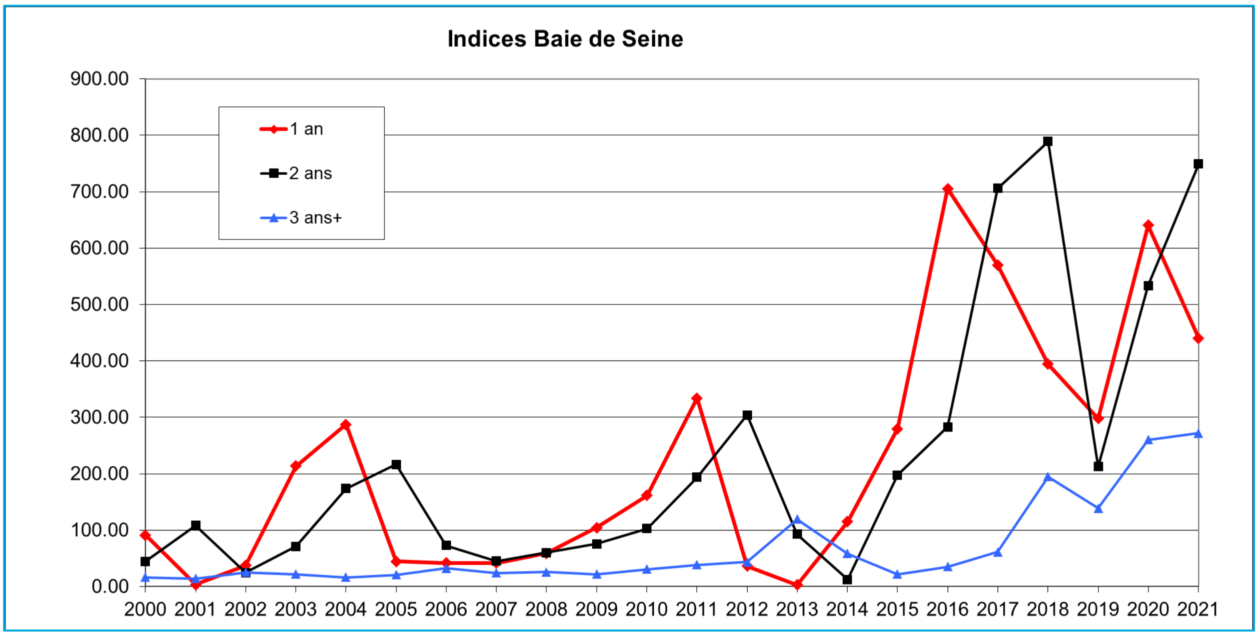

Figure 25. Evolution of abundance indices by age in the Bay of Seine.

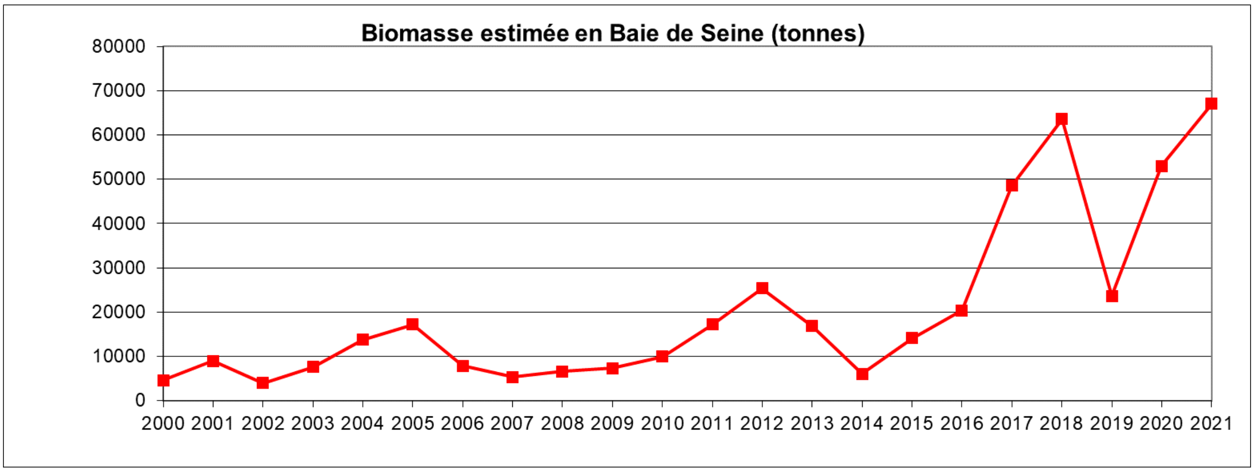

Figure 26. Evolution of exploitable biomass in the Bay of Seine.

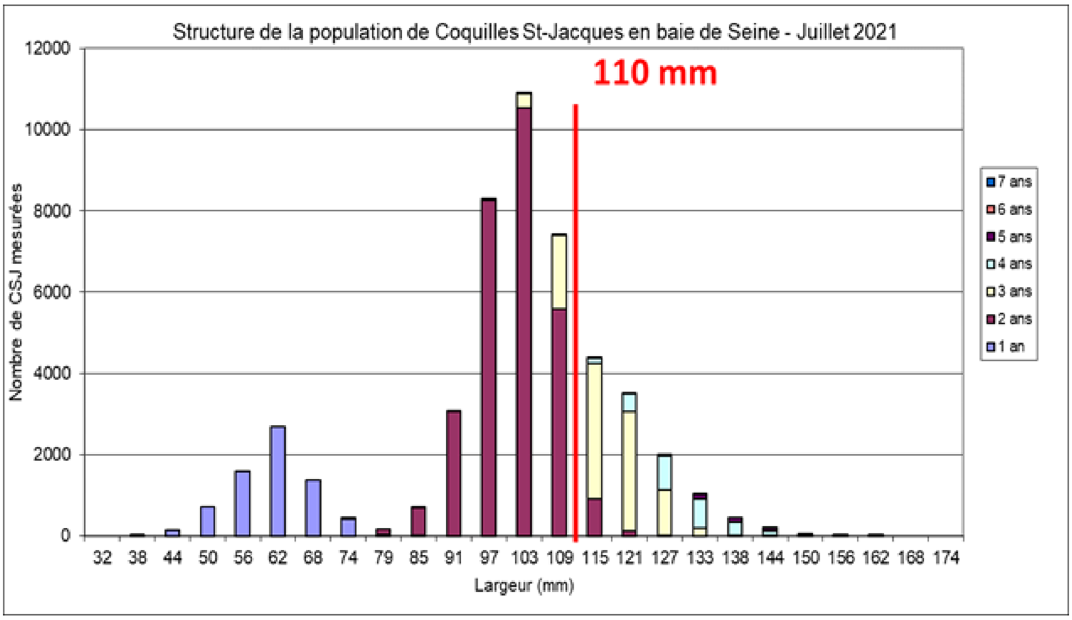

Figure 27. Demographic structure of King scallop population in the Bay of Seine in July 2021.

The distribution of individuals on the sea bottom is relatively homogeneous (Figure 28, 29 and 30). In the Zone 4, which remained closed (biological fallow) throughout the 2020–2021 fishing season, densities of adults are higher than the rest of the Bay of Seine (Figure 30). The average density in the Bay of Seine, all ages combined, is 0.65 individuals/m². Nearly 40 sampling points show densities close to or greater than 1 scallop/m², the maximum density observed is 4.07 scallops/m².

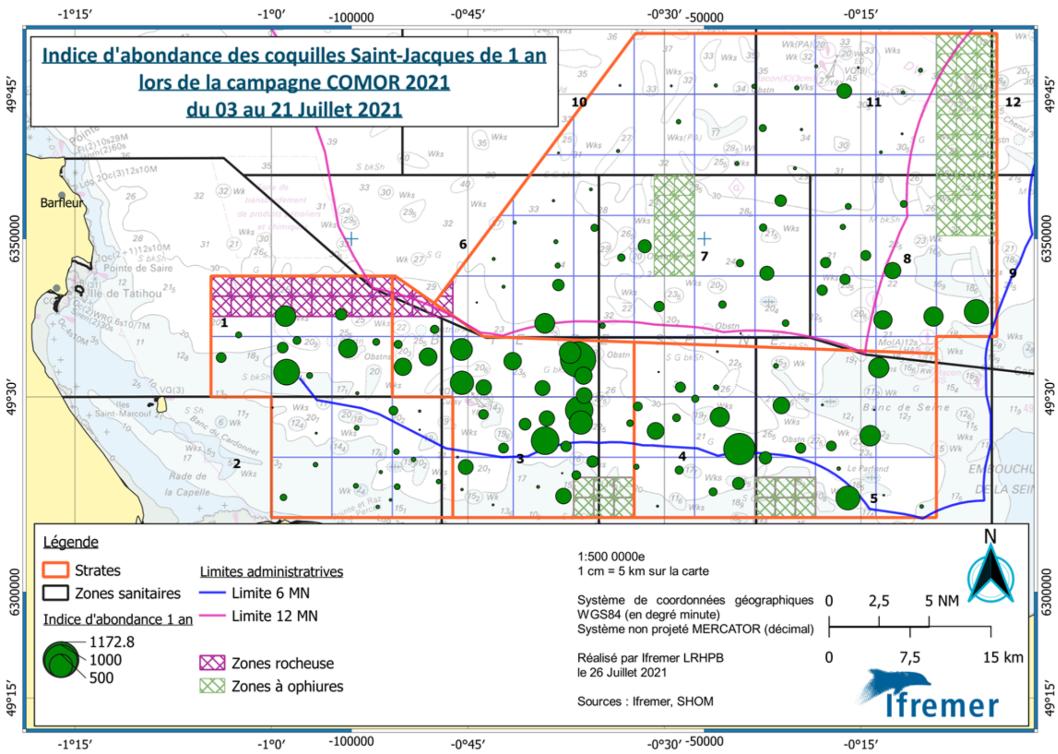

Figure 28. Repartition of 1 year old juveniles in the Bay of Seine.

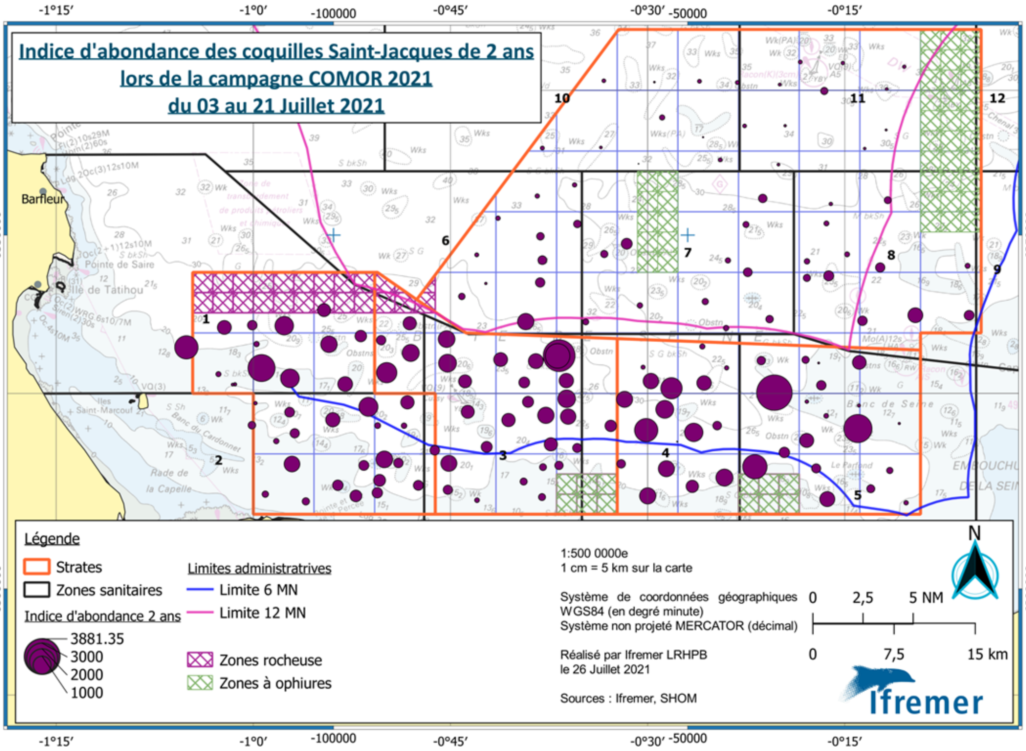

Figure 29. Repartition of 2 years old scallops (recruitment) in the Bay of Seine.

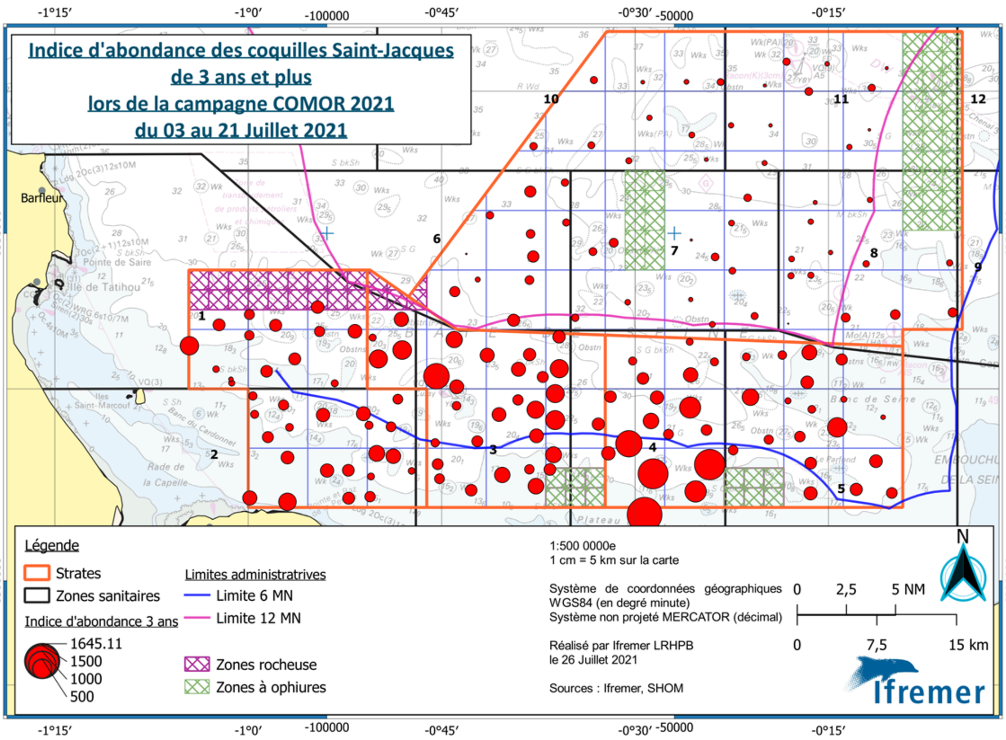

Figure 30. Repartition of 3 years old and over adults in the Bay of Seine.

France, Bay of Saint-Brieuc. King scallop (*Pecten maximus*)

Ifremer carried out the yearly directed stock assessment for the inshore King Scallop fishery of the Saint-Brieuc Bay (VIIe, 26e7) extended to 634 km² of total surface divided in six spatial strata (survey COSB 2021; French R/V "Thalia"). The COVID-19 emergency affected a lot of stock surveys although the one planned for the Saint-Brieuc Bay was undertaken in the initially scheduled period of early September.

The onboard operations usually undertaken in the late summer involve sampling 115 stations by dredging a constant distance of 200 m using an experimental dredge of 2 m width equipped with a pressure plate (Breton dredge), teeth of 8.5 cm length and belly and back ring diameter of 50 mm. The dredge efficiency is calibrated owing to previous references (Fifas and Berthou, 1999; Fifas *et al.*, 2004). Caught individuals are aged and a LFD by age group and by tow is obtained.

The inshore King Scallop fishery of the Saint-Brieuc Bay is probably represented by the highest density levels in European scale. For the period 1962–2021, landings usually oscillated in a range of 4000–6000 t with some extreme values as 12 500 t (season 1972/73) and 1300 t (season 1989/90). In recent years, the exploitation has been undertaken by 220–230 vessels (98% dredgers, 2% divers). Many historical stages throughout more than a half century of exploitation (from the early 1960s onwards) show the vanguard position of this stock for the scallop French fisheries: licence system by pair skipper/vessel, global quota/TAC, obligation of landings at auction, improvement of selectivity pattern.

The adult biomass includes all age groups 2 and +, it provides an index of the potential fecundity of the stock (Figure 31). The exploitable biomass corresponds to individuals larger than 102 mm (MLS in VIIe French waters), thus it is a fraction of the adult one. Those indices show a cyclical pattern with a downwards trend in the period 2006–2013 (respectively -53% and –57% for adult and exploitable biomass). Afterward, an increasing phase is obvious. Since 2018, the stock dynamics has steeply increased. In 2020 and 2021, the absolute records for adult and exploitable biomass were reached (respectively +54% and +43% between 2019 and 2020, +11% and +19% between 2020 and 2021, the highest historical level).

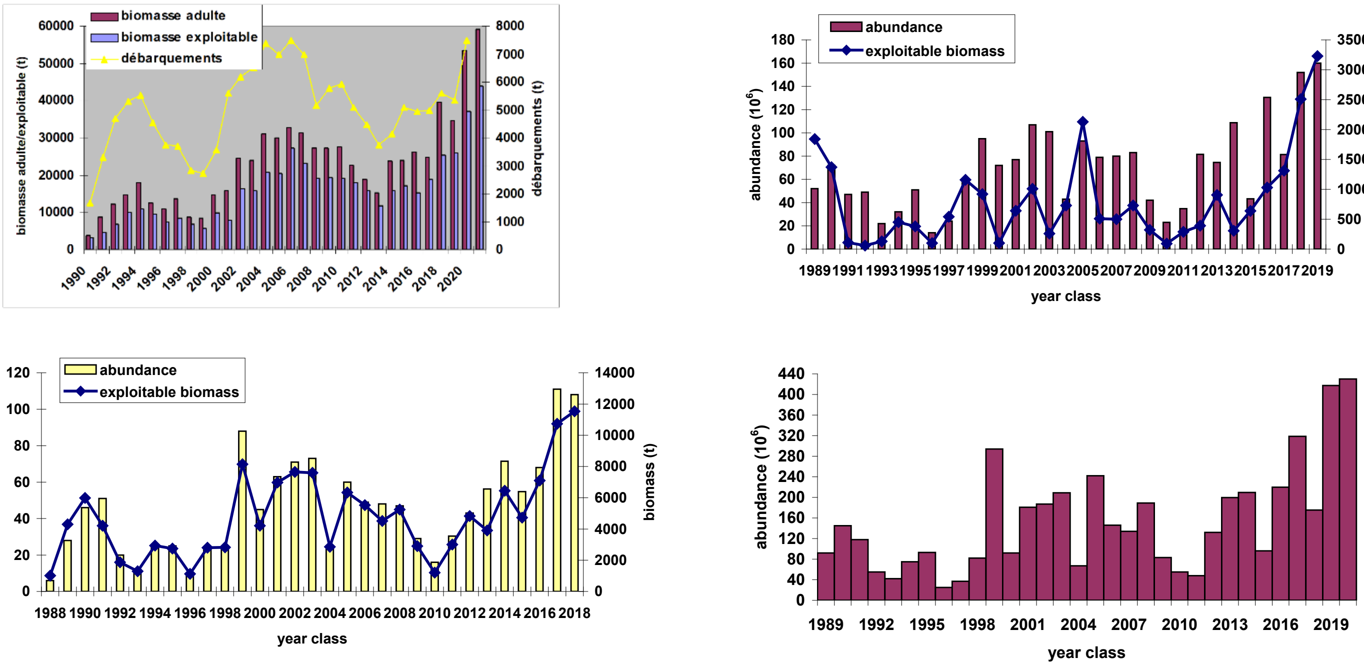

Figure 31. Saint-Brieuc Bay king scallop (1) Adult (yrs 2+) and exploitable biomass (≥102 mm), nominal landings. (2), (3) and (4) age group 2, 3 and 1 indices.

The recruiting class abundance is estimated at 160 million (15 260 t, among them 3230 t immediately exploitable, 11 850 t in the middle of fishing season *i.e.* January 2022). This value is the historically highest the level value last year's index for the same age (152 million).

The management policy consists to preserve more than one significantly abundant age group with the aim of reducing fluctuations between yearly total abundance as much as possible, independently of the annual recruitment variability. Four age groups are significantly abundant in the fishery: 3–6 years (respectively 14 000 t, 14 150 t, 8870 t, 6970 t). The total remaining biomass was estimated at 43 990 t (37 050 t in 2020 and 26 930 t in 2019). The cohort 2018 is represented by a total abundance of 108 million (very near the strongest value throughout the overall time-series: 111 million from the 2020's survey), among them 78% reached the MLS=102 mm (11 540 t on a total biomass of 14 000 t).

In September 2021, the age group 1 was estimated equal to 430 million individuals (this abundance should provide a total one of 166 in the 2022's survey). As for other stock indicators, this value is the maximum historical level near the 2020's level (417 million): it is noticeable that the majority of historically high reproductions (threshold of 200 million) occurred in the period from 2015 onwards: 5 reproductions on 7 (apart from cohorts 2015 and 2018) against only 5 during the remaining time-series (years 1973–2014).The year class abundances (2021–2023) are not yet known. The 2021's cohort abundance will be reliably estimated not before the late summer 2022 as the spat collectors used in summer 2020 provide a minor part of explanation for the future class strength. The input values for those three classes will be simulated. The simulation takes into account that a Ricker S/R model explains a very low ($\varrho^2 \approx .115$) part of the predicted cohort abundance. The uncertainty in this relationship can be expressed by a log-normal probability.

On this basis, recruitments for cohorts 1989–2020 (surveys 1990–2021) are assigned to probability levels against the spawning biomass[1] of the birth year.

There is no other surveyed species or stocks in French fisheries with possibility of reliable projections on three years. The partnership scientists/fishing industry (project FEAMP 28 on years 2017–2019 extended to the period 2020–2022) consists to guarantee the durability of the whole study. In this partnership, the survey at sea provides accurate estimates for GR1+ whereas the age-size structured stratified biological sampling on landings allows to calculate all fishing mortality components for GR2+ and the spat collectors for GR0 gives the first semi-quantitative estimate by cohort.

The management regulations allow to smooth decreasing patterns when the unavoidable weak cohorts arrive although they cannot completely change neither cyclical phenomena nor the global warming trend.

Table 8. Numerical application for the 2021/22 seasons proposed quota. 1st column: proposed quota(t); 2nd column: actual nominal landings (t); 3rd column: Δf=% variation for fishing effort between 2020/21 and 2021/22; 4th to 6th columns: ΔY1, ΔY2, ΔY3=% variation of landings between subsequent fishing seasons; 7th to 9th columns: ΔBf1, ΔBf2, ΔBf3=% variation of spawning biomasses between springs/summers of subsequent years.

							Log-normal p=0.5			Cyclical log-normal p		
Option	Quota	Landings	Δf (%)	ΔY1 (%)	ΔY2 (%)	ΔY3 (%)	ΔBf1 (%)	ΔBf2 (%)	ΔBf3 (%)	ΔBf1 (%)	ΔBf2 (%)	ΔBf3 (%)
1	9542	10200	0.0	36.4	-2.2	5.7	-8.1	-5.6	-20.2	-8.1	-4.4	-17.3
2	6609	7479	-30.3	0.0	7.9	11.5	-1.1	-1.0	-15.5	-1.1	0.1	-13.1
3	6700	7567	-29.3	1.2	7.6	11.3	-1.3	-1.2	-15.7	-1.3	-0.1	-13.2

3.5 ToR e) Continue to refine stock structure using best available information on genetics and larval dispersal and look to improve current mapping of scallop stocks

The Agri-Food and Biosciences Institute (AFBI) have received funding through the European Maritime Fisheries Fund (EMFF) to examine the genetic connectivity and interchange between scallop populations in the Malin & Irish seas. This work will bring together genetic analysis, habitat mapping and larval dispersal modelling. Information is currently lacking on source (broodstock areas) and sink populations (settlement and growth) of both scallops and queenies. To date, important sources of larval supply have not been identified around Northern Ireland for both the commercial species. These source populations are important in the sustainability of the stocks, particularly for the queenie scallop which is more susceptible to the effects of overfishing. By identifying the source populations, areas which are important to the stock can be protected and allowed to seed the remaining grounds. It will also allow for the effectiveness of current protected areas to be determined. This research project will provide the baseline information on which the spatial management of commercial scallop fisheries can be built.

A re-cap was provided on recently published research regarding the genetic and hydrodynamic connectivity of scallop populations around the British Isles, indicating weak population genetic differentiation within the English Channel between the south-western English (SWE) coast and the rest of the English Channel. Around the British Isles, connectivity was high at a regional level (e.g. northern Irish Sea), but lower at scales > 100 km between sites, with the data informing the

[1] The spawning biomass differs from the adult one because it is calculated by weighing accordingly to the number of eggs potentially produced which is a function of the scallop size.

appropriate scale for spatial management of stocks (Handal *et al*., 2020; Hold *et al*., 2021; for summary see WGSCALLOP 2020 report, section e).

The WG were made aware of the start of a new PhD project at Heriot Watt University (Scotland) with the collaboration of governmental, industrial, and other academic partners. The main aim of the project is to investigate the genetic structure and connectivity among king scallop populations around Scottish waters for identify appropriate management units. The project will first identify distinct scallop grounds throughout environmental data layers, VMS data and local knowledge from scallop dredging vessel owners and skippers. Secondly, genetic differentiation will be inferred through genomic analysis and connectivity among patches will be assessed through larval dispersal modelling under different temperature scenarios. This will provide insight into likely future scenarios of scallop recruitment under a warming regime. Finally, with the use of different modelling approaches, critical grounds in the meta-population structure of scallops will be determined. This will inform appropriate approaches for spatial management of the king scallop at the appropriate spatial scale. Indeed, overfishing of critical scallop grounds could potentially alter the connectivity between scallop grounds, thereby leaving the population more exposed to stock collapse.

The group also received an update on the progress of a PhD project which focuses on mathematical modelling of *P. maximus* stocks around Scotland and is currently being carried out at the University of Strathclyde. This project is funded by NERC and falls under the scope of *"Challenged ecosystems: climate, pollution, resilience, resource management, societal well-being"* theme of the SUPER DTP programme. It is a cooperative effort between the University of Strathclyde and Heriot Watt, and has CASE partner Marine Scotland Science. The project's key aims are: identify larval source and sink patterns in Scottish waters, establish which pattern of MPAs (including those created by offshore wind farms) provide a net benefit to both stocks and fisheries, and assess the system's sensitivity to climate change. This study can be divided into four parts. Currently, an individual model to simulate the growth of a king scallop is being developed. This model is based on Dynamic Energy Budget theory and its parameters will be estimated to fit the data available on Scottish scallops from MSS surveys. Then, population demographics around Scotland will be analysed using habitat mapping techniques developed at Strathclyde with existing data on stock distributions. Results will be used to identify sources and sinks in the areas of interest, including where there is potential overlap with offshore renewables sites. A third component of the project is assessing population connectivity through larval transport. To achieve this, we will carry out Lagrangian Particle Tracking simulations using the MSS Scottish Shelf Model, which allows for explorations of future climates as well. Finally, a full-spatial population model will be implemented by combining the DEB model with the particle tracking outputs. Results from this project will inform management practices to prevent over-exploiting king scallop fishing grounds and to promote sustainable fishing.

3.6 ToR f) Keep current biological parameters under review and update when more information becomes available and report on all relevant aspects of: biology, ecology, physiology and behaviour, in field and laboratory studies

Influence of environmental conditions on the variability of recruitment of the King scallop *Pecten maximus* in the Bay of Seine

France presented the first results of a study on the variability of King scallop recruitment in the Seine Bay, and the impact of environmental conditions on this recruitment. This study was carried out as part of Anaïs Clavel-L'Haridon's Master 2 degree internship, and is currently ongoing.

Since the beginning of the 1990s, the abundance indices calculated from the data collected during the annual stock assessment surveys show a certain stability, even if the inter-annual variability of the recruitment observed in the Seine Bay is very high. A clear break in slope is observed in 2014, and the abundance index of 2-year-old scallops constituting the recruitment shows a strong upward trend until today. The question is therefore to understand the causes of this recent change.

Environmental factors (surface temperature, wind strength and direction, climatic indices) and biotic factors (quantity of phytoplankton, spawning biomass, etc.) condition the level of recruitment. A first study on recruitment-environment relations was undertaken about ten years ago within the framework of the ANR-COMANCHE project. It concluded that there was no relationship between the spawning stock (SSB) and recruitment (R), but that R was directly linked to the sea surface temperature (SST) observed during the larval life period (May to July). A GLM-type model fitted to the years 1990 to 2010 was established to estimate R from SST and a climate index (NAO+). This model was applied by integrating the recent period (1990–2020). It diverges completely and now explains only 20% of the variability. Several new models were tested. None of the models with only environmental variables as explanatory variables correctly estimate recruitment. However, a model combining SSB and environmental variables can very correctly explain the strong increase observed since 2015.

A new fisheries management measure was introduced in the Seine Bay in 2015, with the fallowing of an area for the duration of the fishing season. This fallow area changes every year (rotation system). It has led to a significant improvement in the level of SSB and local scallop densities. The effects of this new measure are likely to be directly related to the recent improvement in recruitment, but this needs to be tested. This study is still ongoing.

Determining growth of Pecten maximus in the North Sea and the English Channel based on annuli data

Cefas (Lowestoft, England) presented preliminary results from their ageing programme of *Pecten maximus* based on shells from annual dredge surveys and the industry sampling programme. Age determination is done based on flat/upper shells. Size-at-age is measured perpendicular to the hinge, and is referred to as height. The dimension parallel to the hinge is referred to as length.

Terminal height-at-age data are available for five of the six assessment areas (no data for Area 27.7.f.I, southern approaches of the Bristol Channel) for the years 2017–2020 from dredge surveys, and for the years 2017–2019 from the industry sampling programme (no sampling in 2020, due to the Covid-19 pandemic).

Pre-catch annuli height-at-age data are available for only two assessment areas. For Area 27.4.b.S (western central North Sea, mainly along the Yorkshire coast) shells have been analysed from dredge surveys in 2018–2020, and from the industry sampling programme in 2018. For Area 27.7.d.N (eastern English Channel) shells have been analysed from dredge surveys in 2019 and 2020.

Figure 32. Terminal and pre-catch annuli height-at-age distributions of *Pecten maximus* shells in Area 27.4.b.S (Yorkshire) from dredge surveys and industry sampling. Lines represent medians, and shading represents the 5th to 95th percentile range of the distributions.

For age 2, and to a lesser extent for ages 3 and 4, there are significant differences between terminal height distributions and annuli height distributions for shells that were caught at age 8 and up (Figure 32). At these early ages, only the largest shells in the respective age groups are caught in standard dredges, resulting in an overestimation of typical sizes and, therefore, an underestimation of growth rates. In both assessment areas for which pre-catch annuli height-at-age data are available, the two distributions converge at age 5, corresponding to median heights of 100 mm in the Yorkshire area, and 110 mm in the eastern English Channel. This suggests that ageing effort might be directed towards measuring all distinguishable annuli of the largest caught shells, rather than determining the terminal ages of shells with heights below 100–110 mm.

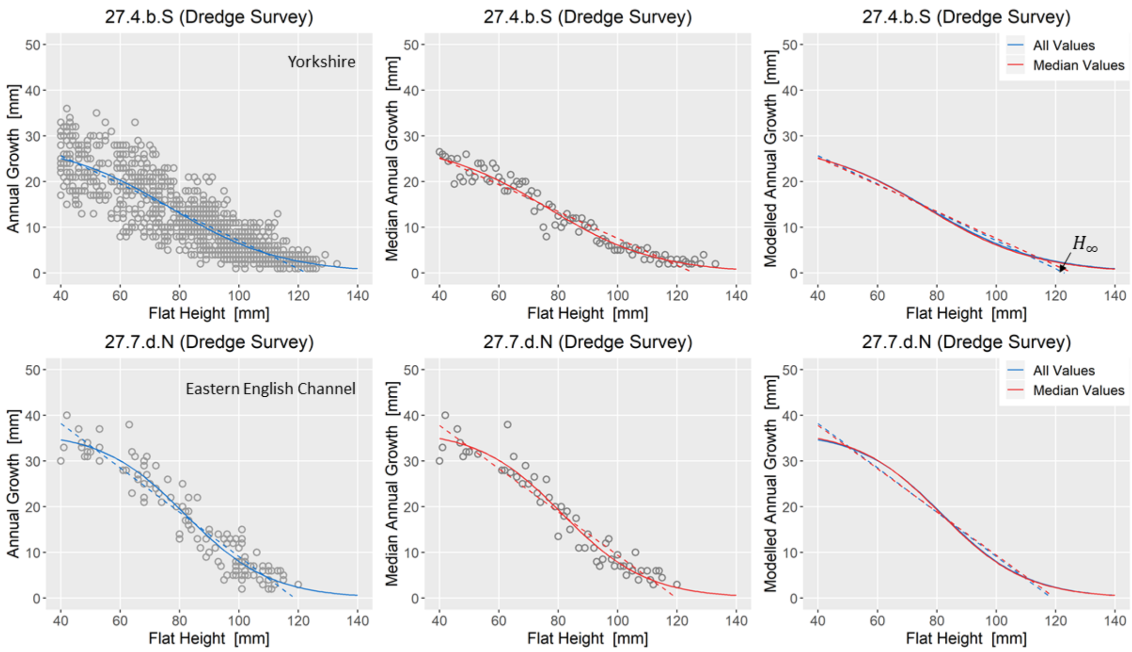

Figure 33. Annual growth increments versus initial flat heights of *Pecten maximus* shells in Area 27.4.b.S (Yorkshire) and Area 27.7.d.N (eastern English Channel) from dredge surveys. Solid lines are logistic function fits, and dashed lines are linear function fits. Blue lines represent fitted models using all values, whereas red lines represent models based on median annual growth rates for each initial flat height.

According to the von Bertalanffy growth model, there should be a negative linear relationship between annual growth increments and the initial flat heights. This is not borne out based on the currently available pre-catch annuli height-at-age data. In the Yorkshire and eastern English Channel assessment areas, there are indications that growth follows a logistic rather than a linear relationship with size (Figure 33). However, more data – particularly in areas for which currently no pre-catch annuli measurements are available – will be required to conduct a more detailed analysis of the differences in growth rates of *Pecten maximus* in English waters. This could include differences between different cohorts, or spatial differences within assessment areas.

Queen scallop subgroup – Update

A queen scallop subgroup was formed following recommendations from the 2020 WG meeting, and an inaugural meeting in December that year was held online due to the pandemic. Queen scallop fisheries around the UK are less widely distributed, often less consistent from year to year, and of lower economic value than king scallop. As such, queen scallop research, monitoring and stock assessment have often been considered a lower priority in most regions. The aim of the subgroup was to focus on queen scallops (*Aequipecten opercularis)*, leading to progress on stock status determination for selected stocks. Specifically, identify and define assessment areas, collate available data, determine data gaps and how best to fill them, and carry out stock assessments where appropriate.

Two further meetings of the subgroup were held early in 2021 where presentations on the current situation by region were made by participating members. Queenie fisheries identified by earlier work of WGScallop were considered and an updated and queenie specific data inventory by ICES Division was created.

The main fishery is in the Irish Sea and that adjacent to the Isle of Man is assessed by Bangor University. Smaller fisheries occur in the wider area of the Irish Sea and around Scottish coasts with artisanal or occasional fisheries in the English Channel and North Sea. Populations of queen scallop occur in other regions, for example, around the Faroe Islands.

Bangor are currently investigating spatial variability in size and age structure around the UK and a biometric sampling programme is underway. Targeted and non-targeted queen scallop surveys are carried out in the Irish Sea and around Scottish coasts by Bangor University (for Isle of Man and Welsh Government), AFBI and Marine Scotland.

Sampling procedures for queen scallop bycatches during annual trawl surveys carried out by Cefas (England) on their research vessel have been improved to provide size structure. Previously, only total catch weight for selected sites was provided. These surveys will enable sample collection for further shore-based biometric analysis.

Next steps will include deciding which stocks warrant assessment and which assessment methods might be appropriate. Data gaps will be determined in consideration of the requirements of any chosen assessment methods. The feasibility of filling these data gaps and the requirement for expansion of current monitoring or survey work will rely on funding.

A review paper will provide a summary of the current situation, may make recommendations towards further data gathering and describe what might be achieved if this sampling is realised.

Growth study for queen scallops (*Aequipecten opercularis*) in ICES waters

At ICES WGSCALLOP 2020 the group discussed the possibility of a collective project collecting samples of queen scallops from across the ICES area for age and growth studies. To date we have collected sampled from three institutions and three spatial areas (Isle of Man, Wales and England). Four of the eight samples have been dissected and the left valve of the shells (Figure 34) prepared for visual ageing as per the standardised methodology

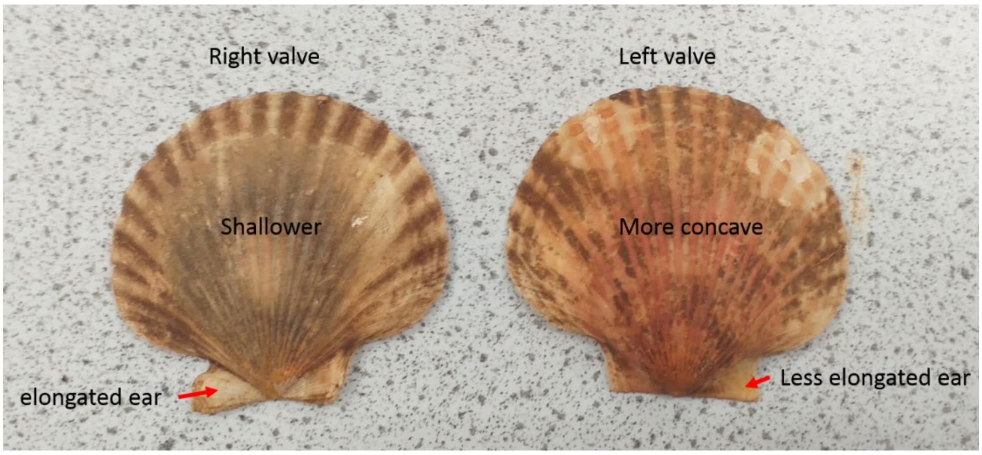

Figure 34. Image showing the two valves of the queen scallop shell. It is the upper left valve, which is more concave, that is used for ageing.

One of these samples has also undergone initial visual ageing with some basic analysis. The intention is to investigate a range of ageing methods (visual rings, microscope hinge etc.) and develop a standardised ageing protocol for queen scallops. Additional samples from a wider spatial extent will be collated over the next year to add to the study.

Metal pollution as a potential threat to shell strength and survival in marine bivalves

Adapted from: Stewart *et al.* (2021) https://doi.org/10.1016/j.scitotenv.2020.143019

Marine bivalve molluscs, such as scallops, mussels and oysters, are crucial components of coastal ecosystems, providing a range of ecosystem services, including a quarter of the world's seafood. Unfortunately, coastal marine areas often suffer from high levels of metals due to dumping and disturbance of contaminated material. We established that increased levels of metal pollution (zinc, copper and lead) in sediments near the Isle of Man, resulting from historical mining, strongly correlated with significant weakening of shell strength in king scallops, *Pecten maximus*. This weakness increased mortality during fishing and left individuals more exposed to predation. Comparative structural analysis revealed that shells from the contaminated area were thinner and exhibited a pronounced mineralisation disruption parallel to the shell surface within the foliated region of both the top and bottom valves. Our data suggest that these disruptions caused reduced fracture strength and hence increased mortality, even at subcritical contamination levels with respect to current international standards. This hitherto unreported effect is important since such non-apical responses rarely feed into environmental quality assessments, despite potentially significant implications for the survival of organisms exposed to contaminants. Hence our findings highlight the impact of metal pollution on shell mineralisation in bivalves and urge a reappraisal of currently accepted critical contamination levels. A number of questions remain: How are the metals affecting shell strength? Is it through effects on scallop physiology, effects on mineralisation, or because metals are being incorporated into shells? We would also like to investigate how widespread the effects we observed might be in other areas and other bivalve species. Finally, looking into the future it will be crucial to examine how metal pollution might interact with the effect of ocean acidification on bivalve shells, such as scallops.

MSS update on scallop dredge survey catch analyses

Marine Scotland Science (MSS) has conducted regular fixed station dredge surveys on the main king scallop (*Pecten maximus*) fishing grounds since the mid 1990s. Typically, there are three annual surveys covering Shetland, the east coast and west coast of Scotland and five of the eight king scallop assessment areas. The primary purpose of the surveys is to collect data on scallop abundance for use in stock assessment.

Over time, reflecting growing interest in ecological monitoring, details of the bycatch species have also been recorded. Preliminary analyses of the bycatch associated with MSS scallop dredge surveys between 2009 and 2019 has included summarising the species encountered, the percentage contribution of species to the catch (in terms of number and weight), and the degree of damage associated with capture as assessed by visual examination on the deck.

A total of 432 366 individuals, identified as 60 different species (excluding starfish), were recorded. King scallops dominated the catch in all areas surveyed, constituting 86.8 % in terms of the total number of individuals recorded and 87 % by weight. Other species commonly encountered include queen scallops, brown crab, whelks and plaice, although differences were observed in the catch assemblages between the different areas.

This time-series of scallop dredge survey catch data includes a range of species of commercial and ecological interest and is of potential use for wider ecosystem assessment in terms of commercial fisheries stock assessments, species assemblages, or the presence of priority marine features. Caution should be exercised in the interpretation of these data because of the fixed station survey design and limited spatial coverage. The survey vessel is rigged with two different types of dredges, one side similar to commercial king scallop dredges and the other side consisting of scientific dredges. The latter sampling gear is used to catch undersized scallops for recruitment estimates and so catch should not be automatically assumed to be representative of the commercial dredge fishery.

The paper is currently in draft but should be publically available in early 2022.

The scallop fishery and the developing windfarm industry on the north east continental shelf of North America

The development of the windfarm industry off the United States has great potential for the harvest of sustainable energy but will take up a large amount of space in an already crowded marine environment. One of the highest valued and historically productive fisheries in this same space is for the Atlantic sea scallop, (*Placopeten magellanicus*). Sea scallops are mostly sessile after their larval phase, so the location of their beds is relatively fixed in time. They are harvested offshore with a New Bedford style dredge towed behind the vessel with at least a 3 to 1 length-depth ratio. The abilities of the fishery to harvest within or next to these windfarms is under debate. The impacts extend beyond the biological to include economic, social and institutional. Fortunately, sea scallops have a large, strong scientific data base and may be one of the few fisheries where the impact of the developing windfarms industry can be assessed on a quantitative bases from scales of "individual", "population" and "community". Understanding the impacts of this new industry and suggesting ways to mitigate negative impacts is key to allowing both industries to prosper and produce a continuing supply of sustainable sea food and renewable energy to an increasingly hunger world.

Low Impact Scallop Innovative Gear (LISIG) Project

The WG were introduced to the LISIG project – a joint Heriot-Watt University and Bangor University project, funded under the UK Seafood Innovation Fund (a £10m DEFRA scheme being run through CEFAS). A modification to the standard Newhaven dredge puts skids on the bottom of the belly bag, thus lifting the belly bag off the seabed and potentially reducing impact to seabed habitats and reducing drag. Sea trials were undertaken in 2021 and aimed to investigate the practicality of the dredge modifications, and any reduction in seabed impact and fuel consumption. The final report is due in 2022.

Dredge efficiency review paper update

The WG started the planning of a catch efficiency review paper at the 2019 annual meeting. This review paper would collate, compare and discuss peer-reviewed and prominent grey literature estimates of catch efficiency for any towed gear used to target a scallop species. Catch efficiency is the fraction of scallops caught from that which were in the swept area of the gear and an important parameter for stock assessments. In addition, the paper would review factors that affected catch efficiency and methods used to estimate it.

An initial draft of the review paper is, at the time of writing, available to be reviewed by WG members. This draft contains sections written by several members of the WG. The next steps are to complete any outstanding sections and to prepare a second draft based on feedback from WG reviewers. The aim is to publish the paper in a peer-reviewed journal.

3.7 ToR g) Compare age reading methodologies and attempt to develop common practices and determine precision and bias of scallop age reading data derived from different readers

An update on the status of the ICES Workshop on Scallop Aging 2 (WKSA2) workshop planned for 2021 was presented. WKSA2 is the second workshop in the series, following on from the progress made in WKSA in 2020 to provide a platform to share expert knowledge, methodologies for age reading, consensus reading and technical aging advances.

Clear understanding and standardization of age reading procedures would aim to improve the accuracy and precision in the age reading of this species. Collaboratively identifying and understanding the criteria and variables that can introduce differences in age assessments between experienced readers was needed. The first ICES Workshop on Scallop Aging (WKSA) reviewed current scallop age reading methodologies across member institutes comparing standard operating procedures and quality assurance processes to collaborate in developing consensus and best practice.

2020 achievements:

- 22 participants from 8 institutes shared expertise, methodologies, advances and knowledge exchange.
- It was agreed that the different protocols across institutes reflected the biological attributes of their stocks. Whilst methods have stock specific requirements, common attributes and standard principles were defined to provide baseline information and standard terminology across institutes.
- The set of standard principles were agreed by comparing the methodologies presented and drawing on commonalities to improve consistency in aging. These can be used when establishing reference sets through consensus agreement across institutes, agreed as a more important step than further exchange programmes at this time.
- The group were keen to hold a future WK focused on producing a full reference set that is aged by consensus for each institute (or fishery/stock area).
- The WG proposed that a reference collection should be collated for each fishery area with consensus aging applied as disparity in aging was reduced when working together to reach a consensus age.
- Future workshops were deemed essential to complete work started the WG proposed a second workshop in October 2021.

Due to Covid-19 pandemic, the planned meeting for WKSA2 was in the form of a virtual one day meeting held in October 2021 with an 'In-person' workshop to be hosted in the summer of 2022. The agenda of the virtual one-day meeting included presentations from participants on updates to aging methodologies, discussions on pivotal issues encountered, quality control procedures and assessments, maintaining a regular aging platform and the potential to apply technics used for *Pecten maximus* on other species, specifically *Aqueipecten opercularis*. At the workshop, there would be a new SmartDots* event released event to accompany the workshop with new shell images and resilia to further test the concordance utilising this online platform for assessing consensus ages virtually. The workshop would further provide feedback on the use of SmartDots for *Pecten maximus* to WGBIOP and WGScallop (*an age reading platform developed within ICES).

Workshop on Scallop Aging 2 (WKSA2) terms of reference are outlined below:

a) Create, collate and consensus age a reference collection of scallop shells for the participating institutes across geographical fishery locations (Science Plan code: 3.1) [Validation In person 2022]
b) Carry out microscope aging QC consensus training (Science Plan code: 3.1) [In person 2022]
c) Further progress the use of SmartDots technology for virtual aging king scallops (Science Plan code: 4.1) [Online]
d) Agree quality assurance parameters for scallop aging (Science Plan code: 3.1) [Online]
e) Review new and evolving methodologies in scallop age techniques (Science Plan code: 3.1) [Online]
f) Maintain a regular platform to progress information flow and develop consistent shell aging Science Plan code: 3.1) [Online]
g) Discuss the potential of applying similar age determination techniques to other scallop species in particular *Aequipecten opercularis* (Science Plan code: 4.1) [Online]

Image Based Scallop Age Reading – Update from Marine Scotland Science

Last year MSS reported to the group a small scale project on image based age reading for scallops, which was started in 2019. Initially a viability trial was conducted to determine if images of scallops could be taken at a resolution high enough to allow age reading of annual rings. In the original trial, 22 scallop shells were selected at random and photographed. The scallops were photographed in numerous ways to determine the best set up. The photos were then placed into a PowerPoint presentation in a random order and sent to identified readers deemed to be expert or non-experts. For the initial trial 7 readers aged the scallops, first from the images and then in real-life. The age readings of experts and non-experts were consistent, with no outliers. The real-life readings showed slightly more accuracy and agreement, but from this we decided reading scallop ages from images was viable and to increase the trial size. The details of the early phase of the project can be found in the WKSA report (https://doi.org/10.17895/ices.pub.6090).

A second trial utilised the same 22 scallop shells re-photographed to improve the image quality (based on feedback from the previous trial). The photos were integrated into a PowerPoint presentation in a random order and sent to readers of varying experience (beginner, expert, intermediate). For this trial 15 readers (seven of whom were involved in the initial trial) aged the scallop images only. For this trial we were interested in the accuracy and precision of age reading between readers using the images, and also comparing the age reading for the seven readers who aged the scallops previously (for the initial trial). Preliminary results revealed that experts all aged the images very similar, but there was more variation in age readings at intermediate and beginner levels. It demonstrated the potential use of this as a tool for training purposes to highlight were further training may be needed for some readers. For the seven readers who aged the scallop shells previously we could see that most readers aged the scallops similarly to their first time, with very few differences.

Work continued and 50 new scallop shells were collected in November 2020. These shells were photographed using the same principles as the previous trial to ensure similar image quality (but without the addition of a scale). These images were placed into a PowerPoint presentation in a random order and sent to the same selection of readers of varying experience (expert, intermediate, beginner), however one new reader has been introduced and two readers have left the trial. So far six readers have aged the images and two of these have aged the real scallops. The plan for this trial is to have all readers age the images and then age the real scallop shells and compare the real scallop shell age readings to the image based age readings for a direct comparison. This work will be reported to ICES WKSA2 in 2022.

3.8 References

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Annex 2: WGScallop resolution

The **Scallop Assessment Working Group** (WGScallop), chaired by Lynda Blackadder, Scotland, UK, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2019	7–11 October	Isle of Man		
Year 2020	5–9 October	by corresp/ webex		physical meeting cancelled - remote work
Year 2021	4–8 October	Online meeting	Final report by 20 November to SCICOM	

ToR descriptors

ToR	Description	Background	Science plan codes	Duration	Expected Deliverables
a	Compile and present data on scallop fisheries in ICES areas II, IV, V, VI and VII by collating available fishery statistics.	The fisheries are socio-economically important and there is a need to collate these data at a national level to ensure assessments can proceed.	5.1	Years 1,2,3	Landings, effort and commercial sampling data on listed species, from each country.
b	Review recent/current stock assessment methods of the main scallop species and explore other methodologies; including comparisons with fishery dependant indicators.	The aim is to assess the status of scallop stocks and contribute to Integrated Ecosystem Assessment and Management and descriptor 3 of the MSFD.	5.1, 6.3	Years 1,2,3	Report on alternative assessment methods. Link with WKLIFE.
c	Collate all available data and attempt to conduct a stock assessment for the north east Irish Sea.	The Isle of Man currently conducts stock assessments on their territorial seas. The aim is to assess the wider area.	5.1, 6.2	Years 1,2,3	Stock assessment for north east Irish Sea.
d	Review and report on current scallop surveys and share expertise, knowledge and technical advances.	Focus will be on reporting recent updates with regards to surveys and sampling, use of cameras, gear efficiency and selectivity, impact of scallop dredging, discard mortality, MPA's and closed areas, bycatch.	1.4, 1.5, 4.4, 5.2, 5.4	Years 1,2,3	WG report chapters. Exchange of scientific staff on surveys. Database to collate bycatch data.

e	Continue to refine stock structure using best available information on genetics and larval dispersal and look to improve current mapping of scallop stocks.	Knowledge on the genetic stock structure and extent of larval dispersal is still weak but a number of projects are underway.	1.4, 1.8	Years 1,2,3	WG report chapters and relevant maps. Link with WGSFD.
f	Keep current biological parameters under review and update when more information becomes available and report on all relevant aspects of: biology, ecology, physiology and behaviour, in field and laboratory studies.	Several biological parameters are important for analytical assessments and parameters may vary depending on the stock area.	5.1, 5.2	Years 1,2,3	Update knowledge on crucial stock parameters.
g	Compare age reading methodologies and attempt to develop common practices and determine precision and bias of scallop age reading data derived from different readers and methods.	Many institutes rely heavily on aging methods but there are no common methodologies or protocols.	4.4, 5.1	Years 1,2,3	Produce guidelines on agreed methodologies.

Summary of the Work Plan

Year 1	Annual standard outputs for ToR a,d,e, f. Collate lists of available data for Irish Sea (c). Age reading workshop (g), arrange scientific staff exchange on surveys (d) and knowledge exchange on current scallop stock assessment methods (b).
Year 2	Annual standard outputs for ToR a,d, f. Collate available data for Irish Sea (c). Age reading guidelines further discussed (g). Update and report on genetic and larval dispersal models and attempt to colloborate on further work (e). Review scallop stock assessments caried out by national institutess (b).
Year 3	Annual standard outputs for ToR a,d, f. Stock assessmnet for Irish Sea (c). Age reading guidelines produced (g). Produce maps on genetic stock structure and larval dispersal (e) Further develop scallop stock assessment methods (b).

Supporting information

Priority	The fisheries for scallops are socio-economically important and transnational in Europe and North America. Management of stocks in Europe is primarily by technical measures and in most countries there are generally little or no management instruments to control fishing effort. This is currently the only scientific assessment forum for discussion and development of common assessment methods for scallops. Consequently, these activities are considered to have a very high priority.

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	The Group is normally attended by 16 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages as the WG does not currently provide advice.
Linkages to other committees or groups	There are currently no direct linkages but the WG has made recommendations for WGSFD and WKLIFE.
Linkages to other organizations	None.

Annex 3: Further data call figures and tables

Table A1. Landings of queen scallops (live weight, t) by ICES area and year.

Year	IV	VI	VII	VIII	Total
2000	105.4	2.1	5104.3	19.4	5231.2
2001	159.1	100.3	9625	17.6	9902
2002	61	4688	11437.6	49.1	16235.7
2003	22.8	1253.5	11507	43.2	12826.5
2004	33	1494.4	7140.7	63.5	8731.6
2005	18.5	1284	9028.1	74.4	10405
2006	21.7	1413.4	8971.4	110.7	10517.2
2007	12	80	13123.6	60.1	13275.7
2008	9.2	203.9	5260.8	51.6	5525.5
2009	16.2	1851.2	5607	91.5	7565.9
2010	11.3	2972.3	12691.8	116.3	15791.7
2011	11.1	3002.1	23520.1	130	26663.3
2012	36.4	4927	17335.9	35.4	22334.7
2013	20.9	2041.2	18864.8	25.2	20952.1
2014	8.8	1022.6	11003.3	47.7	12082.4
2015	17.5	90.2	14535.3	75.8	14718.8
2016	1238	136.3	11090.5	175.8	12640.6
2017	141.2	215.8	10480.4	197.6	11035
2018	66.4	75.9	9272.2	134.6	9549.1
2019	34.1	1.8	6170.8	78.5	6285.2
2020	6	0.7	5220.8	14.9	5242.4

Table A2. Landings of king scallops (live weight, t) by ICES statistical rectangle and year within ICES subarea VIIa (Irish Sea).

Year	33E2	33E3	33E4	33E5	34E3	34E4	34E5	35E3	35E4	35E5	35E6	36E3
2000	16.5	92.2	396.1	298.5	0	58.7	37.8	33.8	34	111.4	43	27.9
2001	4.5	90.9	248.3	126.6	1.1	31.5	2.5	15.8	30.2	83.3	109.2	31.9
2002	0	40.5	133.4	102.6	0	51.1	1	2	3.2	111	58.1	3
2003	18.6	89	90.3	250.8	0	16.3	1.6	5.2	5.3	25.6	66.2	23
2004	24.1	160.8	154.1	645.4	8	15.4	45.3	4.3	0.9	61.3	24.4	5.3
2005	26.8	180.9	13.2	319.8	0	0.3	4.4	0	0	87.2	49.1	7.6
2006	43.7	330.4	54.9	446.9	0	0.3	24	3.2	0.5	22.4	6.9	0

2007	18.1	345.9	160.1	1167.4	4	1.9	89.4	6.1	2	95	11.2	7.4
2008	43.7	241.7	220.3	3961.9	0	25.4	215.4	0	0.2	111.8	3.3	8.6
2009	47.9	100.8	180.1	2309.5	0	0	249.8	0	1	116.7	217.6	2.8
2010	6.4	135.7	84.2	2014.2	0.5	5.3	353.6	0	0.5	223	48.7	11.3
2011	31.8	325.3	67.3	2613.1	4.5	3.9	365.2	0.9	91.1	245.8	67.3	37.9
2012	48.6	479.3	59.3	3392.5	0	0.7	258.1	2.7	4.6	189.5	59.6	26
2013	141.9	475.5	49.2	1369.8	0	9.6	624.4	4.2	8	238.2	20.6	5
2014	67.6	605.6	118.2	1041.5	4.1	26.7	401.6	3.5	101.2	96.5	18.3	7.1
2015	9.1	238.5	63.3	387.6	11.1	22.6	119.9	9	75.9	76.5	58.1	28.2
2016	33.3	114.1	146.8	178.2	9.3	38.2	223	36.4	137.7	65	58.2	15.9
2017	59.1	92.3	21.3	184.3	3.8	10.9	105.6	0	105.8	82.4	15	0.1
2018	45.4	76.5	30.8	293.5	2.5	0.2	137.2	3.9	77	115	139.3	1.3
2019	3.2	205.3	22.7	451	3.6	11.8	113.4	0	35.6	78.9	103.7	1.5
2020	0.7	109.8	75.1	838.4	0	2.7	156.6	14.9	5.6	46.6	57.6	4.9

Table A2 continued.

Year	36E4	36E5	36E6	36E7	37E3	37E4	37E5	37E6	37E7	38E4	38E5	38E6
2000	17.1	100.7	268.4	0	0	104.7	167.5	6	0	176	31	5.7
2001	40.8	219.4	287.3	0	4.7	191.5	269.3	0.5	0	165.5	2.6	0
2002	22.4	369.5	225.6	0	0	138.3	556.6	30.6	0	183.9	105.1	14.3
2003	21.7	604.1	139.8	0	0	97.4	530.6	3.3	0	195.5	144.3	3.6
2004	31.9	425.8	89.7	0	4.4	239	283.2	16.5	0	198.7	347.5	30
2005	15.9	363.6	48.5	0	9.7	165.4	715.2	10.3	0	119.1	231	36.9
2006	22.2	304.7	47.5	2	0	119.8	631.2	5.1	0	150.1	167.2	2.1
2007	33.4	424.7	187.2	0	0.2	248.4	878.3	12.2	1.7	97.1	206.2	11.9
2008	63.4	820.3	96.9	0.1	0	288	658.5	52.1	0	155.1	246.3	14.3
2009	39.1	950.4	278.2	0	0.4	224.5	1489.6	64	0	147.8	237.6	3.3
2010	14.9	1561.6	98.5	0	3.5	186.8	1369.7	130.8	3.4	123	197.6	3.1
2011	65.5	1341.6	99.1	1.7	1.8	221.6	2301.6	53.4	0	207.7	179.1	1.9
2012	63.6	1392.2	205.7	3.6	0	263.7	2562.6	57	1.5	133.3	392.5	19.1
2013	76.8	1792	147.2	0	5.2	230.3	2485.7	45.1	0	374.9	214.9	5.1
2014	74.4	1739.4	156	0.9	1.6	275.2	2677.1	33.5	0	376.2	285	2.1
2015	43.7	1513.8	214.7	0.1	4.7	371.2	2940.5	32.2	0.1	416.3	212.7	16.1
2016	109.8	2293.9	195.2	0	28.2	258.1	3571	7.6	0	402.2	319	2.9
2017	73.6	1378.7	154.3	0	3.9	293.2	2252.1	13.9	0	468.5	247.2	2.1
2018	77.8	1507.9	209.6	0	0	190.4	1901.5	6.5	0	357	192.1	3.8

2019	35.4	799.8	182	0	0.9	259.3	1525.8	5.9	0	229.8	205.7	0.5
2020	40.3	711.1	356.2	0	1	113.3	1168.3	5.7	0	237.3	152.2	15.4

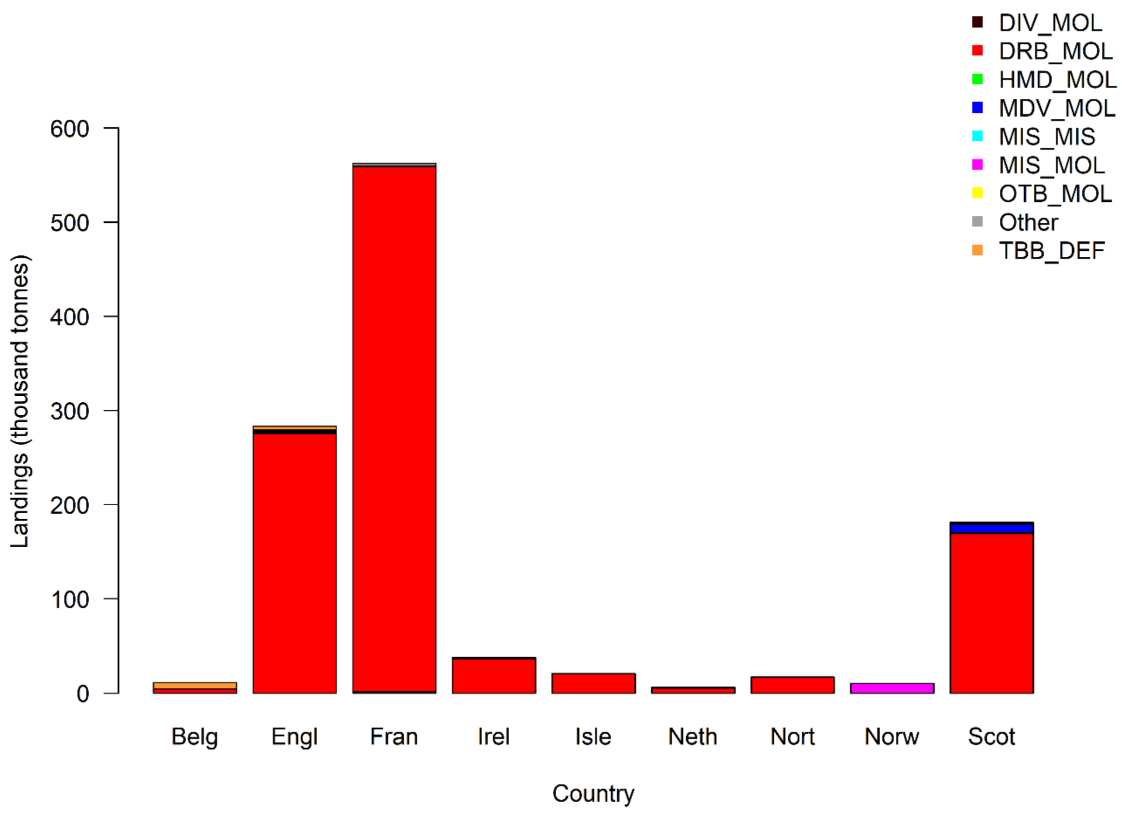

Figure A1. Landings of king scallops (live weight, thousand t) in the data call by country and metier. Metier classified to Level 5. The eight metiers with the highest landings are shown, with all others classified in to 'Other'. Begl is Belgium, Engl is England and Wales, Fran is France, Irel is the Republic of Ireland, Isle is the Isle of Man, Neth is the Netherlands, Nort is Northern Ireland, Norw is Norway and Scot is Scotland. DIV_MOL is divers targeting molluscs, DRB_MOL is dredges targeting molluscs, HMD_MOL is hand mechanised dredges targeting molluscs, MDV_MOL is also divers targeting molluscs, MIS_MIS is miscellaneous gear targeting miscellaneous species, MIS_MOL is miscellaneous gear targeting molluscs, OTB_MOL is bottom otter trawls targeting molluscs and TBB_DEF is beam trawls targeting demersal fish.

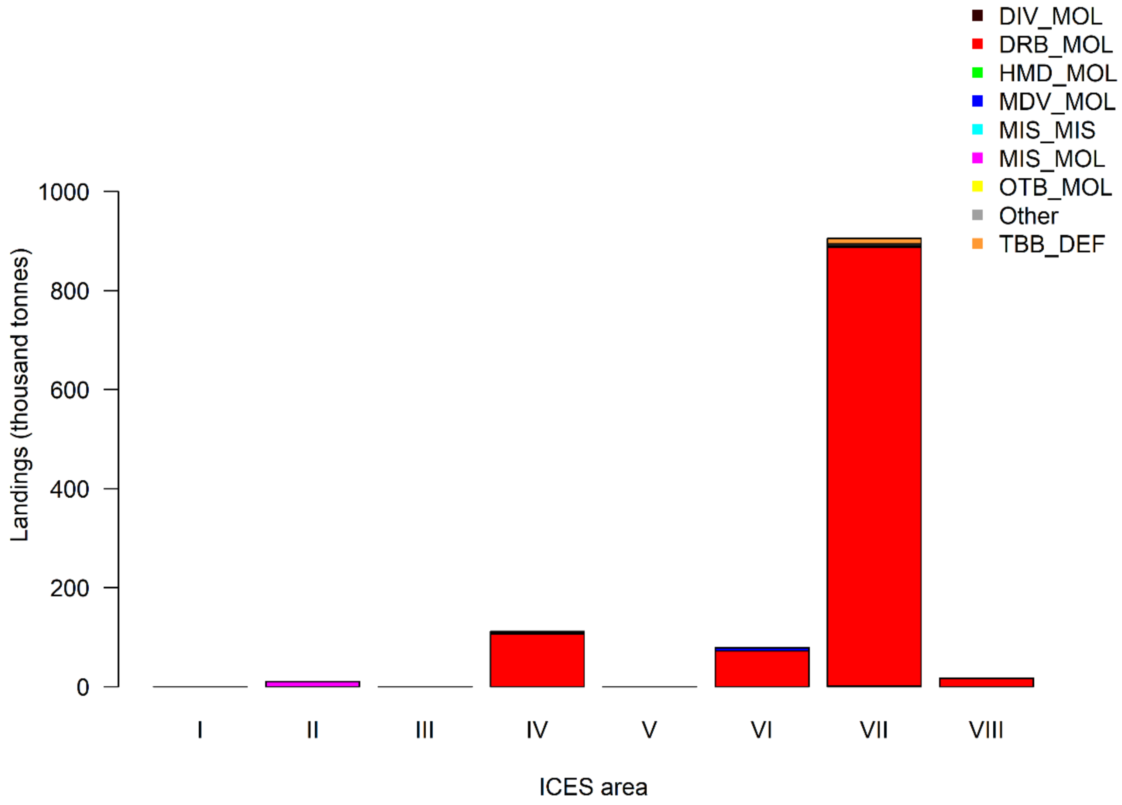

Figure A2. Landings of king scallops (live weight, thousand t) in the data call by ICES area and metier. Metier classified to Level 5. The eight metiers with the highest landings are shown, with all others classified in to 'Other'. DIV_MOL is divers targeting molluscs, DRB_MOL is dredges targeting molluscs, HMD_MOL is hand mechanised dredges targeting molluscs, MDV_MOL is also divers targeting molluscs, MIS_MIS is miscellaneous gear targeting miscellaneous species, MIS_MOL is miscellaneous gear targeting molluscs, OTB_MOL is bottom otter trawls targeting molluscs and TBB_DEF is beam trawls targeting demersal fish.

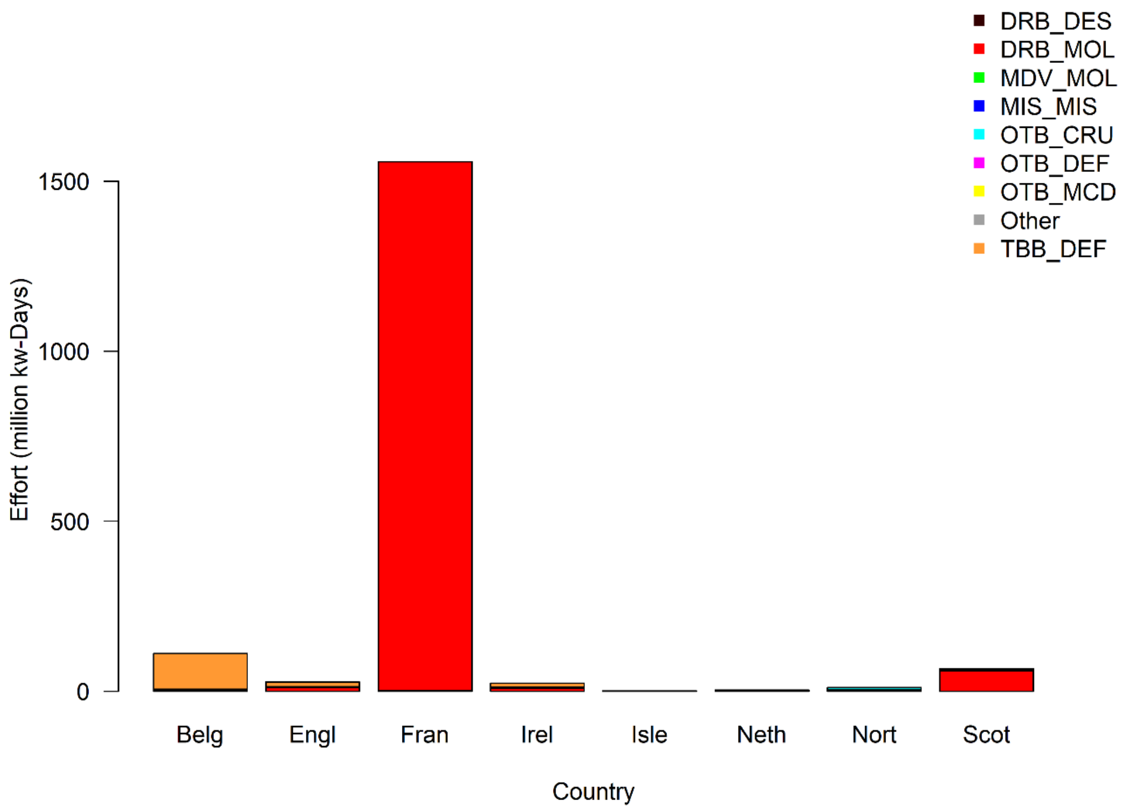

Figure A3. Effort associated with king scallop landings (million kW-days) in the data call by country and metier. Metier classified to Level 5. Note, France effort has been restricted to dredge metiers. The eight metiers with the highest effort are shown, with all others classified in to 'Other'. Begl is Belgium, Engl is England and Wales, Fran is France, Irel is the Republic of Ireland, Isle is the Isle of Man, Neth is the Netherlands, Nort is Northern Ireland, Norw is Norway and Scot is Scotland. DRB_DES is dredges targeting demersal species, DRB_MOL is dredges targeting molluscs, MDV_MOL is divers targeting molluscs, MIS_MIS is miscellaneous gear targeting miscellaneous species, OTB_CRU is bottom otter trawls targeting crustaceans, OTB_DEF is bottom otter trawls targeting demersal fish, OTB_MCD is bottom otter trawls targeting mixed crustaceans and demersal fish and TBB_DEF is beam trawls targeting demersal fish.

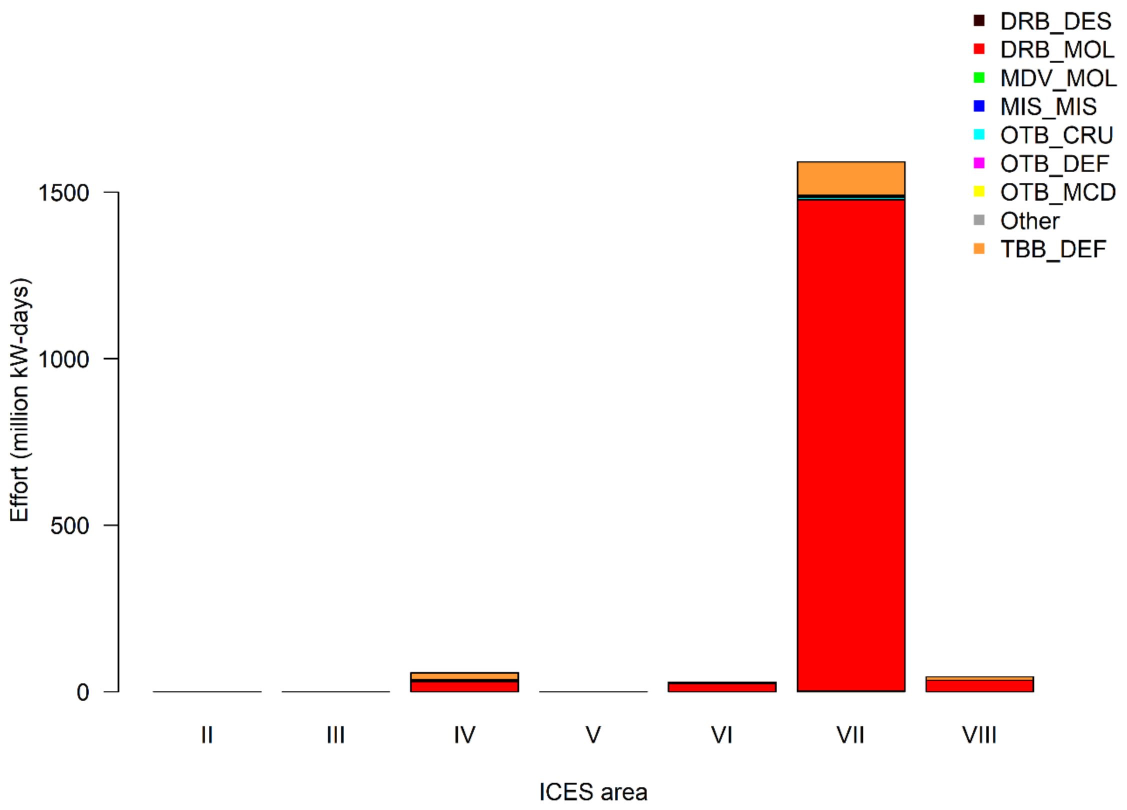

Figure A4. Effort associated with king scallop landings (million kW-days) in the data call by ICES area and metier. Metier classified to Level 5. The eight metiers with the highest effort are shown, with all others classified in to 'Other'. DRB_DES is dredges targeting demersal species, DRB_MOL is dredges targeting molluscs, MDV_MOL is divers targeting molluscs, MIS_MIS is miscellaneous gear targeting miscellaneous species, OTB_CRU is bottom otter trawls targeting crustaceans, OTB_DEF is bottom otter trawls targeting demersal fish, OTB_MCD is bottom otter trawls targeting mixed crustaceans and demersal fish and TBB_DEF is beam trawls targeting demersal fish.

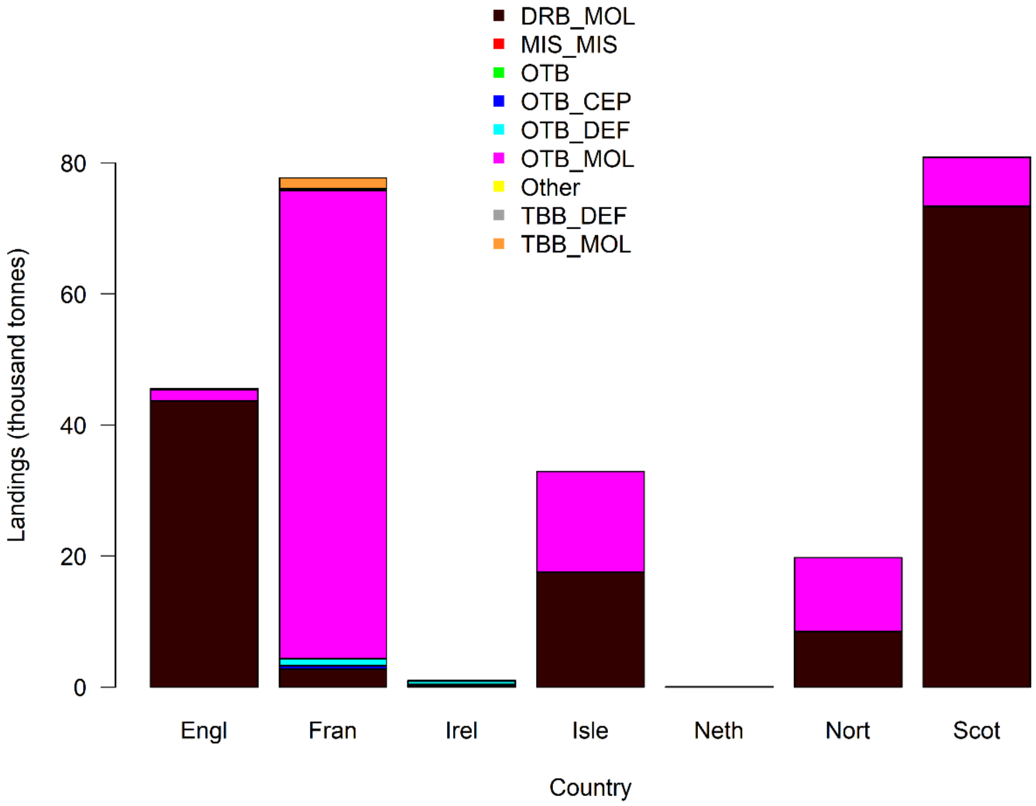

Figure A5. Landings of queen scallops (live weight, thousand t) in the data call by country and metier. Metier classified to Level 5. The eight metiers with the highest landings are shown, with all others classified in to 'Other'. Engl is England and Wales, Fran is France, Irel is the Republic of Ireland, Isle is the Isle of Man, Neth is the Netherlands, Nort is Northern Ireland, Norw is Norway and Scot is Scotland. DRB_MOL is dredges targeting molluscs, MIS_MIS is miscellaneous gear targeting miscellaneous species, OTB is bottom otter trawls (records not provided to Level 5), OTB_CEP is bottom otter trawls targeting cephalopods, OTB_DEF is bottom otter trawls targeting demersal fish, OTB_MOL is bottom otter trawls targeting molluscs, TBB_DEF is beam trawls targeting demersal fish and TBB_MOL is beam trawls targeting molluscs.

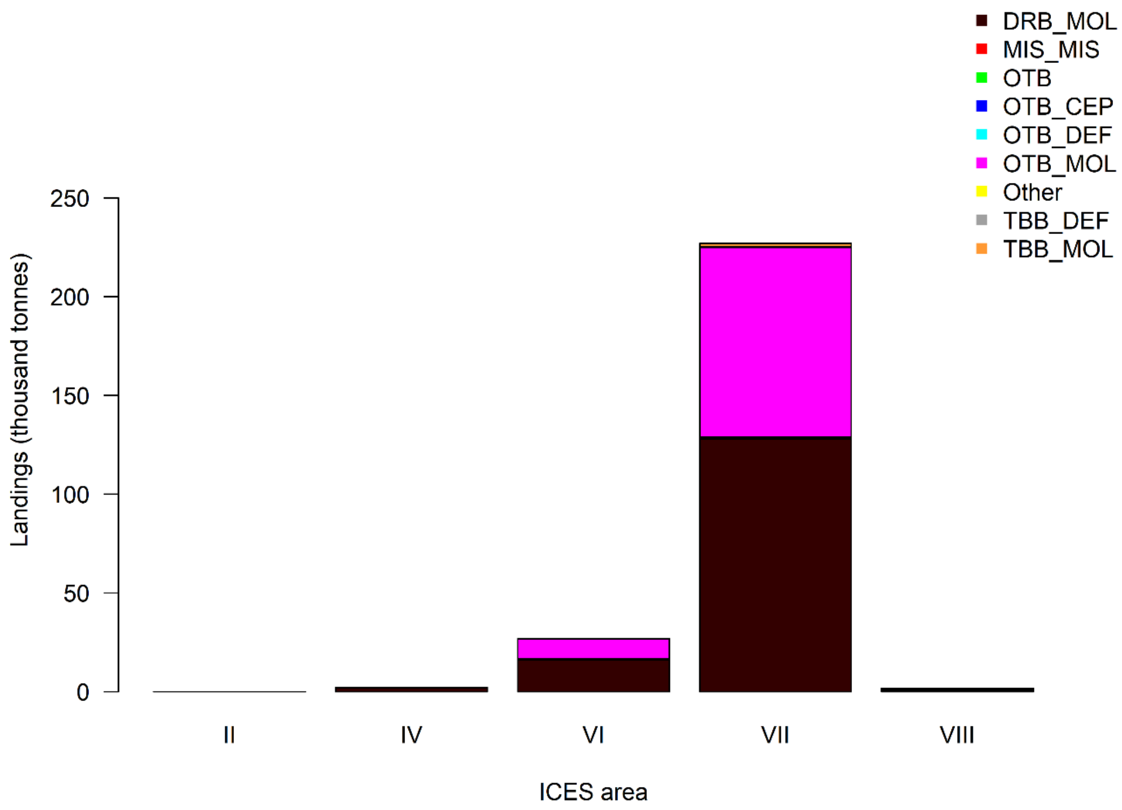

Figure A6. Landings of queen scallops (live weight, thousand t) in the data call by ICES area and metier. Metier classified to Level 5. The eight metiers with the highest landings are shown, with all others classified in to 'Other'. DRB_MOL is dredges targeting molluscs, MIS_MIS is miscellaneous gear targeting miscellaneous species, OTB is bottom otter trawls (records not provided to Level 5), OTB_CEP is bottom otter trawls targeting cephalopods, OTB_DEF is bottom otter trawls targeting demersal fish, OTB_MOL is bottom otter trawls targeting molluscs, TBB_DEF is beam trawls targeting demersal fish and TBB_MOL is beam trawls targeting molluscs.

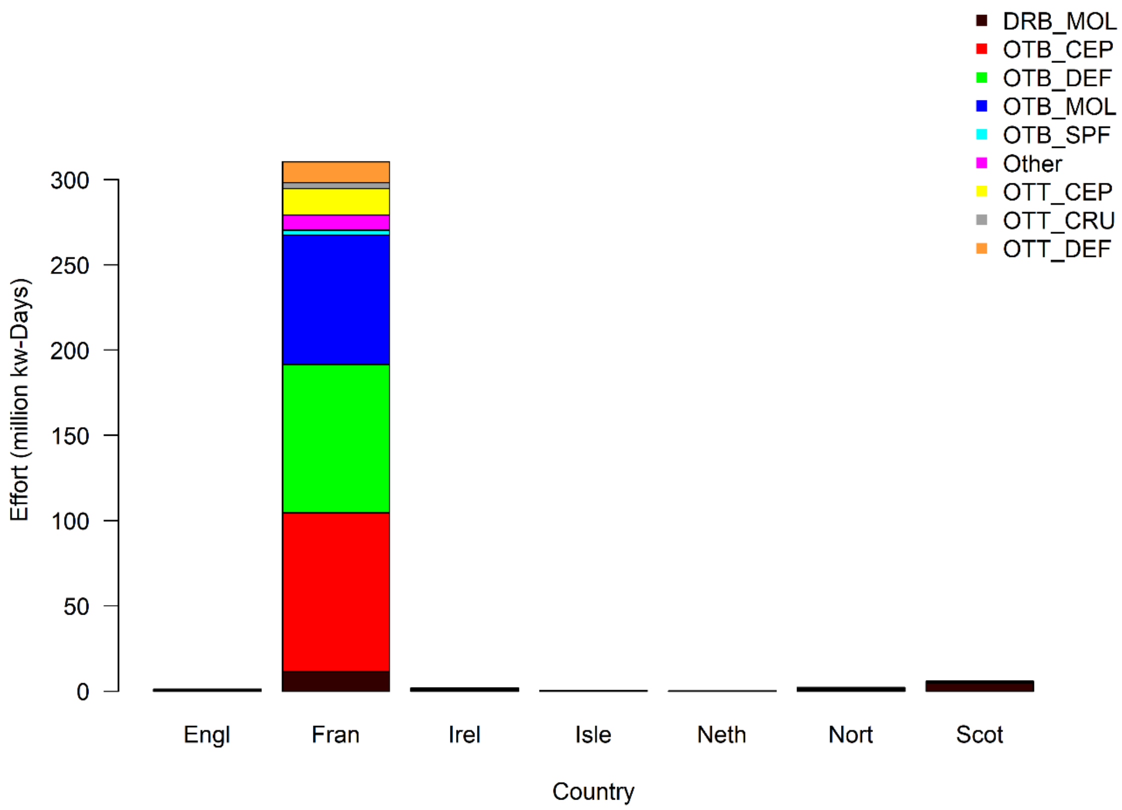

Figure A7. Effort associated with landings of queen scallops (million kW-days) in the data call by country and metier. Metier classified to Level 5. The eight metiers with the highest landings are shown, with all others classified in to 'Other'. Engl is England and Wales, Fran is France, Irel is the Republic of Ireland, Isle is the Isle of Man, Neth is the Netherlands, Nort is Northern Ireland, Norw is Norway and Scot is Scotland. DRB_MOL is dredges targeting molluscs, OTB_CEP is bottom otter trawls targeting cephalopods, OTB_DEF is bottom otter trawls targeting demersal fish, OTB_MOL is bottom otter trawls targeting molluscs, OTB_SPF is bottom otter trawls targeting small pelagic fish, OTT_CEP is multi-rig otter trawls targeting cephalopods, OTT_CRU is multi-rig otter trawls targeting crustaceans and OTT_DEF is multi-rig otter trawls targeting demersal fish.

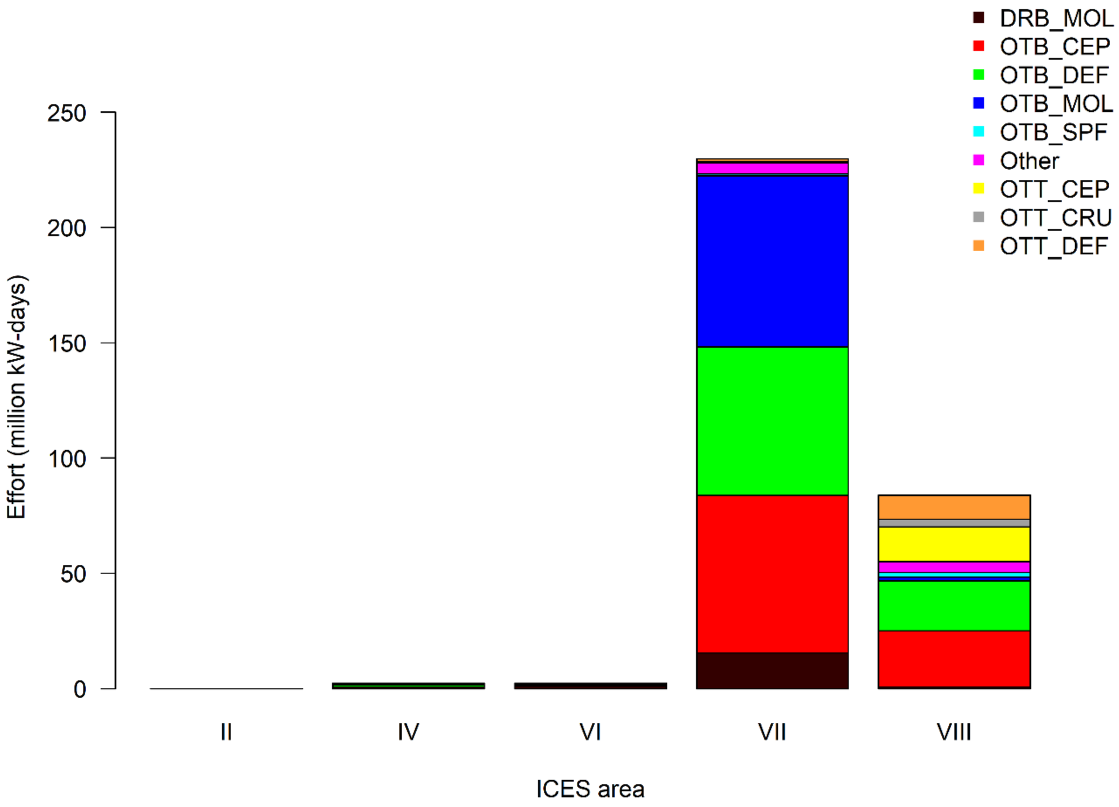

Figure A8. Effort associated with landings of queen scallops (million kW-days) in the data call by ICES area and metier. Metier classified to Level 5. The eight metiers with the highest landings are shown, with all others classified in to 'Other'. DRB_MOL is dredges targeting molluscs, OTB_CEP is bottom otter trawls targeting cephalopods, OTB_DEF is bottom otter trawls targeting demersal fish, OTB_MOL is bottom otter trawls targeting molluscs, OTB_SPF is bottom otter trawls targeting small pelagic fish, OTT_CEP is multi-rig otter trawls targeting cephalopods, OTT_CRU is multi-rig otter trawls targeting crustaceans and OTT_DEF is multi-rig otter trawls targeting demersal fish.

Table A3. Provisional landings of king scallop 2000–2020 by Assessment Area and country, as provided to WGScallop. See issues in table A1-A2.

Assessment Area	Year	Belgium	France	Ireland	Isle of Man	Netherlands	Channel Islands	UK	Total International
27.4.b.S	2000	0	0	0	0	0	0	108	108
	2001	0	0	0	0	0	0	775	775
	2002	0	0	0	0	0	0	1068	1068
	2003	0	0	0	0	0	0	554	554
	2004	0	0	0	0	0	0	103	103
	2005	0	0	0	0	0	0	282	282
	2006	1	0	0	0	0	0	258	260
	2007	2	0	0	0	0	0	285	287
	2008	0	0	0	0	0	0	370	371
	2009	0	0	0	0	0	0	394	394
	2010	0	0	0	0	0	0	361	361
	2011	0	0	0	0	0	0	699	700
	2012	0	0	0	0	0	0	991	991
	2013	0	0	0	1	0	0	352	353
	2014	0	0	0	0	0	0	2286	2286
	2015	0	0	0	0	0	0	3188	3188
	2016	0	0	0	0	0	0	1054	1054
	2017	9	0	0	0	0	0	2505	2513
	2018	0	0	0	0	0	0	2322	2322
	2019	0	0	0	0	0	0	2333	2333
	2020	0	0	0	0	0	0	843	843
27.7.d.N	2000	0	2605	0	0	0	0	1599	4204
	2001	0	3385	0	0	88	0	973	4446
	2002	0	4977	0	0	126	0	1310	6413
	2003	0	4824	207	0	190	0	1822	7043
	2004	0	4750	311	0	222	0	1394	6677
	2005	0	4416	36	0	162	0	1232	5846
	2006	395	4356	0	0	289	0	1561	6601
	2007	397	6124	0	0	154	0	2411	9086
	2008	376	5772	0	0	277	0	1826	8251
	2009	536	6107	0	0	299	0	5911	12853
	2010	530	6690	0	0	148	0	9509	16877
	2011	345	6796	5	0	0	0	8083	15228
	2012	202	5711	0	0	0	0	3061	8975
	2013	274	8327	14	0	0	0	3179	11794
	2014	576	4217	232	0	0	0	4154	9179
	2015	354	2998	7	0	0	0	1602	4961
	2016	358	4263	86	0	0	0	1897	6603
	2017	325	3952	228	0	0	0	3429	7933
	2018	277	7240	768	0	0	0	6160	14444
	2019	205	4260	581	1	0	0	6366	11413
	2020	247	2010	167	0	0	0	4655	7078
27.7.e.I	2000	0	0	54	0	0	0	3674	3729

	2001	0	0	60	0	6	0	2523	2589
	2002	0	0	58	0	45	0	2045	2149
	2003	0	0	285	0	107	0	2380	2772
	2004	0	2	578	0	64	0	2901	3546
	2005	0	1	266	0	224	0	3331	3821
	2006	3	1	4	0	37	0	3286	3331
	2007	14	0	10	0	139	0	1557	1721
	2008	16	2	1	0	121	0	1357	1497
	2009	8	33	0	0	185	0	2281	2507
	2010	13	38	0	0	107	0	1053	1210
	2011	9	50	46	0	0	0	1869	1975
	2012	74	1	2	0	0	0	2554	2632
	2013	13	1	1	0	0	0	2508	2522
	2014	137	0	4	0	0	0	1710	1851
	2015	132	0	33	0	0	0	3823	3989
	2016	103	0	28	1	0	0	2878	3010
	2017	23	0	5	0	0	0	2413	2441
	2018	64	0	1	0	0	3	1810	1878
	2019	21	5	0	0	0	0	2065	2091
	2020	39	3	1	0	0	0	940	983
27.7.e.L	2000	0	1	0	0	0	0	2790	2791
	2001	0	16	0	0	54	0	1475	1545
	2002	0	2	0	0	0	0	1468	1470
	2003	0	6	2	0	0	0	973	981
	2004	0	16	8	0	2	0	1775	1801
	2005	0	17	16	0	67	0	2788	2889
	2006	2	3	0	0	2	0	2286	2293
	2007	8	30	0	0	1	0	2011	2051
	2008	2	17	0	0	0	0	1738	1757
	2009	3	36	0	0	46	0	1823	1908
	2010	3	22	0	0	16	0	2633	2674
	2011	19	41	0	0	0	0	3807	3867
	2012	10	3	0	0	0	0	3010	3023
	2013	4	7	0	0	0	0	2407	2419
	2014	24	0	0	0	0	0	1896	1920
	2015	10	1	0	4	0	0	1367	1381
	2016	5	0	0	2	0	0	1562	1569
	2017	8	0	0	0	0	0	1713	1721
	2018	9	1	0	0	0	0	1905	1915
	2019	6	2	0	0	0	2	1691	1700
	2020	5	0	0	0	0	0	1474	1480
27.7.e.O	2000	0	1270	0	0	0	0	554	1824
	2001	0	944	0	0	32	0	578	1555
	2002	0	775	0	0	0	0	720	1496
	2003	0	880	1	0	0	0	1139	2020
	2004	0	965	0	0	0	0	700	1666

	2005	0	617	0	0	0	0	381	998
	2006	15	558	0	0	0	0	559	1131
	2007	42	1430	0	0	50	0	2407	3928
	2008	43	1251	0	0	16	40	1569	2919
	2009	121	788	0	0	66	0	2054	3029
	2010	114	783	0	0	0	1	3140	4038
	2011	33	638	0	1	0	0	1637	2309
	2012	173	611	0	0	0	0	2662	3445
	2013	16	1008	2	0	0	85	2947	4060
	2014	104	1168	1	0	0	67	1285	2624
	2015	47	654	3	0	0	57	999	1760
	2016	58	751	0	1	0	45	846	1701
	2017	6	264	0	0	0	56	573	900
	2018	15	193	0	0	0	215	1179	1603
	2019	9	163	0	0	0	417	1128	1716
	2020	7	245	92	0	0	239	1718	2300
27.7.f.I	2000	0	0	76	0	0	0	43	119
	2001	0	0	36	0	0	0	24	60
	2002	0	0	3	0	0	0	19	22
	2003	0	0	82	0	0	0	52	134
	2004	0	0	5	0	0	0	17	22
	2005	0	0	7	0	0	0	40	48
	2006	56	0	1	0	110	0	148	315
	2007	92	0	4	0	5	0	29	130
	2008	57	0	0	0	5	0	64	127
	2009	40	0	0	0	0	0	203	243
	2010	59	0	32	0	0	0	543	634
	2011	80	0	143	0	0	0	141	364
	2012	120	0	15	0	0	0	161	295
	2013	134	0	47	0	0	0	393	574
	2014	137	0	21	0	0	0	162	321
	2015	79	0	0	0	0	0	37	116
	2016	61	0	81	0	0	0	109	251
	2017	45	0	5	0	0	0	310	360
	2018	55	0	2	0	0	0	86	143
	2019	51	0	0	0	0	0	221	272
	2020	57	0	75	0	0	0	185	317

Annex 4: Copy of the Data Call 2021

DCF national correspondents

Els Torreele, Jørgen Dalskov, Elo Rasmann, Heikki Lehtinen, Louise Veron, Christoph Stransky, Leonie O'Dowd, Didzis Ustups, Vilda Griūnienė, Mandy Doddema, Irek Wojcik, Emilia Batista, Maria del Pilar Vara del Rio, Anna Hasslow, Jurgen Mifsud, Tim Berginc, Marco Rossitto, Dimitra Petza, Myrto Ioannou, Ivana Vukov.

ICES ACOM members and observers

Els Torreele, Morten Vinther, Robert Aps, Alain Biseau, Christopher Zimmermann, Gudmundur Thordarson, Didzis Ustups, Nils Hintzen, Jan Horbowy, Maria de Fátima Borges, Francisco Velasco Guevara, Massimiliano Cardinale, Pieter-Jan Schön, Petur Steingrund, Jesper Boje, Marie-Julie Roux, Kiersten Curti, Bjarte Bogstad, Jonathan White, Jari Raitaniemi, Linas Lozys, Yuri A. Kovalev

Director of The Russian Research Institute of Fisheries and Oceanography
Kirill V. Kolonchin

Our Ref: H.4/ACB/RC/RF/ck 29 January 2021

Subject: **Data call 2021: Landings, discards, biological sample and effort data from 2020 in support the ICES fisheries advice in 2021.**

Please find enclosed an updated document describing the rationale, scope and technical details of the data call for 2021 update stock assessments.

The data will be used by ICES expert groups contributing to the advisory process addressing requests for advice on fisheries, and fish and shellfish stocks from ICES advice recipients. Cephalopod and scallop data will be used to describe trends and status of the relevant fisheries and conduct stock assessments. For countries which are also EU members this data call is under Regulations (EU) No 2017/1004 and (EU) No 1380/2013.

Note that data needs from WGNAS and WGScallop have been included in the present call.

Due to the 2020 disruptions caused by the pandemic, which also affected national data collection programs, data submitters have the opportunity to provide information/caveats on the data to be submitted.

For questions about the content of the data call, please contact: advice@ices.dk.

For support concerning InterCatch issues please contact: InterCatchsupport@ices.dk.
For questions on data submission, please contact: data.call@ices.dk.

Sincerely,

Anne Christine Brusendorff
General Secretary

CC: Daniel Howell (AFWG Chair); Valerio Bartolino and Afra Egan(HAWG co-chairs); Ole Ritzau Eigaard and Katherine Sosebee (NIPAG co-chairs); Teunis Jansen (NWWG Chair);

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Mikaela Bergenius (WGBFAS Chair); Cristina Silva and Ching Villanueva (WGBIE co-chairs); Mathieu Lundy and Sofie Nimmegeers (WGCSE co-chairs); Ivone Figueiredo and Elvar Halldor Hallfredsson (WGDEEP co-chairs); Leire Ibaibarriaga (WGHANSA Chair); Claire Moore (WGMIXFISH-advice Chair); Raphael Girardin and Tanja Miethe (WGNSSK Chair); Jurgen Batsleer and Pascal Lorance (WGEF co-chairs); Andrew Campbell (WGWIDE Chair); Ana Moreno, Daniel Oesterwind and Graham Pierce (WGCEPH co-chairs); Lynda Blackadder (WGScallop chair); Dennis Ensing (WGNAS chair); DG-MARE (EC); Darius Campbell (NEAFC); Fred Kingston (NAFO); Abdellah Srour (GFCM, FAO); Merete Tandstad (CECAF, FAO); Oleg A. Bulatov (Russian delegate to ICES); Yuri A. Kovalev (ACOM member).

Fisheries Data Call 2020

Data call: Data submission for ICES fisheries advisory work

1 Scope of the Data call

ICES Member Countries are requested to provide the following for selected ICES fish, cephalopod, and shellfish stocks:

- landings, discards, Below Minimum Size catches (selected working groups), biological, and effort data from 2020, and other supporting information.

The list of stocks included in the data call are provided in DC_Annex_1.xlsx and Table 7.7.1. The data call spreadsheet is an indicative list based on previous catches. All countries that have catch or landings data on these stocks should submit data, **even if they are not listed** on the data call request spreadsheets.

2 Rationale

The requested data will be used by ICES expert groups involved in the development and provision of ICES advice and update stock assessments.

3 Legal framework

Generically, all the governments and intergovernmental commissions requesting and receiving advice from ICES have signed international agreements under UNCLOS 1995* Fish Stocks agreement article 5 and 6 to incorporate fisheries impacts on other components of marine ecosystems and WSSD 2002 article 30 to implement an ecosystem approach in relation to oceans policy including fisheries. These agreements include an obligation to collect and share data on, inter alia, vessel position (UNCLOS FSA art 5) and to support assessment of the impacts of fisheries on non-target species and the environment (UNCLOS FSA art 6).
For EU Member States this data call is under the DCF Regulation ((EC) No 2017/1004 and Commission Decision 2016/1251/EU), and in particular, Article 17(3) of Regulation (EC) No 2017/1004 which states "*..requests made by end-users of scientific data in order to serve as a basis for advice to fisheries management, Member States shall ensure that relevant detailed and aggregated data are updated and made available to the relevant end-users of scientific data within the deadlines set in the request,..*"

For non-EU states with fisheries operating in the North Atlantic, there is a requirement to make fisheries data available to support fisheries management under OSPAR, HELCOM, and UNCLOS.

ICES is thus mandated to request all fisheries dependent and independent data including VMS and logbook information to be used in order to provide this advice. This mandate is supported by international agreements and the current EU data collection framework (DCF).
In addition, Article 15 of the NASCO Convention, with reference to obligations of Parties to provide to the Council the available catch statistics, other statistics, and any other available scientific information that the Council requires for the purposes of the Convention.

This Data call follows the principles of personal data protection, as referred to in paragraph (9) of the preamble in Council Regulation (EC) No 2017/1004.

* United Nations (UN). 2011. Agreement related to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks. Available at:
https://documents-dds-ny.un.org/doc/UNDOC/GEN/N95/274/67/PDF/N9527467.pdf?OpenElement

4 Deadlines

ICES requests that the data are delivered by a date specific to each Expert Group, to provide enough time for additional quality assurance prior to the meeting. Data submission deadlines for each of the Expert Groups are given in Table 4.1. **Missing the reporting deadline will compromise the indispensable data quality checking (on a stock basis), that takes place before the use of that data to update assessments.**

The deadline does not apply to the survey data. It is expected that survey data will be submitted to DATRAS (Database of Trawl Surveys) by the agreed timetable (see http://www.ices.dk/data/data-portals/Pages/DATRAS-deadlines.aspx) or to the ICES acoustic database, as early as possible prior to the Expert Group meeting.

Table 4.1. Data submission deadline for ICES expert groups and respective chair contact.

Working Group (WG)	Chair of the WG	Email Address	Data Submission Deadline
HAWG	Afra Egan & Cecilie Kvamme	afra.egan@marine.ie; cecilie.kvamme@hi.no	**01.03.2021**
WGNAS	Dennis Ensing	dennis.ensing@afbini.gov.uk	**15.03.2021**
WGDEEP	Ivone Figueiredo & Elvar Halldor Hallfredsson	ifigueiredo@ipma.pt elvar.hallfredsson@imr.no	**22.03.2021**
WGBFAS	Mikaela Bergenius	mikaela.bergenius@slu.se	**16.03.2021**
WGBIE	Cristina Silva & Ching Villanueva	csilva@ipma.pt Ching.Villanueva@ifremer.fr	**05.04.2021**
AFWG	Daniel Howell	daniel.howell@imr.no	**24.03.2021**
WGCEPH	Ana Moreno, Daniel Oesterwind & Graham Pierce	amoreno@ipma.pt daniel.oesterwind@thuenen.de g.j.pierce@iim.csic.es	**01.04.2021**
WGNSSK	Raphael Girard & Tanja Miethe	raphael.girardin@ifremer.fr Tanja.Miethe@gov.scot	**31.03.2021**
NWWG	Teunis Jansen	tej@aqua.dtu.dk	**01.04.2021**
WGCSE	Mathieu Lundy & Sofie Nimmegeers	mathieu.lundy@afbini.gov.uk sofie.nimmegeers@ilvo.vlaanderen.be	**14.04.2021**
WGHANSA	Leire Ibaibarriaga	libaibarriaga@azti.es	**01.05.2021 (and see section 7.8)**
WGEF	Jurgen Batsleer & Pascal Lorance	Jurgen.Batsleer@wur.nl pascal.lorance@ifremer.fr	**25.05.2021**
WGWIDE	Andrew Campbell	andrew.campbell@marine.ie	**04.08.2021**
WGScallop	Lynda Blackadder	Lynda.Blackadder@gov.scot	**16.08.2021**
NIPAG	Ole Ritzau Eigaard & Katherine Sosebee	ore@aqua.dtu.dk Katherine.Sosebee@noaa.gov	**18.08.2021**
WGMIXFISH -Advice	Claire Moore	claire.moore@marine.ie	**03.05.2021**

5 Data to report

ICES Member Countries are requested to supply data as specified on the Expert Groups' data request spreadsheets (see attached annexes to this call) either to InterCatch, to ICES Secretariat via email (data.call@ices.dk), or to both. Data include:

- landings, discards, biological data, and effort data from 2020, and other supporting information;
- for stocks identified in DC_Annex_1.xlsx with '**Y**' under column 'DLS proxy RP'; estimates of length compositions for landings and discards from the latest year (i.e. 2020). If length frequency data have not been reported before for a given stock, 3 years of data (2018, 2019, 2020) should be provided along with supporting information on life-history parameters (see DC_Annex_2_SupportingInformationLifeHistoryParameters.xlsx and Appendix IV).

The list of species and stocks for which data should be submitted is given in DC_Annex_1.xlsx and Table 7.7.1.

Data should be reported by the lowest subdivision possible. Aggregations should not be beyond the assessment area of individual stocks. If the format for data submission to data.call@ices.dk (see DC_Annex_1.xlsx) is not specified further through the provided templates, the format should be the same as was used in previous data calls and in previous years. If anything is unclear, please contact data.call@ices.dk.

If corrections for earlier years need to be made, please inform the Expert Group chair (see e-mail contact details in Table 4.1) and advice@ices.dk. A full and corrected set of data may need to be uploaded.

Due to the 2020 disruptions caused by the pandemic which affected national data collection programs, ICES would like to give the opportunity for data submitters to provide information/caveats on the data submitted i.e. reductions in sampling size, insufficient spatial coverage, surveys cancelled or shortened, or any other information that is thought to be relevant. This information will be passed directly to expert groups which will make use of this information when running assessments and drafting advice.

Please use this link to provide all the relevant information.

6 Data submission

6.1 Reporting to InterCatch

The InterCatch-formatted national data should be uploaded into InterCatch, which is available on this link: https://InterCatch.ices.dk/Login.aspx.

Please see the 'InterCatch Exchange Manuals' on the ICES website for information on the required exchange format, and the codes used, at: http://ices.dk/data/data-portals/Pages/InterCatch.aspx An overview of the data fields used in the InterCatch exchange format are detailed in DC_Annex_3_InterCatch Exchange format overview updated.docx. The codes for metiers/fleets and areas are listed in appendices I, II, and III.

For stocks where discard data have been submitted to InterCatch in previous years, they should also be submitted for 2020 (see DC_Annex_1.xlsx).

Area-disaggregated catch data should be submitted to InterCatch in a consistent manner between Data Calls. If area aggregations must be made, it should be clearly stated in the InfoStockCoordinator information text field (field number 23 in the import file to InterCatch).

6.1.1 Data conversion to InterCatch format

A description of the InterCatch Exchange format is found in the InterCatch User Manual[†]. An overview of the fields in the InterCatch commercial catch format is found in the InterCatch Format overview[‡], where valid codes are also listed.

To ease the process of converting the national data into the InterCatch format, Andrew Campbell from the Marine Institute (Ireland) has made the conversion tool "InterCatchFileMaker", which converts data manually entered in the 'Exchange format spreadsheet' into a file in the InterCatch format. **Be aware that the tool does not currently support the catch categories BMS Landings and Logbook Registered Discards** (see section 6.1.4.). The conversion tool "InterCatchFileMaker" can be downloaded from the ICES webpage under 'Format conversion tools' (link). The download includes a spreadsheet in which the catch and sampling data can be placed; the program then converts the data into the InterCatch format.

If the "InterCatchFilemaker" conversion program and the exchange format spreadsheet have been used to convert your data to InterCatch format, then the values in the data field "NumSamplesAge" in the InterCatch format file must be entered manually.

If in some areas and quarters there are only length samples available (if age samples are missing), then it is possible to use ALKs from neighboring areas or quarters to calculate CANUM and WECA for "Species Data" (SD) records, before importing data to InterCatch. In this case "-9" must be entered in the data fields of "NumSamplesAge" and "NumAgeMeas".

6.1.2 Age and length data in parallel in InterCatch

InterCatch can work with age and length data in parallel. Previously it was important that length data were imported last, though currently the order in which catches with sample data (age/length) are

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[†] http://ices.dk/data/Documents/Intercatch/InterCatch%20User%20Manual.pdf

[‡] http://dome.ices.dk/datsu/selRep.aspx?Dataset=76

imported does not matter. In the current version it is important that, within a given stratum, a catch *with* samples is not imported before a catch *without* samples. So as an example; never import a catch with age samples followed by the same catch without samples, because this will erase the age samples already imported. This is a way that can be used to remove wrongly imported age or length data which do not belong to the strata. A simple procedure to follow would be to first import catches for all strata, together with the existing age samples. Then in a second import, include only the strata where there are catches with length samples.

6.1.3 Sample information on age and length data in InterCatch

When age or length data are imported in InterCatch, ICES requests that the following age and length sampling information fields are filled in for both landing and discard samples:

- Number samples of length, field: NumSamplesLngt
- Number length measured, field: NumLngtMeas
- Number samples of age, field: NumSamplesAge
- Number age measured, field: NumAgeMeas

Data submitters are encouraged to use the fields related to data quality within InterCatch (NumSamplesLngt, NumLngtMeas, NumSamplesAge, NumAgeMeas). This will help stock assessors make allocations in InterCatch, and identify changes in sampling levels from one year to another.

The units of the samples in the record types "NumSamplesLngt" and "NumSamplesAge" of the species data record refer to the number of primary sample units (vessel, trip, harbour day, etc.). The units should be given in the InterCatch species information field named "InfoFleet".

If there are any questions regarding InterCatch submissions, please contact the working group chair (see Table 4.1) and ICES Secretariat at InterCatchsupport@ices.dk.

6.1.4 Catch categories in InterCatch

Landing, 'L'

The 'Landing' catch category in InterCatch will cover the scientific estimates of landing.

Discard, 'D'

The 'Discard' catch category in InterCatch will cover the discard fraction based on fishery observer estimations. This category is the part of the catch, which is thrown overboard into the sea.

This component should be in the CATON field, and in the OffLandings field a "'-9" should be inserted (see Figure 6.2).

Data for this fraction should be reported even when discard values are low. Discard estimations for pelagic species based on demersal observer programs should also be reported. This is especially important for some small pelagic stocks.

BMS Landing, 'B'

Relevant to stocks under landing obligations. The BMS landings consist of fish and crustaceans Below Minimum Size, as registered in the logbook or as estimated by fishery observers (see Figure 6.2).

If it is possible to separate BMS and discards fractions from e.g. at sea observer programme then the BMS estimate should be inserted into the CATON field. If it's not possible to separate discard and BMS fractions then a zero "0" should be entered into the CATON field for BMS. Either way, the value of BMS as reported in the logbook should always be inserted in the OffLandings field (see Figure 6.2).

Logbook Registered Discard, 'R'

This component corresponds to discards which are registered in the logbook.

ICES does not require this fraction to be provided as it is not used for the provision of ICES advice.

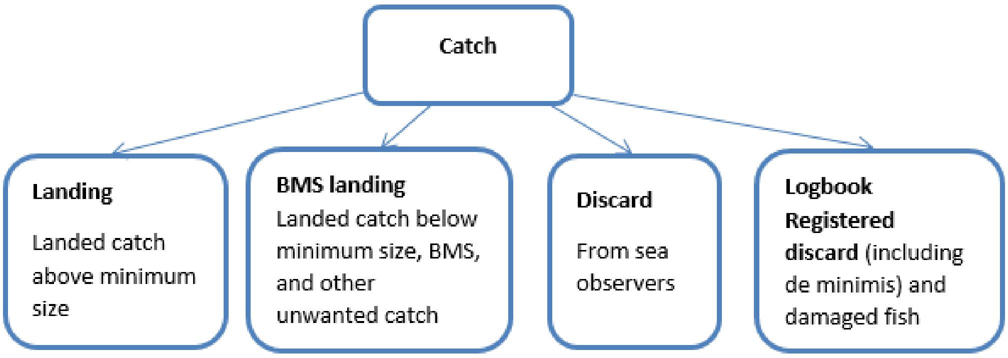

Figure 6.1. Description of the four current catch categories.

BMS landings should be submitted as specified in DC_Annex_1.xlsx for stocks to which landing obligations applies.

In InterCatch only CATON is used to derive the total catch used in stock assessment. The values for the different categories in the OffLandings fields (OfficialLanding) are only informative and will not be used in the catch estimate.

Use only the Reporting Category R (for all catch categories). In case of black landings (non-reported) please use Reporting Category N.

Reporting of discard and BMS in the SI record fields CATON and OffLandings

To clarify the values to insert into the CATON and OffLandings fields in the SI record, the following figure gives an overview of the two different discard-BMS scenarios. The overview shows how to fill in data from the at sea observer programs for two different discard-BMS scenarios.

	Scenario 1 Discard and BMS can be split Discard / BMS	Scenario 2 Discard and BMS cannot be split Discard + BMS (seen as discard)
SI record with **Catch Category=D** (D for discard)	CATON = Discard weight OffLandings = -9	CATON = Discard + BMS weight OffLandings = -9
SI record with **Catch Category=B** (B for BMS)	CATON = BMS weight OffLandings = declared* BMS	CATON = 0 OffLandings = declared* BMS **If there is no declared BMS** No SI record with 'Catch Category = B' is needed

*Declared BMS from logbooks, sales notes or landing declarations.

Figure 6.2. CATON and OffLandings for two discard and BMS scenarios

6.1.5 Effort data in InterCatch

Effort is recorded in position 11 of the InterCatch header information. Different units of effort are required by different WGs as specified in Table 6.1.

Table 6.1. Units of effort requested/accepted by WGs.

	kW×day	Days at sea
WGBFAS		X
WGCEPH	X	X
WGMIXFISH-Advice	X	X
All others	X	

Please note that the effort value should be the same for all species, for a given strata. The effort in InterCatch supports WGMIXFISH, which needs effort by metier and not by species. If landing data and discard data are imported in separated files, then effort should only be imported once in the landings data. Effort for the discard data should be indicated with a '–9' (indicating no effort). If there has been fishing effort but zero landings, the effort should be also imported.

6.2 Reporting to other destinations

Files for data.call@ices.dk should be submitted in as few e-mails as possible. The file name must include expert group, stock, country, and data type references as specified below. The email subject must include expert group, stock, and country references.

"2021 DC [expert group] [stock code/stock codes] [country] [type of data]"

(example: 2021 DC WGBFAS her.27.28 LV landings)

6.3 Métiers

In response to ICES Data Calls, landings and effort data by métier should be submitted to InterCatch in a consistent manner. The following text will focus on the codes used for the field "Fleet", which in general is referred to as "*metier*". The *metiers* for each Expert Group are listed in DC_Annex_1.xlsx (sheet "IC Metier tags"). If a *metier* needed is not available in InterCatch, please contact the Expert Group chair (see email address in Table 4.1).

The *metier* tag entries closely follow the naming convention used for the EU Data Collection Framework (DCF). Below is an explanation of the *metier* tag elements; an underscore separates each of the elements (Figure 6.3).

OTB_CRU_>=70_0_0_all

Bottom otter trawl_directed to crustaceans_(at least 70 mm)_with no selectivity device_no selectivity device mesh size_all vessel length classes

Figure 6.3. Explanation of the *metier* tag elements; an underscore separates each of the elements.

Metier tag elements

1. GEAR TYPE (gear types available under the DCF are shown in 2010/93/EU Appendix IV). Note that WGCSE, WGNSSK, WGBIE and WGMIXFISH allow only specific *metier*s in specific areas (see appendices I-III).

2. TARGET ASSEMBLAGE CODE (code conforming to target assemblage under the DCF are shown in 2010/93/EU Appendix IV). Data can be aggregated over more than one category but in this case the most significant *metier* code is entered.

3. MESH SIZE RANGE (mesh size ranges available under the DCF). If necessary data can be aggregated over more than one category but in this case the most significant mesh size range is entered. Exception to this general rules are cases where, for that gear type, data have been aggregated over all mesh size ranges used by a nation. In this case an additional entry "**0**" can be used (the metier should look like e.g. LHM_DEF_**0**_0_0. The use of "_all_" in this tag element should be avoided).

4. SELECTIVITY DEVICE (types of selectivity device available under the DCF: 0: No selectivity device, 1: Exit window or panel, 2: Grid, 3: Square meshes (T90)). See 2010/93/EU Appendix IV.

5. SELECTIVITY DEVICE MESH SIZE (if the actual mesh size of any selectivity device is entered, this level is referred to as level 6). Data aggregation over several DCF level 6 categories is possible though should be avoided. In these cases the *metier* tag corresponding to the most significant category is chosen e.g. a mobile gear with mesh sizes covering 70–119 mm (combining 70–99 and 100–119) but for which 70–99 mm is most significant, the code 70–99 will apply. Exceptions to this general rule are cases where data have been aggregated over all mesh size ranges within the national fleet. In these instances the mesh size is omitted and only a *metier* with level 5 (Gear code Target assemblage) is used.

6. VESSEL LENGTH CLASS (Member states have been indicated by national sampling scheme designs to not take into account vessel lengths. Therefore the standard entry of "all" or omitted is currently provided for in InterCatch). The option has been left open for length category specific *metier* tags to be added in future years if nations begin to sample and raise data independently for different vessel length categories.

Unspecified data accounting all together for less than 10% of catches and effort, can be coded into a miscellaneous group named either MIS_MIS_0_0_0_HC (Miscellaneous Human Consumption) or MIS_MIS_0_0_0_IBC (Miscellaneous Industrial By-Catch) However, this métier aggregation label hinders the ability to effectively model the fishery interactions and its use **should be minimized.**

If multiple metiers are aggregated or merged into dominant metiers, these should be clearly stated in the InfoStockCoordinator information text (field number 23 in the import file to InterCatch).

6.4 Data reporting units

Landings, discards, and biological sampling data: units descriptors as specified in InterCatch Exchange Format.

Landings, discards, and recreational catches:

- by number of fish;
- by weight in tonnes (for fish except for wild catches of Atlantic salmon, Norway lobster and Northern prawn) or in Kg (for cephalopods, scallops and wild catches of Atlantic salmon);
- Length distributions; in 1 cm length intervals (for fish and cephalopods) or 1 mm intervals (for Norway lobster and Northern prawn).

Effort (WGNSSK, WGCSE, WGBIE, WGDEEP, WGHANSA, WGEF, WGSCALLOP): kW days (in InterCatch).

Effort (WGBFAS): in days-at-sea, see further specifications in section 7.4.

Effort (WGCEPH): in days-at-sea or kW days, see further specifications in section 7.6.

Effort (WGMIXFISH-advice): in days-at-sea and kW days, see further specifications in section 7.3.

Year must be entered as four digits, e.g. "2020".

6.5 Zero catch

Zero should only be reported for discards and/or BMS from observer programs when zero is the result of an estimation.

6.6 NEAFC Areas and ICES subdivisions

For stocks with catches in areas within both ICES and NEAFC regulatory area; the areas should be reported with the correct NEAFC area code (e.g. specifying 7.k.1, 7.k.2 vs. 7.k only, or 6.b.1, 6.b.2, vs. 6.b only; see Table 6.6.1). This is particularly relevant to stocks under WGDEEP, WGWIDE, NWWG and WGEF.

Table 6.6.1. NEAFC area codes and description.

ICES Code	Description
27.1.a	Barents Sea - NEAFC Regulatory Area
27.10.a.1	Azores Grounds - Parts of the NEAFC Regulatory Area

27.12.a.1	Subdivision XIIa1 - NEAFC Regulatory Area
27.12.a.2	Subdivision XIIa2 - NEAFC Regulatory Area
27.14.b.1	Southeast Greenland - Parts of NEAFC Regulatory Area
27.2.a.1	Norwegian Sea - NEAFC Regulatory Area
27.2.b.1	Spitsbergen and Bear Island - NEAFC Regulatory Area
27.5.b.1.a	Faroe Plateau - Part of NEAFC Regulatory Area
27.7.c.1	Porcupine Bank - NEAFC Regulatory Area
27.7.j.1	Southwest of Ireland - East - Parts of the NEAFC Regulatory
27.7.k.1	Southwest of Ireland - West - Part of the NEAFC Regulatory Area
27.8.d.1	Bay of Biscay - Offshore - Parts in NEAFC Regulatory Area
27.8.e.1	West of Bay of Biscay - Parts in NEAFC Regulatory Area
27.9.b.1	Portuguese Waters - West Parts in NEAFC regulatory Area

6.7 Recreational fisheries data

Recreational fisheries catch data should not be included as commercial landings, even if this has been the case in previous years. The final version of the recreational fisheries data should be submitted separately via email to data.call@ices.dk. The respective Working Group chair (see e-mail addresses in Table 4.1) and ICES Secretariat (advice@ices.dk) should be informed accordingly.

7 Expert group specific uploading information

7.1. HAWG specifications

Herring entries marked with “AC” in DC_Annex_1.xlsx need to be sent by stock in the exchange format specified in the so-called Yellow Sheets (DC_Annex 7.1.1._Yellow sheet).

Sprat entries marked with “AC3” in DC_Annex_1.xlsx need to be sent by stock in the exchange format specified in Annex 7.1.2. (i.e. DC_Annex 7.1.2_ Template_sprat).

For the stock her.27.20-24 entries marked with “AC4” in DC_Annex_1.xlsx need to be sent in the exchange format specified in Annex 7.1.3. (i.e. DC_Annex 7.1.3_ Template_her.27.20-24).

For the stock her.27.3a47d entries marked with “AC12” in DC_Annex_1.xlsx need to be split in 4a West and 4a East (split at 2 degrees East).

7.2 WGDEEP specification

Black scabbardfish (*Aphanopus carbo*) is believed to constitute a unique stock with three migratory components located in the West of the British Islands, Portugal mainland and Canary/Madeira areas. The southernmost component lies under the Fishery Committee for the Eastern Central Atlantic (CECAF) competence and it is believed to be an important spawning area for the species. In order to strengthen the ICES advisory process and allow for a more comprehensive stock assessment of black scabbardfish, access to the southernmost component data (FAO Fishing Area 34, Division 1.2) is requested in this Data Call from all ICES countries with data available from this area.

The data requested, if available, should be provided as follows:

- Landings and discards per month in tonnes.
- Fishing effort per month (kW days).
- Length frequency distribution per month or per quarter.
- Weight length relationship.
- Proportion of mature individuals (by sex) in the last quarter of the year.

Data submitters are also requested to submit catch data for 2020 to InterCatch on Lesser silver smelt/Lesser argentines (ARY) or/and Silver smelt/Argentines (ARG) by ICES Division. This will help to identify the contribution of the different species of argentines in the current assessment.

7.3 WGMIXFISH-ADVICE specification (WGNSSK, WGCSE, WGBFAS and WGBIE)

WGMIXFISH produces fleet-based mixed fisheries forecasts for four ecoregions, the Greater North Sea, Celtic Seas, Baltic Sea, Bay of Biscay and Iberian Coast. WGMIXFISH intends to develop advice for the North Sea, Celtic Sea, and Iberian waters in 2021. This data call is structured to provide biological and economic information at the level of DCF metier level 6 and the vessel length category, disaggregated by ICES divisions and by Subdivision for the Baltic Sea.

Table 7.1 : ICES divisions and species requested by the WGMIXFISH data call

Spatial Dissagregation	Species FAO code
ICES divisions 27.3.a.20, 27.3.a.21, 27.3.a, 27.3.b.23, 27.3.c.22, 27.3.d.24, 27.3.d.25, 27.3.d.26, 27.3.d.27, 27.3.d.28, 27.3.d.28.1, 27.3.d.28.2, 27.3.d.29, 27.3.d.30, 27.3.d.31, 27.3.d.32, 27.4.a, 27.4.b, 27.4.c, 27.6.a, 27.6.b, 27.7.a, 27.7.b, 27.7.c, 27.7.d, 27.7.e, 27.7.f, 27.7.g, 27.7.h, 27.7.j, 27.7.k,	ANF *(Lophius spp)* ANK (*Lophius budegassa*) BLL (*Scophthalmus rhombus*) CAA (*Anarhichas lupus*) COD (*Gadus morhua*) COE (*Conger conger*) DAB (*Limanda limanda*) FLE (*Platichthys flesus*) GUG (*Eutrigla gurnardus*) GUR (*Aspitrigla cuculus*) HAD (*Melanogrammus aeglefinus*) HAL (*Hippoglossus hippoglossus*)

27.8.a, 27.8.b, 27.8.c, 27.8.d, 27.9.a, Baltic Sea subdivisions: 27.3.d.24, 27.3.d.25, 27.3.d.26, 27.3.d.27, 27.3.d.28, 27.3.d.28.1, 27.3.d.28.2, 27.3.d.29, 27.3.d.30 27.3.d.31, 27.3.d.32	HER (*Clupea harengus*) HKE (*Merluccius merluccius*) HOM (*Trachurus trachurus*) LBD (*Lepidorhombus boscii*) LEM (*Microstomus kitt*) LEZ (*Lepidorhombus* spp.) LIN (*Molva molva*) MAC (*Scombrus scombrus*) MEG (*Lepidorhombus whiffiagonis*) MON (*Lophius piscatorius*) NEP (*Nephrops norvegicus*) *** **Note**: FU must be provided here, i.e. NEP.FU.16 NOP (*Trisopterus esmarkii*) PLE (*Pleuronectes platessa*) POK (*Pollachius virens*) POL (*Pollachius pollachius*) RJU (Raja *undulata*) SKA (aggregated rays and skates: RJC, SKA, RAJ, RJA, RJB, RJC, RJE, RJF, RJH, RJI, RJM, RJN, RJO, RJR, SKA, SKX, SRX) SDV (aggregated dogfish: DGS, DGH, DGX, DGZ, SDV) SOL (*Solea solea*) SPR (*Sprattus sprattus*) TUR (*Scophthalmus maximus*) WHB (*Micromesistius poutassou*) WHG (*Merlangius merlangus*) WIT (*Glyptocephalus cynoglossus*) All remaining catch should be aggregated into an **'OTH'** class.

7.3.1 WGMIXFISH-ADVICE Data Format

This data should be submitted in the following format. Failure to do so will result in file rejection and a request for resubmission.

Files: Two comma separated (.csv) files should be provided, one reporting 'effort', and the other reporting 'catch'.

Format: These two files should adhere to the following format outlined in DC_Annex_1.xlsx for 'effort' (sheet "WGMIXFISH-effort") and 'catch' (sheet, "WGMIXFISH-catch").

Coding: Data entries must be fully consistent with the coding provided in the DC_Annex_1.xlsx and outlined in the table below:

Table: 7.3.1 Fields to be used in the submission spreadsheet with respective descriptor.

Fields	Descriptor
ID	Unique identifier
Country	Two letter short code as per DC_Annex_1.xlsx.
Year	Four digit format e.g. "2020"
Quarter	Abbreviated e.g. Q1
IntercatchMetierTag	Métier should match what has been submitted to InterCatch. A list of accepted metiers can be found in DC_Annex_1.xlsx (sheet "IC Metier tags").
VesselLengthCategory	Vessel length categories are should be specified using one of these exact codes: "<10m", "10<24m", "24<40m", ">=40m".
FDFVessel	Fully Documented Fisheries should be identified here using "FDF". Please leave the field blank for the non-FDF fleet.
Area	ICES divisions should match those in DC_Annex_1.xlsx (sheet "ICES area codes").
Species	Should be consistent with the three letter FAO codes outlined in Table 7.1. Except in the case of *Nephrops*, which the Functional unit must be concatenated to the species name, i.e. a catch of *Nephrops* in FU 16 should be noted as "NEP.FU.16" in the species column. In the case of *Nephrops* caught outside of an FU please provide the subarea, i.e. for *Nephrops* caught outside of an FU in ICES Subarea 27.7 as "NEP.OUT.7".
Landings	Estimated landings in tonnes (live weight). Including landings below minimum conservation reference size.
Value	Estimated total value of the landings in euro.
Discards	Only supply a discards in tonnes if none has been submitted to InterCatch. Or if specific discard information exists for each vessel length category.
KWdays.	Fishing effort in KWdays, i.e. engine power in kW times fishing days
DaysAtSea	Number of days at sea.
NoVessels	Number of vessels executing this activity at this level of aggregation.

Submission: Both files should be submitted to data.call@ices.dk. File name must follow this format "2021 WGMIXFISH-ADVICE" [country] [*metier*_catch/*metier*_effort]" (example: 2021 WGMIXFISH-ADVICE FR_ metier catch).

7.4 WGBFAS specifications

Units for data submission

For landings and discards; numbers (in thousands) and mean weight (in grammes) by age or length (depending on the stock and according to DC_Annex_1.xlsx specifications) per fleet/segment, quarter, year, Subdivision and country.

The unit for commercial effort is **days-at-sea** and should be aggregated at the same level as the sampling data (i.e. effort per fleet/segment, quarter, year, Subdivision and country).

Data specification

- Discard survival rates **should not** be accounted for by countries when uploading the data.
- For **sprat,** fleet segments to be considered are; "Pelagic trawlers" for all trawl gears and "Passive" for all passive gears.

Besides landings and discards InterCatch includes the catch category BMS landings.

It is important when Member Countries are uploading data to InterCatch that the catch categories in CATON are summing up to the total catch. BMS landings can either be calculated as an estimate from the observer trips or from official registrations such as sale slips, logbooks, or landing declarations (see section 6.1.4). Both the landed BMS catch and the discard estimate will be needed for the WGBFAS.

Specifics of data requirements for eastern and western Baltic cod (see also DC_Annex_1.xlsx)

- Denmark and Germany are requested to provide stock (i.e. eastern and western Baltic cod) proportions by gear and subarea (i.e. subareas 1 and 2; see Figure 4 of Western Baltic cod stock annex; link).
- For cod in SubDivisions (SD) 22-23, age distribution data should be uploaded to IC.
- For cod in SD 22-32, length distribution data should be uploaded to IC.
- For cod in SD 24, landings should be submitted by ICES square.

For Recreational catch from Denmark, Germany, and Sweden of western Baltic cod (cod.27.22-24) the following data are requested:

- Catch in weight, separately for SD 22, 23 and 24
- Catch-at-age in numbers, separately for SD 22, 23 and 24 (only age readings originating in SD 22 or 23 should be used. i.e. not age readings from SD 24)
- Mean weight at age in the catch.

The data should be provided as *Excel* spreadsheets and submitted to data.call@ices.dk.

Data from the surveys 1 to 3 below conducted in 2020, should be uploaded to the ICES databases (DATRAS and acoustic-trawl survey) by 1st February 2021. Data from surveys 4 to 6 below should be sent to the WG chair (see contact details in Table 4.1.) by 1st February 2021.

List of surveys conducted in Kattegat-Skagerrak and the Baltic Sea:

1) Baltic Acoustic Spring Survey, BASS;
2) International Bottom Trawl Survey Quarter 3, IBTS Q3;
3) Baltic International Trawl Survey quarter 4, BITS Q4
4) Fishermen-DTU Aqua sole survey, FFS;
5) Cod survey in Kattegat, CODS_Q4;
6) Fehmarn Juvenile Cod Survey, FEJCS.

7.5. WGBIE specifications

For four-spot megrim (*Lepidorhombus boscii*) in divisions 7.b-k, 8.a-b, and 8.d (west and southwest of Ireland, Bay of Biscay) (ldb.27.7b-k8abd) data from Spain (landings, discards, and associated biological information as specified in DC_Annex_1.xlsx) **should be submitted for the years 2003 to 2016 and 2020**.

Reporting of effort should be as reported for megrim (*Lepidorhombus whiffigonus*) in divisions 7.b-k, 8.a-b, and 8.d (west and southwest of Ireland, Bay of Biscay) (meg.27.7b-k8abd).

7.6. WGCEPH specifications

Cephalopod data will be used to describe trends and status of cephalopod fisheries, and to conduct stock assessments.

Data reporting

Data for the species-specific stocks should be reported according to the following list of areas;

27.3.a, 27.4.a, 27.4.b, 27.4.c, 27.5.b, 27.6.a, 27.6.b, 27.7.a, 27.7.b, 27.7.c, 27.7.d, 27.7.e, 27.7.f, 27.7.g, 27.7.h, 27.7.j, 27.7.k, 27.8.a, 27.8.b, 27.8.c, 27.8.d, 27.9.a.n, 27.9.a.c.n, 27.a.c.s, 27.9.a.s.a, 27.9.a.s.c, 27.10. All catches should be uploaded by ICES Division (e.g. 27.4.c or 27.8.d) except for Division 27.9.a, for which catches should be split into 27.9.a.n., 27.9.a.c.n, 27.9.a.c.s, 27.9.a.s.a, 27.9.a.s.c.

Detailed anonymised data on landings and fishing activities of selected fishing fleets (OTB, TBB and OTM) from countries with significant cephalopod fisheries (i.e. landings exceeding 1000 tonnes per year), as specified in DC_Annex_1.xlsx, should be provided via email to data.call@ices.dk following the format outlined in DC_Annex_7.6.1. WGCEPH Detailed Catch and Effort data.xlsx.

For trawl surveys with accurate identification of cephalopods at species level, the abundance indices (numbers) and cpue (weights) should be provided via email to data.call@ices.dk following the format outlined in DC_Annex_7.6.2. WGCEPH Survey data. **Note** that in the case of surveys with a stratified sampling scheme average computations by strata should be also provided. Survey data should be submitted via data.call@ices.dk unless detail data have already been submitted to the ICES database DATRAS (http://www.ices.dk/data/data-portals/Pages/DATRAS.aspx). Submission of cephalopod survey data to the quality assured and open DATRAS database is encouraged. If the data have been already uploaded to DATRAS, WGCEPH co-chairs should be informed. Additionally, in case of missing data for one of more species, WGCEPH co-chairs should be informed about whether the species are not caught by trawl surveys or whether the species may have been caught but have not been recorded in the DATRAS database.

Data for WGCEPH (see DC_Annex_1.xlsx, 7.6.1 and 7.6.2) should only be submitted using the specific FAO 3-alfa species codes. Please note the code SQU should only be used if there is a genuine doubt as to whether the squid landed were Loliginidae or Ommastrephidae. Additionally, if cephalopod catches are being recorded under any code other than those listed, (a) please indicate this in a note to WGCEPH and (b) include those data also. Finally, if countries are aware of any current issues with coding of cephalopod landings please inform the WGCEPH chairs (see contact details in Table 4.1). This request is prompted by recently reported issues with use of the codes SQZ and SQU. The métier codes to be used are specified in DC_Annex_1.xlsx, in the sheet "IC Metier tags". If other level 6 métiers have catches and are not available in InterCatch, please contact the Expert Group chairs (see email address in Table 4.1).

Effort specifications

The units for fishing effort can be either "KW×fishing days" or "Total Days at sea" but should be consistent with data previously provided to WGCEPH. The fishing 'Effort' in InterCatch concerns all fishing effort of each métier catching cephalopods in the area of the stock. By "all fishing effort" it is meant all the activity of these métiers and not only the trips when cephalopods were caught.

WGCEPH needs all landings data, even if some landings have no associated fishing effort record; in such case enter '−9' in the effort field.

7.7. WGEF specifications

Provide national landings and discards data for 2020 for all elasmobranch in Annex_7.7.1 WGEF.csv. Landings and discards should be provided via InterCatch, by metier level 4 and by ICES Division. Landings and discards should be provided in tonnes with three decimal places.

Submitted data should include national catches for all elasmobranch species in FAO area 27, as well as catches outside ICES areas for selected stocks (see Table 7.1.):

Length composition for all the stocks in Table 7.1 (below) for discards and landings should be submitted via data.call@ices.dk in centimetres (cm). These data should contain the following fields per stock:

- Year,
- Country,
- Catch category (DIS or LAN),
- Sex (M, F),
- Length (cm) and,
- Number of individuals

All countries that have landings or discards data on these stocks should submit data, even if the sampling size is small, this is due to the importance of and scarcity of sampling for these stocks.

File name should follow the following format "2021 WGEF [country]"

(example: 2021 WGEF FR).

Table 7.7.1.: ICES Elasmobranchs stocks *per* FAO area.

FAO Area	Stock code	Description
27 and 34	cyo.27.nea	Portuguese dogfish (*Centroscymnus coelolepis*, *Centrophorus squamosus*) in subareas 1-10, 12 and 14 (the Northeast Atlantic and adjacent waters)

FAO Area	Stock code	Description
	guq.27.nea	Leafscale gulper shark (*Centrophorus squamosus*) in subareas 1-10, 12 and 14 (the Northeast Atlantic and adjacent waters)
27, 34 and 37	gag.27.nea	Tope (*Galeorhinus galeus*) in subareas 1-10, 12 and 14 (the Northeast Atlantic and adjacent waters)
	por.27.nea	Porbeagle (*Lamna nasus*) in subareas 1-10, 12 and 14 (the Northeast Atlantic and adjacent waters)
	sdv.27.nea	Smooth-hound (*Mustelus spp.*) in subareas 1-10, 12 and 14 (the Northeast Atlantic and adjacent waters)
21, 27, 31, 34 and 37	bsk.27.nea	Basking shark (*Cetorhinus maximus*) in subareas 1-10, 12 and 14 (Northeast Atlantic and adjacent waters)
	thr.27.nea	Thresher sharks (*Alopias spp.*) in subareas 10, 12, divisions 7.c-k, 8.d-e, and subdivisions 5.b.1, 9.b.1, 14.b.1 (Northeast Atlantic)
27	agn.27.nea	Angel shark (*Squatina squatina*) in subareas 1-10, 12 and 14 (the Northeast Atlantic and adjacent waters)
	dgs.27.nea	Spurdog (*Squalus acanthias*) in subareas 1-10, 12 and 14 (the Northeast Atlantic and adjacent waters)
	raj.27.1012	Rays and skates (Rajidae) (mainly thornback ray (*Raja clavata*)) in subareas 10 and 12 (Azores grounds and north of Azores)
	raj.27.3a47d	Rays and skates (Rajidae) in Subarea 4 and in divisions 3.a and 7.d (North Sea, Skagerrak, Kattegat, and eastern English Channel)
	raj.27.67a-ce-h	Rays and skates (Rajidae) in Subarea 6 and divisions 7.a-c and 7.e-h (Rockall and West of Scotland, southern Celtic Seas, western English Channel)
	raj.27.89a	Rays and skates (Rajidae) in Subarea 8 and Division 9.a (Bay of Biscay and Atlantic Iberian waters)
	rja.27.nea	White skate (*Rostroraja alba*) in subareas 1-10, 12 and 14 (the Northeast Atlantic and adjacent waters)
	rjb.27.3a4	Common skate complex (Blue skate (*Dipturus batis*) and flapper skate (*Dipturus intermedius*) in Subarea 4 and Division 3.a (North Sea, Skagerrak and Kattegat)
	rjb.27.67a-ce-k	Common skate complex (Blue skate (*Dipturus batis*) and flapper skate (*Dipturus intermedius*) in Subarea 6 and divisions 7.a–c and 7.e–k (Celtic Seas and western English Channel)
	rjb.27.89a	Common skate complex (Blue skate (*Dipturus batis*) and flapper skate (*Dipturus intermedius*) in Subarea 8 and Division 9.a (Bay of Biscay and Atlantic Iberian waters)
	rjc.27.3a47d	Thornback ray (*Raja clavata*) in Subarea 4 and in divisions 3.a and 7.d (North Sea, Skagerrak, Kattegat, and eastern English Channel)
	rjc.27.6	Thornback ray (*Raja clavata*) in Subarea 6 (West of Scotland)
	rjc.27.7afg	Thornback ray (*Raja clavata*) in divisions 7.a and 7.f-g (Irish Sea, Bristol Channel, Celtic Sea North)
	rjc.27.7e	Thornback ray (*Raja clavata*) in Division 7.e (western English Channel)
	rjc.27.8	Thornback ray (*Raja clavata*) in Subarea 8 (Bay of Biscay)
	rjc.27.9a	Thornback ray (*Raja clavata*) in Division 9.a (Atlantic Iberian waters)
	rje.27.7de	Small-eyed ray (*Raja microocellata*) in divisions 7.d and 7.e (English Channel)

FAO Area	Stock code	Description
	rje.27.7fg	Small-eyed ray (*Raja microocellata*) in divisions 7.f and 7.g (Bristol Channel, Celtic Sea North)
	rjf.27.67	Shagreen ray (*Leucoraja fullonica*) in subareas 6-7 (West of Scotland, southern Celtic Seas, English Channel)
	rjh.27.4a6	Blonde ray (*Raja brachyura*) in Subarea 6 and Division 4.a (North Sea and West of Scotland)
	rjh.27.4c7d	Blonde ray (*Raja brachyura*) in divisions 4.c and 7.d (southern North Sea and eastern English Channel)
	rjh.27.7afg	Blonde ray (*Raja brachyura*) in divisions 7.a and 7.f-g (Irish Sea, Bristol Channel, Celtic Sea North)
	rjh.27.7e	Blonde ray (*Raja brachyura*) in Division 7.e (western English Channel)
	rjh.27.9a	Blonde ray (*Raja brachyura*) in Division 9.a (Atlantic Iberian waters)
	rji.27.67	Sandy ray (*Leucoraja circularis*) in subareas 6-7 (West of Scotland, southern Celtic Seas, English Channel)
	rjm.27.3a47d	Spotted ray (*Raja montagui*) in Subarea 4 and divisions 3.a and 7.d (North Sea, Skagerrak, Kattegat, and eastern English Channel)
	rjm.27.67bj	Spotted ray (*Raja montagui*) in Subarea 6 and divisions 7.b and 7.j (West of Scotland, west and southwest of Ireland)
	rjm.27.7ae-h	Spotted ray (*Raja montagui*) in divisions 7.a and 7.e-h (southern Celtic Seas and western English Channel)
	rjm.27.8	Spotted ray (*Raja montagui*) in Subarea 8 (Bay of Biscay)
	rjm.27.9a	Spotted ray (*Raja montagui*) in Division 9.a (Atlantic Iberian waters)
	rjn.27.3a4	Cuckoo ray (*Leucoraja naevus*) in Subarea 4 and Division 3.a (North Sea, Skagerrak and Kattegat)
	rjn.27.678abd	Cuckoo ray (*Leucoraja naevus*) in subareas 6-7 and divisions 8.a-b and 8.d (West of Scotland, southern Celtic Seas, and western English Channel, Bay of Biscay)
	rjn.27.8c	Cuckoo ray (*Leucoraja naevus*) in Division 8.c (Cantabrian Sea)
	rjn.27.9a	Cuckoo ray (*Leucoraja naevus*) in Division 9.a (Atlantic Iberian waters)
	rjr.27.23a4	Starry ray (*Amblyraja radiata*) in subareas 2 and 4, and Division 3.a (Norwegian Sea, North Sea, Skagerrak and Kattegat)
	rju.27.7bj	Undulate ray (*Raja undulata*) in divisions 7.b and 7.j (west and southwest of Ireland)
	rju.27.7de	Undulate ray (*Raja undulata*) in divisions 7.d and 7.e (English Channel)
	rju.27.8ab	Undulate ray (*Raja undulata*) in divisions 8.a-b (northern and central Bay of Biscay)
	rju.27.8c	Undulate ray (*Raja undulata*) in Division 8.c (Cantabrian Sea)
	rju.27.9a	Undulate ray (*Raja undulata*) in Division 9.a (Atlantic Iberian waters)
	sck.27.nea	Kitefin shark (*Dalatias licha*) in subareas 1-10, 12 and 14 (the Northeast Atlantic and adjacent waters)

FAO Area	Stock code	Description
	sho.27.67	Black-mouth dogfish (*Galeus melastomus*) in subareas 6 and 7 (West of Scotland, southern Celtic Seas, and English Channel)
	sho.27.89a	Black-mouth dogfish (*Galeus melastomus*) in Subarea 8 and Division 9.a (Bay of Biscay and Atlantic Iberian waters)
	syc.27.3a47d	Lesser-spotted dogfish (*Scyliorhinus canicula*) in Subarea 4 and divisions 3.a and 7.d (North Sea, Skagerrak and Kattegat, eastern English Channel)
	syc.27.67a-ce-j	Lesser-spotted dogfish (*Scyliorhinus canicula*) in Subarea 6 and divisions 7.a-c and 7.e-j (West of Scotland, Irish Sea, southern Celtic Seas)
	syc.27.8abd	Lesser-spotted dogfish (*Scyliorhinus canicula*) in divisions 8.a-b and 8.d (Bay of Biscay)
	syc.27.8c9a	Lesser-spotted dogfish (*Scyliorhinus canicula*) in divisions 8.c and 9.a (Cantabrian Sea and Atlantic Iberian waters)
	syt.27.67	Greater-spotted dogfish (*Scyliorhinus stellaris*) in subareas 6 and 7 (West of Scotland, southern Celtic Sea, and the English Channel)

7.8 WGHANSA specifications

For stocks to be assessed in November 2021 (i.e. ane.27.8, pil.27.7, pil.27.8abd, pil.27.8c9a,) countries are encouraged to submit preliminary catch data from the current year (2021) by the 1st of November of 2021.

7.10 WGCSE specifications

Data submitters are requested to provide additional data for Seabass (*Dicentrarchus labrax*) in Divisions 4.b-c, 7.a, and 7.d-h (central and southern North Sea, Irish Sea, English Channel, Bristol Channel, and Celtic Sea). The data requested is comprised of:

- Monthly landings (kg) by metier (level 5) and vessel (anonymised).
- Monthly length sampling data by metier level 5 for both landings and discards.

The temporal range for the data requested above is from 2010 to 2020

This information should be submitted separately as .csv files via email to data.call@ices.dk. The subject of the email and the file name should be clearly labelled as “2021 WGCSE-bss [country]”

(example: 2021 WGCSE-bss France).

7.11 NWWG specifications

For the stock reb.2127.dp data should be submitted for catches harvested below 500m depth only as specified in DC_Annex_1.xlsx as "AC13".

For the stock reb.2127.sp data should be submitted for catches harvested above 500m depth only as specified in DC_Annex_1.xlsx as "AC14".

7.12 WGNAS specifications

Data on all 2020 Atlantic salmon catches and landings by stock, as specified in DC_Annex_1.xlsx, should be provided via email to data.call@ices.dk following the format outlined in DC_Annex_7.12.1 WGNAS_Template.xlsx. North Atlantic salmon ICES stock definitions align with the NASCO Commission area [§]. Additional data types for Atlantic salmon requested and outlined in DC_Annex_7.12.1 WGNAS_Template.xlsx. include;

- Data on the production of farmed and sea-ranched Atlantic salmon in 2020 (in number of individuals and by weight (tonnes));
- Numbers of fish released back alive from commercial and recreational fisheries;
- Estimates for both reported and unreported catches.

Data should be marked as provisional, where necessary.

When reporting data on salmon caught in rivers, provide the name of the river. This information will be used to develop an accepted list of salmon rivers to be used in future data calls.

Special terminology and codes used in this data call are described in the glossary in Appendix V and DC_Annex_7.12.1 WGNAS_Template.xlsx.

7.13 WGScallop specifications

Data on all 2020 landings by stock, as specified in DC_Annex_1.xlsx, should be provided via email to data.call@ices.dk following the format outlined in DC_Annex_7.13.1 WGSCALLOP Template.xlsx.

Data submitters are requested to contact their national expert to provide further quality assurance prior to the data being submitted.

Table 7.13.1: List of relevant national experts.

[§] For a description of the Commission Areas See Figure in page 3 of the sal.27.neac stock annex; https://www.ices.dk/sites/pub/Publication%20Reports/Stock%20Annexes/2019/sal.27.neac_SA.pdf

Member	Dept/Institute	Email	Country
Lynda Blackadder	Marine Scotland Science	Lynda.Blackadder@gov.scot	United Kingdom-Scotland
Adam DeLargy	Bangor University	Adam.delargy@bangor.ac.uk	United Kingdom-Wales
Carrie McMinn	Agri-food and Biosciences Institute	Carrie.McMinn@afbini.gov.uk	United Kingdom-Northern Ireland
Fabian Zimmermann	Institute Marine Research	fabian.zimmermann@hi.no	Norway
Luis Ridao Cruz	Faroe Marine Research Institute	luisr@hav.fo	Faroe Islands
Andy Lawler	Centre for Environment, Fisheries and Aquaculture Science	andy.lawler@cefas.co.uk	United Kingdom-England
Eric Foucher	Ifremer	eric.foucher@ifremer.fr	France
Isobel Bloor	Bangor University	i.bloor@bangor.ac.uk	United Kingdom-Isle of Man
Jónas Jónasson	Marine and Freshwater Research Institute	jonas.jonasson@hafogvatn.is	Iceland
Oliver Tully	Marine Institute	oliver.tully@marine.ie	Ireland

The species listed in table 7.13.2 are non–exclusive. If a scallop species has been omitted then please submit data using the generic code name (SCX) and notify ICES of any species that should possibly be included in future data calls (link to the SpecASFIS vocabulary).

Table 7.13.2: Species list and respective FAO codes.

Common name	Scientific name	FAO code
Great Atlantic scallop (King scallop)	*Pecten maximus*	SCE
Queen scallop	*Aequipecten opercularis*	QSC
Iceland scallop	*Chlamys islandica*	ISC
American sea scallop	*Placopecten magellanicus*	SCA
Scallops nei	*Pectinidae*	SCX

Data types

Table 7.13.3: Aggregation levels by data type.

Type of data	Temporal aggregation level	Metier level 5	Geographical Reporting Level
Landings Quantity	Monthly	see table 7.13.5	ICES Statistical Rectangle
Effort	Monthly	see table 7.13.5	ICES Statistical Rectangle

The template provided (DC_Annex_7.13.1. WGSCALLOP Template) should be used to reply to this data call. All the fields needed are included in the template.

Please rename the file in order to include; WGSCALLOP and country as specified below. The email subject must include WGSCALLOP and country references.

"2021 DC [expert group] [country]"

example: 2021 DC WGSCALLOP FR

The file should be submitted via e-mail to datacall@ices.dk in as few e-mails as possible.

Table 7.13.4: Reporting format

Variable	Unit	Type	Comments
Country		String	ISO country label
Year		Integer	Year (e.g. "2020")
Month		Integer	Month (1 to 12)
ICES area		String	Up to division level
ICES Statistical rectangle		String	StatRec
Metier level 5		String	Table 7.13.5Metier5_FishingActivity)
Landings	kg	Decimal numeral	
Effort	kWday	Decimal numeral	kW × fishing days

Fishing effort should be calculated following the fecR STECF method which applies the principles of the 2nd Workshop on Transversal Variables and calculates days at sea and fishing days (lb-na-27897-en-n.pdf (europa.eu). The WG request that effort is reported as **kW fishing days**.

Table 7.13.5: Reporting format

Gear Type	**Metier level 5 to be reported**
Boat dredge	DRB_MOL
Dive caught or scallops by hand	MDV_MOL
Beam trawl targeting scallops	TBB_MOL
Beam trawl targeting demersal fish	TBB_DEF
Bottom trawl targeting demersal fish	OTB_DEF
Bottom trawl targeting scallops	OTB_MOL
Hand mechanised dredge targeting scallops	HMD_MOL
Miscellaneous gear not included above	MIS_MIS

8. Contact information

For support concerning any data call issues please contact the Advisory Department (advice@ices.dk).

For support concerning InterCatch submissions please contact: InterCatchSupport@ices.dk.

For support concerning other data-submission issues, please contact: data.call@ices.dk.

Appendix I.

Gear coding (as defined under the DCF), allowed for WGNSSK and WGMIXFISH-ADVICE. Based on information from countries fishing in areas 27.3.a.20, 27.4 and 27.7.d and significant fishing gears. Note that the vessel length category (currently '_all') must appear at the end of every *métier* tag except the MIS_MIS *métier* tags.

AREA	GEAR TYPE	AVAILABLE METIER TAGS FOR FULLY DOCUMENTED FISHERIES ADD "_FDF" AFTER LENGTH CLASS
27.3.a.20 (Skagerrak) and 27.3.a.21 (Kattegat) Area Type = SubDiv	Beam trawl	TBB_CRU_16-31_0_0_all
		TBB_DEF_90-99_0_0_all
		TBB_DEF_>=120_0_0_all
	Otter trawl	OTB_CRU_16-31_0_0_all
		OTB_CRU_32-69_0_0_all
		OTB_CRU_32-69_2_22_all
		OTB_CRU_70-89_2_35_all
		OTB_CRU_90-119_0_0_all OTB_CRU_90-119_0_0_all_FDF
		OTB_DEF _>=120_0_0_all OTB_DEF _>=120_0_0_all_FDF
	Seines	SDN_DEF_>=120_0_0_all SDN_DEF_>=120_0_0_all_FDF
		SSC_DEF_>=120_0_0_all SSC_DEF_>=120_0_0_all_FDF
	Gill, trammel, drift nets	GNS_DEF_100-119_0_0_all
		GNS_DEF_120-219_0_0_all GNS_DEF_120-219_0_0_all_FDF
		GNS_DEF_>=220_0_0_all
		GNS_DEF_all_0_0_all
		GTR_DEF_all_0_0_all
	Lines	LLS_FIF_0_0_0_all LLS_FIF_0_0_0_all_FDF
	Others (Human consumption)*	MIS_MIS_0_0_0_HC
	Others (Industrial bycatch)*	MIS_MIS_0_0_0_IBC
27.4 – (North Sea) Area type = SubArea & 27.7.d (Eastern Channel) Area Type = Div & 27.6.a (for saithe and haddock only) Area Type = Div	Beam trawl	TBB_CRU_16-31_0_0_all
		TBB_DEF_70-99_0_0_all
		TBB_DEF_>=120_0_0_all
	Otter trawl	OTB_CRU_16-31_0_0_all
		OTB_CRU_32-69_0_0_all
		OTB_SPF_32-69_0_0_all
		OTB_CRU_70-99_0_0_all OTB_CRU_70-99_0_0_all_FDF
		OTB_ DEF _>=120_0_0_all OTB_DEF _>=120_0_0_all_FDF OTB_DEF_70-99_0_0_all
	Seines	SDN_DEF_>=120_0_0_all SDN_DEF_>=120_0_0_all_FDF
		SSC_DEF_>=120_0_0_all

AREA	GEAR TYPE	AVAILABLE METIER TAGS FOR FULLY DOCUMENTED FISHERIES ADD "_FDF" AFTER LENGTH CLASS
		SSC_DEF_>=120_0_0_all_FDF
	Gill, trammel, drift nets	GNS_DEF_100-119_0_0_all
		GNS_DEF_120-219_0_0_all GNS_DEF_120-219_0_0_all_FDF
		GNS_DEF_>=220_0_0_all
		GNS_DEF_all_0_0_all
		GTR_DEF_all_0_0_all
	Lines	LLS_FIF_0_0_0_all LLS_FIF_0_0_0_all_FDF
	Pots and Traps	FPO_CRU_0_0_0_all
	Others (Human consumption)*	MIS_MIS_0_0_0_HC
	Others (Industrial bycatch)*	MIS_MIS_0_0_0_IBC

* The use of metiers under the MIS_MIS category should be minimized.

Appendix II.

Gear coding (as defined under the DCF), allowed for WGCSE and WGMIXFISH-ADVICE in specific areas. Note that the vessel length category (currently '_all') must appear at the end of every *métier* tag except the MIS_MIS *métier* tags.

AREA	GEAR TYPE	AVAILABLE METIER TAGS
West of Scotland (27.6.a) and Rockall (27.6.b)	Pots and traps	FPO_CRU_0_0_0_all
	Gillnets	GNS_DEF_>=220_0_0_all
	Longline	LLS_FIF_0_0_0_all
	Otter trawl	OTB_CRU_70-99_0_0_all
		OTB_DEF_>=120_0_0_all
		OTB_DEF_100-119_0_0_all
		OTB_DWS_>=120_0_0_all
		OTB_DWS_100-119_0_0_all
		OTB_MOL_>=120_0_0_all
		OTB_MOL_100-119_0_0_all
	Midwater trawl	OTM_DEF_32-69_0_0_all
		OTM_SPF_32-69_0_0_all
	Seines	SSC_SPF_0_0_0_all
	Others (Human consumption)*	MIS_MIS_0_0_0_HC
	Others (Industrial bycatch)*	MIS_MIS_0_0_0_IBC
Irish Sea (27.7.a)	Pots and traps	FPO_CRU_0_0_0_all
		FPO_MOL_0_0_0_all
	Gillnets	GNS_DEF_120-219_0_0_all
		GNS_DEF_90-99_0_0_all
	Otter trawl	OTB_CRU_70-99_0_0_all
		OTB_DEF_70-99_0_0_all
		OTB_MOL_70-99_0_0_all
	Beam trawl	TBB_DEF_70-99_0_0_all
	Others (Human consumption)	MIS_MIS_0_0_0_HC
	Others (Industrial bycatch)	MIS_MIS_0_0_0_IBC
West of Ireland (27.7.b-c) and Celtic Sea slope (27.7.k–j)	Gillnets	GNS_DEF_>=220_0_0_all
		GNS_DEF_100-119_0_0_all
		GNS_DEF_120-219_0_0_all
		GNS_DWS_100-119_0_0_all
	Otter trawl	OTB_DEF_100-119_0_0_all
		OTB_DEF_70-99_0_0_all
		OTB_DWS_100-119_0_0_all
		OTB_MOL_100-119_0_0_all
		OTB_MOL_70-99_0_0_all
		OTB_SPF_100-119_0_0_all
		OTB_CRU_100-119_0_0_all
	Midwater trawl	OTM_SPF_16-31_0_0
		OTM_SPF_32-69_0_0_all
		OTM_DEF_100-119_0_0_all
		OTM_LPF_70-99_0_0_all

		OTM_LPF_100-119_0_0_all
	Others (Human consumption)*	MIS_MIS_0_0_0_HC
	Others (Industrial bycatch)*	MIS_MIS_0_0_0_IBC
Celtic Sea Shelf (27.7.f–h)	Pots and traps	FPO_CRU_0_0_0_all
		FPO_MOL_0_0_0_all
	Gillnets	GNS_DEF_>=220_0_0_all
		GNS_DEF_120-219_0_0_all
		GNS_SPF_10-30_0_0_all
		GTR_DEF_>=220_0_0_all
	Lines	LLS_FIF_0_0_0_all
	Otter trawl	OTB_CRU_100-119_0_0_all
		OTB_CRU_70-99_0_0_all
		OTB_DEF_100-119_0_0_all
		OTB_DEF_70-99_0_0_all
		OTB_DWS_100-119_0_0_all
		OTB_MCD_70-99_0_0_all
		OTB_MOL_100-119_0_0_all
		OTB_MOL_70-99_0_0_all
	Midwater trawl	OTM_DEF_32-69_0_0_all
		OTM_SPF_32-69_0_0_all
	Seines	SSC_SPF_0_0_0_all
		SSC_DEF_100-119_0_0_all
		SSC_DEF_70-99_0_0_all
	Beam trawl	TBB_DEF_70-99_0_0_all
	Others (Human consumption)*	MIS_MIS_0_0_0_HC
	Others (Industrial bycatch)*	MIS_MIS_0_0_0_IBC
Western Channel (27.7.e)	Pots and traps	FPO_CRU_0_0_0_all
		FPO_MOL_0_0_0_all
	Gillnets	GNS_CRU_0_0_0_all
		GNS_DEF_>=220_0_0_all
		GNS_DEF_100-119_0_0_all
		GNS_DEF_120-219_0_0_all
		GTR_CRU_0_0_0_all
		GTR_DEF_>=220_0_0_all
		GTR_DEF_120-219_0_0_all
	Lines	LLS_DEF_0_0_0_all
		LLS_FIF_0_0_0_all
	Otter trawl	OTB_CRU_100-119_0_0_all
		OTB_CRU_70-99_0_0_all
		OTB_DEF_100-119_0_0_all
		OTB_DEF_70-99_0_0_all
		OTB_DWS_100-119_0_0_all
		OTB_MOL_100-119_0_0_all
		OTB_MOL_70-99_0_0_all
		OTB_SPF_70-99_0_0_all
	Midwater trawl	OTM_SPF_16-31_0_0
		OTM_SPF_32-69_0_0_all

		OTM_DEF_70-99_0_0_all
		OTM_DEF_100-119_0_0_all
	Seines	SSC_SPF_0_0_0_all
		SSC_DEF_70-99_0_0_all
	Beam trawl	TBB_DEF_70-99_0_0_all
	Others (Human consumption)*	MIS_MIS_0_0_0_HC
	Others (Industrial bycatch)*	MIS_MIS_0_0_0_IBC

* The use of metiers under the MIS_MIS category should be minimized.

Appendix III.

Gear coding (as defined under the DCF), allowed for WGBIE and WGMIXFISH-ADVICE.

GEAR TYPE	AVAILABLE METIER TAGS
Boat dredge, molluscs, no selectivity devise, all vessels	DRB_MOL_0_0_0_all
Pots and Traps, Crustaceans, no selectivity device, all vessels	FPO_CRU_0_0_0_all
Gill nets, demersal fish, mesh size 100-109mm, no selectivity device, all vessels	GN_DEF_100-109_0_0_all
Set gillnet, Demersal fish, mesh size more than 100mm, no selectivity device	GNS_DEF_>=100_0_0
Set gillnet, Demersal fish, mesh size more than 220mm, no selectivity device, all vessels	GNS_DEF_>=220_0_0_all
Set gillnet, Demersal fish, mesh size >=220mm, no selectivity device, all vessels, Fully Documented Fisheries	GNS_DEF_>=220_0_0_all_FDF
Set gillnet, Demersal fish, mesh size 100-119mm, no selectivity device, all vessels	GNS_DEF_100-119_0_0_all
Set gillnet directed to demersal fish (100-219 mm)	GNS_DEF_100-219_0_0
Set gillnet, Demersal fish, mesh size 10-30mm, no selectivity device, all vessels	GNS_DEF_10-30_0_0_all
Set gillnet, Demersal fish, mesh size 120-219mm, no selectivity device, all vessels	GNS_DEF_120-219_0_0_all
Set Gillnet, Demersal Fish, Mesh size 120-219, All Vessels, No grid selectivity, Fully Documented Fisheries	GNS_DEF_120-219_0_0_all_FDF
Set gillnet directed to demersal fish (45-59 mm)	GNS_DEF_45-59_0_0
Set gillnet, Demersal fish, mesh size 60-79 mm, no selectivity device	GNS_DEF_60-79_0_0
Set gillnet directed to demersal fish (80-99 mm)	GNS_DEF_80-99_0_0
Set gillnet, Demersal fish, all mesh sizes, no selectivity device, all vessels	GNS_DEF_all_0_0_all
Trammel nets, Demersal fish, mesh size 60-79mm, no selectivity device	GTR_DEF_60-79_0_0
Trammel nets, Demersal fish, all mesh sizes, no selectivity device, all vessels	GTR_DEF_all_0_0_all
Hand lines directed to demersal fish	LHM_DEF_0_0_0
Set longline directed to demersal fish	LLS_DEF_0_0_0
Set longlines, Demersal fish, mesh size not specified, no selectivity device, all vessels.	LLS_DEF_0_0_0_all
Set longlines, Finfish, no selectivity device, all vessels	LLS_FIF_0_0_0_all
Demersal fisheries, Demersal fish, mesh size any, no selectivity device, all vessels	MIS_DEF_all_0_0_all*
Demersal fisheries - Miscellaneous Industrial bycatch	MIS_MIS_0_0_0_IBC*
Demersal fisheries - Miscellaneous	MIS_MIS_All_0_0_All*
Bottom otter trawl directed to crustaceans (at least 70 mm)	OTB_CRU _>=70_0_0
Otter trawl, Crustaceans, mesh size 100-119, no selectivity device, all vessels	OTB_CRU_100-119_0_0_all
Otter trawl, Crustaceans and Demersal fish, mesh size 32-69, no selectivity device, all vessels	OTB_CRU_32-69_0_0_all
Otter trawl, Crustaceans, mesh size 32-69, selectivity device - grid 22mm, all vessels	OTB_CRU_32-69_2_22_all
Otter trawl, Crustaceans, mesh size 70-89, selectivity device - grid 35mm, all vessels	OTB_CRU_70-89_2_35_all
Bottom otter trawl directed to crustaceans (70-99 mm)	OTB_CRU_70-99_0_0
Otter trawl, Crustaceans and Demersal fish, mesh size 70-99, no selectivity device, all vessels	OTB_CRU_70-99_0_0_all
Otter trawl, Crustaceans and Demersal fish, mesh size 90-119, no selectivity device, all vessels	OTB_CRU_90-119_0_0_all
Bottom otter trawl, Crustaceans, mesh Size 90-119, Selectivity Device - none, All vessel types, Fully Documented Fisheries	OTB_CRU_90-119_0_0_all_FDF
Bottom otter trawl, Crustaceans, all mesh sizes, no selectivity devise, all vessel types	OTB_CRU_All_0_0_All
Bottom otter trawl directed to demersal fish (100-119 mm)	OTB_DEF _100-119_0_0

GEAR TYPE	AVAILABLE METIER TAGS
Otter trawl, Demersal fish and Crustaceans, mesh size more than 120mm, no selectivity device, all vessels	OTB_DEF_>=120_0_0_all
Bottom otter trawl, Demersal fish, Mesh Size 120 or greater, Selectivity Device - none, All vessel types, Fully Documented Fisheries	OTB_DEF_>=120_0_0_all_FDF
Bottom otter trawl directed to demersal fish (at least 55 mm)	OTB_DEF_>=55_0_0
Bottom otter trawler targeting demersal fish with a mesh size > 70 mm	OTB_DEF_>=70_0_0
Bottom otter trawler targeting demersal fish with a mesh size 100-119 mm	OTB_DEF_100-119_0_0_all
Bottom otter trawl directed to demersal fish (70-99 mm)	OTB_DEF_70-99_0_0
Bottom otter trawl directed to demersal fish, all mesh sizes, no selectivity devise	OTB_DEF_All_0_0_All
Otter trawl, Mixed crustaceans and demersal fish, mesh size more than 55mm, no selectivity device.	OTB_MCD_>=55_0_0
Otter trawler targeting cephalopods and fish	OTB_MCF_>=70_0_0
Otter trawl, Molluscs, mesh size 70-99mm, no selectivity device, all vessels	OTB_MOL_70-99_0_0_all
Bottom otter trawl directed to mixed pelagic and demersal fish (at least 70 mm)	OTB_MPD _>=70_0_0
Bottom otter trawl directed to pelagic and demersal fish (at least 55 mm)	OTB_MPD_>=55_0_0
Otter Bottom trawl, Small pelagic fish, 32-69 mm, no selectivity devise, all vessels	OTB_SPF_32-69_0_0_all
Midwater otter trawl, Demersal species, mesh size 100-119mm, no selectivity device, all vessels	OTM_DEF_100-119_0_0_all
Midwater otter trawl, Demersal species, mesh size 32-54mm, no selectivity device, all vessels	OTM_DEF_32-54_0_0_all
Midwater otter trawl, Demersal species, mesh size 55-69mm, no selectivity device, all vessels	OTM_DEF_55-69_0_0_all
Midwater otter trawl, Demersal species, mesh size 70-99mm, no selectivity device, all vessels	OTM_DEF_70-99_0_0_all
Midwater otter trawl, Demersal species, mesh size 80-89mm, no selectivity device, all vessels	OTM_DEF_80-89_0_0_all
Multi-rig otter trawl directed to crustaceans (at least 70 mm)	OTT_CRU _>=70_0_0
Multi-rig otter trawl directed to demersal fish (at least 70 mm)	OTT_DEF _>=70_0_0
Multi-rig otter trawl, demersal fish, mesh size more than 120mm, no selectivity device, all vessels	OTT_DEF_>=120_0_0_all
Multi-rig otter trawl, demersal fish, mesh size 100-119mm, no selectivity device, all vessels	OTT_DEF_100-119_0_0_all
Multi-rig otter trawl, demersal fish, mesh size 16-31mm, no selectivity device, all vessels	OTT_DEF_16-31_0_0_all
Multi-rig otter trawl, demersal fish, mesh size 80-89mm, no selectivity device, all vessels	OTT_DEF_80-89_0_0_all
Multi-rig otter trawl, demersal fish, mesh size 90-99mm, no selectivity device, all vessels	OTT_DEF_90-99_0_0_all
Purse seine, Small pelagic fish, no selectivity device.	PS_SPF_0_0_0
Bottom pair trawl directed to demersal fish (at least 70 mm)	PTB_DEF _>=70_0_0
Pair bottom trawl, demersal fish, mesh size more than 120mm, no selectivity device, all vessels	PTB_DEF_>=120_0_0_all
Pair bottom trawler targeting demersal fish	PTB_DEF_>=70_0_0
Pair bottom trawl, demersal fish, mesh size 80-89mm, no selectivity device, all vessels	PTB_DEF_80-89_0_0_all
Bottom pair trawl directed to mixed pelagic and demersal fish (at least 55 mm)	PTB_MPD_>=55_0_0
Midwater pair trawl, demersal fish, mesh size 90-104 mm, no selectivity device	PTM_DEF_90-104_0_0
Anchored seine, Demersal fish, mesh size more than 120mm, no selectivity device, all vessels	SDN_DEF_>=120_0_0_all

GEAR TYPE	AVAILABLE METIER TAGS
Anchored Seine, Demersal Fish, Mesh Size 120 or above, Selectivity Device - none, All vessels, Fully Documented Fisheries	SDN_DEF_>=120_0_0_all_FDF
Fly shooting seine, Demersal fish, mesh size more than 120mm, no selectivity device, all vessels	SSC_DEF_>=120_0_0_all
Fly shooting seine, Demersal Fish, Mesh Size 120 or greater, Selectivity Device - none, All vessels, Fully Documented Fisheries	SSC_DEF_>=120_0_0_all_FDF
Fly shooting seine, Demersal fish, mesh size 100-119mm, no selectivity device, all vessels.	SSC_DEF_100-119_0_0_all
Fly shooting seine, Demersal fish, mesh size 80-89mm, no selectivity device, all vessels.	SSC_DEF_80-89_0_0_all
Fly shooting seine, , Demersal fish, all mesh sizes, no selectivity, all vessels	SSC_DEF_All_0_0_All
Beam trawl, Crustaceans, mesh size 16-31mm, no selectivity device, all vessels	TBB_CRU_16-31_0_0_all
Beam trawl, Demersal fish, mesh size 16mm or less, no selectivity device, all vessels	TBB_DEF_<16_0_0_all
Beam trawl, Demersal fish, mesh size more than 120, no selectivity device, all vessels	TBB_DEF_>=120_0_0_all
Beam Trawl, mesh size 100-119mm	TBB_DEF_100-119_0_0_all
Beam trawl, Demersal fish, mesh size 70-99, no selectivity device, all vessels	TBB_DEF_70-99_0_0_all
Beam trawl, Demersal fish, mesh size 90-99, no selectivity device, all vessels	TBB_DEF_90-99_0_0_all
Beam trawl, Demersal fish, all mesh sizes, no selectivity, all vessels	TBB_DEF_all_0_0_all

* The use of metiers under the MIS_MIS category should be minimized.

Appendix IV.

The information requested in this Appendix is required for stocks identified in DC_Annex_1.xlsx with "Y" under column "DLS proxy RP" <u>and for which such information has not been reported in previous data calls.</u>

"Supporting life history information" (See DC_Annex_2_SupportingInformationLifeHistoryParameters.xlsx) should include information on life history traits for the last three years (2018, 2019, 2010), if available, noting that some candidate reference points may require input on L_{mat} (length at first maturity), growth parameters (e.g., L_{inf}, K), and M (natural mortality). Please note that article 17(3) of Regulation (EC) No 2017/1004 states "..*requests made by end-users of scientific data in order to serve as a basis for advice to fisheries management, Member States shall ensure that relevant detailed and aggregated data are updated and made available to the relevant end-users of scientific data within the deadlines set in the request*,.."

^ If information is provided on traits not listed in the template, include them in these rows with the parameter name in the comments column.

	Value	Reference	Country code	Stock code	Species code	Comments
Lmat						
Linf						
K						
M						
Unspecified parameter^						
Unspecified parameter^						

Figure IV. Supporting life history information.

Appendix V.

WGNAS glossary

1SW (*One-Sea-Winter*). Maiden adult salmon that has spent one winter at sea.

2SW (*Two-Sea-Winter*). Maiden adult salmon that has spent two winters at sea.

MSW (Multi-Sea-Winter). A MSW salmon is an adult salmon that has spent two or more winters at sea and may be a repeat spawner.

Catch-and-release fisheries Catch and release is a practice within recreational fishing intended as a technique of conservation. After capture, the fish are unhooked and returned to the water before experiencing serious exhaustion or injury.

NAC (*North American Commission*). The North American Atlantic Commission of NASCO or the North American Commission area of NASCO.

WGC (*West Greenland Commission*). The West Greenland Commission of NASCO or the West Greenland Commission area of NASCO.

NEAC (*North Eastern Atlantic Commission*). North-East Atlantic Commission of NASCO or the North-East Atlantic Commission area of NASCO.

NEAC – N (*North Eastern Atlantic Commission- northern area*). The northern portion of the North-East Atlantic Commission area of NASCO.

NEAC – S (*North Eastern Atlantic Commission – southern area*). The southern portion of the North-East Atlantic Commission area of NASCO.

NASCO (*North Atlantic Salmon Conservation Organisation*). An international organisation, established by an inter-governmental convention in 1984. The objective of NASCO is to conserve, re-store, enhance and rationally manage Atlantic salmon through international cooperation taking account of the best available scientific information.