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## Regulation (EU) 2017/1004 of 17 May 2017 of the European Parliament and the Council

on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008

Commission Implementing Decision (EU) 2019/909 of 18 February 2019 establishing the list of mandatory research surveys and thresholds for the purposes of the multiannual Union programme for the collection and management of data in the fisheries and aquaculture sectors

Commission Delegated Decision (EU) 2019/910 of 13 March 2019 establishing the multiannual Union programme for the collection and management of biological, environmental, technical and socioeconomic data in the fisheries and aquaculture sectors

Commission Implementing Decision (EU) 2016/1701 of 19 August 2016 laying down rules on the format for the submission of work plans for data collection in the fisheries and aquaculture sectors.

Commission Implementing Decision (EU) 2018/1283 of 24 August 2018 laying down rules on the format and timetables for the submission of annual data collection reports in the fisheries and aquaculture sectors.

## **Ireland Annual Report for Data Collection in the Fisheries and Aquaculture Sectors**

**2021**

**Version 1**

Marine Institute, Ireland, 31<sup>st</sup> May 2022

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## SECTION 1: BIOLOGICAL DATA

### Text Box 1C: Sampling intensity for biological variables

General comment: This box fulfils paragraph 2 point (a)(i)(ii)(iii) of Chapter III, of the Annex of the Delegated Decision (EU) 2019/910 and Chapter I of the Implementing Decision (EU) 2019/909 on the multiannual Union programme; and Article 2, Article 4 paragraph 1 and Article 8 of the Implementing Decision (EU) 2016/1701 on the format of the WP. This box is applicable to the Annual Report.

The following applies to all regions/RFMO/RFO/IO:

#### 1. Evidence of Data Quality Assurance

Standard Operating Procedures (SOP's) and documentation on sampling design are all available on Irelands National DC-MAP website: <http://www.dcmmap-ireland.ie/>

##### **Sampling on shore- demersal and pelagic fish species**

Guidelines: ICES WGCATCH (statistically sound sampling)

Purpose: Length, age, weight data of landings and sex/maturity of pelagic landings

Design: Class C - sites x time

Expected difficulties: Refusals related to landing obligation

Data archiving: Secure SQL database and RDB

Quality assurance: Data entry checks and database validation, visual inspection of outliers

Analysis: Estimation procedure adapted from COST project.

Sampling frame: top 21 ports x time for demersal, and top 7 ports for pelagics

Sample selection PSU: Port-day - random, weighted by landings in previous 2 years.

Sample selection SSU: Stock – ad-hoc, based on target number of samples per stock

Sample selection TSU: Size grade – ad-hoc, at least one box per grade

Coverage: sampled ports receive >95% of landings of demersal and pelagic species into Ireland (3% of demersal landings and 15% of pelagic landings are in foreign ports which are covered under bilateral agreements (see table 7c); <1% of the total landings are sampled.

Stratification: 5 regions, 4 quarters

Targets: 1) number of port visits; 2) number of samples per stock; 3) number of age structures per sample

Quality: No major bias identified, targets are based on optimising precision for 26 demersal stocks and 9 pelagic stocks

##### **Demersal at-sea Pelagic at-sea**

Guidelines: ICES WGCATCH (statistically sound sampling for demersal metiers)

Purpose: Length, age, weight data of discards and landings of demersal species & Pelagics (excluding Nephrops)

Design: Class A - vessels x time

Expected difficulties: Refusals, mainly related to landing obligation; logistics

Data archiving: Secure SQL database and RDB

Quality assurance: Data entry checks and database validation, visual inspection of outliers

Analysis: R code and markdown including COST

Sampling frame: vessels x time

Sample selection PSU: vessel x time – Random draw list

Sample selection SSU: haul – ad-hoc, dictated by rest periods

Sample selection TSU: discard sample – random box

Coverage: around 1% of the total number of trips are sampled.

Stratification: 4 regions, 4 quarters for demersals, 5 regions, 2 quarters for pelagics

Targets: 1) number of observer trips; 2) number of hauls per trip 3) representative amount of commercial fish sampled per haul/trip 4) All discard fish measured per sample unit

Quality: Possible bias due to refusals, precision is determined by number of trips

As Covid-19 restrictions and advice resulted in the temporary suspension of the At Sea Sampling aboard commercial vessels the Marine Institute in consultation with industry have set up an At Sea Self Sampling Program in order that skippers and crews can collect data and samples at sea to mitigate for this loss. The At Sea Self Sampling Program allows for the vessels to collect data and samples from a subset of hauls during the fishing trip. For one haul per day, haul specific metadata is collected by the skipper on Start and Stop of Latitude and longitude, Date & Time, as well as Bulk catch (kg), and Landed catch (kg by species) for the selected haul. A random box of Unwanted Catch is collected from the haul and is labelled and stored on ice. On vessel landing Marine Institute staff collect the datasheets and the samples for further processing. All associated data from the At-Sea Sampling trip is entered onto a central database for later analysis. While this has been designed as a mitigating measure in 2020 we expect to continue with the program in 2021 while the Covid situation lasts and thereafter look at piloting the At Sea Self Sampling as an extra data stream to augment the At Sea Sampling with Samplers at sea. The At Sea Self Sampling program can potentially bring vessels excluded from the At Sea Sampling due to limited accommodation back into our sampling frames.

### **Crustacean at-sea & Sampling on shore (Nephrops)**

Guidelines: ICES WGCATCH (statistically sound sampling), WKNEPH (2013)

Purpose: Length, sex, maturity data of discards and landings

Design: Class A - vessels x time

Expected difficulties: Refusals, mainly related to landing obligation; logistics

Data archiving: Secure SQL database

Quality assurance: Electronic data capture. Quality assurance using NEMESYS software

Analysis: R code and markdown

Sampling frame: vessels x time

Sample selection PSU: vessel x time – currently ad-hoc, will move to sampling a reference fleet.

Sample selection SSU: haul – ad-hoc

Sample selection TSU: discard sample – random box, catch sample – random box, graded landings (FU16)

Coverage: around 1% of the total number of trips are sampled.

Stratification: 6 FUs, 4 quarters

Targets: 1) number of trips

Quality: Possible bias due to refusals, bias due to seasonal variation, precision is determined by number of trips

### **Crustacean at-sea & Molluscs at-sea (crab lobster, bivalves)**

Guidelines: ICES WGCATCH

Purpose: Length, weight data of discards and landings of shellfish (except Nephrops), biomass estimates for bivalves

Design: Class A - vessels x time, stratified random or grid sampling for bivalves  
Expected difficulties: Refusals, logistics, weather  
Data archiving: Secure SQL database  
Quality assurance: Data entry checks and database validation, visual inspection of outliers  
Analysis: R, ArcMap, spatial analysis  
Sampling frame: crustaceans: vessels x time, bivalves: stock distributional extent for bivalves  
Sample selection PSU: crustaceans: vessel x time – currently ad-hoc. Bivalves: haul  
Sample selection SSU: census, all hauls sampled  
Sample selection TSU: random sample or total catch  
Coverage: crustaceans: <1% of the total number of trips are sampled (Inshore fleet). Bivalves: full coverage of geographic stock distribution area  
Stratification: crustaceans: 5 regions, 3 quarters, Bivalves: none  
Targets: 1) number of catch sampling trips; 2) number of hauls per trip  
Quality: Crustaceans: Possible bias due vessel selection (mainly larger vessels are sampled)

Fishery dependent self-sampling data potentially enables a significant increase in data volume for both transversal and biological variables. Self-sampling data are regularly collected for shellfish under Ireland's sentinel vessel programme for vessels under 12m and by arrangement with individual vessel operators. Data on catch, effort, by-catch including PET species and size distribution data by species is collected. Data are collected using paper based and electronic methods. Validation for some variables such as location and PET species is through mobile phone GPS, VMS and geotagged images and video. This programme will be enhanced in 2021 and will reduce the risk of under sampling due to Covid-19 restrictions on access to vessels by observers.

### **Sampling on shore (crab lobster, bivalves, whelks)**

Guidelines: ICES WGCATCH  
Purpose: Length, age (where possible), weight data of landings of shellfish species (Pecten, Homarus, Cancer, Buccinum)  
Design: Class C - sites x time  
Expected difficulties: Prior grading of landings, time constraints at processing plants  
Data archiving: Secure SQL database and RDB  
Quality assurance: Data entry checks and database validation, visual inspection of outliers  
Analysis: Estimation procedure adapted from COST project where possible  
Sampling frame: ports targeted based on location of >80% of landings.  
Sample selection PSU: Fishing trip or 'fishing trip x ICES rectangle' or 'bulk landing'  
Sample selection SSU: Unit of landing (box, bag, tank)  
Sample selection TSU: Size grade – ad-hoc  
Coverage: sampled ports receive >80% of landings of Pecten and Buccinum >80% and >20% of landings of Homarus and Cancer. <1% of trips sampled.  
Stratification: 3 regions, during the 6-9 months of fishing season  
Targets: 1) number of port visits; 2) number of samples per stock; 3) number of age structures per sample where possible  
Quality: poor identification of origin in bulk landings, bias due to poor spatial coverage

## **2. Deviations from the Work plan**

### **Sampling intensity**

Some deviations in excess of planned sampling intensity occurred, but were achieved at national expense and at no additional expense to the DCF.

Where planned numbers were not achieved, explanations are provided Table 1C. As a general rule, the number of individuals sampled is of almost no value in evaluating the quality of a sampling programme. The number of samples taken is more relevant.

Sampling, both at sea and onshore continued to be impacted by the Covid – 19 Global pandemic, in 2021, please refer to Tables 1C and 4A for further details. The Marine Institute’s response to these unprecedented circumstances are detailed below.

#### Restricted access to commercial port sampling opportunities ashore due to the Covid – 19 global pandemic

Covid – 19 Level 5 restrictions (full lockdown) were re-introduced at midnight on the 31<sup>st</sup> of December 2020 and remained in effect in Ireland until the 10<sup>th</sup> of May 2021.

These restrictions had a direct effect on the Marine Institutes ability to access samples ashore in Fishermen’s Co – Op’s, Auctions Halls and fish and shellfish processors. In some areas fishing vessels continued to conduct shorter trips, only fishing subject to buyer demand/requests, resulting in very little fish being available to buy & sample and not a large mix of species. However, fishing and subsequently landings increased again during the Summer months and remained steady until the vessel tie up scheme came into effect in Q4 2021. More details on the vessel tie up scheme are provided below.

Throughout 2021 local fishermen’s Co-Op, and auction halls remained accessible in the most part, but under strict protocols, which dictated that sampling could only be completed by Marine Institute staff, outside normal working hours when the Co – Op, auction hall workers were not present. This necessitated a lot of weekend work or overnight sampling, getting in and out before workers arrived around 7am. In one Co – Op, only a single designated member of Marine Institute staff was allowed to sample throughout 2021.

Sampling was completely denied from a number of fish and shellfish processors around the country for the first 5 months of 2021, with one location remaining closed to sampling to this day. Access increased during the summer but was again curtailed with the surge in covid numbers in Q4 2021. Two of the main fish and shellfish processors in the South – East did re – open to Marine Institute staff in 2021, however there were ad hoc issues gaining access on occasion, throughout 2021, due to workers at these locations testing positive for Covid.

#### Ireland’s Vessel Tie – Up Scheme Q4 2021

The Irish Government launched and operated a Vessel Tie Up Scheme in Q4 of 2021. The purpose of the scheme was to temporarily mitigate the negative impacts on the white fish sector from:

1. The reduction in quotas for 2021 arising from the Trade and Cooperation Agreement. The Scheme aims to mitigate losses associated with certain stocks included in Annex FISH.1 and FISH.2 of the TCA.

## 2. Difficulties in accessing UK waters or third country waters due to Brexit.

The scheme was designed to support white fish vessels in the Polyvalent and Beam Trawl segments to temporarily cease all fishing activity in a particular calendar month, thus increasing the quota available for remaining vessels. The grant aided vessels in question could not engage in fishing activity of any sort for the duration of the grant aided period and had to remain in port throughout the month. Vessels could participate on the scheme for a maximum of two months

In 2021 a total of 183 vessels availed of the scheme and were tied up at various times between October and December 2021.

All of this combined to make achieving sampling targets for some species/parameters difficult, especially where landings had decreased, as fish were often already sold or processed or taken by buyers, during normal working hours and before Marine Institute staff had access to sample. This was particularly true in relation to sex and maturity sampling, where access to round or ungutted samples continued to be challenging, most acutely for stocks in areas VI due to limited access to the local fishermen's co – op and VIIa, where access to the main processors was denied throughout 2021. In some cases, where market sampling fell short of planned targets, it was possible to collect additional samples at sea on surveys, above planned survey targets, to help bolster sample numbers in the various areas. This was done when additional specimens were encountered on survey and was completed at no additional expense to the DCF. Specific issues per stock are highlighted in the AR Comment column in Table 1C.

### Sampling at Sea Programme – Catch Sampling Programme

Unfortunately, the Covid 19 global pandemic continued to negatively impact the Catch Sampling Programme in 2021. The suspension of at sea sampling on vessels >18hrs at sea remained in place. It was possible to continue the at sea sampling programme on inshore vessels, during the 2nd half of 2021, for day trips only, where overnight accommodation was not a requirement and sampling occurred outside on an open deck, which allowed adherence to public health guidelines.

Brexit and the resulting cuts to TAC's, also further exacerbated these difficulties, resulting in nation – wide protests by the fishing industry and its representative organisations and the introduction of a national Tie-Up scheme where vessels were paid to stay ashore for two months, resulting in reduced opportunities to sample at sea.

The 'At Sea Self Sampling Programme' designed and initiated in collaboration with the Irish Fishing Industry, was the main source of data collection at sea from the offshore fleet throughout 2021. The skippers and crews collected data and samples from a subset of the hauls and brought these data and samples ashore for Marine Institute staff to work up, while adhering to all public health guidelines. This measure has ensured that data flow is maintained and has ensured that the working relationship between the Marine Institute and the industry is preserved.

Each vessel is contacted individually following 4S methodologies for selection in advance of a possible trip and the skipper is trained remotely and supplied with a sampling pack pre sailing. Participating skippers record data on haul start & stop positions, date and time, estimate the Bulk catch, record observations on bird, mammal, reptile interaction record by kg /species what catch is wanted and take one random box of Unwanted catch for measurement ashore by Marine

Institute staff. On sailing the participating skipper maintains contact with the Fisheries Liaison Team Leader and quality assurance checks are performed during the trip via WhatsApp. The samples generated by this programme, have resulted in an increased resource requirement ashore which is however offset by the lack of commercial sea time for staff.

In 2021, 63 inshore trips were achieved. 64 demersal trips and 13 pelagic trips were also achieved.

In 2021 The Marine Institute continued the partnership project with the Irish Tuna Fishery Improvement Project FIP (<http://www.irishtunafip.ie/>) where the Irish Tuna fleet employ a crew member to self-sample data during the Albacore fishery working to the Marine Institute's standard operating procedures. The crew member was trained by the Marine Institute and delivered the data to Marine Institute for entry/analysis. This resulted in albacore tuna trips from the Irish fleet fishing in the Bay of Biscay.

The FU16 At Sea Self sampling programme for Nephrops initiated in 2020, another Covid-19 mitigation measure, was continued and expanded in 2021. A number of vessels participated in this new sampling programme with 10 trips achieved.

During 2021 the Marine Institute in conjunction with Inland Fisheries Ireland ran an At Sea Sampling - Angling Charters programme where samplers sailed with commercial charter angling skippers and recorded the catch from recreational fishing. This is part of a wider project to increase the data available for commercial fisheries from the recreational catching sector. A total of 40 trips were carried out on various charter vessel on the Irish Coast.

A welcome addition to the sampling programme in 2021 was the active participation of vessels from the beam trawl fleet. We hope that this introduction via the At Sea Self Sampling programme will lead to greater participation in the Sampler at Sea programme post Covid-19 from this and other fleets.

In 2020 a total of 26 vessels participated in the At Sea Self Sampling Programme, for 2021 this was increased to 35 active vessels, many of which were new to the programme. Assessment is on – going as to the merits of maintaining this dual stream of fisheries dependant data 1) from the self-sampling programme and 2) from the At Sea Sampling (Observer) Programme on board commercial vessels. This approach, continues to facilitate an increase in vessel participation as the At Sea Self Sampling program is not limited by the availability of accommodation on-board vessels for observers.

#### **Methods used for collecting data**

All data collection is in line with international best practice and is fully documented and available on Irelands National DC-MAP website: <http://www.dcmmap-ireland.ie/>

#### **Methods used for estimating the parameters**

Detailed comments on deviations on particular stocks are included in the AR Comments column in Table 1C, and some overarching general comments are also highlighted above under sampling intensity.

No changes in methodologies used to estimate the parameters were made.

### **3. Actions to avoid deviations**

In order to mitigate against the adverse effects of Covid – 19 on sampling achievement the Marine Institute re – focused efforts on purchasing samples, particularly ungraded samples either directly from fishing vessels or from Co – Op’s and Fish and Shellfish processors to make up for the lack of access to sampling opportunities ashore.

In response to the Covid – 19 global pandemic, the Marine Institute has collaborated with the Irish Fishing Industry and initiated, at sea self-sampling programmes to mitigate for the loss of observer trips at sea on commercial vessels as detailed above.

It is not possible to mitigate against a fishery not opening, as was the case for *Clupea harengus* in VlaN in 2021. Also this fishery was deselected from sampling in the 2021 Work Plan in Table 1A but was mistakenly included in Table 1C, so has been reported in Table 1C in the 2021 Annual Report for consistency.

Survey targets will remain for skates and rays and all individuals encountered in the surveys will be sampled.

Sex and maturity sampling from commercial sources remains problematic as it relies on vessels providing fish that have not been gutted. In some cases, additional samples were taken at sea on demersal surveys.

The Marine Institute is actively engaging with the fishing industry and an industry liaison officer has been appointed specifically to improve opportunities to obtain biological and catch data from commercial sources.

The sampling programme is strongly end-user needs driven, and for species/stocks where shortfalls were experienced, Ireland will continue efforts to address these.

Actions to avoid deviations were influenced by the Covid - 19 restrictions as they stood in 2021. Whilst under Covid restrictions, we continued to expand the At Sea Self Sampling Programme to encompass extra métiers by modifying and developing new protocols and recruiting new vessels to the programme. Ultimately, post Covid, the aim is to build on the partnerships developed with the At Sea Self Sampling Programmes in the hopes of increasing the number of fishers accommodating observers aboard their vessels when it safe to do so. It is hoped to re – instate the at sea Catch Sampling Programme in 2022 and the first off shore trip has just been completed.

The Enhanced Catch Sampler pilot scheme (Having identified the fact that sampler availability was an external factor contributing to shortfalls in previous years, a recruitment campaign was initiated in 2020 for the ‘Enhanced Catch Sampling Pilot Scheme’. Under this scheme two additional at sea samplers were to be recruited on a contract that ensured a minimum 100 days at sea each, with an additional retainer paid to the sampler to guarantee availability.) will be re-instated and made operational once Covid – 19 restrictions are lifted and a full risk assessment has been made, deeming it safe for staff and contractors to return to at sea sampling, on board commercial vessels.

Every possible action is being taken to mitigate against the loss of sampling opportunities brought about due to Covid – 19, as described above. The Marine Institute’s Fisheries Liaison will continue to act as a conduit to maintain an open channel of communications with the Irish fishing industry, as a means to increase cooperation with Marine Institute sampling programmes and to secure increased sampling opportunities, as the country transitions into what will hopefully be, a post Covid future.

## SECTION 1: BIOLOGICAL DATA

### Text Box 1D - Recreational fisheries

General comment: This box fulfills paragraph 2 point (a) (iv) of Chapter III of the Annex of the Delegated Decision (EU) 2019/910 on the multiannual Union programme; and Article 2, Article 3 and Article 4 paragraph 1 of the Implementing Decision (EU) 2016/1701 on the format of the WP. This box is applicable to the Annual Report. This box is intended to provide information on the design, implementation and analysis of all components of sampling schemes/ surveys that are listed in Table 1D.

#### National Coded Wire Tagging Programme

##### 1. Description of the target population

There are 144 salmon rivers in Ireland and advice is provided for all of these based on the attainment of scientifically derived biological reference points for all individual rivers (Conservation Limit). In addition, separate advice may be given for upstream and downstream areas of large rivers with hydroelectric dams and for two adult age cohorts separately. All recreational fisheries take place in freshwater.

The provisional rod harvest in 2021 is 19,616 fish (52.3 t). This is notably higher than 2020 is 16,748 fish (45.2t), 2019 (8,570 fish, 23.14 t), 2018 (11,495 fish, 31.04 t) and 2017 (15,159 fish, 40.93 t).

The commercial catch in in 2021 was 17.47 t (6,480 fish) which is marginally higher than for 2020 which was 16.68t (6,179 fish) which is marginally higher than for 2019 which was 15.45 t (5,725 fish).

Therefore, the total harvest by all methods in 2021 was 22,857 fish (62.09 t). Rod harvests are considerably lower than the reported catches prior to the introduction of the carcass tagging and logbook scheme in 2001 (e.g. 102 t in 2000 and 97 t in 1999) and reflect the fact that many rod fisheries are closed or restricted to catch and release only, since harvest fisheries are permitted only on rivers exceeding conservation limits. In 2021, the estimated number of salmon caught and released was 10,332 compared to 11,105 in 2020, 7,769 in 2019, 8,729 in 2018 and 12,562 in 2017. The 2021 released catch represented 45.2 % of the total rod catch and 35.2% of the total catch.

The most recent stock status and catch advice suggests that for the 2022 fishery: 48 rivers have an advised harvestable surplus as they are exceeding their conservation limits (CLs). A further 32 rivers, may be opened on a catch and release only basis, subject to management criteria based on having a high probability of achieving 50% of their conservation limit (CL) or exceeding the management qualifying fry threshold of  $\geq 15$  fry (0+) per 5-minute electrofishing (multiple site catchment average).

In addition, 64 rivers are (a) failing to meet 50% of their CL or (b) recent data to determine their CL attainment status are lacking. Where there is a lack of data, or where catchment-wide electro-fishing surveys indicate juvenile abundance below the fry threshold, scientific advice is that these rivers are failing to meet Conservation Limits.

Since 2013, this represents a moderate decline in the number of river systems open as a harvest fishery, a moderate increasing trend in fisheries open solely for catch and release angling and a moderate increasing trend in closed fisheries.

There are 16 rivers for which there are significant fisheries on the MSW (spring salmon) component of the stock and a separate assessment is made. Of these:

- 11 have an advised harvestable surplus as they are exceeding their CLs.
- 4 rivers may be opened on a catch and release-only basis subject to IFI management criteria as they have a high probability of achieving at least 50% of their CL or exceed the management catchment-wide electro-fishing lower mean fry threshold ( $\geq 15$  fry).
- In addition 1 river is advised for closure as it is failing to meet 50% of its CL and is below the management catchment-wide electro-fishing lower mean fry threshold ( $\geq 15$  fry).

There are currently 40 rivers or river tributaries of the 144 salmon rivers assessed in Special Areas of Conservation (SACs) where salmon have a qualifying interest under the EU Habitats Directive. Of these, only 22 are above their CL.

Amongst the stocks being assessed are 57 river stocks where no rod catch data has been available since 2006 and the most recent annual average rod catch (2002–2006) has been less than 10 salmon, making a direct assessment difficult. Although these are insignificant fisheries (accounting for less than 0.5% of the total national rod catch when combined), their stocks are important as spawning populations in their own right, which must be maintained as constituent elements of biodiversity, as required under the EU Habitats Directive. Because there is no recent means of direct salmon stock assessment on these rivers, an assessment of CL attainment on these rivers is not provided in the advice for 2022. However, it is advised that these rivers remain closed until additional information is made available to assess stock status relative to their CLs. In effect this means that stocks in 87 salmon rivers are assessed annually.

In addition, there are four assessments on major rivers used for hydro power which have been assessed as being below their CL i.e. Upper Liffey (Dublin), Upper Lee (Cork), Upper Shannon (Limerick) and the River Erne. Stocks in the areas above the impoundments are significantly below their CLs and following the scientific advice already provided for other rivers, there should be no harvest fisheries on wild salmon in these specific rivers.

NOTE: Recreational Eel Fisheries remain closed and bycaught eel are subject to Catch & Release

Ireland does not have a commercial fishery for Eel. *Anguilla anguilla* is protected in Ireland by legislation. In May of 2009 Eamon Ryan, Minister for Communications, Energy and Natural Resources passed two Bye laws closing the commercial and recreational eel fishery in Ireland. The byelaw which prohibited the issuing of licenses was continued. However, on expiry of Bye law C.S. 312 of 2012, a new byelaw was required to prohibit the fishing for eel or possessing or selling eel caught in a Fishery District in the State for a further period until June 2018.

- • Bye-Law No 858, 2009 prohibits the issue of eel fishing licences by the regional fisheries boards in any Fishery District.
- • Bye-law No C.S. 319, 2015 prohibits fishing for eel, or possessing or selling eel caught in a Fishery District in the State until June 2018.
- 

It should be noted that since EU Commission ratification of the Ireland/UK NWIRBD transboundary plan in March 2010, the fishery in the NI portion of the Erne was closed from April 2010.

In late 2018 the Department of Communications, Climate Change and Energy announced the creation of a Support Scheme for Former Eel Fisherpersons to address the hardship experienced by commercial eel fisherpersons.

<https://www.gov.ie/en/publication/fc2ee-inland-fisheries-bye-laws-2015/#>

<https://www.gov.ie/en/publication/bc446-inland-fisheries-bye-laws-2009/>

**RCM NA 2012 Comment:** Irelands request for an exemption to sample commercial eel catches was supported by the RCM North Atlantic in 2012 “RCM NA supports the request under the assumption that the laws are respected”.

## 2. Type of survey

The methodology and the sampling design of the National Coded Wire Tagging Programme is fully documented in Tables 1D, 1E and 5A.

## 3. Data Quality

Recreational fisheries are required to obtain a state license and report their catches as soon as they are landed in a mandatory logbook. They are also required to fix a self-locking tag on the carcass of the fish and record the unique tag number into the logbook. Other data required to be recorded in the logbook are Date of capture, River/lake, Beat, County, Species (salmon or sea trout), Weight (lbs or kgs), lure (fly, spinner, worm, prawn/shrimp), other and total days fished. The information must be returned to the fisheries authority on the 19th of October of the year for which the licence is valid. Returns of recreational logbooks are over 60% while returns for commercial logbooks is 100%. Data are centralised by the Inland Fisheries Ireland and published annually.

Specific biological sampling of the salmon fisheries (commercial and recreational) is carried out in selected rivers where artificially reared salmon are tagged and released either in scientific smolt release programmes or smolt releases to mitigate against loss of natural production by hydro-

damming, or other man made problems. A National Microtagging and Tag Recovery programme was established in 1980 by the fisheries authorities. Approximately 152,600 salmon smolts were tagged and released in 2021 for return in 2022. This included approximately 114 wild salmon sampled and tagged from the River Corrib in Galway. No wild salmon were tagged in 2020 for return in 2021 owing to reduced operational activity caused by the COVID-19 pandemic. The data from the National Coded Wire Tagging and Tag Recovery programme provides information on marine survival, exploitation rates, and survival to spawn for national and international stock assessments. Marine survival has been in a very low phase for over a decade.

Salmon stock assessment is reported on the basis of numbers rather than biomass. There are only two principal sea-age classes which are represented in the fisheries in Ireland i.e. 1 Sea Winter and multi sea Winter (MSW) which are predominantly 2 SW fish. Recent catch information from angling logbooks suggests an average MSW proportion of 15.5% for the period 2007 to 2020 with a value of 17.6% for 2021 (provisional estimate). Stock assessment is not dependent on sampling for length and age and results from these analyses are mainly for monitoring the biological characteristics of the stocks. On the reported recreational catch statistics estimated individual weights are provided by anglers in the mandatory reporting logbooks. In the sampling of salmon in the National Coded Wire Tagging and Tag Recovery Programme, approximately 3,301 adult salmon were measured and weighed.

Recreational catch data quality is assessed initially by district salmon fishing inspectors of Inland Fisheries Ireland. Subsequent data quality checking and analyses may be carried out by the TEGOS (an independent Technical Expert Group on Salmon) established by the cross-border North South Standing Scientific Committee on Inland Fish (NSSSCIF). The catch data are modified to account for non-return of logbooks, anomalous returns in logbook data and for the provision of a total estimated catch and unreported catch is included. Long term trends are examined and an assessment of stock status relative to the attainment of Conservation Limits (defined as Maximum Sustainable Yield in numbers of salmon) is carried out by the SSC. Advice on catch levels and river TACs is provided on an individual river or stock basis.

Length composition of the catch originates from voluntary data provided by recreational fishermen in the logbook and from private fishery owners who monitor the number and size of fish captured in their rivers, as well as sampling carried out by staff of Inland Fisheries Ireland and the Marine Institute. There is no specific sampling, or precision targets associated with this process but it is known that weight estimates may be estimated and the effect of this relative imprecision on spawning parameters is being investigated by the TEGOS.

Data collection at a regional level is co-ordinated by the IFI, the Electricity Supply Board (ESB) in respect of large rivers harnessed for hydro power and the Marine Institute while, data analyses, stock assessment and research are carried out by the IFI, the Marine Institute and the Loughs Agency. Cross boarder collaboration with the Loughs Agency (an inter-government agency between Ireland and the UK) occurs in the case of the river Foyle, while inter-governmental collaboration also exists between the UK and Ireland by the cross-border North South Standing Scientific Committee on Inland Fish (NSSSCIF).

#### **4. Data Analysis and processing:**

Data editing and imputation methods are fully documented and identified in Table 5A.

## SECTION 1: BIOLOGICAL DATA

### **Pilot Study 1: Relative share of catches of recreational fisheries compared to commercial fisheries**

General comment: This box fulfils paragraph 4 of Chapter II of the Annex of the Implementing Decision (EU) 2019/909 on the multiannual Union programme and Article 2 and Article 4 paragraph (3) point (a) of the Implementing Decision (EU) 2016/1701 on the format of the WP.

General comment: This box is applicable to the Annual Report. This box is intended to provide information on the results obtained from the implementation of the pilot study.

#### Pilot study on marine recreational fisheries in Ireland

In 2017 Ireland submitted a pilot study on marine recreational studies in the AWP, but delays in the process of setting up the pilot study with the regulating authority occurred. Ireland has now completed the process to authorise Inland Fisheries Ireland to commence in 2019. An updated outline of the pilot study and timelines are presented below.

##### 1. Aim of pilot study

Marine recreational fisheries in Ireland consist mainly of angling on shore, charter vessels and private boats (Hyder et al, 2017; Hynes et al, 2017) with an estimated number of 127 000 people engaged in this activity every year (Inland Fisheries Ireland, 2015). The aim of the DCF pilot study on marine recreational fisheries in Ireland is to assess the spatial/seasonal distribution and effort of marine recreational fishing; the characterisation of catches from the onshore and off shore components of marine recreational fisheries and the estimation of the share of catches from the marine recreational fishery for cod, pollack, elasmobranchs, seabass and highly migratory fishes. Eel is not a focal species in the pilot study on recreational fisheries in Ireland as it is prohibited under Irish law (bye law 319,2015) to take/fish or attempt to fish for eel in any district in Ireland.

##### 2. Duration of pilot study

The pilot study was designed in 2019 and a test scale survey was scheduled for roll out in late 2019 (Stage1) with full in situ data collection commencing in 2020 (Stage 2) selecting a calendar year of angling activity. Due to COVID19 restrictions an extension to mid 2021 is necessary.

##### 3. Methodology and expected outcomes of pilot study

###### Stage 1 (2019)

A desk study (IFI, unpublished) was carried out in 2019 to characterise the total national marine angling sector in Ireland. This identified the lack of a licensing system or a sea angling register in this country and therefore a means to determine recreational sea angling effort. To estimate angling effort across all components of the

sector, this desk study and Curtis and Grilli (2019) have identified the requirement for a national, bespoke marine angler participation survey. This will allow for scaling up CPUE species catch data so that annual catch volumes across the sector can be accurately estimated.

The desk study also identified the requirement for timely, open communication and consultation with the angling sector. To that end, a representative stakeholder Steering Group, (comprising representatives from across the sector) was formed to strategically guide the roll-out of the survey and the entire sampling programme.

To develop a sampling plan the Irish coastline was framed into discrete sampling units based spatial distribution of known angling locations, harbours and piers. The angling charter fleet was characterised. A survey format was developed (in consultation with stakeholders) in advance of the roll-out of the random stratified sampling programme of shore, charter boat anglers and private/rental boat anglers.

#### Stage 2 (2020-2021)

To obtain robust estimates of fishing effort throughout the recreational sea angling sector, and in the absence of suitable data, a national sea angling participation survey will be undertaken. This will run in parallel with a random-stratified survey of marine recreational fisheries in Ireland with representative sampling of anglers in the fleet (charter and private) and the shore angling population. Further characterisation of the sector will be undertaken through an on-line sea angler behaviour and attitudes (B&A) survey. An on-line voluntary angler diary will be developed with an anticipated trial roll out in 2021.

Expected outcomes: the participation survey will identify how many people fish in the sea, how they fish and when they fish. From the random-stratified survey species-specific catch, size and catch & release data will be collected from these groups and extrapolated up to ICES divisions (statistical rectangles), corresponding to the scale of stock assessments. Using these datasets for the prescribed species, indicative estimates of the marine angling proportion of total national landings for the required species will be derived for the current reporting period. The on-line (B&A) and on-site surveys of anglers will provide an opportunity to develop a panel who could be requested to act as angling diarists who would share information on their angling activity/catches on an ongoing basis into the future.

Due to travel restrictions imposed in March 2020 due to the Covid19 pandemic all angler surveys had to be postponed until July 2020. Consequently pilot study data collection will have to continue until July 2021 in order to account for temporal variation of angler catch data over a calendar year.

#### References:

Curtis, J. and Grilli, G. (2019). Recreational angling monthly activity survey. ESRI Survey and statistical report series number 76.

Hyder, K, Radford, Z, Prellezo, R, Weltersbach, MS, Lewin, WC, Zarauz, L, Ferter, K, Ruiz, J, Townhill, B, Mugerza, E, & Strehlow, HV, 2017, Research for PECH Committee – Marine recreational and semi-subsistence fishing - its value and its impact on fish stocks, European Parliament, Policy Department for Structural and Cohesion Policies, Brussels;

Hynes, Stephen, Gaeven, Rainey and Paul, O'Reilly, (2017), Estimating a Total Demand Function for Sea Angling Pursuits, Ecological Economics, 134, issue C, p. 73-81;

Inland Fisheries Ireland, 2015. The Economic Contribution of Bass and Sea Angling in Ireland. IFI publication, Dublin.

## **Irish Marine Recreational Angling Programme**

Having commenced in February 2020, surveys of anglers had to be postponed between March and July 2020 due to the Covid19 pandemic. Data collection was extended until September 2021 to account for temporal variation of angler catch data over a full calendar year.

A national sea angling participation/effort survey was completed by Q2 2021. Five sampling waves (5000 respondents) were undertaken through an IPSOS MRBI telephone omnibus survey. Participation/effort data were also collected in Q3 through the Central Statistics Office (CSO) General Household Survey. Results were based on responses from 4,641 households. IPSOS MRBI and CSO survey data were combined to estimate angling participation rates.

Data collection for the roving creel survey of shore anglers concluded in August 2021. Surveyors conducted 163 shore surveys and 271 shore angler interviews were completed. Sampling for the bus route access point survey of private boat anglers concluded in August 2021. A total of 44 PSUs were sampled and 57 anglers were interviewed. A limited sample of charter skippers completed an angling catch diary for the 2021 season. Onboard charter catch surveys, were undertaken in summer 2021 (between 2nd June and 26th September). A stratified random sampling frame was developed with charter skippers who agreed to participate in the programme (n=22) to collect all relevant catch data.

A self-reporting online angler catch diary was developed by the survey team and launched on a pilot basis in Aug 21. As of December 2021, 70 diarists had completed the sign-up process and 295 individual sessions logged. Further diarist recruitment efforts are ongoing along with managing diarist retention.

Atlantic Bluefin Tuna (ABFT) catch data was available from the Tuna CHART programme. In 2018, ICCAT permitted countries including Ireland to authorise a limited number of sport vessels to target Bluefin tuna for the purposes of data collection through 'catch, tag and release' without the need to allocate a specific quota.

### **4. Achievement of the original expected outcomes of pilot study and justification if this was not the case.**

#### Angling effort

It is estimated that 7.1% of the Irish population go sea angling at least occasionally (266,000, *RSE* 0.11). Of those, 5.4% partook in shore angling (202,000, *RSE* 0.13) and 3.9% partook in small boat angling (146,000, *RSE* 0.15). Shore anglers went on an average of 8 (*RSE* 0.18) trips per year and small boat anglers went on average 7 (*RSE* 0.28) trips per year.

To estimate annual effort across the charter angling sector, detailed and reliable effort data (1992-2008) from a charter skipper voluntary diary scheme, managed by IFI, was reviewed and collated. These data estimated that charter vessels take 62 on average angling trips per year and have 6.6 anglers onboard.

#### Angling catches

CPUE estimates for all species caught during the on-site shore surveys were calculated across all strata. Pollack release rate estimates were 34%. All other species showed high release rates

exceeding 85%. Retention of elasmobranch species was negligible. No catches of cod were recorded during the on-site shore surveys. The estimate of retained Pollack through shore angling was 167 ( $\pm 75$ s.e) tonnes. The estimate of retained bass through shore angling was 10 ( $\pm 5$ s.e) tonnes.

CPUE estimates for all species caught during the small boat surveys were calculated across all strata. As resources were not available to undertake extensive national sampling, the introduction of 'convenience sampling' for small boat surveys in 2021 allowed for samplers to focus efforts on high activity small boat launching sites. This change resulted in an increase in anglers interviewed, however the magnitude of bias in estimates is currently unknown. Small boat pollack release rates were slightly lower than shore release rates at 28%. Cod catches represented 6% of overall small boat captures with a 50:50 retained/released ratio. All Lesser spotted dogfish catches, the only elasmobranch recorded, were released. European seabass accounted for 3% of all small boat catch records (with 75% being released). Small boat CPUE estimates are based on limited data set ( $n = 57$ ), so catch estimates are imprecise and likely biased. CPUE estimates currently provide a qualitative overview of small boat angler catch.

Currently catch estimates for the charter sector rely on data collected through the onboard charter catch survey. All elasmobranch catches were released. Release rates for most other species were generally high. Lowest release rates were observed for species popular for consumption such as cod (24%) and pollack (39%). No European Sea Bass captures were recorded. Retained annual catch for Pollack and Cod were estimated to be 54.9 ( $\pm 4.9$  s.e) and 2.8 ( $\pm 2.8$  s.e) tonnes respectively for the Irish charter fleet.

Under the Tuna CHART programme (a collaborative scientific programme between Inland Fisheries Ireland and the Marine Institute in partnership with the Sea Fisheries Protection Authority, the Department of Agriculture, Food and the Marine (DAFM) and the Department of Communications, Climate Action and Environment (DCCAE). As stipulated by ICCAT, training and reporting are requirements of the programme. Any mortalities must be reported to ICCAT), 251 ABFT were caught on rod and line, measured (in the water) and released in 2021. All measured Atlantic bluefin tuna were released alive. The total estimated tonnage of ABFT based on measured fish was 38.21 tonnes.

#### **5. Incorporation of results from pilot study into regular sampling by the Member State.**

The output of the national sea angling participation survey will be used in all future estimations for recreational catch volumes until such time as another robust participation survey is commissioned. The pilot survey report can be found at: [https://www.dcmapireland.ie/sites/default/files/DCF\\_Files/docs/MRF\\_Ireland\\_Pilot%20study\\_MI\\_FINAL\\_DEC%2021.pdf](https://www.dcmapireland.ie/sites/default/files/DCF_Files/docs/MRF_Ireland_Pilot%20study_MI_FINAL_DEC%2021.pdf)

The onsite surveys of shore and small boat anglers have been reviewed and modifications to the survey designs have been made because of learnings from the pilot study. Refined spatio-temporal sampling frames have been designed with the aim of increasing sampling effort per stratum without the requirement to increase overall sampling effort. Activity strata have been refined by updating sampling unit activity scores based on field activity observed at each site visited. This will increase the likelihood of surveyors encountering anglers for both angling types.

The temporal range of the onboard charter sampling programme will be increased to include sampling days outside the active summer months.

Both diary programmes are ongoing and have been incorporated into the regular sampling plan.

## SECTION 1: BIOLOGICAL DATA

### **Text Box 1E: Anadromous and catadromous species data collection in fresh water**

General comment: This box fulfills paragraph 2 points (b) and (c) of Chapter III of the Annex of the Delegated Decision (EU) 2019/910 on the multiannual Union programme; and Article 2 of the Implementing Decision (EU) 2016/1701 on the format of the WP.

General comment: This box is applicable to the Annual Report.

Method selected for collecting data

#### **National Coded Wire Tagging Scheme**

Tags seaward migrating salmon smolts, detected upon river return as adults. Data include release and recovery locations, dates and sea age.

**Use:** Estimating survival/exploitation rates and also straying of wild/hatchery salmon.

#### **Counters and traps**

Counters record returning salmon numbers and dates. Traps monitor fish moving upstream and downstream, enabling full census on wild salmon, released reared salmon and downstream migrating silver eels. Fixed elver ladder traps monitor upstream recruiting juvenile eel.

**Use:** Estimating annual returns of adult salmon and recruitment of salmon smolt, silver eel production, annual relative abundance of recruiting juvenile eel and dates. Numbers of fish upstream/downstream, daily number, size, weight and sex ratio of salmon and emigrating silver eels.

#### **Silver Eel mark recapture Escapement**

Programme to estimate silver eel production/escapement and to monitor downstream trap and transport of migrating silver eel using mark-recapture, DIDSON, hydrological profiles and

assessment models. Additional sampling (length, silvering characteristics) undertaken at the point of capture.

Use: determines eel escapement.

#### **Electrofishing and fyke net surveys**

Electrofishing (salmon, eel) and fyke net (eel) surveys target juvenile salmon and yellow eel in selected water bodies, all fish identified; weight and length measurements taken.

**Use:** Estimating juvenile salmon (river) and yellow eel (river, lake and transitional water) populations.

Above described programmes contribute to the national salmon and eel monitoring programmes (Eel: Council Regulation 1100/2007), which operate across different Irish agencies and parent departments. National coordination discussions are underway, to ensure contribution of all relevant salmon and eels sampling activities to the national data collection required under EUMAP.

## 2. Were the planned number achieved? Yes/ No

In the majority of cases, Yes. Brief reasons were given in Table 1E for targets not being met and are explained further below.

#### **Transport capture sites Coghills and Vwing Fykes for Silver Eel**

Trap and Transport surveys were planned for three locations on the Erne, Shannon and Lee rivers in 2021. For the conservation fishery in both the Shannon and Lee rivers, targets were achieved 100%. Whereas 83% of targets for the river Erne were achieved, due to access issues with one of the sampling sites. However, the trap and transport target was met as per National Eel Management Plan at the 5 accessible sites.

The Eel Management Plan target for silver eel trap and transport was achieved in all three rivers in 2021. Close liaison is maintained between partner agencies to ensure all sampling is completed as planned and reflects the activity in each of these major rivers.

#### **Electrofishing on the Burrishoole river for Yellow Eel**

There was a short fall in the achieved number of electrofishing surveys completed in the Burrishoole in 2021. This was due to COVID-19 restrictions. Only sites with easy access that could be surveyed by small socially distanced crews were fished. It was not possible to include remote sites that require off-road vehicles and vehicle sharing.

#### **Electrofishing on the Burrishoole river for Juvenile Salmon**

There was a short fall in the achieved number of electrofishing surveys completed in the Burrishoole in 2021. This was due to COVID-19 restrictions. Only sites with easy access that could be surveyed by small socially distanced crews were fished. It was not possible to include remote sites that require off-road vehicles and vehicle sharing.

#### **Fyke net surveys on Burrishoole**

All core survey sites were fished in 2021. Some additional sites were also fished in the transitional waters. Sampling target was achieved at 135%.  
(max 500 words per Area)

## SECTION 1: BIOLOGICAL DATA

### **Text box 1F: Incidental by-catch of birds, mammals, reptiles and fish**

General Comment: This box fulfils paragraph 3 point (a) of Chapter III of the Annex of the Delegated Decision (EU) 2019/910, on the multiannual Union programme; and Article 2 of the Implementing Decision (EU) 2016/1701 on the format of the WP. This box is applicable to the Annual Report. This box is applicable only for those sections where Member States have reported that they have been carrying out regular sampling. Results and deviations for Pilot studies should be reported under Pilot Study 2.

#### **1. Results**

Occurrences of incidental bycatch for birds and cetaceans are generally very low. Two incidents of seabird, one seal, and no cetacean bycatch were recorded in 2021.

#### **2. Deviations from Work Plan**

Covid-19 restrictions and public health measures meant that observers could not be placed on many vessels in 2021 as social distancing could not be maintained. The Observer programme was suspended in mid - March 2020 and remained suspended throughout 2021 for the off shore fleet. Trips were achieved on inshore vessels, where there was no need for overnight accommodation and where work could be completed on an open deck. However, the first >18hr observer trip has just taken place and will be used as a springboard to refine protocols and to re – launch the observer programme in 2022. An ‘At Sea Self-Sampling Program’ was put in place to enable the gathering of demersal and pelagic fisheries data. For further details on the Observer Programme and Self – Sampling Programme in 2021, please refer to Text Box 1C. Each vessel is contacted individually following 4S methodologies for selection in advance of a possible trip and the skipper is trained and supplied with a sampling pack pre sailing. Participating skippers record data on haul start & stop positions, date and time, estimate the bulk catch, record observations of incidental by catch of birds, mammals, and reptiles, and record by kg /species what catch is wanted and take one random box of Unwanted catch for measurement ashore by Marine Institute staff. On sailing the participating skipper maintains contact with the Fisheries Liaison Team Leader and quality assurance checks are performed during the trip via WhatsApp.

#### **3. Data quality**

Protocols for observation of incidental bycatch are currently in place for the off shore observer programme. Collection protocols follow the design recommended by WGBYC.

- Does the on board observer protocol contain a check for rare specimens in the catch at opening of the codend?

Normal Yes- Yes, this is highlighted in the Irish protocols.

Self-sampling – No, but skippers are advised to report sightings of birds/mammals/reptiles on the sorting of the catch.

- In gill nets - and hook-and-line fisheries: does the on board observer protocol instruct the observer to indicate how much of the hauling process has been observed for (large) incidental bycatches which never came on board (because they fall out of the net)?

No, this is currently not recorded.

- In large catches: does the protocol instruct to check for rare specimens during sorting of the catch (i.e. at conveyor belt)?

Normal - Yes, during catch sampling at sea, the catch is observed as it is being sorted.

Self-Sampling – No, but skippers are advised to report sightings of birds/mammals/reptiles on the sorting of the catch.

- Is the observer instructed to indicate what percentage of the sorting or hauling process has been checked at “haul level”?

This is not currently recorded.

-Does the on board observer protocol instruct to report on the use of mitigation (i.e. Escape Devices or Acoustic Deterrent Devices)?

Normal - Yes, observers record the use of mitigation devices as part of the logging of gear and the modification is logged using a specific gear code.

Self-sampling- Yes, as above.

-Does the sampling design and protocol follow the recommendations from relevant expert groups?

Normal - Yes, the Irish protocol follows the advice and recommendations of WGBYC.

Self-sampling – Yes, takes account of advice and recommendations as above.

- Are data quality issues taken into account?

Yes

- How are data (and samples) stored?

Data is uploaded to the Catch Sampling Database. If possible, biopsy samples are taken and frozen for further chemical analysis. Data are further reported to the ICES bycatch database each year.

## SECTION 1: BIOLOGICAL DATA

### **Pilot Study 2: Level of fishing and impact of fisheries on biological resources and marine ecosystem**

General comment: This Box fulfills paragraph 3 point (c) of Chapter III of the Annex of the Delegated Decision (EU) 2019/910 on the multiannual Union programme; and Article 2 and Article 4 paragraph (3) point (b) of the Implementing Decision (EU) 2016/1701 on the format of the WP.

General comment: This box is applicable to the Annual Report. This box is intended to provide information on the results obtained from the implementation of the pilot study.

### **1. Aim of pilot studies**

In Ireland, pilot studies to investigate the level of fishing and impact of fisheries on biological resources and marine ecosystem are conducted under the EMFF marine biodiversity scheme. The thematic objective of the scheme is to preserve and protect the environment and to promote resource efficiency. The two specific objectives are 1.) Reduction of the impact of fisheries and aquaculture on the marine environment, including the avoidance and reduction, as far as possible, of unwanted catch and 2.) Protection and restoration of aquatic biodiversity and ecosystems. Specific projects are submitted annually and measures implemented under the scheme are undertaken for the protection and preservation of marine biodiversity, for the benefit of the industry as a whole, and to contribute to fulfilment of Ireland's obligations under EU Natura Directives.

### **2. Duration of pilot study**

Pilot studies last between 24 and 36 months or are multiannual programmes from 2018 onwards.

### **3. Methodology and expected outcomes of pilot study**

Eighteen projects have been submitted and approved since - 2018 and below are descriptions of the projects that are directly relevant to the DCF requirements to inform on the level of fishing and impact of fisheries on biological resources and marine ecosystem and to inform on future data collection programmes.

#### **3.1. Mapping fishing pressures on habitats (2 projects)**

##### **3.1.1. Methodology to map fishing pressure of <12m vessels Phase 2**

Data acquisition will be automated for vessels under 12 m in length, building on the iVMS project operating mainly in the Irish Sea by expanding iVMS to other fleets and adding functionality to enable capture of fishing effort and catch data. Expected outcome will be the acquisition of data to allow mapping of fishing pressures in relation to Natura 2000 sites and for MSFD descriptors, improved fisheries advice, improved data on landings, effort and economic value of the sector as required for ICES; STECF data calls and DCF requirements.

##### **3.1.2. Assessment of fisheries/habitat interactions on Irish offshore reef habitats Phase 2**

Assessment of fisheries/habitat interactions will be carried out on offshore reefs. Ireland will have completed three ROV (remote operated vehicle) surveys of offshore reefs with a view to mapping of status and pressures from fishing on offshore reef habitat. The survey results will be consolidated and synthesised in 2020 and 2021 to prepare data dissemination for endusers and scientific advice support for policy makers. Expected outcome is improved spatial data of offshore reefs and their status in relation to spatial distribution of bottom impacting fishing pressure.

#### **3.2. Ecosystem fisheries interaction (2 projects)**

##### **3.2.1. Species catch composition in fisheries posing a risk to biodiversity (Phase 2)**

In Ireland, the data collection scheme under EMFF UP 3 monitors the bycatch of endangered and protected species as part of the at sea observer scheme. The sampling effort of this observer scheme is, however, stratified according to commercial fisheries and might not provide adequate resolution for statistically meaningful bycatch data. As part of this pilot study, additional sampling effort will be allocated to fisheries that pose a potential risk to biodiversity through bycatch of PET species. Monitoring of retained

and non-retained by-catch including endangered and protected species will be carried out via an at sea observer programme targeting fisheries that have been identified by endusers as a potential risk to the conservation objectives under NATURA, and GES GES for MSFD. These include tangle netting, gill netting, trammel netting and pelagic trawling (horse mackerel). Additional information is obtained by determining the cause of mortality of stranded marine mammals. Under Ireland's ongoing Cetacean Strandings Scheme a proportion of the annual stranding of four cetacean species are selected to carry out post mortem examinations. Expected outcomes are actual recorded bycatch figures by species per unit of fishing effort; total bycatch estimates by métier for selected métiers, season/month, area fished, vessel size; risk profiling of the observed fisheries; identification of problem areas and/or fishing practices where possible; identification of sources of variability & data gaps; recommendations for ongoing monitoring.

### 3.2.2. Establishing Maximum Sustainable Yield (MSY) proxies for data-limited stocks for key stone species and species sensitive to the impacts of fishing (Phase 2):

Many stocks of Irish importance are data-limited or not assessed at all. In phase 1 of the MYDAS project, a framework was developed to establish and test a range of assessment models and methods to establish MSY (or proxy MSY) across the spectrum of data-limited stocks. Phase 2 aims to implement the approaches and build capacity internally and internationally using a number of case studies including as identified in WW MAP (Pollack, black angler fish, 4 spot megrim); WW MAP non target stocks (rays; ling); non TAC species of ecological significance (sprat, witch lemon sole, MSE not related to catch (eg V notching); time series for stock status (lobster); and development of growth parameters using mark recapture for crustaceans.

For more detail in relation to the Irish EMFF marine biodiversity scheme please see:

<https://emff.marine.ie/>

<https://www.agriculture.gov.ie/emffoperationalprogramme/>

<https://www.agriculture.gov.ie/media/migration/seafood/marineagenciesandprogrammes/emff/EMFFOPSummary251116.pdf>

*(max 900 words)*

Brief description of the results obtained (including deviations from planned and justifications as to why if this was not the case).

#### 3.1.1 Methodology to map fishing pressure of <12m vessels Phase 2

#### **4. Achievement of the original expected outcomes of pilot study and justification if this was not the case**

Commercial fishing vessels under 12m (Small Scale Coastal Fisheries; SSCF) in overall length in Europe do not generally report position when fishing at sea; there are no Vessel Monitoring Systems (VMS) installed in these vessels. Vessels between 10-12m report catches in EU logbooks. Vessels under 10m in length are not required to report catches. The SSCF fleet constitutes the majority, by number, of the fishing fleet in most European countries including Ireland. In Ireland SSCF is polyvalent but specialises on shellfish fisheries using pots (FPO), set nets (GNS), dredges (DRB) and mechanised dredges (HMD). Data on fishing location is needed for a number of reasons including mapping of fishing pressures, assessing overlap and interaction with other marine sectors, interaction with habitats and species in Natura 2000 sites or other protected areas and for food traceability and safety requirements in the case of bivalve molluscs.

In order to increase the provision of data from SSCF Ireland introduced a pilot project on iVMS systems for SSCF in 2014. The objectives are

1. To trial the functioning of a number of different iVMS systems on vessels using dredgers, pots and set nets
2. To assess the costs, depreciation and reliability of systems on SSCF vessels.

### 3. Derive relevant data products from the data including modelling of data to derive fishing effort estimates

Add value and functionality to electronic reporting by coupling VMS with gear sensors or with electronic catch reporting

#### Data acquired

#### Data structure and volume

VMS systems were installed on 163 vessels and a total of over 18.5 million pings were acquired over a 6-year period.

Approximately 6.3 million pings were associated with steaming to fishing grounds or actually fishing. SSCF vessels spend a lot of time in harbour and this accounts for the majority of the data.

#### Information in the data included

- Vessel ID
- VMS device ID
- Date and time stamp when data was generated
- Date and time stamp when data was received in database
- Longitude
- Latitude
- Speed (derived from change in Lat Long over time)
- Course
- Various reporting of VMS device battery status and power source

#### Reporting frequency

Various methods were trialled to reduce data transmission frequency, from the standard 10 min, when vessels were not fishing.

These included

- Reducing the frequency of logging position when vessels were not in a fishing area as defined by a geofence (boundary). In some bivalve fisheries this is possible as fishing grounds are very discrete
- When vessels were in or close to port a buffer zone around each port (geofence) was used to define an area for reduced reporting
- When speed or motion of the vessel was zero for more than a given period of time the reporting frequency was reduced.

All of the above scenarios could be set remotely.

#### Data products and data use

##### Fishing footprint

High frequency VMS data for the razor clam fishery collected in 2021 (and previous years) clearly shows its spatial distribution and extent. Before the installation of VMS this information was available only in a general sense as a polygon outlining the approximate area based on information on the maximum depth of fishing of the fleet and information from vessel operators. The VMS data shows the distributional extent precisely, the distribution of effort within the fishing area and the annual variation in the distribution of effort. The 10minute frequency of reporting for this fleet allows fishing effort to be plotted on a 100m<sup>2</sup> grid given the vessel speed is only 0.3knots during fishing operations.

VMShrs reported by fleets targeting Razor clams was correlated with landings. The relationship varied annually probably reflecting variation in stock abundance.

##### Relationship with Natura 2000 sites

The high temporal and spatial resolution of the VMS data enables the spatial relationship between the razor clam fishery and Natura 2000 sites to be mapped with a high degree of certainty. The estimation of fishing footprints or overlaps with specific habitats within Natura 2000 sites is required for assessments of the impact of fisheries on designated features of the sites required by Article 6 of the Habitats Directive. Prior to the availability of precise spatial data, provided by VMS fishing, this fleet was allowed to fish only with specific co-ordinates as the extent of overlap with Natura sites was unknown. The data, therefore, negates the need for precautionary spatial buffers and gives direct evidence of the spatial overlap with Natura. In 2021

a fishery exclusion area was proposed and developed using the iVMS data and separate information from the NISR razor clam survey data. Habitats within the area will be monitored for changes resulting from the exclusion of dredge fishing.

#### Identification of fishing events

Identification of individual fishing events in pot fisheries, using Hidden Markov Modelling methods, was successful particularly at VMS reporting frequency of 1-3min and with less certainty at reporting frequency of 10 minutes. Two or 3 state models could identify vessel behaviour as steaming, fishing and relocating or transiting between lines of static gear. Simpler 2 state models were sufficient to identify the extent and duration of fishing events in pot fisheries (Error! Reference source not found.). Using additional information on the spacing between pots in lines of deployed pots an application (“Pings to Pots”) was developed in ‘R Shiny’ to estimate total fishing effort, expressed as number of pots hauled or kilometres of fishing gear hauled over a given time, area and fleet. This type of analysis can probably replace the need for gear sensors in some fisheries. Case studies on estimation of effort from high frequency iVMS were developed in WKSSFGE0 in 2021.

### **5. Incorporation of results from pilot study into regular sampling by the MS**

The project began in 2014 and continues into 2022. The European Parliament voted on March 11<sup>th</sup> 2021 that all EU fishing vessels – including over 49,000 small-scale vessels – will be required to have a location tracker and to report their catches. The current proposal allows 4 years for entry into force of the rules to equip vessels with the new technology.

#### 3.1.2. Assessment of fisheries/habitat interactions on Irish offshore reef habitats Phase 2

### **4. Achievement of the original expected outcomes of pilot study and justification if this was not the case**

The original expected outcomes are listed below with current status in brackets:

- Assessment of Irish National Seabed Survey and compiled reef habitat data in Irish Offshore Waters to identify high likelihood of reef distribution (Completed).
- VMS overlay of vessels using bottom impacting gears (Completed).
- Proposed survey design based on fisheries (VMS) habitat interaction of Irish reef habitats >200m (Completed).
- Survey reports of three 3 week ROV habitat mapping surveys completed and available at:  
2017 – <https://oar.marine.ie/handle/10793/1339>  
2018 - <https://oar.marine.ie/handle/10793/1434>  
2019 - <https://oar.marine.ie/handle/10793/1496>
- Sensitive Ecosystem Assessment and ROV Exploration of Reef (SeaRover), Synthesis Report 2021: [Sensitive Ecosystem Assessment and ROV Exploration of Reef \(SeaRover\), Synthesis Report \(marine.ie\)](#)
- Qualitative & Quantitative reports to catalogue and report on species and habitat distribution have now been provided for each survey by Plymouth University.
- Data dissemination (SeaRover data has been submitted as part of ICES VME data call 2019, 2020 & 2021 and for WGEF data call in 2019)
- Outreach material relating to the above ongoing - survey results presented at several outreach events, online videos uploaded and relevant reports hosted on EMFF website: [SeaRover \(Phase 1\) Assessment of Fisheries/Habitat Interaction on Offshore Reefs | Marine Institute EMFF 2014 - 2020](#)

### **5. Incorporation of results from pilot study into regular sampling by the MS**

Incorporation of results from pilot study into regular sampling by Ireland informed the development of Ireland's new National Work Plan 2022 – 2027.

### 3.2.1. Species catch composition in fisheries posing a risk to biodiversity (Phase 2)

#### 4. Achievement of the original expected outcomes of pilot study and justification if this was not the case

To monitor the bycatch interaction of endangered and protected species in Irish fisheries an enhanced bycatch programme was launched to supplement the standard at sea catch-sampling programme that is conducted as part of the Data Collection Scheme. The enhanced bycatch project focuses on fisheries that have been identified as potentially posing an increased risk to biodiversity and the conservation objectives of protected species under NATURA. As part of this project, a Necropsy pilot study was conducted on stranded cetaceans to evaluate mortality through fisheries' bycatch.

The project is ongoing and the completion of tasks is in progress. The original expected outcomes are listed below with current status in brackets:

Increased observer efforts on fishing metiers with higher risk of bycatch was achieved with a focus on pelagic trawl fisheries. Sampling in higher risk metiers has increased annually for a number of years. For the offshore catch sampling at sea programme, there were 24 additional trips in 2017 and 32 trips in 2018 on the gillnet and pelagic fleets (Sprat and Horse Mackerel), increasing the overall catch sampling at sea effort by 22% and 41% respectively. There was an increase of 50% in 2019 on the pelagic fleets (Horse Mackerel); there was no increase in the set net fishery in 2019. Due to Covid-19 sampling restrictions observer sampling in the fleet was curtailed in march 2020 and all of 2021, with only fisher-self-sampling for discards after this time for 2020, and as a result there are no reports of cetacean or seabird bycatch for 2020. Occurrences of incidental bycatch for birds and cetaceans are generally very low. Two incidents of seabird, one seal, and no cetacean bycatch were recorded in 2021.

- A. . Bycatch data is stored in the in-house discard database, which was adapted to contain PET bycatch data. Data will be submitted to ICES as part of the WGBYC data call (Working Group on Bycatch of Protected Species). Results were also presented in the DCF annual report.
- B. An enhanced inshore PET by-catch monitoring programme in the tangle net fishery was completed. The work included observer coverage on 5 vessels for approximately 50 days in 2017 and two vessels submitting self-sampled data on by-catch for all fishing events in 2018, 2019 and 2020. The data has been used by researchers to model the relationship between by-catch of grey seal and fishing position relative to distance to seal haul out sites in SACs and also to get the first raised estimates of total seal by-catch in Irish waters. Catch composition data for the tangle net fleet has been collected over a 3-year period and fine spatial scale. The target species in this fishery is spiny lobster (*Palinurus elephas*). Mark recapture programmes were completed in 2017-2018 and connectivity between Irish coastal and French coastal spiny lobster stocks has been shown from recapture data.

To determine whether the cause of death could be attributed to bycatch, validated post mortems were carried out on small cetaceans stranded along the south, west and northern coast of Ireland. Between July 2017 and December 2019, 118 stranded cetaceans were recovered of the three species striped dolphins, harbour porpoises and common dolphins. The carcasses were examined at the Department of Agriculture Food and the Marine, veterinary laboratory, and the cause of death verified by the Institute of Zoology in London. To facilitate the future investigation of a variety of parameters where marine vertebrate ecology is concerned, a wide range of samples of animal tissue, bone and other biological material (e.g., parasites, stomach contents, prey remains, biopsies) have been taken of the stranded animals and stored with their associated data for future dissemination.

The final reports for the Necropsy Pilot Study will be published soon and will be available on Ireland's EMF site: [DCMAP Ireland | \(dcmmap-ireland.ie\)](https://dcmmap-ireland.ie) and will also be found at: [Marine Institute Open Access Repository](https://marineinstitute.ie)

To date, four sample requests have been facilitated and tissue samples are being used as part of ongoing contaminant, diet, aging, and stress studies.

#### 5. Incorporation of results from pilot study into regular sampling by the MS

Due to ongoing issues related to Covid-19 restrictions, there has been a delay in the completion of necropsy reports and the final report for the project. The final report is due in July 2021 and its recommendations will influence core bycatch sampling programmes.

3.2.2 Establishing Maximum Sustainable Yield (MSY) proxies for data-limited stocks for key stone species and species sensitive to the impacts of fishing (Phase 2)

#### **4. Achievement of the original expected outcomes of pilot study and justification if this was not the case**

In order to expand the application of the framework developed in the first phase of the MYDAS (MsY Proxies for Data limited Stocks) project to a wide range of stocks, a second phase of the MYDAS project was initiated in 2020. Phase 2 aimed to implement the approaches and build capacity internally and internationally using a number of case studies including as identified in WW MAP (Pollack, black angler fish, 4 spot megrim); WW MAP non target stocks (rays; ling); non TAC species of ecological significance (sprat, witch lemon sole, MSE not related to catch (e.g. V notching); time series for stock status (lobster); and development of growth parameters using mark recapture for crustaceans. This phase provided hands-on support in the development of a number of case studies by Marine Institute experts. These case studies served to build capacity within the Marine Institute, but also to prove the value of the MYDAS framework internationally. The project members actively engaged with the relevant ICES expert groups in order to facilitate wider use of the MYDAS framework.

The project has provided support to MI staff and the ICES community in the development of stock assessment models for plaice, megrim (both used now to provide ICES catch advice) and brown crab (used to advise DAFM). Management strategy evaluations were developed for sprat, plaice and pollack in close cooperation with MI and ICES experts. A scientific paper has been prepared for publication, outlining a method to identify the main parameters that influence the Maximum Sustainable Yield of a stock.

Recruitment for the second phase of the project was delayed due to Covid 19 and the project started in early 2021 and was completed at the end of 2021. A large number of potential cases studies were initially identified and not all of these were addressed but the plaice case study was designed as a template that can be applied to any stock. Indeed, the Pollock and sprat case studies were based on this template.

#### **5. Incorporation of results from pilot study into regular sampling by the MS**

The project has resulted in new collaborations between teams within Fisheries Ecosystems Advisory Services in the Marine Institute and with external experts; a legacy of this project is the continued collaboration through the forum that was set up for the project.

The project report (in draft) contains R vignettes that allows any user to replicate setting up the operating models, running assessments and management strategy evaluations and identifying parameters that are influential to a stock's maximum sustainable yield. These tools are essential for prioritising data collection for different parameters (e.g. growth, natural mortality, gear selectivity etc.).

## SECTION 1: BIOLOGICAL DATA

### **Text Box 1G: List of research surveys at sea**

General comment: This box fulfills Chapter I of the Annex of the Implementing Decision (EU) 2019/909, on the list of mandatory surveys and thresholds, of the multiannual Union programme; and Article 2 and Article 7 paragraph (3) of the Decision (EU) 2016/1701 on the format of the WP. It is intended to specify which research surveys at sea set out in the multiannual Union programme will be carried out. Member States shall specify whether the research survey is included in Chapter I of the Annex of the implementing decision of the multiannual Union programme or whether it is an additional survey.

General comment: This box is applicable to the Annual Report. This box should provide complementary information on the performance of the surveys, the results and their main use.

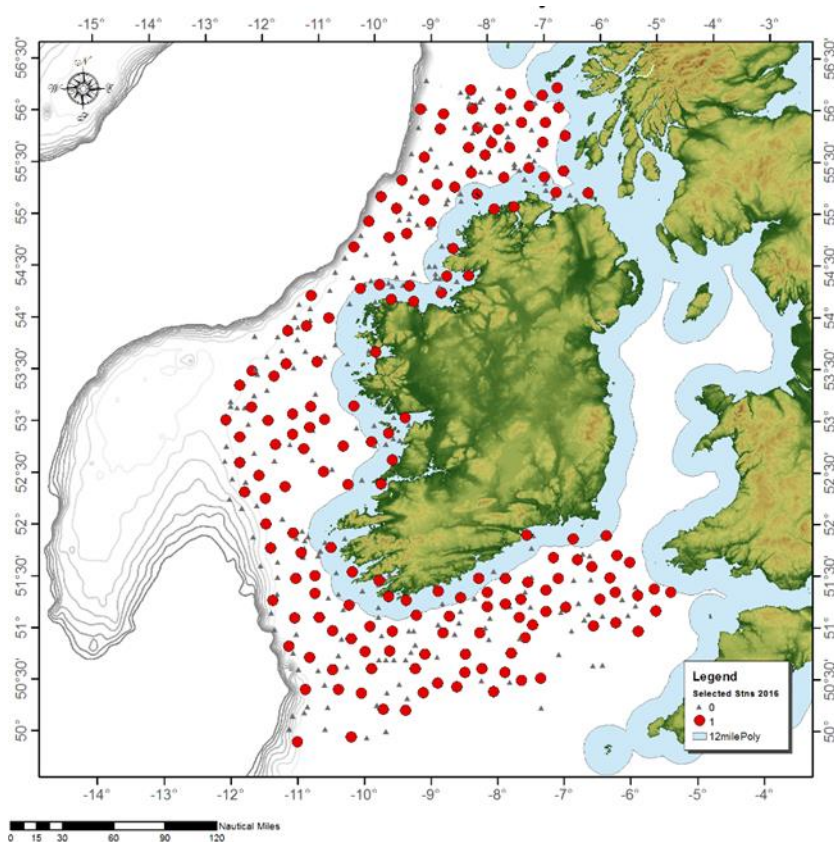
## Western IBTS 4th quarter (including Porcupine survey) (IBTS Q4)

### 1. Objectives of the survey:

The main objectives of the Irish Groundfish Survey (IGFS) are to provide a relative index of abundance for commercially exploited demersal fish stocks around Ireland. In particular recruitment indices for tuning ICES stock assessment models. The survey also collects data on non-commercial fish, elasmobranch, cephalopod and invertebrate species; oceanographic data; litter data; and additional international research sample requests where possible.

### 2. Description of the methods used in the survey.

Methodology is per general IBTS protocols ([IBTS Manual](#)) using the GOV 36/47 otter trawl. More specific details for the Western Area surveys can be found in the [Western Area IBTS Manual](#). The survey is essentially a depth stratified semi-random trawl survey of 30min duration per haul.



**Figure 1.** IGFS stations

### 3. For internationally coordinated surveys, describe the participating Member States/ vessels and the relevant international group in charge of planning the survey

The IGFS is co-ordinated under the ICES International Bottom Trawl Survey Working Group (<http://www.ices.dk/community/groups/Pages/IBTSWG.aspx>). Co-ordination occurs with Norway, Sweden, Denmark, Holland and Germany in N. Sea; to Scotland, Ireland, Northern. Ireland, England, France, Spain and Portugal in the North East Atlantic

### 4. Where applicable, describe the international task-sharing (physical and/or financial) and the cost-sharing agreement used

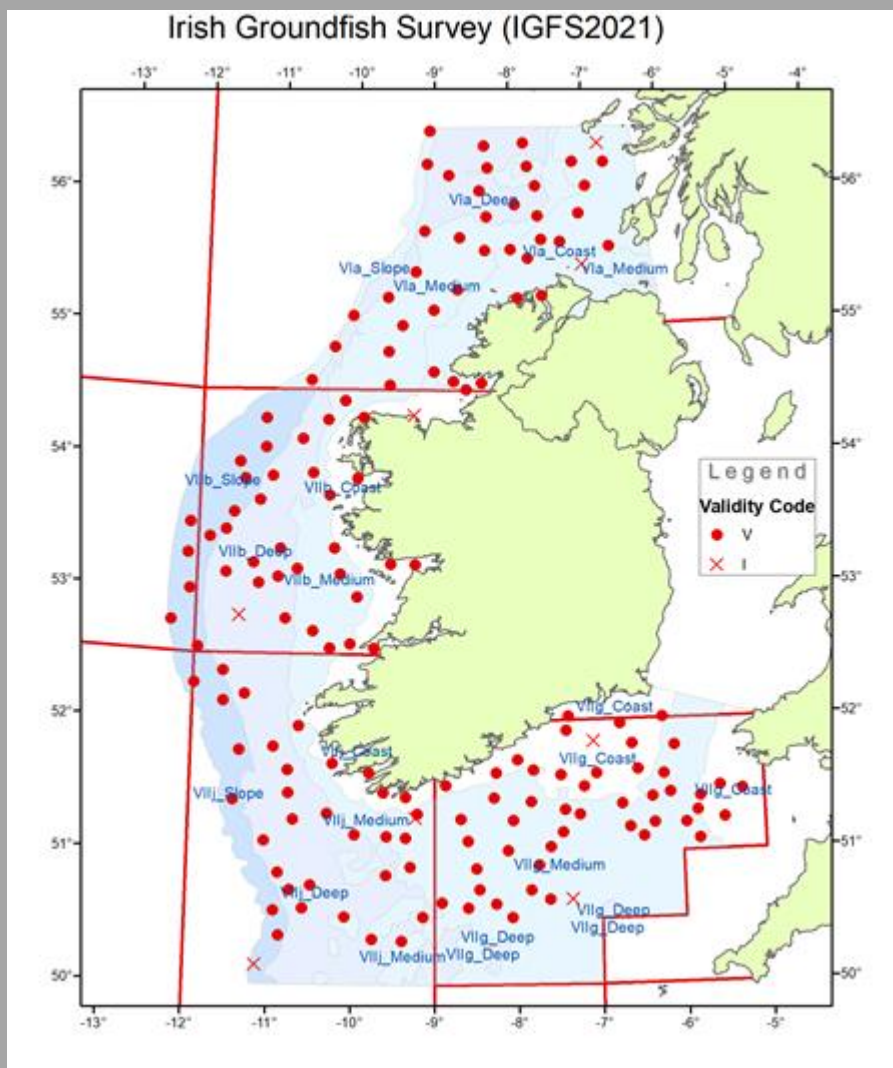
Main shared tasks are the construction of combined indices for cod, haddock and whiting between Ireland and France for WGCSE.

5. Explain where thresholds apply

Share of Union TAC for target species is above 3%

#### Western IBTS 4th quarter (including Porcupine survey) (IBTS Q4)

6. Graphical representation (map) showing the positions (locations) of the realized samples.



**AR Figure 1.** IGFS stations 2021 showing valid (V) and invalid(I) hauls.

**7. For internationally coordinated surveys, provide a link to the latest meeting report of the coordination group.**

The IGFS is internationally coordinated through the International Bottom Trawl Survey Working Group, and their latest report is below: [International Bottom Trawl Survey Working Group \(IBTSWG\) \(figshare.com\)](https://figshare.com)

**8. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators).**

Abundance estimates are provided for a broad range of species (as indicated in Table 1H of this report) to the international working groups, i.e. WGCSE and WGBIE annually to contribute to the provision of assessment and management advice.

CTD stations are also completed and all hydrographic data are uploaded to EUROGOOS.

A litter log is also maintained for each station, categorizing and weighing any litter brought on board which is then uploaded to DATRAS.

VME species are collected annually on the IGFS and submitted as part of the VME data call.

**9. Extended comments (Tables 1G and 1H)**

Recent benchmarks have seen a shift in producing modelled survey indices such as those for cod, haddock and whiting in the Celtic Sea. This has seen demonstrable improvements in precision of the indices so far. In addition much of the routine diagnostics available as a result has proved valuable in managing issues such as loss of days at sea due to poor weather.

The current IBTS Term of Reference to develop a new sampling trawl is being carried out, including sea trials, with Marine Science Scotland and IFREMER, Lorient. Work is being absorbed within existing programs until roll out of the proposed trawl to IBTS participants.

(max 450 words per survey)

General comment: This box fulfills Chapter I of the Annex of the Implementing Decision (EU) 2019/909, on the list of mandatory surveys and thresholds, of the multiannual Union programme; and Article 2 and Article 7 paragraph (3) of the Decision (EU) 2016/1701 on the format of the WP. It is intended to specify which research surveys at sea set out in the multiannual Union programme will be carried out. Member States shall specify whether the research survey is included in Chapter I of the Annex of the implementing decision of the multiannual Union programme or whether it is an additional survey.

General comment: This box is applicable to the Annual Report. This box should provide complementary information on the performance of the surveys, the results and their main use.

## Blue whiting survey

### 1. Objectives of the survey

The primary objective of the survey is to provide an age stratified abundance and biomass index for pre-spawning /spawning aggregations of blue whiting observed over the survey area and to combine data to produce a global estimate of abundance for this widely distributed stock on the western spawning grounds.

### 2. Description of the methods used in the survey. For mandatory surveys, link to the manuals. Include a graphical representation (map)

Survey methods applied during the survey are provided in the survey cruise report (<https://oar.marine.ie/handle/10793/1148>) and detailed in the Manual for International Pelagic Surveys

([http://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20\(SISP\)/SISP%209%20Manual%20for%20International%20Pelagic%20Surveys%20\(IPS\).pdf](http://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%209%20Manual%20for%20International%20Pelagic%20Surveys%20(IPS).pdf)).

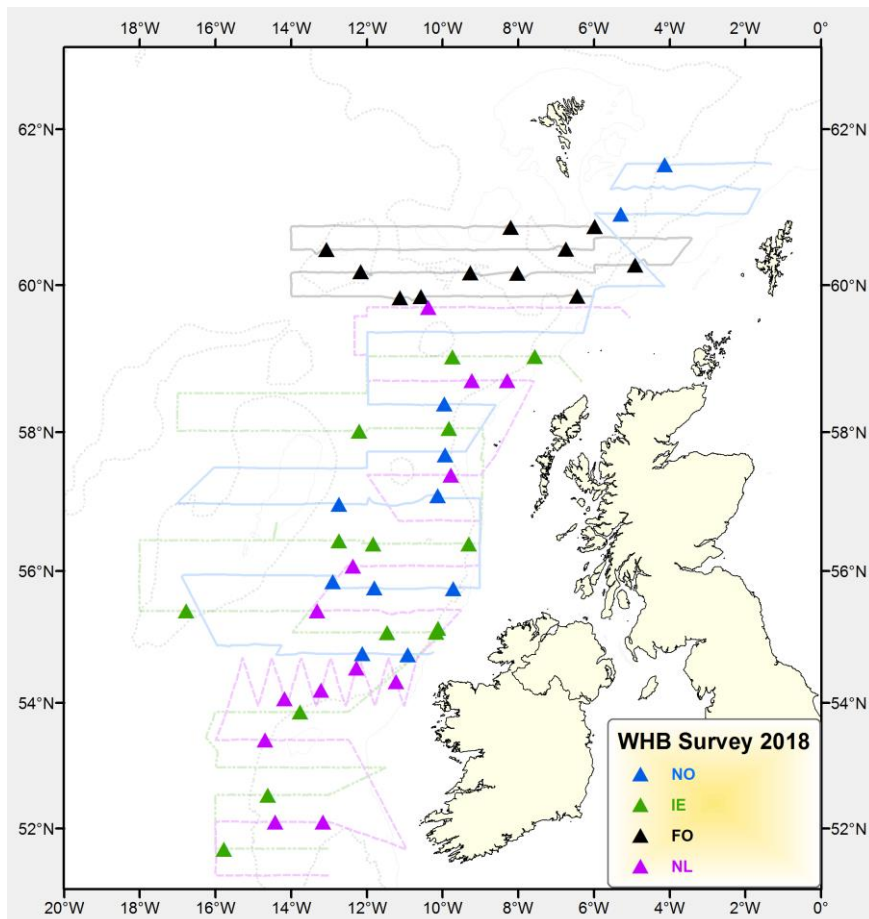


Figure 2. 2018 Blue whiting survey cruise track by nation and trawl stations (triangle)

### 3. For internationally coordinated surveys, describe the participating Member States/ vessels and the relevant international group in charge of planning the survey

The survey is coordinated by WGIPS through by the IBWSS survey coordinator. Details of the IBWSS area, participant countries are latest stock estimate of provided in the WGIPS report. (<http://www.ices.dk/community/groups/Pages/WGIPS.aspx>).

4. Where applicable, describe the international task-sharing (physical and/or financial) and the cost-sharing agreement used.

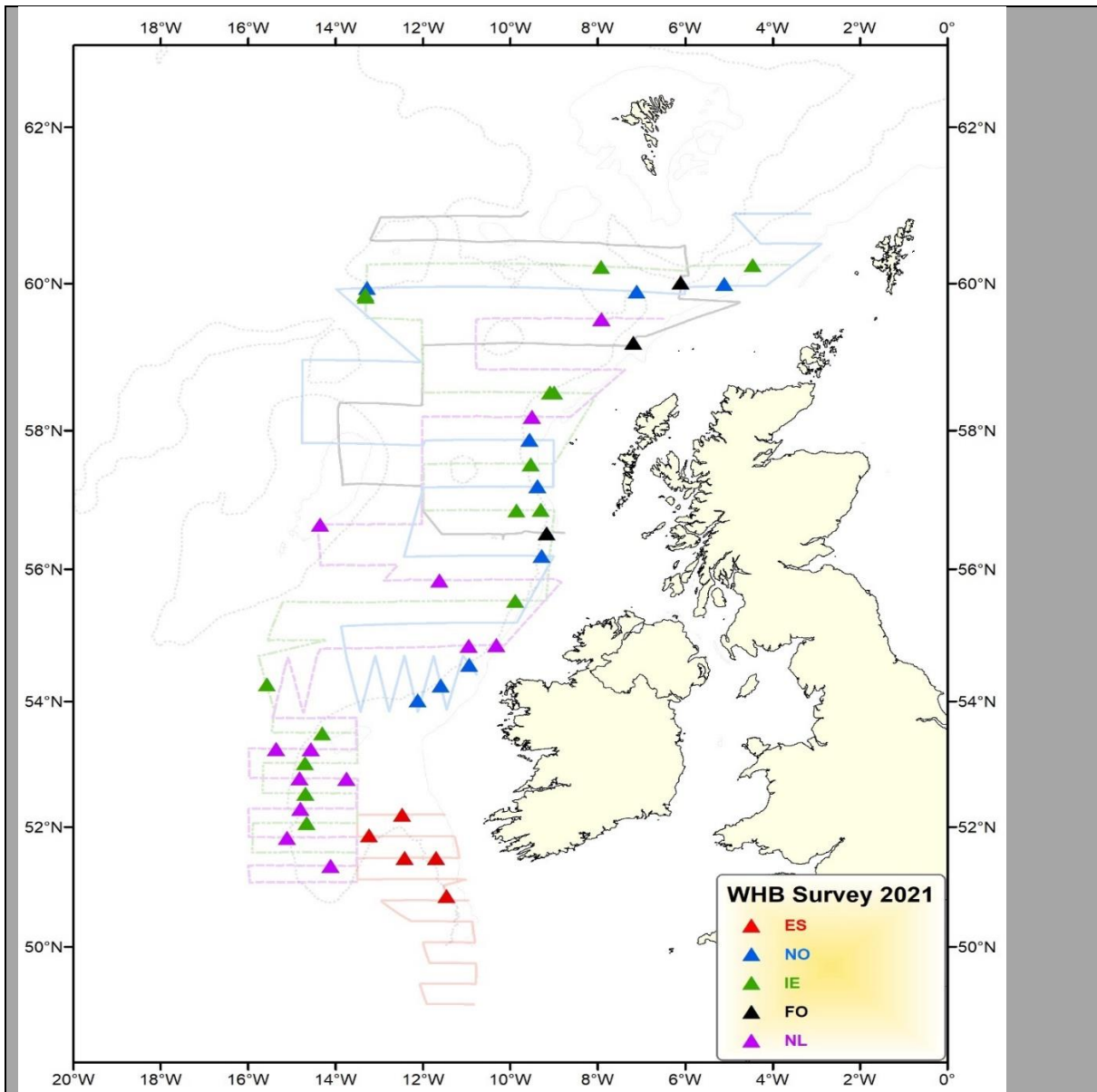
Data is shared internationally between participant countries. International data is compiled to produce acoustic abundance and biomass for blue whiting. Denmark provides a scientist annually to participate in this survey as art of a cost sharing agreement.

5. Explain where thresholds apply

Share of Union TAC for target species is above 3%

#### **International blue whiting spawning stock survey (IBWSS)**

6. **Graphical representation (map) showing the positions (locations) of the realized samples.**



**AR Figure 2.** International blue whiting spawning stock survey (IBWSS) tracks and fishing positions undertaken in 2021 by participant vessels. Irish (IE) effort shown in green.

**7. For internationally coordinated surveys, provide a link to the latest meeting report of the coordination group.**

Cost sharing with provision of scientist from Denmark to join the Irish IBWSS survey annually.

Cruise report 2021

<http://hdl.handle.net/10793/1689>

Survey manual

[https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20\(SISP\)/SISP%209%20Manual%20for%20International%20Pelagic%20Surveys%20\(IPS\).pdf](https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%209%20Manual%20for%20International%20Pelagic%20Surveys%20(IPS).pdf)

Data repository

<https://www.ices.dk/data/data-portals/Pages/acoustic.aspx>

ICES parent planning group

<https://www.ices.dk/community/groups/Pages/WGIPS.aspx>

ICES stock assessment group

<https://www.ices.dk/community/groups/Pages/WGWIDE.aspx>

**8. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators).**

The IBWSS international survey is a multi-vessel survey carried out annually to determine the size and distribution of spawning aggregations of blue whiting. Data from the survey are combined to report the annual estimate of biomass and abundance of blue whiting in western waters. The survey index is updated annually and submitted to the ICES stock assessment group WGWIDE. These data form a vital index in the stock assessment process of this stock.

Survey data (biological and acoustic) are uploaded to the open access ICES trawl acoustic database. Hydrographic data collect during the survey are uploaded to the open access ICES Oceanographic database.

**9. Extended comments (Tables 1G and 1H)**

NA

General comment: This box fulfills Chapter I of the Annex of the Implementing Decision (EU) 2019/909, on the list of mandatory surveys and thresholds, of the multiannual Union programme; and Article 2 and Article 7 paragraph (3) of the Decision (EU) 2016/1701 on the format of the WP. It is intended to specify which research surveys at sea set out in the multiannual Union programme will be carried out. Member States shall specify whether the research survey is included in Chapter I of the Annex of the implementing decision of the multiannual Union programme or whether it is an additional survey.

General comment: This box is applicable to the Annual Report. This box should provide complementary information on the performance of the surveys, the results and their main use.

**International Mackerel and Horse Mackerel Egg Survey (Triennial) MEGS**

**1. Objectives of the survey**

The surveys are carried out over a six-month period every three years and provide the main fishery independent data for the assessment programme. Members collect, count and stage mackerel and horse mackerel eggs from plankton hauls. Fishing tows are also carried out to collect adult fish for fecundity and atresia estimations.

**2. Description of the methods used in the survey**

The surveys are carried out over a number of time periods and areas between January and the end of July. Participants are given time periods and areas within which to work. The survey is adaptive and participants are requested to cover their areas on alternate transects on a first pass, filling in any gaps where time allows. During each survey double oblique plankton tows are carried out every ICES half statistical rectangle, either to within 5m of the bottom or to a maximum depth of 200m. These plankton tows are sorted and mackerel and horse mackerel eggs are extracted, counted and development stage recorded. Adult fish are collected at various latitudes for histology sample collection. The protocols used on the survey can be found in

[http://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20\(SISP\)/SISP%206%20-%20MEGS%20V1.3.pdf#search=sisp%206](http://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%206%20-%20MEGS%20V1.3.pdf#search=sisp%206). Procedures for fecundity sampling can be found in

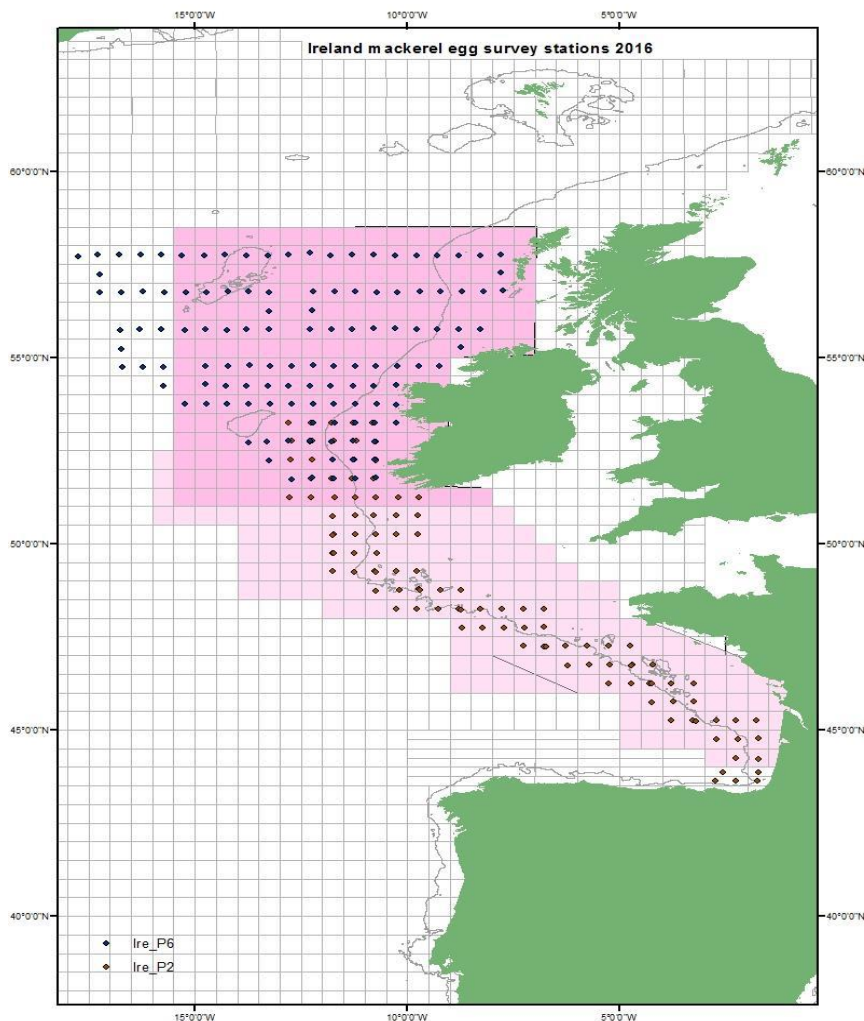


Figure 3: MEGS 2019 stations

3. For internationally coordinated surveys, describe the participating Member States/ vessels and the relevant international group in charge of planning the survey  
 The participating states are Ireland, Scotland, Netherlands, Germany, Spain (IEO), Spain (AZTI), Portugal, Iceland, and Faroes, working either on national research or commercially chartered vessels. The survey programme is coordinated by WGMEGS.

4. Where applicable, describe the international task-sharing (physical and/or financial) and the cost-sharing agreement used  
 Participants carry out between one and three surveys. Each member analyses their own egg samples. Fecundity samples are pooled and analysed by five participants.

5. Explain where thresholds apply

Share of Union TAC for target species is above 3%

**International Mackerel and Horse Mackerel Egg Survey (Triennial) MEGS**

**6. Graphical representation (map) showing the positions (locations) of the realized samples.**

Triennial MEGS Survey planned for March and June 2022.

**7. For internationally coordinated surveys, provide a link to the latest meeting report of the coordination group.**

Planning and coordination for the 2022 survey was discussed at WGMEGS in April 2021.

**8. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators).**

The final results produced by WGMEGS feed into the assessment of NEA mackerel and horse mackerel stocks, carried out by WGWIDE.

Data and biological samples are disseminated as requested (e.g. to research projects/students).

**9. Extended comments (Tables 1G and 1H)**

NA

General comment: This box fulfills Chapter I of the Annex of the Implementing Decision (EU) 2019/909, on the list of mandatory surveys and thresholds, of the multiannual Union programme; and Article 2 and Article 7 paragraph (3) of the Decision (EU) 2016/1701 on the format of the WP. It is intended to specify which research surveys at sea set out in the multiannual Union programme will be carried out. Member States shall specify whether the research survey is included in Chapter I of the Annex of the implementing decision of the multiannual Union programme or whether it is an additional survey.

General comment: This box is applicable to the Annual Report. This box should provide complementary information on the performance of the surveys, the results and their main use.

**Spawning/Pre spawning Herring/Boarfish acoustic survey (WESPAS component)**

**1. Objectives of the survey**

The primary objective of the survey is to provide an age stratified abundance and biomass index for target species observed over the survey area. For the WESPAS survey this represents; spawning/pre-spawning aggregations of boarfish and feeding aggregations of Malin Shelf herring. In addition, data is collected on the hydrographic conditions encountered over the survey area alongside seabird and marine mammal abundance surveys.

**2. Description of the methods used in the survey. For mandatory surveys, link to the manuals. Include a graphical representation (map)**

Survey methods applied during the survey are provided in the survey cruise report and detailed in the Manual for International Pelagic Surveys

[http://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20\(SISP\)/SISP%209%20Manual%20for%20International%20Pelagic%20Surveys%20\(IPS\).pdf](http://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%209%20Manual%20for%20International%20Pelagic%20Surveys%20(IPS).pdf)

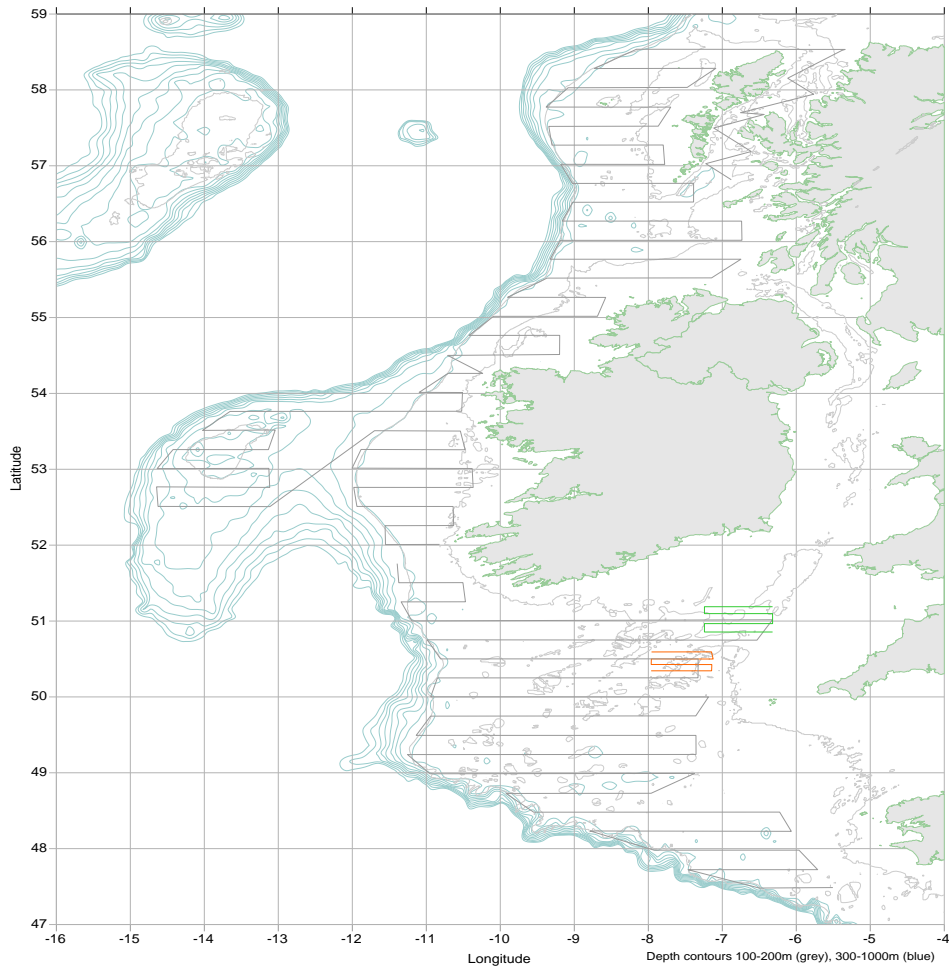


Figure 4 Spawning/Pre spawning Herring/Boarfish acoustic survey (WESPAS component) survey track 2019.

3. For internationally coordinated surveys, describe the participating Member States/ vessels and the relevant international group in charge of planning the survey

The herring component of the survey is coordinated by WGIPS through by the HERAS survey coordinator. This position is rotated every four years within HERAS member countries. Details of the current HERAS coordinator and latest work schedule is provided in the latest WGIPS report (<http://www.ices.dk/community/groups/Pages/WGIPS.aspx>)

4. Where applicable, describe the international task-sharing (physical and/or financial) and the cost-sharing agreement used

The herring component of the survey is coordinated by WGIPS through by the HERAS survey coordinator. Data is shared internationally between participant countries. International data is compiled to produce acoustic abundance and biomass for herring. Details of the HERAS area, participant countries are latest stock estimate of provided in the WGIPS report. (<http://www.ices.dk/community/groups/Pages/WGIPS.aspx>)

5. Explain where thresholds apply

Share of Union TAC for target species is above 3%

**Spawning/Pre spawning Herring/Boarfish acoustic survey (WESPAS component)**

6. Graphical representation (map) showing the positions (locations) of the realized samples.



**AR Figure 4:** WESPAS Survey 2021, showing survey effort (track) and trawling effort (circles).

**7. For internationally coordinated surveys, provide a link to the latest meeting report of the coordination group.**

Cruise report 2021

<http://hdl.handle.net/10793/1720>

Survey manual

[https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20\(SISP\)/SISP%209%20Manual%20for%20International%20Pelagic%20Surveys%20\(IPS\).pdf](https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%209%20Manual%20for%20International%20Pelagic%20Surveys%20(IPS).pdf)

Data repository

<https://acoustic.ices.dk/submissions>

ICES parent planning group

<https://www.ices.dk/community/groups/Pages/WGIPS.aspx>

ICES stock assessment group

<https://www.ices.dk/community/groups/Pages/HAWG.aspx>

<https://www.ices.dk/community/groups/Pages/WGWIDE.aspx>

**8. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators).**

Split-beam acoustic data on boarfish, herring and horse mackerel feeding and spawning aggregations within a pre-determined survey area. Used Annually by WGWIDE and WGHAWG to provide assessment and management advice.

Age stratified estimate of biomass and abundance for the above target species from survey data, submitted to WGWIDE and used annually in the assessment, also used routinely at a national level. Collect biological samples from directed trawling on fish echotraces to determine age structure and maturity state of target stocks, submitted to WGWIDE and used annually in the assessment.

Morphometric and genetic samples of individual herring in 6a/7b, c for stock identification analysis. These fish are processed according to SGHERWAY procedures (ICES 2010).

CTD casts to determine hydrographic conditions and the extent of shelf frontal regions, used routinely on a national level All hydrographic, biological and oceanographic data is uploaded to the ICES Acoustic Database and ICES Oceanographic Database.

Collect plankton samples using dedicated vertical trawls to determine biomass of zooplankton and the spatial extent of areas of concentration, as part of an on – going project, at national level.

The observed marine mammal data from the 2020 Irish WESPAS cruise was reported to the relevant government department (National Parks & Wildlife Service) responsible for the implementation of the Habitats Directive.

Data and biological samples are disseminated as requested (e.g. to research projects/students).

**9. Extended comments (Tables 1G and 1H)**

NA

General comment: This box fulfills Chapter I of the Annex of the Implementing Decision (EU) 2019/909, on the list of mandatory surveys and thresholds, of the multiannual Union programme; and Article 2 and Article 7 paragraph (3) of the Decision (EU) 2016/1701 on the format of the WP. It is intended to specify which research surveys at sea set out in the multiannual Union programme will be carried out. Member States shall specify whether the research survey is included in Chapter I of the Annex of the implementing decision of the multiannual Union programme or whether it is an additional survey.

General comment: This box is applicable to the Annual Report. This box should provide complementary information on the performance of the surveys, the results and their main use.

Spawning/Pre spawning Herring/Boarfish acoustic survey: (Celtic Sea Herring Acoustic Survey Component CHAS)

1. Objectives of the survey

The objective of the survey is to provide an age stratified abundance and biomass index for pre-spawning /spawning aggregations of herring observed over the survey area.

2. Description of the methods used in the survey. For mandatory surveys, link to the manuals. Include a graphical representation (map)

Details of survey methods outlined in the CSHAS cruise report (<http://hdl.handle.net/10793/1143>) and detailed in the Manual for International Pelagic Surveys ([http://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20\(SISP\)/SISP%209%20Manual%20for%20International%20Pelagic%20Surveys%20\(IPS\).pdf](http://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%209%20Manual%20for%20International%20Pelagic%20Surveys%20(IPS).pdf))

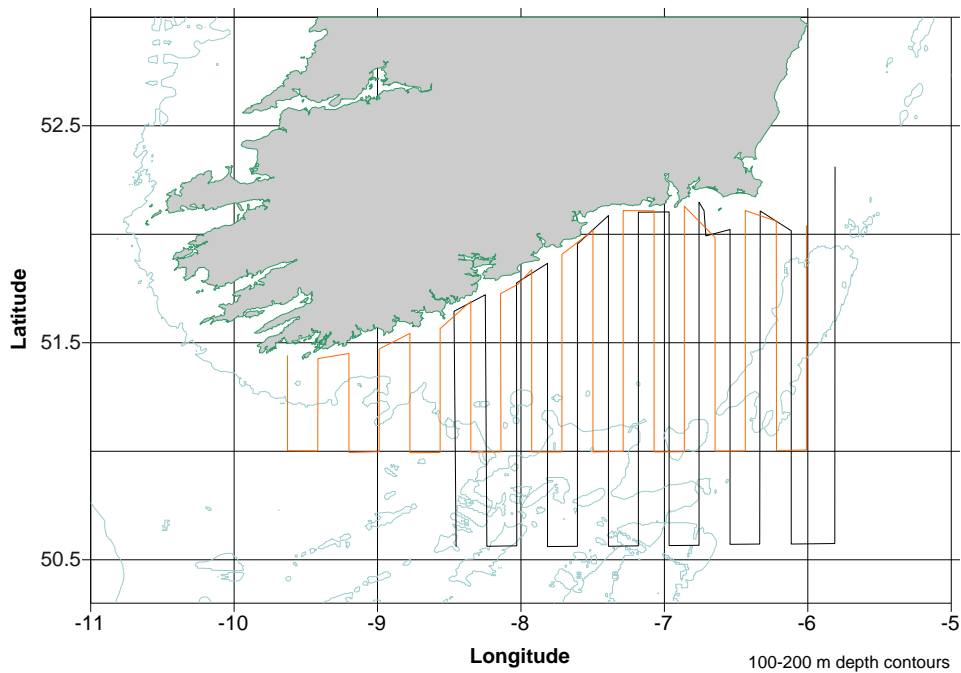


Figure 5: CSHAS survey cruise track 2018.

3. For internationally coordinated surveys, describe the participating Member States/ vessels and the relevant international group in charge of planning the survey

NA

4. Where applicable, describe the international task-sharing (physical and/or financial) and the cost-sharing agreement used

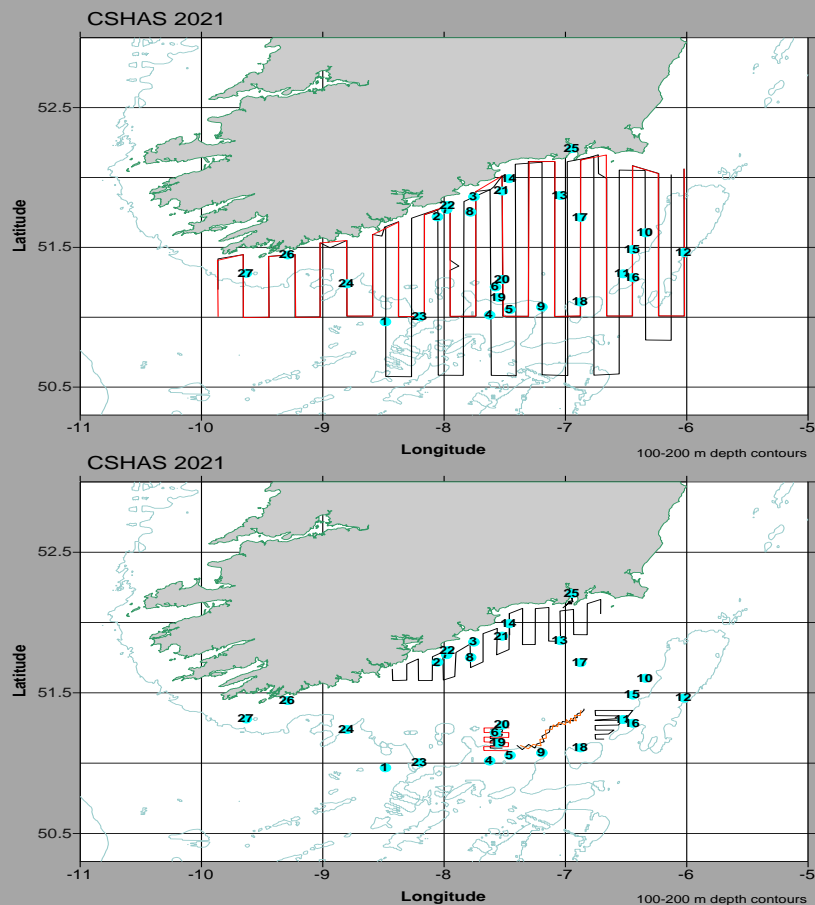
NA

5. Explain where thresholds apply

Share of Union TAC for target species is above 3%

**Spawning/Pre spawning Herring/Boarfish acoustic survey: (Celtic Sea Herring Acoustic Survey Component CHAS)**

6. Graphical representation (map) showing the positions (locations) of the realized samples.



**AR Figure 5:** Celtic sea herring acoustic survey tracks and fishing positions undertaken in 2021, core survey effort (top panel) and adaptive survey effort (bottom panel).

**7. For internationally coordinated surveys, provide a link to the latest meeting report of the coordination group.**

Cruise report 2021

<http://hdl.handle.net/10793/1732>

Survey manual

[https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20\(SISP\)/SISP%209%20Manual%20for%20International%20Pelagic%20Surveys%20\(IPS\).pdf](https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%209%20Manual%20for%20International%20Pelagic%20Surveys%20(IPS).pdf)

Data repository

<https://acoustic.ices.dk/submissions>

ICES parent planning group

<https://www.ices.dk/community/groups/Pages/WGIPS.aspx>

ICES stock assessment group

<https://www.ices.dk/community/groups/Pages/HAWG.aspx>

**8. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators).**

Carry out a two phase survey cruise track covering the core survey area and Investigate high abundance herring aggregations using adaptive survey techniques. Acoustic data is submitted to HAWG annually and contributes towards assessment and management advice.

Use the EM 2040 Bathymetric multibeam and SU90 Omni-directional fisheries sonar to map the extent of herring aggregations during adaptive surveys..

Collect biological samples from directed trawling on insonified fish echotraces to determine age structure and maturity state of the herring stock. Biological data submitted to HAWG on an annual basis and contributes towards the development of assessment and management advice.

Determine an age stratified estimate of relative abundance of herring within the survey area (ICES Divisions VIIj, VIIg and VIIaS). Biological data submitted to HAWG on an annual basis and contributes towards the development of assessment and management advice.

Determine estimates of biomass and abundance for sprat within the survey area.

Collect physical oceanography data from vertical profiles from a deployed sensor array. All hydrographic, biological and oceanographic data is uploaded to the internationally coordinated database.

Survey by visual observations: marine mammal, surface litter and seabird abundance and distribution. It is envisaged that this data will be analysed in the future and the seabird abundance (birds per km travelled), and seabird density (birds per km<sup>2</sup>) will be mapped allowing comparison to the results of previous seabird surveys in the waters around Ireland.

Data and biological samples are disseminated as requested (e.g. to research projects/students).

## 9. Extended comments (Tables 1G and 1H)

NA

General comment: This box fulfills Chapter I of the Annex of the Implementing Decision (EU) 2019/909, on the list of mandatory surveys and thresholds, of the multiannual Union programme; and Article 2 and Article 7 paragraph (3) of the Decision (EU) 2016/1701 on the format of the WP. It is intended to specify which research surveys at sea set out in the multiannual Union programme will be carried out. Member States shall specify whether the research survey is included in Chapter I of the Annex of the implementing decision of the multiannual Union programme or whether it is an additional survey.

General comment: This box is applicable to the Annual Report. This box should provide complementary information on the performance of the surveys, the results and their main use.

Nephrops UWTV surveys-

These are not as described in Annex 1 but are re arranged following the recommendations in <http://oar.marine.ie/bitstream/10793/863/1/SGNEPS12%5B1%5D.pdf> where the Irish survey effort was moved from ICES division VIIa and extended in to VIIbcjk and VIIfgh

### 1. Objectives of the survey

- a) To obtain quality assured estimates of Nephrops burrow densities for the following Functional Units FU16, 17, 19, 20-21 and 22. The number of random stations should be sufficient to cover adequately the known spatial bathymetric of the stock and should ensure a CV of less than 20% for the total abundance estimate as recommended by WGNEPS.
- b) To collect ancillary information from the UWTV footage collected at each station such as the occurrence of sea-pens, other macro benthos and fish species and trawl marks on the sea bed.
- c) To collect oceanographic data using a sledge mounted CTD.
- d) To opportunistically sample Nephrops and macro benthos using a 4 m beam trawls.

### 2. Description of the methods used in the survey. For mandatory surveys, link to the manuals. Include a graphical representation (map)

Methods used on the surveys is described here: <http://oar.marine.ie/handle/10793/59>

The survey is typically carried out between June and August over 3 legs of 10-12 days each.

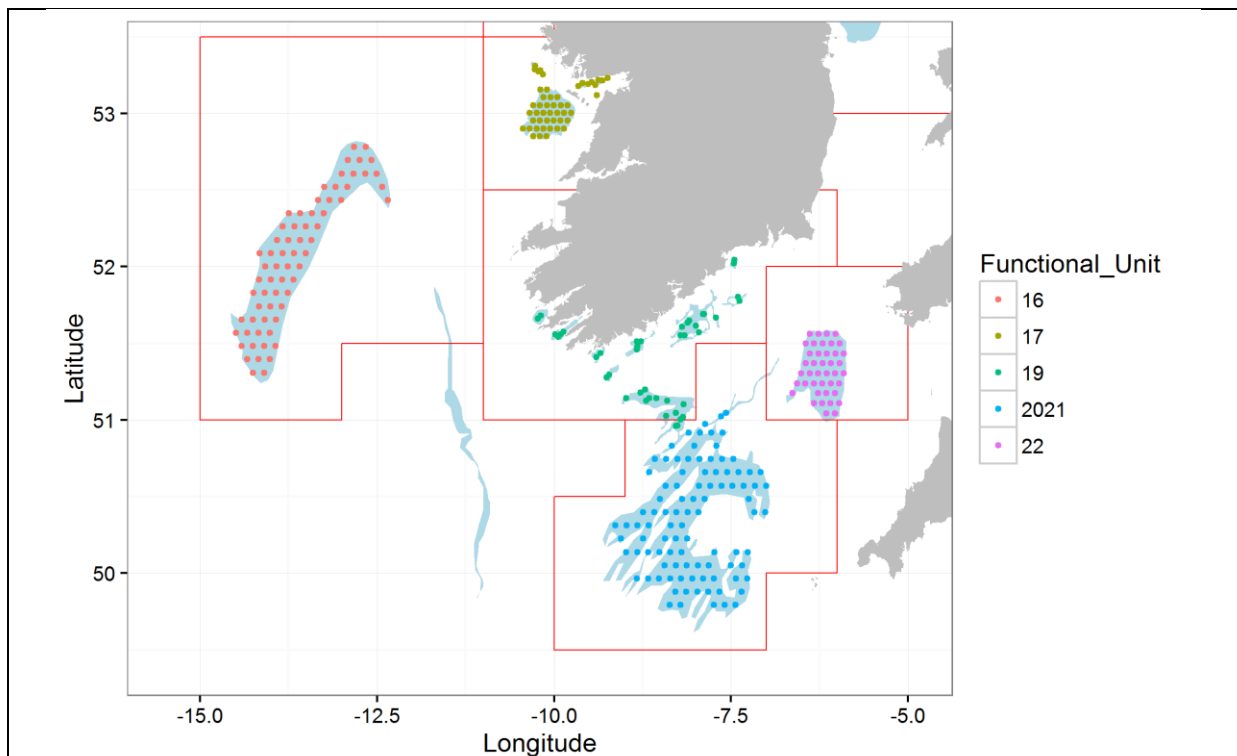


Figure 6 Planned station positions for 2019 Irish UWTV surveys.

3. For internationally coordinated surveys, describe the participating Member States/ vessels and the relevant international group in charge of planning the survey

These surveys are co-ordinated internationally by WGNEPS.

Latest report can be found here: <http://www.ices.dk/community/groups/Pages/WGNEPS.aspx>

4. Where applicable, describe the international task-sharing (physical and/or financial) and the cost-sharing agreement used

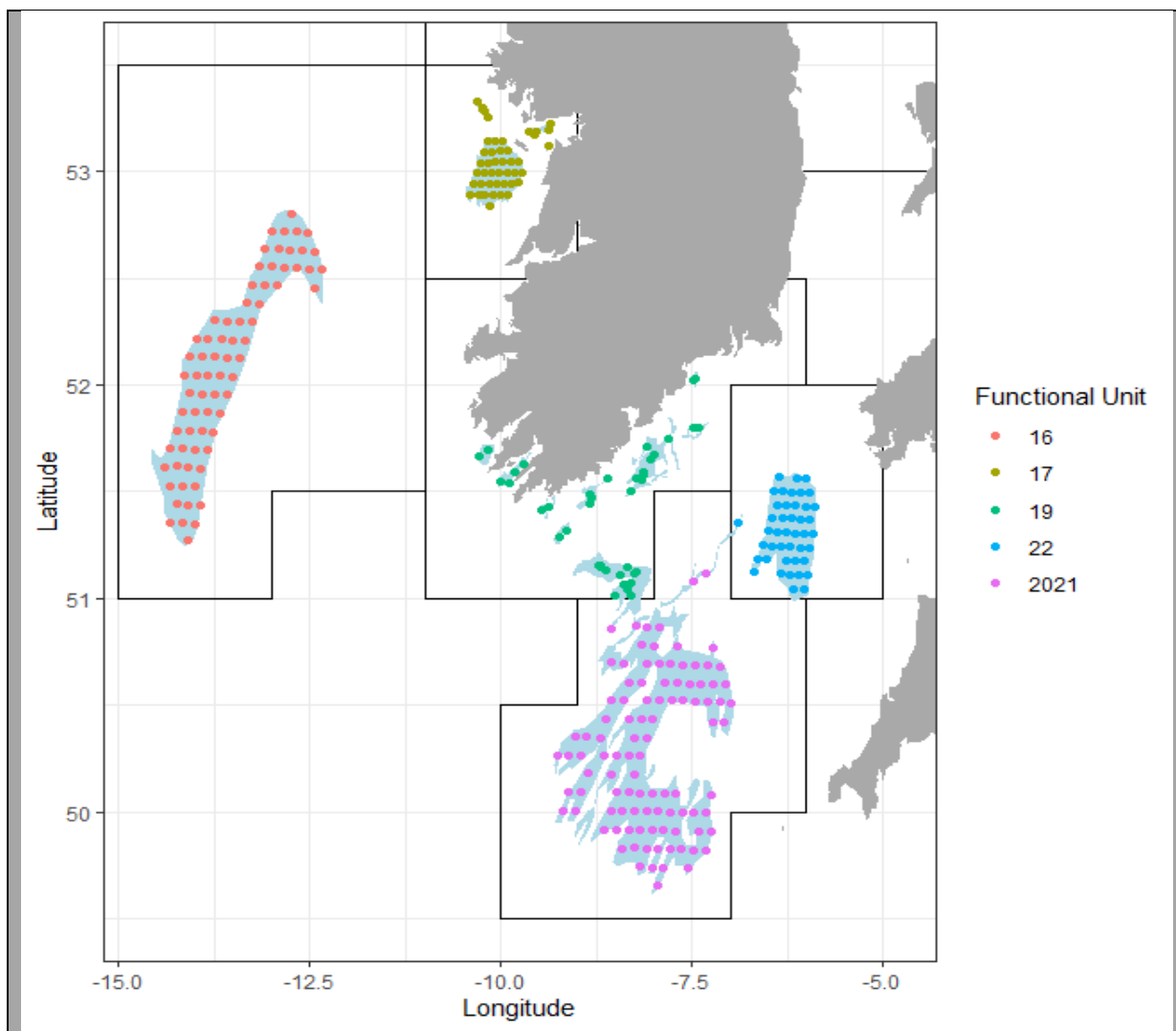
The Marine Institute task shares with the UK and France by exchanging staff between Irish UWTV surveys and those in FU14, 15 and FU23-24 combined.

5. Explain where thresholds apply

Share of Union TAC for target species is above 3%.

#### Nephrops UWTV surveys-

6. Graphical representation (map) showing the positions (locations) of the realized samples.



**AR Figure 6.** Stations completed on Irish *Nephrops* Underwater TV surveys in 2021 by Functional Unit.

**7. For internationally coordinated surveys, provide a link to the latest meeting report of the coordination group**

*Nephrops* UWTV surveys are co-ordinated internationally by the international coordination group for *Nephrops* underwater television and trawl surveys within ICES (WGNEPS).

Here is the link to the WGNEPS most recent report (2021): [Working Group on Nephrops Surveys \(WGNEPS; outputs from 2021\) \(figshare.com\)](https://www.figshare.com/projects/WGNEPS_outputs_from_2021)

Under normal circumstances, Ireland task shares with the UK and France by exchanging staff between Irish UWTV surveys and those in FU 14, FU 15 and FU 23-24 combined. However, in 2021 due to the COVID-19 global pandemic international staff exchange was not feasible.

And here also are the individual Irish *Nephrops* survey cruise reports for 2021:  
 FU16 *Nephrops* UWTV Survey 2021: [Porcupine Bank Nephrops Grounds \(FU16\) 2021 UWTV Survey Report and catch scenarios for 2022 \(marine.ie\)](https://www.marine.ie/Portals/0/Files/2021%20UWTV%20Survey%20Report%20and%20catch%20scenarios%20for%202022.pdf)

FU17 Nephrops UWTV Survey 2021: [Aran, Galway Bay and Slyne Head Nephrops Grounds \(FU17\) 2021 UWTV Survey Report and catch scenarios for 2022 \(marine.ie\)](#)

FU19 Nephrops UWTV Survey 2021: [FU19 Nephrops Grounds 2021 UWTV Survey Report and catch scenarios for 2022 \(marine.ie\)](#)

FU2021 Nephrops UWTV Survey 2021: [The Labadie, Jones and Cockburn Banks Nephrops Grounds \(FU2021\) 2021 UWTV Survey Report and catch scenarios for 2022. \(marine.ie\)](#)

FU22 Nephrops UWTV Survey 2021: [The “Smalls” Nephrops Grounds \(FU22\) 2020 UWTV Survey Report and catch scenarios for 2021 \(marine.ie\)](#)

**8. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators).**

Obtain quality assured estimates of Nephrops burrow densities from a randomised isometric grid of UWTV stations at specific nautical mile spacing over the known spatial and bathymetric distribution for each of the stocks. This data is submitted to WGCSE on an annual basis to contribute to stock assessment and management advice and also to WGNeps annually, for coordination and quality control purposes.

To collect ancillary information from the UWTV footage collected at each station such as the occurrence of sea-pens, other macro benthos and fish species and trawl marks on the sea bed. Sea-pens and burrowing megafauna communities have been listed by OSPAR as threatened and/or declining species and habitats All sea pen data is available and used routinely by national researchers.

To collect oceanographic data using a sledge mounted CTD. All hydrographic data is made available and is used routinely by national researchers.

Data and biological samples are disseminated as requested (e.g. to research projects/students).

**9. Extended comments (Tables 1G and 1H)**

The first priority of the UWTV survey programme is to obtain mean density estimates (burrow /m<sup>2</sup>) as per WGNeps guidelines for approximately 280 stations on an annual basis. This dataset is the basis for stock assessment and informs management advice for five commercial *Nephrops* stocks.

Beam trawl operations are only carried out when UWTV survey operations have been successfully completed. Then if time allows approximately 10 trawls are conducted randomly on two surveys areas: FU 17 and FU 22 only. Beam trawl operations also require full survey staff complement to process the data in a timely fashion. The beam trawl data is useful as provides background information such as a potential indicator of recruitment and also data on macro-benthic fauna assemblages. In 2021 due to COVID-19 pandemic there were reduced staff numbers at sea and hence it was not feasible to carry out trawling.

Target Number: 10 trawls.

Achieved: 0 trawls.

**Image Data review – Counting Teams**

Due to the COVID-19 pandemic, survey operations in 2021 with reduced personnel were limited to data acquisition and quality control of image and navigation data only at sea. All counting reviews were

completed by the counting teams in home offices after each survey using an in-house developed image review app ([Aristegui, 2020](#)) and MS Teams platform for training and discussion. Counting teams ashore comprised of between 4- 6 individuals.

#### References.

Aristegui, M. 2020. Image annotation R Shiny app. Marine Institute. <http://doi.org/d24n>

Dobby, H., Doyle, J., Jónasson, J., Jonsson, P., Leocádio, A., Lordan, C., Weetman, A., and Wieland, K. 2021. ICES Survey Protocols – Manual for Nephrops underwater TV surveys, coordinated under ICES Working Group on Nephrops Surveys (WGNEPS). ICES Techniques in Marine Environmental Sciences Vol. 65. 44 pp. <https://doi.org/10.17895/ices.pub.8014>

ICES. 2022. Working Group on Nephrops Surveys (WGNEPS; outputs from 2021)

ICES Scientific Reports. 4:29. 183pp. <http://doi.org/10.17895/ices.pub.19438472>

General comment: This box fulfills Chapter I of the Annex of the Implementing Decision (EU) 2019/909, on the list of mandatory surveys and thresholds, of the multiannual Union programme; and Article 2 and Article 7 paragraph (3) of the Decision (EU) 2016/1701 on the format of the WP. It is intended to specify which research surveys at sea set out in the multiannual Union programme will be carried out. Member States shall specify whether the research survey is included in Chapter I of the Annex of the implementing decision of the multiannual Union programme or whether it is an additional survey.

General comment: This box is applicable to the Annual Report. This box should provide complementary information on the performance of the surveys, the results and their main use.

#### Irish Anglerfish and Megrim Survey ( IAMS)

Not included in Table 10.

##### 1. Objectives of the survey

The main objective of the survey is to obtain biomass estimates for anglerfish and establish an abundance index for megrim in VIa and VII. Secondary objectives are to collect data on the distribution and relative abundance of anglerfish, megrim and other commercially exploited species. The survey also collects maturity and biological information for commercial fish species.

##### 2. Description of the methods used in the survey.

The trawl survey takes place in areas VIa and VII at depths from around 150m to 1000m and uses a bottom trawl which is based on commercial monkfish trawls. The survey operates 24 hours per day with 1-hour tows. The sampling protocol is focused on monkfish and megrim but maturity data of other 'commercial' species are also collected.

Station positions, heading and bottom depth were recorded at the moment the gear settled on the bottom and when the gear is hauled back. Tide and wind direction and speed, barometric pressure, heave, pitch and roll are recorded at the mid-point in the tow. Bottom depth and GPS position are also recorded in a SQL database at intervals of approximately 1 per second.

Catch weights, length frequency distributions and biological data (sex, live weight, maturity, age) were captured using an Electronic Data Capture (EDC) system and stored into a central SQL database that also hold the station information.

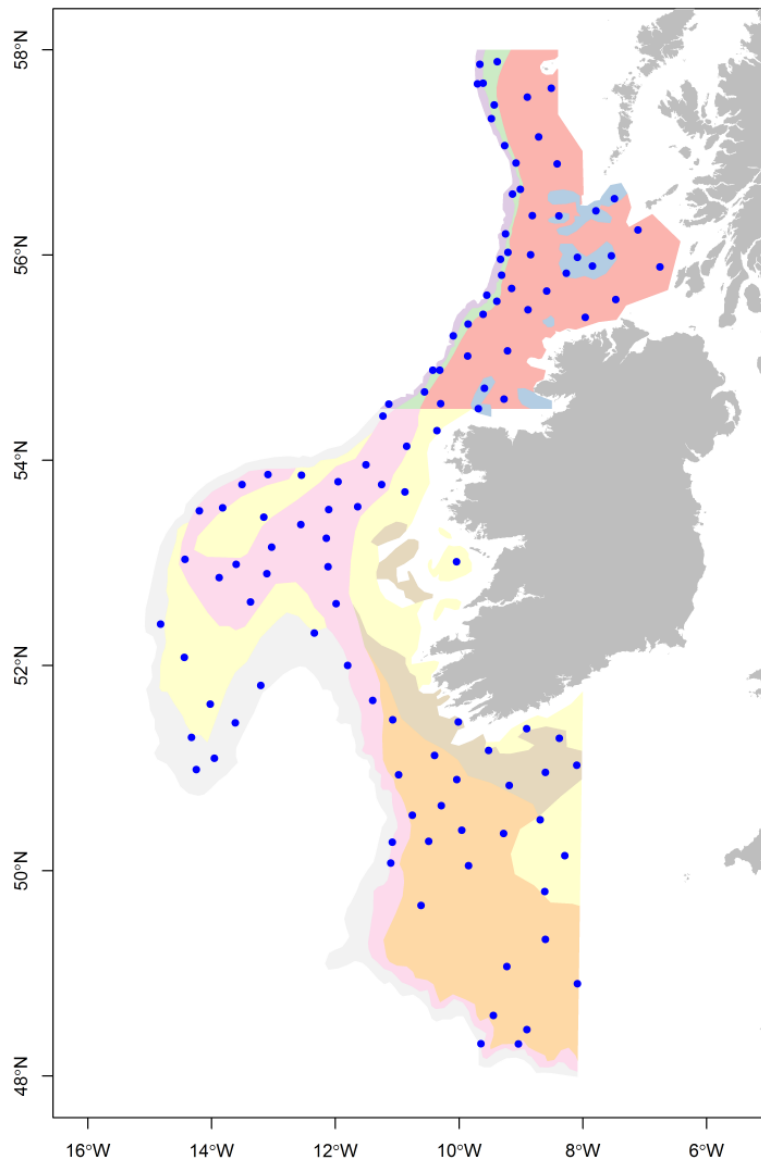


Figure 7: Completed stations from 2018 Irish Anglerfish and Megrim Survey

3. For internationally coordinated surveys, describe the participating Member States/ vessels and the relevant international group in charge of planning the survey

The survey is coordinated by ICES IBTSWG

- Where applicable, describe the international task-sharing (physical and/or financial) and the cost-sharing agreement used

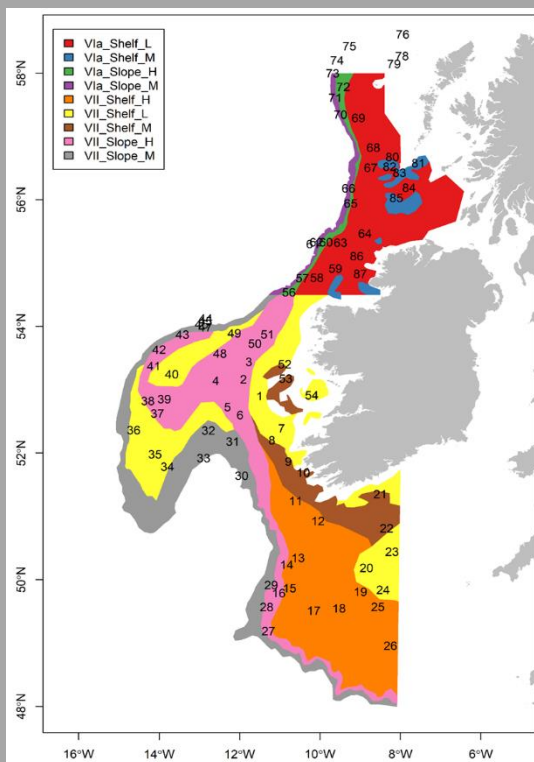
The trawl survey is coordinated with the Scottish monkfish survey in IV, VI: the combined surveys have nearly complete coverage of the stock area. The combined index from the two surveys is used in the assessment of monkfish and megrim in the area.

- Explain where thresholds apply

Share of Union TAC for target species is above 3%

### Irish Anglerfish and Megrim Survey ( IAMS)

- Graphical representation (map) showing the positions (locations) of the realized samples.



AR Figure 7: Valid tow positions from Irish Anglerfish and Megrim Survey 2021.

- For internationally coordinated surveys, provide a link to the latest meeting report of the coordination group.

The IAMS survey is internationally coordinated by IBTS WG [IBTSWG \(ices.dk\)](http://ices.dk)

The latest IBTS WG report is available here: [International Bottom Trawl Survey Working Group \(IBTSWG\) \(figshare.com\)](https://www.figshare.com/)

And the 2021 cruise report is available here: [Cruise report: Irish Anglerfish & Megrim Survey 2021 \(marine.ie\)](https://marine.ie)

**8. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators).**

Biomass estimates for anglerfish (*Lophius piscatorius* and *Lophius budegassa*) megrim (*Lepidorhombus whiffiagonis* and *Lepidorhombus boscii*) in areas 6a (south of 58°N) and 7 (west of 8°W) are submitted to the International assessment working group dealing with monkfish and megrim, WGBIE and WGCSE annually. The indices are used in stock assessment and management advice.

Secondary objectives are to collect data on the distribution and relative abundance of anglerfish, megrim and other commercially exploited species. The survey also collects maturity and other biological information for commercial fish species. This data is submitted to the relevant international assessment working groups.

CTD stations, and litter data are also collected on board, and are available and used by national researchers. Ireland works with ICES to enable upload of the IAMS data into the DATRAS database.

Data and biological samples are disseminated as requested (e.g. to research projects/students).

**9. Extended comments (Tables 1G and 1H)**

The IAMS survey is coordinated with the Scottish Anglerfish and Megrim Survey (SIAMISS) and uses the same gear and fishing practices. Survey data are uploaded to ICES DATRAS database and are used in annual ICES stock assessment working groups WGBIE and WGCSE:

<https://www.ices.dk/community/groups/Pages/WGbie.aspx>

<https://www.ices.dk/community/groups/Pages/WGcse.aspx>

General comment: This box fulfills Chapter I of the Annex of the Implementing Decision (EU) 2019/909, on the list of mandatory surveys and thresholds, of the multiannual Union programme; and Article 2 and Article 7 paragraph (3) of the Decision (EU) 2016/1701 on the format of the WP. It is intended to specify which research surveys at sea set out in the multiannual Union programme will be carried out. Member States shall specify whether the research survey is included in Chapter I of the Annex of the implementing decision of the multiannual Union programme or whether it is an additional survey.

General comment: This box is applicable to the Annual Report. This box should provide complementary information on the performance of the surveys, the results and their main use.

## Razor clam Irish Sea (RCIS)

### 1. Objectives of the survey

Estimation of biomass to provide catch advice. Monitoring of benthic habitats in the fished area. Correspondence between survey estimates and fishery dependent indicators

### 2. Description of the methods used in the survey. For mandatory surveys, link to the manuals. Include a graphical representation (map)

Stratified random based on high frequency iVMS data (Fig 16). Hydraulic dredge used for fish hauls. Day Grab for benthic grab samples. Enumeration of target species and other bivalves in by-catch. Size distributions target species. Marine Community assessment.

### 3. For internationally coordinated surveys, describe the participating Member States/vessels and the relevant international group in charge of planning the survey

NA

### 4. Where applicable, describe the international task sharing (physical and/or financial) and the cost sharing agreement used

NA

### 5. Explain where thresholds apply

NA

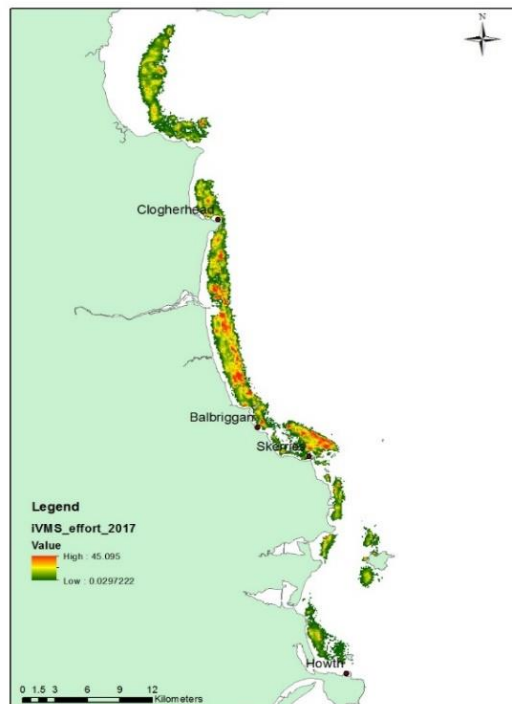


Figure 8: iVMS data showing distribution of Razor clam fishery in the north Irish Sea inside 10m depth contour.

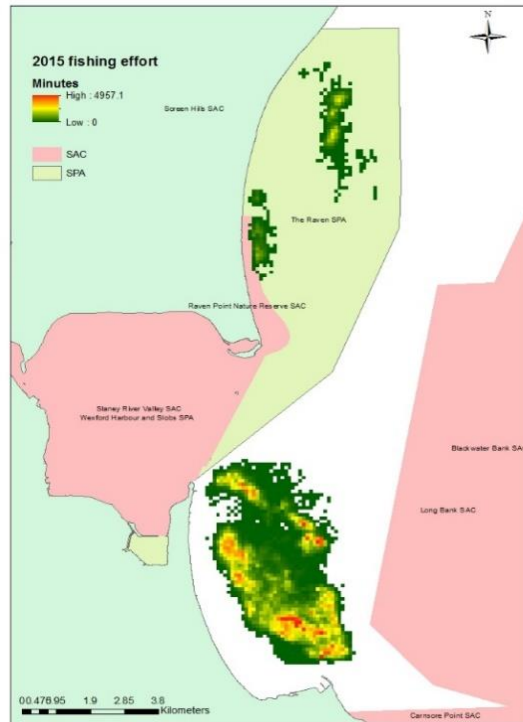


Figure 9: iVMS data showing distribution of Razor clam fishery in the south Irish Sea.

**Razor clam Irish Sea (RCIS)**

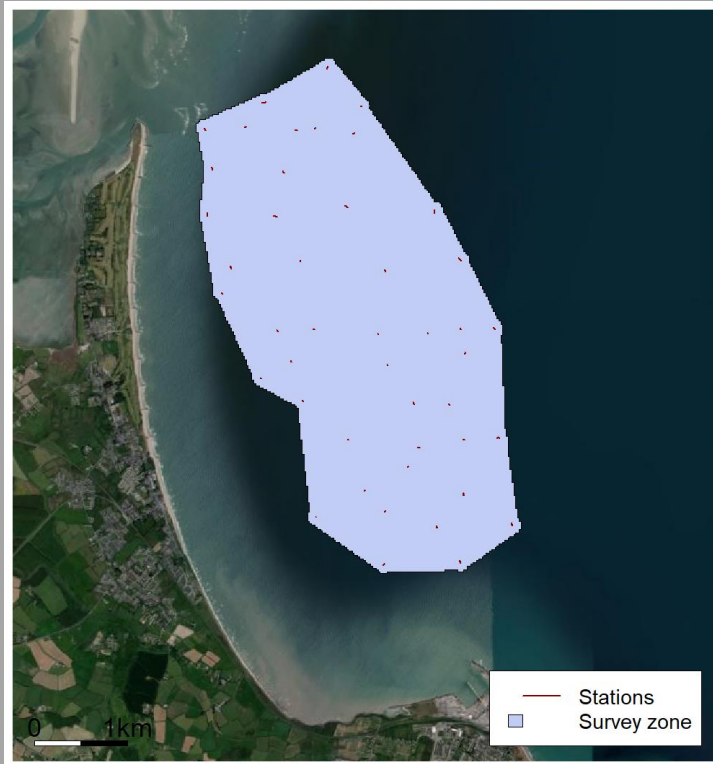
**6. Graphical representation (map) showing the positions (locations) of the realized samples.**



**AR Figure 8:** showing survey zone and stations, Razor Clam Survey, Irish Sea North 2021



**AR Figure 9:** showing survey zone and stations, Irish Sea Razor Clam Survey Curracloe Beach 2021



**AR Figure 9(a):** showing survey zone and stations, Irish Sea Razor Clam Survey Rosslare Beach 2021

**7. For internationally coordinated surveys, provide a link to the latest meeting report of the coordination group.**

The Razor clam Irish Sea (RCIS) surveys are not coordinated internationally. The latest RCIS survey report is available at: [Shellfish Stocks and Fisheries Review 2021: an assessment of selected stocks \(marine.ie\)](https://marine.ie) as part of the 2021 Shellfish Stocks and Fisheries Review

**8. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators).**

Obtain biomass estimates for razor clams (*Ensis siliqua*). Survey data is submitted routinely to the government department responsible for the management of inshore fisheries in Ireland, i.e. The Department of Agriculture, Food and the Marine (DAFM). Data is also made available to the National and Regional Inshore Fisheries Forums (NIF and RIFF's), at which marine agencies, DAFM, the minister, representatives of the inshore industry and other stakeholders participate.

Calculate size and weight distribution: reflecting exploitation rate, growth, mortality and recruitment history of the stock. Data submitted and used routinely by DAFM and also at the RIFF's and NIF.

**9. Extended comments (Tables 1G and 1H)**

The survey in the north Irish Sea is based on a stratified random design using iVMS data. Commercial vessels using standard commercial dredges undertake sampling of 800 pre-determined stations towing for between 3-5-minute duration. The commercial dredges are 1-1.2 meters in width and the dredge cages are comprised of 10 mm bar spacing or a 10 mm grid. The sampled area or swept area

at each station was estimated from the tow length and the dredge width. Tow length was calculated from the point at which the vessel started towing to the point at which it stopped. GPS positions along the tow path were generated every 5 seconds and recorded in a Trimble GPS field survey unit. Full selectivity is assumed for razor clams above the minimum size. Fishing uses an auxiliary engine to drive water at 2-3 bar pressure to the dredge head. The pressure and the angle of the water jets generated in front of the dredge influence dredge efficiency. The survey estimates assumed a precautionary efficiency of 1. In the south Irish Sea a random survey design using a survey grid was utilised

General comment: This box fulfills Chapter I of the Annex of the Implementing Decision (EU) 2019/909, on the list of mandatory surveys and thresholds, of the multiannual Union programme; and Article 2 and Article 7 paragraph (3) of the Decision (EU) 2016/1701 on the format of the WP. It is intended to specify which research surveys at sea set out in the multiannual Union programme will be carried out. Member States shall specify whether the research survey is included in Chapter I of the Annex of the implementing decision of the multiannual Union programme or whether it is an additional survey.

General comment: This box is applicable to the Annual Report. This box should provide complementary information on the performance of the surveys, the results and their main use.

**Name of survey: Razor Clam West Ireland (RCWI)**

1. Objectives of the survey

Estimation of biomass to provide catch advice. Monitoring of benthic habitats in the fished area. Correspondence between survey estimates and fishery dependent indicators

2. Description of the methods used in the survey. For mandatory surveys, link to the manuals. Include a graphical representation (map):

Regular grid surveys or where available stratified surveys based on high frequency VMS data. Survey areas small <1 square kilometre for a number of locally distributed stocks. Hydraulic dredge used for fish hauls. Day Grab for benthic grab samples. Enumeration of target species and other bivalves in by-catch. Marine Community assessment.

No map available as locations are very local & dispersed

3. For internationally coordinated surveys, describe the participating Member States/vessels and the relevant international group in charge of planning the survey:

NA

4. Where applicable, describe the international task sharing (physical and/or financial) and the cost sharing agreement used:

NA

5. Explain where thresholds apply:

NA

#### **Razor Clam West Ireland (RCWI)**

##### **6. Graphical representation (map) showing the positions (locations) of the realized samples.**

No Map as no survey occurred in 2021, please see Table 1G for comments.

##### **7. For internationally coordinated surveys, provide a link to the latest meeting report of the coordination group.**

The Razor clam West of Ireland (RCWI) survey is not coordinated internationally.

##### **8. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators).**

- Obtain biomass estimates for razor clams (*Ensis siliqua* and *Ensis magnus*). Survey data is submitted routinely to the government department responsible for the management of inshore fisheries in Ireland, i.e. The Department of Agriculture, Food and the Marine (DAFM). Data is also made available to the National and Regional Inshore Fisheries Forums (NIF and RIFF's), at which marine agencies, DAFM, the minister, representatives of the inshore industry and other stakeholders participate.
- Calculate size and weight distribution: reflecting exploitation rate, growth, mortality and recruitment history of the stock. Data submitted and used routinely by DAFM and also at the RIFF's and NIF.
- Data and biological samples are disseminated as requested (e.g. to research projects/students).

##### **9. Extended comments (Tables 1G and 1H)**

NA

(max 450 words per survey)

General comment: This box fulfills Chapter I of the Annex of the Implementing Decision (EU) 2019/909, on the list of mandatory surveys and thresholds, of the multiannual Union programme; and Article 2 and Article 7 paragraph (3) of the Decision (EU) 2016/1701 on the format of the WP. It is intended to specify which research surveys at sea set out in the multiannual Union programme will be carried out. Member States shall specify

whether the research survey is included in Chapter I of the Annex of the implementing decision of the multiannual Union programme or whether it is an additional survey.

General comment: This box is applicable to the Annual Report. This box should provide complementary information on the performance of the surveys, the results and their main use.

**Name of survey: Scallop Inshore (SIS)**

1. Objectives of the survey

Estimation of relative abundance and/or biomass in inshore scallop stocks west of Ireland

2. Description of the methods used in the survey. For mandatory surveys, link to the manuals. Include a graphical representation (map)

Regular grid surveys or where available stratified surveys based on high frequency VMS data or benthic habitats (sediments). Scallop dredge tows. Enumeration of target species and by-catch.

No map available as locations are very local & dispersed

3. For internationally coordinated surveys, describe the participating Member States/ vessels and the relevant international group in charge of planning the survey

NA

4. Where applicable, describe the international task-sharing (physical and/or financial) and the cost-sharing agreement used

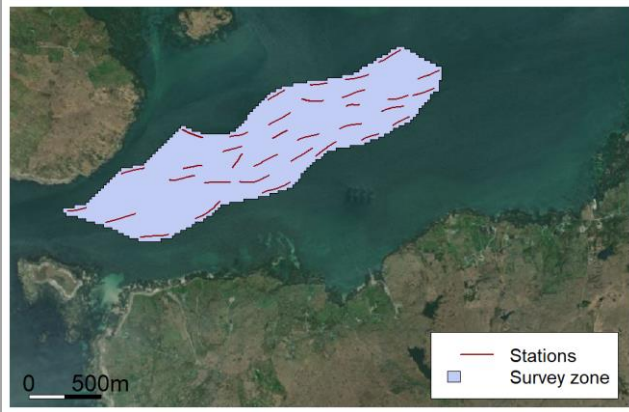
NA

5. Explain where thresholds apply

NA

**Scallop Inshore Survey (SIS)**

**6. Graphical representation (map) showing the positions (locations) of the realized samples.**



**AR Figure 9(b):** Scallop Inshore Survey Beirtreach Bui.



**AR Figure 9(c):** Scallop Inshore Survey Cill Chiarain.



**AR Figure 9(d):** Scallop Inshore Survey Cill Chiarain: Caisin Bay

**7. For internationally coordinated surveys, provide a link to the latest meeting report of the coordination group.**

The Scallop Inshore Surveys (SIS) are not coordinated internationally. The SIS survey reports are made available in the Shellfish Stocks and Fisheries Review annually: [Shellfish Stocks and Fisheries Review 2021: an assessment of selected stocks \(marine.ie\)](#)

**8. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators).**

Inshore Scallop surveys were undertaken in two scallop beds off the west coast in 2021. Inshore Scallop surveys were not undertaken in other areas as the total fishery outtake since the previous survey was very low. The results of these surveys are used to estimate the biomass of king scallop (*Pecten maximus*) in Beirtreach Buí Bay and Cill Chiaráin Bay, Co. Galway, and to provide advice on stock status in both areas to the CSC which allows sustainable harvest rates to be allocated to its members.

**9. Extended comments (Tables 1G and 1H)**

In both Beirtreach Buí Bay and Cill Chiaráin Bay, a random survey design using a survey grid was utilized covering a survey area designated through a combination of previous surveys and local fishers knowledge. Surveys were carried out on board commercial fishing vessels. In Beirtreach Buí Bay, a single dredge, 1.2 metres wide was towed on the seabed at each sampling station. In October 2021, sampling at 35 stations was carried out in Beirtreach Buí Bay, with 42 stations sampled in November. In Cill Chiaráin Bay, three spring loaded dredges, each 0.75 metres wide were used to sample 48 stations in October 2021. GPS data for each tow was recorded on a YUMA GPS survey unit which provides an accurate record of each tow's length. The swept area, a proxy for fishing effort, can then be calculated for each sampling station, and is equal to tow length multiplied by dredge width. Dredges were towed for between 200–250 metres at each station. Following a successful tow, all scallop catch and bycatch were recorded, weighed, and individually measured on board. Sub-samples of scallop were kept and brought back to the laboratory to be individually weighed and measured to construct a size-weight relationship for each survey. The assessment method and resulting biomass estimates assume full selectivity for scallop above the minimum landing size. It should be noted however, that the gear employed during the survey is designed for commercial fishing and is thus unlikely to efficiently sample the smaller size classes of scallop. Dredge efficiency can also be highly variable, and is largely influenced by ground type.

General comment: This box fulfills Chapter I of the Annex of the Implementing Decision (EU) 2019/909, on the list of mandatory surveys and thresholds, of the multiannual Union programme; and Article 2 and Article 7 paragraph (3) of the Decision (EU) 2016/1701 on the format of the WP. It is intended to specify which research surveys at sea set out in the multiannual Union programme will be carried out. Member States shall specify whether the research survey is included in Chapter I of the Annex of the implementing decision of the multiannual Union programme or whether it is an additional survey.

General comment: This box is applicable to the Annual Report. This box should provide complementary information on the performance of the surveys, the results and their main use.

**Name of survey: Cockle North Irish Sea Survey(CNIS)**

1. Objectives of the survey

Estimation of biomass to provide catch advice. Habitat assessment and impact of fishery on designated bird populations.

2. Description of the methods used in the survey. For mandatory surveys, link to the manuals. Include a graphical representation (map)

Stratified random. Scientific quadrat sampling. Enumeration of target species and other characterising species of benthic habitat.

3. For internationally coordinated surveys, describe the participating Member States/ vessels and the relevant international group in charge of planning the survey

NA

4. Where applicable, describe the international task-sharing (physical and/or financial) and the cost-sharing agreement used

NA

5. Explain where thresholds apply

NA

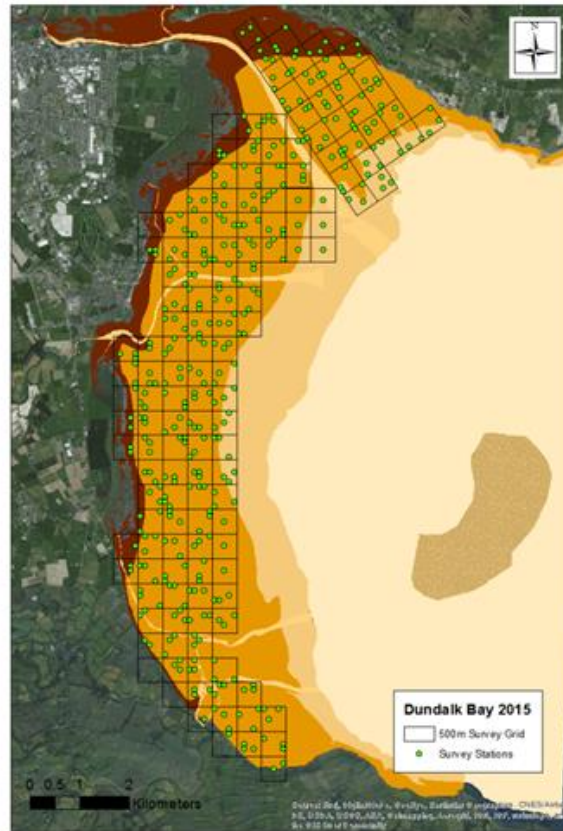
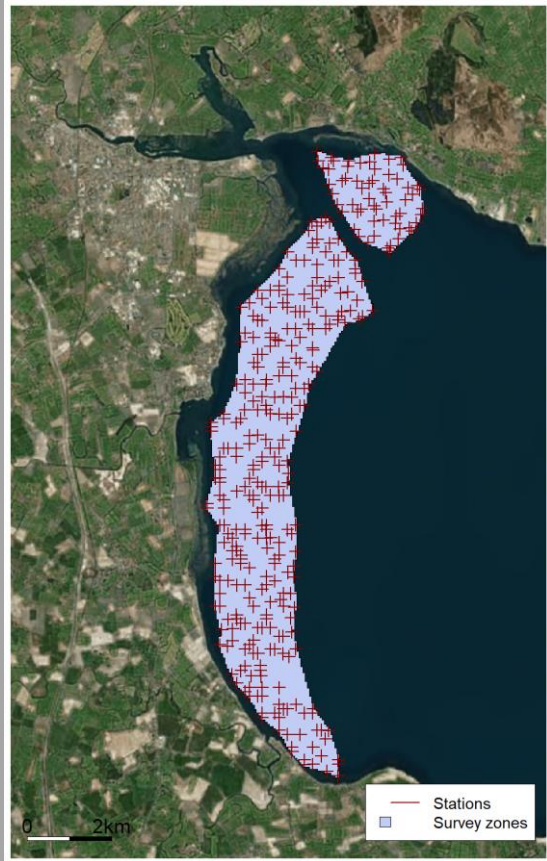


Figure 12. Stratified random grid for cockle survey in Dundalk Bay SAC/SPA in north Irish Sea 2015

(max. 450 words per survey)

### Cockle North Irish Sea Survey(CNIS)

#### 6. Graphical representation (map) showing the positions (locations) of the realized samples.



**AR Figure 10:** showing location of stations for Irish Sea Cockle Survey, Dundalk Bay 2021

**7. For internationally coordinated surveys, provide a link to the latest meeting report of the coordination group.**

The Cockle Irish Sea (CIS) survey is not coordinated internationally. The CIS survey report is available in the Shellfish Stocks and Fisheries Review 2021 publication: [Shellfish Stocks and Fisheries Review 2021: an assessment of selected stocks \(marine.ie\)](https://marine.ie/publications/shellfish-stocks-and-fisheries-review-2021)

**8. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators).**

- Obtain biomass estimates for cockle (*Cerastoderma edule*). Survey data is submitted routinely to the government department responsible for the management of inshore fisheries in Ireland, i.e. The Department of Agriculture, Food and the Marine (DAFM). Data is also made available to the National and Regional Inshore Fisheries Forums (NIF and RIFF's), at which marine agencies, DAFM, the minister, representatives of the inshore industry and other stakeholders participate.
- Calculate size and weight distribution: reflecting exploitation rate, growth, mortality and recruitment history of the stock. Data submitted and used routinely by DAFM and also at the RIFF's and NIF.
- Data and biological samples are disseminated as requested (e.g. to research projects/students).

**9. Extended comments (Tables 1G and 1H)**

Member State shall refer to any status report (e.g. Cruise report).

The Cockle Irish Sea (CIS) survey is not coordinated internationally. The CIS survey report is available in the Shellfish Stocks and Fisheries Review 2021 publication [Shellfish Stocks and Fisheries Review 2021: an assessment of selected stocks \(marine.ie\)](#).

(max 450 words per survey)

General comment: This box fulfills Chapter I of the Annex of the Implementing Decision (EU) 2019/909, on the list of mandatory surveys and thresholds, of the multiannual Union programme; and Article 2 and Article 7 paragraph (3) of the Decision (EU) 2016/1701 on the format of the WP. It is intended to specify which research surveys at sea set out in the multiannual Union programme will be carried out. Member States shall specify whether the research survey is included in Chapter I of the Annex of the implementing decision of the multiannual Union programme or whether it is an additional survey.

General comment: This box is applicable to the Annual Report. This box should provide complementary information on the performance of the surveys, the results and their main use.

**Name of Survey: Oyster West of Ireland Survey**

1. Objectives of the survey

Estimation of biomass to provide catch advice. Habitat assessment.

2. Description of the methods used in the survey. For mandatory surveys, link to the manuals. Include a graphical representation (map)

Regular grid or random, oyster dredge hauls. Enumeration of target and by-catch. Size distribution data.

No map available as locations are very local & dispersed

3. For internationally coordinated surveys, describe the participating Member States/ vessels and the relevant international group in charge of planning the survey

NA

4. Where applicable, describe the international task-sharing (physical and/or financial) and the cost-sharing agreement used

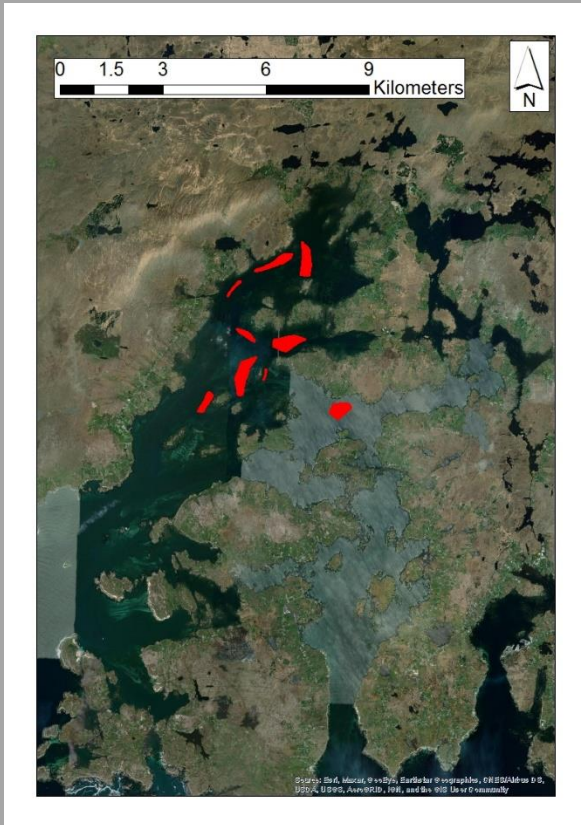
NA

5. Explain where thresholds apply

NA

**Oyster West of Ireland Survey**

**6. Graphical representation (map) showing the positions (locations) of the realized samples.**



**AR Figure 11:** showing survey zones and tows for the Oyster (*Ostrea edulis*) West of Ireland Cill Chiarain.



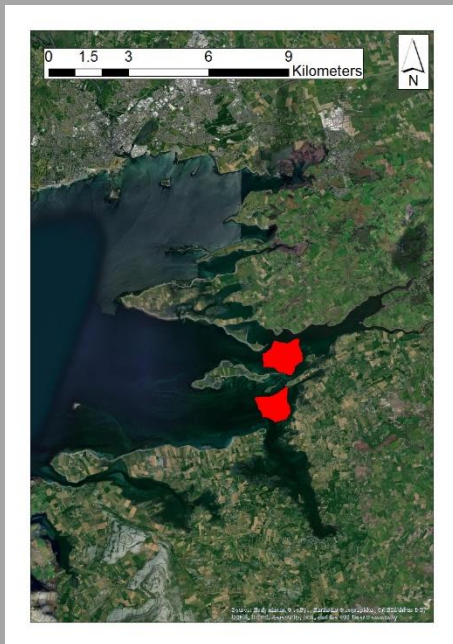
**AR Figure 12:** showing survey zones and tows for the Oyster (*Magallana gigas*) West of Ireland Survey Lough Swilly.



**AR Figure 13:** showing survey zones and tows for the Oyster West of Ireland Survey Outer Tralee Bay and Fenit



**AR Figure 14:** showing survey zones and tows for the Oyster West of Ireland Survey Clew Bay North.



**AR Figure 15:** showing survey zones and tows for the Oyster West of Ireland Survey Inner Galway Bay.

**7. For internationally coordinated surveys, provide a link to the latest meeting report of the coordination group.**

Oyster survey reports are available in the Shellfish Stocks and Fisheries Review 2021 publication [Shellfish Stocks and Fisheries Review 2021: an assessment of selected stocks \(marine.ie\)](https://www.marine.ie/publications/shellfish-stocks-and-fisheries-review-2021)

**8. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators).**

- Obtain biomass estimates for native oysters. Survey data is submitted routinely to the government department responsible for the management of inshore fisheries in Ireland, i.e. The Department of Agriculture, Food and the Marine (DAFM). Data is also made available to the National and Regional Inshore Fisheries Forums (NIF and RIFF's), at which marine agencies, DAFM, the minister, representatives of the inshore industry and other stakeholders participate.
- Distribution and Biomass of naturalised pacific oysters (*Magellana gigas*). Survey data is submitted routinely to the government department responsible for the management of inshore fisheries in Ireland, i.e. The Department of Agriculture, Food and the Marine (DAFM). Data is also made available to the National and Regional Inshore Fisheries Forums (NIF and RIFF's), at which marine agencies, DAFM, the minister, representatives of the inshore industry and other stakeholders participate.
- Calculate size and weight distribution: reflecting exploitation rate, growth, mortality and recruitment history of the stock. Data submitted and used routinely by DAFM and also at the RIFF's and NIF

**9. Extended comments (Tables 1G and 1H)**

NA

## SECTION 2: FISHING ACTIVITY DATA

### **Text Box 2A: Fishing activity variables data collection strategy**

General comment: This box fulfills paragraph 4 of Chapter III of the Annex of the Delegated Decision (EU) 2019/910 on the multiannual Union programme; and Article 2, Article 4 paragraph (2) point (b) and Article 5 paragraph (2) of the Implementing Decision (EU) 2016/1701 on the format of the WP. It is intended to describe the method used to derive estimates on representative samples where data are not to be recorded under Regulation (EU) No 1224/2009 or where data collected under Regulation (EU) No 1224/2009 are not at the right aggregation level for the intended scientific use.

General comment: This box is applicable to the Annual Report. This box should provide information on the implementation of the data collection of fishing activity variables of Member States.

#### 1. Description of methodologies used to cross-validate the different sources of data

The Member State will continue to collect transversal, economic and social parameters, on a daily basis, from vessels < 12 meters in length (LOA) in a national, sentinel vessel programme. This is justified on the basis that it is not currently possible to define quantitative targets for a sampling programme for transversal parameters within metiers containing an inshore component; specifically, for vessels <10 metres LOA and where official declarations of their landings are not required.

In accordance with Article 11(4) of Council Regulation (EC) No 199/2008 – defining the eligibility of self-sampling aboard Community fishing vessels – vessel owners participating in the sentinel programme will record their daily landings, effort and price data in a ‘sentinel record book’, specifically designed to capture these data, for a full calendar year.

Additionally, and to enhance the cost-effectiveness of this programme;

- Non-transversal economic parameter will also be collected, again on a daily basis, by vessels < 12 meters (LOA) participating in the sentinel programme;
- Non-operational economic parameters will also be collected at the end of the reference year. These data will be collected using a survey and an exit interview from the sentinel programme;
- Biological (length composition) and discard information will be collected on a weekly basis by vessels participating in the sentinel programme to complement the data on biological variables in these metiers.
- Daily landings and price figures are collected

#### 2. Description of methodologies used to estimate the value of landings.

Buyers and sellers (sales note) data provide estimates of landings by all vessels and value of landings at first point of sale. In addition, the sentinel vessel data from the pilot programme provides data on unit value for species landed by these vessels.

#### 3. Description of methodologies used to estimate the average price (it is recommended to use weighted averages, trip by trip)

Daily landed price figures are collected in the logbooks by all vessels. These averages are weighted by segment, species and trip.

4. Description of methodologies used to plan collection of the complementary data (sample plan methodology, type of data collected, frequency of collection etc)

The sample population for the sentinel programme is designed to represent the diverse inshore fisheries

sector in Ireland. Specific fisheries are targeted that represent gear usage, target species, and geographical location. The list of participants is reviewed annually to ensure that it remains representative of the small scale fisheries.

Logbooks are provided to participants every January. The logbooks record, vessel details and economic data annually. Daily logbook entries record target species, effort, landings, and economic data (fish prices, fuel prices). Weekly logbook entries record biological data of the catches. Logbooks are collected at the end of the year and data is entered and checked.

Those vessels accepted into the sentinel programme are remunerated to the amount of €1000 per vessel per annum. Remuneration is based on an average of 180 days at sea per year, and an estimated 30 - 40 minutes to record the data in the supplied sentinel record book. When the additional time commitment required from each participating vessel owner for direct contact with survey personnel, to complete the exit interview required at the end of the data collection period and to provide non-operation data are included, the total commitment amounts to 115 hours per year. Using the national minimum wage in Ireland (currently €8.65 per hour for adults over the age of 18) the total annual cost of 115 hours at €8.65 per hour is €1,000. This remuneration is deemed the minimum necessary to attract eligible fishermen into the programme and to ensure accurate and reliable data are recorded.

**5. Deviations from Work Plan methodology used to cross-validate the different sources of data**

There were no deviations from the Work Plan in 2021.

**Actions to avoid deviations.**

As there were no deviations, no remedial actions were necessary.

**6. Deviations from Work Plan methodology used to estimate the value of landings.**

There were no deviations from the Work Plan in 2021.

**Actions to avoid deviations.**

As there were no deviations, no remedial actions were necessary.

**7. Deviations from Work Plan methodology used to estimate the average price.**

There were no deviations from the Work Plan in 2021.

**Actions to avoid deviations.**

As there were no deviations, no remedial actions were necessary.

## **8. Deviations from Work Plan methodology used to plan collection of the complementary data**

In addition to the annual data collection via the national Sentinel Vessel Programme in the Work Plan, as part of the MS's new Inshore Fisheries Strategy, work has commenced in 2022 to establish a comprehensive profile of the inshore sector. A complete census of the sector will be conducted in the summer of 2022 which will be repeated on a periodic basis (e.g. every 5 years). This census will enhance the baseline quality of inshore data (i.e. vessels under 12 metres LOA) for DCF/ EU MAP purposes going forward.

### **Actions to avoid deviations.**

The planned census of the inshore fleet in 2022 is an addition to the Work Plan which will improve the methodology and enhance the baseline quality of data for vessels under 12 metres LOA.

## SECTION 3: ECONOMIC AND SOCIAL DATA

### **Text Box 3A: Population segments for collection of economic and social data for fisheries**

General comment: This box fulfils paragraph 5 points (a) and (b) of Chapter III of the Annex of the Delegated Decision (EU) 2019/910 on the multiannual Union programme; and Article 2, Article 4 paragraphs (1), (2) and (5) and Article 5 paragraph (2) of the Implementing Decision (EU) 2016/1701 on the format of the WP. It is intended to specify data to be collected under Tables 5(A) and 6 of the delegated decision on the multiannual Union programme.

General comment: This box is applicable to the Annual Report. This box should provide information on the implementation of the fleet socio-economic data collection of Member States.

#### **1. Description of methodologies used to choose the different sources of data**

The data sources used to collect economic and social data from fleet segments are:

- Sales notes data for landing income for vessels under 10m.
- Logbook data for effort and landing income for vessels over 10m.
- Voluntary questionnaire information returned by vessel owners targeted in the annual economic survey for all economic and social variables. All vessels over 10m, active in the previous year, are targeted by a national postal survey (National Seafood Survey). For vessels under 10m surveys are received via the data sources listed in points 5 and 6 below. Additional to this a pilot national postal survey, designed in conjunction with the fishing industry, will be circulated to all registered fishing vessels under 10m.
- Face-to-face/phone interviews with vessel owners to clarify any issues arising with economic and social variables from questionnaire.
- Mandatory economic and social questionnaire information returned by vessel owners applying for EU/National grant aid,

- Data from vessel owners from a national sentinel vessel programme (to collect both transversal and non-transversal economic and social data from vessels in the small scale fisheries where log-book declarations are not mandatory). See table text box 2a for details.

## **2. Description of methodologies used to choose the different types of data collection**

Data collected through EU register, Logbook and Sales notes is treated as census data.

Given the constraints imposed by the voluntary nature of the current data collection regime, the data collection scheme for all economic variables from all metiers segments is a non-probability sample survey based on a probability sample survey design.

In 2010, a Statutory Instrument (S.I. 132 of 2010) was introduced by the MS requiring all fishery sector operators to collect and maintain economic data as listed in Annex XII of the Commission Decision.

However, there is no enforcement of this national legislation.

## **3. Description of methodologies used to choose sampling frame and allocation scheme**

The population shall be all active and inactive vessels registered in the Union Fishing Fleet Register as defined in Commission Regulation (EC) No 26/2004 (2) on 31 December of the reporting year and vessels that do not appear on the Register at that date but have fished at least one day during the reporting year.

The data sources for the national implementation for the fleet target population are:

- EU Fleet register;
- EU Log-book data.

The target population is the “commercial fishing fleet” as recorded in the EU Fleet Register on the last day of the reference year.

Fleet Segmentation: The segmentation of the fleet, will follow the guidelines in Table 5b of Commission Implementing Decision (2016/1251) and is used to stratify the collection of all, non-transversal, economic parameters.

The following data sources will be used to segment the fleet:

- EU Fleet Register on the 31<sup>st</sup> December for the reference year.
- EU log-book activity records for vessels active in the reference year (>10 meters);
- Sentinel Vessel Programme Effort Data
- Recorded fishing activity from previous economic surveys.

Individual vessels are assigned to fleet segments by overall length (LOA) class and the main fishing method engaged in by the vessel, in the previous calendar year. In cases where there is a risk of natural persons and/or legal entities being identified clustering may be applied to report economic variables in order to ensure statistical confidentiality. Such a clustering scheme shall be consistent over time.

The source of information used to distinguish the sampling frame from the target population, will be based on EU logbook data as follows:

- Active Vessels: For vessels greater than 10 meters in overall length, only those with at least one entry in the EU log-book, in the reference year, will be deemed active. This analysis will take place once the log-book data are available for a particular reference year, which is approximately 3 months after the end of the calendar year (March n-1);
- For vessels less than 10 meters in overall length, an estimate of inactivity will be conducted each year using all available sources, including: previous survey responses, the National Inshore Sentinel programme, sales notes data and the fleet register.

Required sampling intensities have been estimated using statistical analysis of the previous year's survey data. The analysis determines required sample size  $n$ , based on the mean of a finite population, to achieve a given level of precision (e.g., a CV of 25% on the sample mean).

$$n = s^2 / \left( \widehat{CV}(\bar{y})^2 \bar{y}^2 + \frac{s^2}{N} \right)$$

Applying the function we can see that for very low CV, all vessels need to be sampled and that the required sample number increases with the standard deviation of the segment. However, due to the finite population function you can never sample more than the full population (census). Some segments have a planned sample rate of 0% as the number of active vessels in the segment are very low ( $n < 5$ ). These segments have been presented in their entirety in Table 3A (Sample Rate 'N') but will most likely be clustered with similar segments which have higher number of vessels for data submission.

#### 4. Description of methodologies used for estimation procedures

Recognising the implications and influences imposed by the voluntary nature of the annual survey on the probability sample survey design standard appropriate raising techniques will be used, to derive final estimates for each variable collected. This methodology was reviewed in 2018, which resulted in a report to assess and improve the raising estimations. Various methods of raising are possible and this report set to establish a theoretical and empirical basis for the decision as to how best to raise sampled economic data to the fleet level.

The mean squared error (MSE) encapsulates the bias and variance of an estimator. The MSE was used as the basis for comparing raising performance. We first derive theoretical expectations on which raising method would work best when there is or is not a relationship with fishing effort. Raising methods were then tested on the real data via re-sampling and appraisal of the ability of various raising methods to recover the true sum. A suite of specifically developed visualisation code assists in appraising the distribution of the data, in particular with identifying outlying values that can overly influence the raised sum.

From the theoretical analyses there were two major conclusions for raising sample data:

1. Where a variable is independent of effort it is best to raise the average to the segment level as the inclusion of unrelated effort adds additional variance to the estimator.
2. Where a variable is proportional to effort, raising based on effort will provide a better estimator as long as the residual variance of the relationship between the economic variable and effort is comparatively small and the strength of the proportionality constant comparatively large. In other words if there is a strong relationship with effort, raise by effort, if not raise by the average. A 'strong' relationship is defined as having less bias associated with raised estimating using this theory.

In accordance with Appendix VI of Commission Decision (2008/199/EC), the Perpetual Inventory Method (PIM) will be applied to estimate capital value and costs for each of the fleet segments.

Capacity indicators and capital value will be estimated for all vessels on the register, regardless of their activity. The following sources will be used to estimate the input parameters to the PIM model:

- Questions on fixed assets, investments, and depreciation from the annual economic survey,
- EU fleet register,
- EU log-book data
- Sentinel vessel programme,

A harmonised FTE will be estimated for each of the fleet segments. For vessels >10 meters in length (LOA), operational data from log-book submissions will be used in the estimation of fishing time on a trip-by-trip basis. In addition, there are several questions on the annual economic survey forms that deal specifically with hours worked and the nature of the engagement (full-time, part-time, casual). Questions regarding gender breakdown and age profiles, education and nationality have been added to the annual survey.

#### 5. Description of methodologies used on data quality

The sampling intensity is based on an analysis of the variance of historic, operational data, as these have proved to be the most uniform, with the aim of achieving a precision of 25% at a 95% confidence level.

Variances within fixed costs have proved much higher than expected and, as such, quality will be measured at a coverage rate, commensurate with the target precision for the non-operational parameters.

Data for the 2020 work Programme will be submitted electronically via interactive PDF forms and website interface to a centralised database, with pre-validation necessary before the accountants can successfully submit the forms. A secondary validation process will be performed on the data once received, and any erroneous data will be queried directly with the vessel owners or their accountants, by survey personnel. Similarly, any erroneous data supplied by vessel owners, contracted under the sentinel vessel programme, will be queried and rectified by survey personnel, as and when it arises, or at the exit interview stage of the programme.

Although error associated with bias and variability will effectively be introduced if observed returns do not match those expected, these descriptors will be reported where possible and with appropriate caveats.

The issue of consistency of data coming from different data sources is recognized as being of significant importance. The introduction of bias in this area, is under continual assessment and is currently being addressed by restricting acceptance of data to a small number of official data streams (i.e. data items consistent with fields in annual company returns (provided via accountants), EU logbook data and Sales notes data).

#### **6. Deviations from Work Plan methodology for selection of data source**

None

#### **Actions to avoid deviations**

None

#### **7. Deviations from Work Plan methodology to choose type of data collection**

There were deviations to the Work Plan methodology in 2021. Prior to 2021, data was collected by a combination of paper-based questionnaire surveys and electronically via interactive PDF forms submitted by email. The MS developed a new online portal for the annual fisheries survey which was launched in 2021 as a means of streamlining the process and allowing for easier transfer into specialised statistical software for detailed analysis. However, some challenges were encountered with the response rate and the transition from the traditional paper-based survey was not as smooth as expected due to IT literacy skills issues amongst the target audience. There was also a Brexit-related tie-up scheme for industry from October to December 2021 (182 vessels participated) which coincided with the online survey dates (i.e. it was launched in October and ran until January 2022).

A combination of the above factors is likely to have also impacted the achieved sample numbers and rates as industry were focused on other matters.

While data collected through the EU register, Logbook and Sales notes (i.e. census data) was used for 2020, to augment the low return rates for the other variables, the MS combined the limited returns for 2020 data from the online survey with 2019 data returns to augment data for the statistical raising to national totals and used the known 2020 landings data to weight the estimates.

#### **Actions to avoid deviations**

MS has initiated two remedial actions to address the challenges with data collection experienced in 2021:

[Supplementary paper-based surveys](#)

- In order to proactively mitigate the online response rate challenges in 2021 and in response to industry feedback, the MS initiated a supplementary paper-based survey in April 2022 to target vessels greater than 12 metres LOA as a temporary measure to address the data gaps arising from the low response rate via the new online portal.

- In addition, as part of the MS's new Inshore Fisheries Strategy, work has commenced to establish a comprehensive profile of the inshore sector (i.e., all vessels under 12 metres LOA). A complete census of the sector will be conducted in the summer of 2022 and repeated on a periodic basis (e.g. every 5 years). A team of survey staff will travel to ports and harbours around the country to conduct the inshore census. This data collected as part of this census will enhance the baseline quality of inshore data for DCF/ EU MAP purposes going forward.

#### Outreach with industry to enhance capacity to complete the surveys

A series of outreach activities with industry are planned in June-July 2022 to target vessel owners in the major fisheries harbour centres around the Irish coastline . The primary aim of this outreach is to run information events and training workshops with industry to improve awareness and increase capacity to utilise the new online survey portal.

It is anticipated that these remedial actions will increase the online survey response rate going forward.

### **8. Deviations from Work Plan methodology regarding sampling frame and allocation scheme**

As a result of the challenges described in relation to return rates (in 7. Deviations from Work Plan methodology to choose type of data collection), the samples rates in Table 3A reflect 2019 and 2020 combined.

#### **Actions to avoid deviations**

As described above, an increased effort in data collection to address the data gaps was initiated in April 2022 through the circulation of a supplementary paper based survey. This will be supported by a complete census of the inshore sector later in 2022 in addition to a series of outreach events to is to run information events and training workshops with industry to improve awareness and increase capacity to utilise the new online survey portal.

### **9. Deviations from Work Plan methodology used for estimation procedures**

None

#### **Actions to avoid deviations**

None

### **10. Quality assurance**

10.1 Sound methodology

Data is collected using methodologies that follow best practices and guidelines of agreed in expert working groups including PGECON/ RCG Econ. Unfortunately in 2021, due to ongoing restrictions associated with Covid – 19 and the introduction of the new online survey, the return from certain segments were much lower than expected, in these instances we used historic data to create an approximate for this years data call.

#### 10.2. Accuracy and reliability

Response rate and Achieved sample rate are provided in Table 3A.

Besides the details regarding accuracy and reliability given in the work plan the MS also runs routine data audits, checks and identification of outliers in our data processing predcures. The data undergoes additional validation and quality checks and is pre-validated prior to data submission.

#### 10.3. Accessibility and Clarity

Are methodological documents publicly available? Yes

Are data stored in databases? Yes

Where can methodological and other documentation be found?

Methodologies for Economic data are available on Ireland’s DC MAP website: [https://www.dcmapp-ireland.ie/sites/default/files/DCF\\_Files/DCF\\_Methodology\\_Economic\\_IRL\\_2020.pdf](https://www.dcmapp-ireland.ie/sites/default/files/DCF_Files/DCF_Methodology_Economic_IRL_2020.pdf)

### SECTION 3: ECONOMIC AND SOCIAL DATA

#### **Pilot Study 3: Data on employment by education level and nationality**

General comment: This box fulfills paragraph 5 point (b) and paragraph 6 point (b) of Chapter III of the Annex Delegated Decision (EU) 2019/910 on the multiannual Union programme; and Article 2 and Article 4 paragraph (3) point (c) of the Implementing Decision (EU) 2016/1701 on the format of the WP. It is intended to specify data to be collected under Table 6 of the delegated decision on the multiannual Union programme.

General comment: This box is applicable to the Annual Report. This box is intended to provide information on the results obtained from the implementation of the pilot study (including deviations from planned and justifications as to why if this was not the case).

##### **1. Aim of pilot study**

Workplan 2017-2019: Assess feasibility of gathering data on social variables from the fisheries and aquaculture sector as listed in Table 6 of the EUMAP multi-annual programme.

In the 2019 and 2020 workplan social variables as listed in Table 6 have been added to the annual fishery and aquaculture surveys.

## **2. Duration of pilot study**

Three years. Data gathering exercise, where necessary, will be designed and commence in 2017. The first round of data will then be available in early formats in 2018. The data collection methodology can be redefined in 2018 based on the initial data gathering exercise and improved upon for data collection in 2018 with output in 2019.

## **3. Methodology and expected outcomes of pilot study**

Data will be collected either by direct census or sample survey and by access to indirect sources if these can be identified.

Following the pilot study in 2018 for the collection of socio-economic data these variables were incorporated into the annual economic survey. In general there was good response to the questions on age, and employment status. However, employment by education level, was difficult to collect. None the less this has also been added to the annual survey.

(max 900 words)

## **4. Achievement of the original expected outcomes of pilot study and justification if this was not the case.**

Survey response rates for these variables range widely for as demonstrated by the data in Table 3A. In 2021, the MS developed and launched a new online portal for the annual collection of economic and social data fisheries with the intention of streamlining the process, allowing for easier transfer into specialised statistical software for detailed analysis. However, some challenges were encountered with the online response rate and the transition from the traditional paper-based survey was not as smooth as expected due to IT literacy skills issues amongst the target audience. There was also a Brexit tie-up scheme for industry from October to December 2021 which coincided with the online survey dates (i.e., it was launched in October and ran until January 2022). This factor is likely to have also impacted the achieved sample numbers and rates as industry were focused on other matters. In total 183 vessels in the large-scale fishery available of the tie-up scheme.

For aquaculture a sample survey design was used as part of the pilot project, targeting 20% of the industry. In 2021, the returns from the sample questionnaire resulted in a varied response rate from the industry (i.e. 1% - 48%) as demonstrated in Table 3B possibly indicating some reluctance to provide information to these variables.

## **5. Incorporation of results from pilot study into regular sampling by the Member State.**

Following the initial pilot project from 2016-2019, variables on employment by education level and nationality are now integrated into the annual collection of national data for fisheries, aquaculture and processing.

For fisheries, communication with the industry and subsequent feedback led to the inclusion of questions on vocational training alongside education level as these are more important and

relevant to the industry. Educational level and vocational training are also collected at an individual crew level together with nationality and gender from 2021.

The data required have been incorporated into annual economic surveys and are now part of the annual data collection for Ireland.

### SECTION 3: ECONOMIC AND SOCIAL DATA

#### **Text Box 3B: Population segments for collection of economic and social data for aquaculture**

General comment: This box fulfills paragraph 6 points (a) and (b) of Chapter III of the Annex of the Delegated Decision (EU) 2019/910 on the multiannual Union programme; and Article 2, Article 4 paragraphs (1) and (5) and Article 5 paragraph (2) of the Implementing Decision (EU) 2016/1701 on the format of the WP. It is intended to specify data to be collected under Tables 6 and 7 of the delegated decision on the multiannual Union programme.

General comment: This box is applicable to the Annual Report. This box should provide information on the implementation of the socio-economic data collection for aquaculture of Member States.

##### **1. Description of methodologies used to choose the different sources of data**

The source of variable data are chosen on the basis of quality consistency and accessibility. Business owners are found to be the best source for input-output production data and employment breakdown and operational costs data. Detailed accounts, when these can be obtained, also provide an accurate source of operational costs and accounts data. These data sources are more detailed than the abridged accounts found on-line which are also obtained.

Economic Data will be collected as part of national grants or training applications and must be provided to obtain these grants. Finally local officers can be called on to provide estimates based on their regular visits to non compliant business. Some raw material input data can be sourced from both the census questionnaire survey and from other agency surveys. Bottom mussel seed data taken from landings data for example, is preferred over the in-house Census source, due to greater proximity to real time and close monitoring of activity. Oyster seed input data from the in-house Census can be compared with import data from other sources for quality assessment.

##### **2. Description of methodologies used to choose the different types of data collection**

The type of data collection used follow in order of choice and/or necessity:

Direct:- census survey and/or sample survey questionnaires to clients,

Indirect:- Online sample survey of Business accounts, aggregated data of other surveys conducted in-house or by other state agencies or a combination of methods where appropriate.

Overall the methods used to collect data for a particular variable are those proven over time to be the most effective in terms of accuracy, continuity of supply and minimum burden on the survey population. Thus production input-output volumes, costs and values and employment breakdown are collected by the direct method of census survey as this approach is a long established practice, easily participated in and appreciated by clients as published results quickly follow the survey. Participation level in the production and employment census is generally about 80% of the total population.

The majority of clients are small operators for whom access to accountants is limited by cost and for many, financial data is sensitive to exposure. Access to full accounts documents from such businesses is limited to those submitted for grants purposes through on-line surveys. However online data however is limited by exemption law and therefore operational costs data and some accounts data is obtained by direct sample questionnaire.

Sample surveys are non random due to the diverse non-homogenous nature of aquaculture segments and business size in the Republic of Ireland. They consist of a questionnaire to a rotating 25% sample of the active commercial businesses annually for operational costs variables, some financial variables not found in abridged accounts and the new socio-economic variables. The latter may be collected by access to indirect sources from existing data collection exercises or from other agencies. Each business is requested therefore to fill a sample questionnaire once every 4 years and a census questionnaire annually. A larger sample of abridged accounts is obtained on-line; 33% of the population annually. This allows for the continuous on-line data collection from indicator companies annually in the larger segments as well as gathering sample data.

### **3. Description of methodologies used to choose sampling frame and allocation scheme**

The census is conducted on all commercial businesses of the population. That is, all businesses producing stock for purposes of sale and profit generation. This means that non-profit state owned enterprises and moribund businesses (no stock, no employment during surveyed period) are excluded from the frame. The 25 % sample is extracted from the same frame as the census. The rotating 25% sample was chosen by choosing a profile through the population, based on average turnover from each aquaculture segment. The segments are from the templates provided, populated by businesses based on Species and culture technique

### **4. Description of methodologies used for estimation procedures**

Data for non participants of the census is estimated in order of preferred method thus:

- Estimate of the local officer in contact with the non survey participant is used if available.
- Average historical performance of the business has been used to predict variables in instances of non-compliance with the survey. The % trend of the nearest participating business. ie if the neighbour

is up n% or down n%, the 'n' trend is applied to the historical average of the non-participant.

If neither option above is possible, indirect data from other agencies can be applied to obtain scale of production activity such as seed input, while abridged accounts will be available on-line if the business is a company.

For sampled variables, national level data is estimated from sample data by summing up the total turnover value of the sample, where individual turnover values were obtained through Census survey, expressing this sample sum as a % value of the national turnover value, also obtained through Census and ascribing this % to the sum values of other sample variables and extrapolating up to the 100 % equivalent values accordingly.

If feed volume data is not acquired by questionnaire then it is generated by applying the average FCR for the species to the weight gained from input weight to sales weight.

The minimum expected wage was calculated by multiplying the national minimum wage by the FTE of the segment obtained through census. The addition of the new related variables 'number of unpaid' and number of hours worked by them may simplify estimations.

The imputed value of unpaid labour is obtained by comparing the sample-estimated value of Wages and Salaries per segment with the value of the product of minimum wage and FTE of the segment, obtained from the census. If the estimated value of the former is less than the value of the latter then the difference is the imputed value of unpaid labour

#### **5. Description of methodologies used on data quality**

Variable data obtained from both questionnaire and indirect sources such as from other in-house or other agency data or business accounts are compared and the data used will be from the most competent source. Bottom mussel seed input data is taken from landings data if available rather than from the census due to the formers recording at the point of fishing activity. The census is chosen as the best source for oyster seed input due to its recording of what was actually input over what was intended to be input. Turnover, employment and other variables are comparable between questionnaire and accounts sources depending on the style of accounts presentation. To aid in this, only accounts by calendar years are used to compare with calendar based census to check the quality of the latter data source.

#### **6. Deviations from Work Plan methodology for selection of data source**

No deviations.

#### **Actions to avoid deviations**

None.

#### **7. Deviations from Work Plan methodology to choose type of data collection**

No deviations.

**Actions to avoid deviations**

None.

**8. Deviations from Work Plan methodology regarding sampling frame and allocation scheme**

A census approach is the primary source of data for a number of variables (e.g. gross sales per species, FTE national, employment by gender etc.). Secondary data is also collected for these variables for data validation reasons only and the corresponding achieved rates tend to be lower than the achieved census rates.

There are ongoing challenges with data collection by questionnaire for certain variables (e.g. energy costs, repair and maintenance, other operating costs etc.) However, increased sample numbers and return rates for some variables in certain species (e.g. salmon, mussel, oyster) were recorded for other income, personnel costs and total value of assets). This was due to a Covid aquaculture support scheme in 2020 being tied to Annual Aquaculture Production and Employment Surveys and high levels of return continued into 2021.

**Actions to avoid deviations**

Continued communication with industry to encourage enhanced provision of data for all variables in the future.

**9. Deviations from Work Plan methodology used for estimation procedures**

No deviations.

**Actions to avoid deviations**

None

**10. Quality assurance**

**10.1 Sound methodology**

Data is collected using methodologies that follow best practices and guidelines as agreed in expert working groups including PGECON/RCG ECON

**10.2. Accuracy and reliability**

Response rate and Achieved sample rate are provided in Table 3B.

Besides the details regarding accuracy and reliability given in the work plan, the MS also runs routine data audits, checks and identification of outliers in our data processing procedures. The data undergoes additional validation and quality checks and is pre-validated prior to data submission.

**10.3. Accessibility and Clarity**

Are methodological documents publicly available?

Yes

Are data stored in databases?

Yes

Where can methodological and other documentation be found?

On the IRL DCF Website. [https://www.dcmapi-ireland.ie/sites/default/files/DCF\\_Files/DCF\\_Methodology\\_Economic\\_IRL\\_2020.pdf](https://www.dcmapi-ireland.ie/sites/default/files/DCF_Files/DCF_Methodology_Economic_IRL_2020.pdf)

## SECTION 3: ECONOMIC AND SOCIAL DATA

### **Pilot Study 4: Environmental data on aquaculture**

General comment: This box fulfills paragraph 6 point (c) of Chapter III of the Annex of the Delegated Decision (EU) 2019/910 on the multiannual Union programme; and Article 2 and Article 4 paragraph (3) point (d) of the Implementing Decision (EU) 2016/1701 on the format of the WP. It is intended to specify data to be collected under Table 8 of the delegated decision on the multiannual Union programme.

General comment: This box is applicable to the Annual Report. This box is intended to provide information on the results obtained from the implementation of the pilot study (including deviations from planned and justifications as to why if this was not the case).

#### ***1. Aim of pilot study***

Assess feasibility of gathering environmental data from aquaculture sector in terms of data quality and consistency over a time period.

#### ***2. Duration of pilot study***

Three years, 2017-2019. Data collection will collection into 2020.

#### ***3. Methodology and expected outcomes of pilot study***

Data will be collected by direct census survey and by access to indirect sources if these can be identified and collated. The amount of chemical use in Irish aquaculture is miniscule given its organic status and extensive nature. It is not known what level of data quantity or quality will be gathered for Chemical/medicinal inputs. The percentage of mortality should be gathered to a reasonable level of accuracy for intensive mollusc culture such as oysters but it will be more difficult in the case of extensive bottom cultures such as bottom mussels and native oysters.

Data collection of these two variables have proved difficult as enterprises are unsure as to why mortalities are being collected.

#### **4. Achievement of the original expected outcomes of pilot study and justification if this was not the case.**

Essentially, the environmental variables were incorporated into the mainstream survey from the outset. The pilot study element was the initial response rate which has built up over the years following introduction to the questionnaire.

Data was collected by direct census survey. Access to indirect sources of data for meds and chemical input did not materialise and data was only acquired successfully by questionnaire. The amount of chemical use in Irish aquaculture is miniscule given its organic status and extensive nature. The percentage of mortality data was gathered to a reasonable level of accuracy for intensive mollusc culture such as oysters. Data from Finfish units was collected by a combination of direct questionnaire answers and derivation from numbers input and output, also obtained by questionnaire. In the case of extensive bottom cultures such as bottom mussels and native oysters, some seed mortality estimates were offered on questionnaires.

The results followed expectations. There is solid mortality data direct from the shellfish sectors and some direct and ample raw data that could be used for proxy estimation for finfish mortality if suitable corrective formulae can be found and applied. Collection of medicines or treatments data has been gathered and probably reflects the relatively miniscule amounts required to service the handful of small land based non-Organic units needing and permitted to use such.

#### **5. Incorporation of results from pilot study into regular sampling by the Member State.**

From 2019 onwards, both environmental variable data are requested by direct census questionnaire for all segments. The collection of medicines or treatments is largely irrelevant for the mainly organically-certified Irish industry, nevertheless it is included on the questionnaire and achieves a useable response level for estimation purposes of around 10-20%.

### SECTION 3: ECONOMIC AND SOCIAL DATA

#### **Text Box 3C: Population segments for collection of economic and social data for the processing industry**

General comment: This box fulfils footnote 6 of paragraph 1.1(d) of Chapter III of the Annex of the Delegated Decision (EU) 2019/910 on the multiannual Union programme; and Article 2, Article 4 paragraphs (1) and (5) and Article 5 paragraph (2) of the Implementing Decision (EU) 2016/1701 on the format of the WP. It is intended to specify data to be collected under Table 10 of the delegated decision on the multiannual Union programme.

General comment: This box is applicable to the Annual Report. This box should provide information on the implementation of the socio-economic data collection for aquaculture of Member States.

#### **1. Description of methodologies used to choose the different sources of data**

The data collection scheme for all processing sector variables may be collected on a voluntary basis as per

Table 11 of Commission Implementing Decisions (EU) 2016/1251. The data source for the target population is the national database of registered processing companies in the seafood sector.

Data in relation to employment will be gathered in an annual employment survey which is circulated to every seafood processing company in the Republic of Ireland. Data collected relates to Table 11 of Commission Implementing Decisions (EU) 2016/1251. Data is for economic data, or non-responses, is augmented from Abridged Company accounts.

Data for all other variables will be collected by

- Data submitted voluntarily by processing enterprises via questionnaire
- Abridged Company accounts

## **2. Description of methodologies used to choose the different types of data collection**

Total population sampling will be by non-probability sample survey for all variables excluding employment data which will be gathered by census method. Economic survey returns are obligatory for those companies applying for grant aid.

## **3. Description of methodologies used to choose sampling frame and allocation scheme**

Examining the total number employed by each processor in 2017, there were 86 companies in the “≤ 10” category size, 45 in the “11 – 49” category, and 26 in the “50 – 249” category. A survey sampling rate of 10% in the “≤ 10” category, 30% in the “11 – 49” category, and 35% in the “50 – 249” category is deemed sufficient coverage to get a good representative sample of the sector. This represents a total of 31 companies, or 19% of the total population. As the majority of seafood processing companies in Ireland are limited liability (Ltd) companies they are required to publish abridged accounts on an annual basis. The Member State will carry out an analysis of these audited accounts through the Companies Registration Office (CRO) to augment the survey data.

Although the voluntary nature of the annual survey prevents the practical development of the sampling frame, the development of such innovation will represent a core function of the DCF staff group.

## **4. Description of methodologies used for estimation procedures**

Recognising the implications and influences imposed by the voluntary nature of the annual survey on the census survey design the best statistical methods will be utilised to derive final estimates for each variable collected.

An estimation of unpaid labour, in any, by family members or other will be ascertained by using best information available in relation to unpaid labour and using total employment and average wages, or national minimum wage, and salaries as an estimator. A question was added to the questionnaire to gather the

information on this variable but to date there has been a very low response rate to this question.

Employment will be collected by total engaged in the sector by enterprise, and a national FTE based on the average industrial working week of 40 hours with 20 days annual leave and 9 public holidays. This equates to 230 working days, or 1840 hours annually. This compares with 2000 hours as recommended for a harmonised EU FTE, as stated in Study No FISH/2005/14 “Calculation of labour including FTE (full-time equivalents) in fisheries.

For all other variables the company questionnaire and the abridged company accounts will be examined to complete these parameters.

#### **5. Description of methodologies used on data quality**

There are no stated precision requirements for collecting data in the processing industry sector. As such, the Member State is using the percentage coverage of the size categories as the measure of quality. For some parameters, a census will be conducted from publicly available sources. These include employment statistics. The format of the abridged accounts of companies vary significantly in the detail supplied, necessitating the Member State to request additional information from those companies selected in the sampling frame where the data are lacking in the published accounts. This is currently run on a voluntary basis, and hence the quality of the data is dependent on compliance within the industry. Certain data collected via questionnaire will be validated, where possible, against their published end-of-year abridged accounts.

(max 1000 words)

#### **6. Deviations from Work Plan methodology for selection of data source**

There were no deviations

##### **Actions to avoid deviations**

None

#### **7. Deviations from Work Plan methodology to choose type of data collection**

For the collection of 2017 data onwards, one questionnaire was used for all variables including employment categories which previously had been collected on two forms. Many of the variables' data was also supplied from abridged accounts obtained online. Whereas the returns from the questionnaire were poor; under 10% for certain costs and employment category variables, many companies could be sampled from the online source increasing the data sources for many variables.

##### **Actions to avoid deviations**

None. The deviation was considered to be a methodological improvement.

#### **8. Deviations from Work Plan methodology regarding sampling frame and allocation scheme**

No deviations

**Actions to avoid deviations**

None

**9. Deviations from Work Plan methodology used for estimation procedures**

No deviations

**Actions to avoid deviations**

None

**10. Quality assurance**

**10.1 Sound methodology**

Data is collected using methodologies that follow best practices and guidelines as agreed in expert working groups including RCG ECON.

**10.2. Accuracy and reliability**

Response rate and Achieved sample rate are provided in Table 3C.

**10.3. Accessibility and Clarity**

Are methodological documents publicly available?

Yes

Are data stored in databases?

Yes

Where can methodological and other documentation be found?

Provided on the IRL DCF website. [https://www.dcmapp-ireland.ie/sites/default/files/DCF\\_Files/DCF\\_Methodology\\_Economic\\_IRL\\_2020.pdf](https://www.dcmapp-ireland.ie/sites/default/files/DCF_Files/DCF_Methodology_Economic_IRL_2020.pdf)

SECTION 4: SAMPLING STRATEGY FOR BIOLOGICAL DATA FROM COMMERCIAL FISHERIES

**Text Box 4A: Sampling plan description for biological data**

General comment: This box fulfills Article 3, Article 4 paragraph (4) and Article 8 of the Implementing Decision (EU) 2016/1701 on the format of the WP and forms the basis for the fulfilment of paragraph 2 point (a)(i) of Chapter III of the Annex of the Delegated Decision (EU) 2019/910 on the multiannual Union programme. This Table refers to data to be collected under Tables 1(A), 1(B) and 1(C) of the delegated decision on the multiannual Union programme.

General comment: This box is applicable to the Annual Report. This box should provide information on the deviations from the planned sampling of Member States.

Description of the sampling plan according to Article 5 paragraph (3) of this Decision  
(*max 900 words per Region*)

### **Sampling for population parameters (sex ratio and maturity) of demersal species**

These parameters are generally collected on surveys (sampling plans described in Text Box 1G).

#### **Sampling on shore- demersal and pelagic fish species**

Guidelines: ICES WGCATCH (statistically sound sampling)

Purpose: Length, age, weight data of landings and sex/maturity of demersal and pelagic landings

Design: Class C - sites x time

Expected difficulties: Refusals related to landing obligation

Data archiving: Secure SQL database and RDB

Quality assurance: Data entry checks and database validation, visual inspection of outliers

Analysis: Estimation procedure adapted from COST project.

Sampling frame: top 21 ports x time for demersal, and top 7 ports for pelagics

Sample selection PSU: Port-quarter - random, weighted by weighted by landings in previous 2 years.

Sample selection SSU: Stock – ad-hoc, based on target number of samples per stock

Sample selection TSU: Size grade – ad-hoc, at least one box per grade

Coverage: sampled ports receive >95% of landings of demersal and pelagic species into Ireland (3% of demersal landings and 15% of pelagic landings are in foreign ports which are covered under bilateral agreements ( see table 7c); <1% of the total landings are sampled.

Stratification: 5 regions, 4 quarters

Targets: 1) number of port visits; 2) number of samples per stock; 3) number of age structures per sample

Quality: No major bias identified, targets are based on optimising precision for 26 demersal stocks and 9 pelagic stocks

#### **Demersal at-sea and Pelagic at-sea**

Guidelines: ICES WGCATCH (statistically sound sampling)

Purpose: Length, age, weight data of discards and landings of demersal species & Pelagics (excluding Nephrops)

Design: Class A - vessels x time

Expected difficulties: Refusals, mainly related to landing obligation; logistics

Data archiving: Secure SQL database and RDB

Quality assurance: Data entry checks and database validation, visual inspection of outliers

Analysis: R code and markdown

Sampling frame: vessels x time

Sample selection PSU: vessel x time –random draw list, weighted by landings in previous years

Sample selection SSU: haul – ad-hoc, dictated by rest periods

Sample selection TSU: discard sample – random box

Coverage: around 1% of the total number of trips are sampled.

Stratification: 3 vessel groups (based on main fishing areas),( see xl table 4a for details ) 4 quarters for demersals, 5 regions, 2 quarters for pelagics

Targets: 1) number of observer trips; 2) number of hauls per trip 3) representative amount of commercial fish sampled per haul/trip 4) All discard fish measured per sample unit

Quality: Possible bias due to refusals, precision is determined by number of trips.

As Covid-19 restrictions and advice resulted in the temporary suspension of the At Sea Sampling aboard commercial vessels the Marine Institute in consultation with industry have set up an At Sea Self Sampling Program in order that skippers and crews can collect data and samples at sea to mitigate for this loss. The At Sea Self Sampling Program allows for the vessels to collect data and samples from a subset of hauls during the fishing trip. For one haul per day, haul specific metadata is collected by the skipper on Start and Stop of Latitude and longitude, Date & Time, as well as Bulk catch (kg), and Landed catch (kg by species) for the selected haul. A random box of Unwanted Catch is collected from the haul and is labelled and stored on ice. On vessel landing Marine Institute staff collect the datasheets and the samples for further processing. All associated data from the At-Sea Sampling trip is entered onto a central database for later analysis. While this has been designed as a mitigating measure in 2020 we expect to continue with the program in 2021 while the Covid situation lasts and thereafter look at piloting the At Sea Self Sampling as an extra data stream to augment the At Sea Sampling with Samplers at sea. The At Sea Self Sampling program can potentially bring vessels excluded from the At Sea Sampling due to limited accommodation back into our sampling frames.

#### **Crustacean at-sea Sampling on shore for Nephrops**

Guidelines: ICES WGCATCH (statistically sound sampling), WKNEPH (2013)

Purpose: Length, sex, maturity data of discards and landings

Design: Class A - vessels x time

Expected difficulties: Refusals, mainly related to landing obligation; logistics

Data archiving: Secure SQL database

Quality assurance: Electronic data capture. Quality assurance using NEMESYS software

Analysis: R code and markdown

Sampling frame: vessels x time

Sample selection PSU: vessel x time – currently ad-hoc, will move to sampling a reference fleet.

Sample selection SSU: haul – ad-hoc

Sample selection TSU: discard sample – random box, catch sample – random box, graded landings (FU16)

Coverage: around 1% of the total number of trips are sampled.

Stratification: 6 FUs, 4 quarters

Targets: 1) number of trips

Quality: Possible bias due to refusals, bias due to seasonal variation, precision is determined by number of trips

#### **Crustacean at-sea Molluscs at-sea (crab lobster, bivalves)**

Guidelines: ICES WGCATCH (statistically sound sampling)

Purpose: Length, weight data of discards and landings of shellfish (except Nephrops), biomass estimates for bivalves

Design: Class A - vessels x time, stratified random or grid research surveys for bivalves

Expected difficulties: Refusals, logistics, weather

Data archiving: Secure SQL database

Quality assurance: Data entry checks and database validation, visual inspection of outliers

Analysis: R, Arcmap, spatial analysis

Sampling frame: crustaceans: vessels x time, bivalves: stock distributional extent for bivalves

Sample selection PSU: crustaceans: vessel x time – currently ad-hoc. Bivalves: haul

Sample selection SSU: census, all hauls sampled

Sample selection TSU: random sample or total catch

Coverage: crustaceans: <1% of the total number of trips are sampled (Inshore fleet). Bivalves: full coverage of geographic stock distribution area by survey

Stratification: crustaceans: 5 regions, 3 quarters, Bivalves: by species and stock area  
Targets: 1) number of catch sampling trips; 2) number of hauls per trip  
Quality: Crustaceans: Possible bias due vessel selection (mainly larger vessels are sampled)

Fishery dependent self-sampling data potentially enables a significant increase in data volume for both transversal and biological variables. Self-sampling data are regularly collected for shellfish under Ireland's sentinel vessel programme for vessels under 12m and by arrangement with individual vessel operators. Data on catch, effort, by-catch including PET species and size distribution data by species is collected. Data are collected using paper based and electronic methods. Validation for some variables such as location and PET species is through mobile phone GPS, VMS and geotagged images and video. This programme will be enhanced in 2021 and will reduce the risk of under sampling due to Covid-19 restrictions on access to vessels by observers.

### **Sampling on shore (crab lobster, bivalves, whelks)**

Guidelines: ICES WGCATCH (statistically sound sampling)

Purpose: Length, age (where possible), weight data of landings of shellfish species (Pecten, Homarus, Cancer, Buccinum)

Design: Class C - sites x time

Expected difficulties: Prior grading of landings, time constraints at processing plants

Data archiving: Secure SQL database and RDB

Quality assurance: Data entry checks and database validation, visual inspection of outliers

Analysis: Estimation procedure adapted from COST project where possible

Sampling frame: ports targeted based on location of >80% of landings.

Sample selection PSU: Fishing trip or 'fishing trip x ICES rectangle' or 'bulk landing'

Sample selection SSU: Unit of landing (box, bag, tank)

Sample selection TSU: Size grade – ad-hoc

Coverage: sampled ports receive >80% of landings of Pecten and Buccinum >80% and >20% of landings of Homarus and Cancer. <1% of trips sampled.

Stratification: 3 regions, 6-9 months

Targets: 1) number of port visits; 2) number of samples per stock; 3) number of age structures per sample where possible

Quality: poor identification of origin in bulk landings, bias due to poor spatial coverage

Deviation from the sampling plan according to Article 5 paragraph (3) of the Implementing Decision (EU) 2016/1701:

## **2. Deviations from the Work Plan**

Overview of fisheries with shortfalls:

### Sampling Onshore

No Sampling ashore, in processors for crab, lobster and whelk was possible in the North – West and South East (IRL NW 8, IRL SE 8, IRL SE 12) due to the Covid – 19 global pandemic, and denied or restricted access due to concerns by owners for worker's health and safety.

Nephrops: IRL E8: Was also under sampled with decreased landings, however the data collected was sufficient to support assessments.

Pelagic: Small pelagic fish (IRL NE2,) were also under sampled and no sampling was possible for small pelagic fish in the North (IRL N2) due to Covid – 19 restrictions.

### At Sea Sampling

The at sea sampling programme continued to be severely disrupted across all regions and fisheries, by the Covid – 19 pandemic and the resulting public health restrictions, with the programme being suspended from mid – March 2020 and throughout 2021. A first off shore trip has taken place in May 2022 and it is hoped to re – launch the observer at sea programme fully in 2022.

However, as a result in 2021:

No observer trips at sea were achieved for the following: IRL E 2, IRL SE8, IRL IRLWSW 5 and IRL N1

Less trips than planned were achieved for the following, due to Covid – 19 restrictions and the suspension of the at sea observer programme.

Pelagic at sea: IRL NW 2, IRL WSW 6 IRL SE4 and IRL NE1

Crustaceans at sea: IRL E 6, IRL WSW 8

Demersal at sea: IRL DS 6ab, and IRL DS 7a

### External Drivers for shortfalls:

In 2021 the external driver for shortfalls in the achievement of sampling targets on land and at sea, across all fisheries was the Covid – 19 global pandemic, which led to the suspension of the Observer at Sea programme from mid-March 2020, a suspension that remained in place throughout 2021. The pandemic also adversely affected the Marine Institutes ability to access sampling events ashore, in fishermen’s Co – Op’s, auction halls and in fish and shellfish processors throughout 2021. Further details on the effect of the Covid – 19 global pandemic on sampling can be seen in Text Box 1C

### Ireland's Vessel Tie – Up Scheme Q4 2021

The Irish Government launched and operated a Vessel Tie Up Scheme in Q4 of 2021. The purpose of the scheme was to temporarily mitigate the negative impacts on the white fish sector from:

1. The reduction in quotas for 2021 arising from the Trade and Cooperation Agreement. The Scheme aims to mitigate losses associated with certain stocks included in Annex FISH.1 and FISH.2 of the TCA.

2. Difficulties in accessing UK waters or third country waters due to Brexit.

The scheme was designed to support white fish vessels in the Polyvalent and Beam Trawl segments to temporarily cease all fishing activity in a particular calendar month, thus increasing the quota available for remaining vessels. The grant aided vessels in question could not engage in fishing activity of any sort for the duration of the grant aided period and had to remain in port throughout the month. Vessels could participate on the scheme for a maximum of two months

In 2021 a total of 183 vessels availed of the scheme and were tied up at various times between October and December 2021.

### Internal drivers:

In 2021 one permanent member of staff remained unable to go to sea for medical reasons.

### **3. Action to avoid deviations**

#### Commercial Port Sampling Ashore

Covid – 19 Level 5 restrictions (full lockdown) were re-introduced at midnight on the 31st of December 2020 and remained in effect in Ireland until the 10th of May 2021.

These restrictions had a direct effect on the Marine Institute's ability to access samples ashore in Fishermen's Co – Op's, Auctions Halls and fish and shellfish processors. In some areas fishing vessels continued to conduct shorter trips, only fishing subject to buyer demand/requests, resulting in very little fish being available to buy & sample and not a large mix of species. However, fishing and subsequently landings increased again during the Summer months and remained steady until the vessel tie up scheme came into effect in Q4 2021.

Throughout 2021 local fishermen's Co-Op, and auction halls remained accessible in the most part, but under strict protocols, which dictated that sampling could only be completed by Marine Institute staff, outside normal working hours when the Co – Op, auction hall workers were not present. This necessitated a lot of weekend work or overnight sampling, getting in and out before workers arrived around 7am. In one Co – Op, only a single designated member of Marine Institute staff was allowed to sample throughout 2021.

Sampling was completely denied from a number of fish and shellfish processors around the country for the first 5 months of 2021, with one location remaining closed to sampling throughout 2021. Access increased during the summer but was again curtailed with the surge in covid numbers in Q4 2021. Two of the main fish and shellfish processors in the South – East did re – open to Marine Institute staff in 2021, however there were ad hoc issues gaining access, throughout 2021, due to workers at these locations testing positive for Covid.

Marine Institute staff continue to work closely with all Auction Hall, Co – Op, and fish and shellfish processor managers to ensure access to landings for sampling events, and continued to adapt to and adhere to all Covid - 19 restrictions in place locally throughout 2021

Additional Port Contract Samplers were also recruited for strategically important landings/areas. throughout 2021, with a focus on the collection of length measurements to support and bolster the traditional port sampling programme. These are generally people who live locally and who also have good connections to the sampling locations of interest.

#### Communication and outreach

An internal Industry Liaison team leader post was recruited in Q3, 2019. With a view to increasing direct engagement with the Irish fishing industry through phone/email communication as well as meetings with fishermen's representative organisations and port visits to speak directly with fishermen about the Catch Sampling program, when this is again possible.

On – going efforts are being made to gain entry again to inshore shellfish processors, with local Marine Institute staff keeping in regular contact with these processors. Sampling was re – established at one shellfish processor in the North West in 2021, which had been closed to Marine Institute staff throughout 2020.

#### Adapting Sampling Programmes

To mitigate for the loss of at sea sampler coverage an 'At Sea Self Sampling Programme' was initiated in 2020 in collaboration with the Irish Fishing Industry and this programme continued in

2021, and was the main source of data collection at sea from the offshore fleet throughout last year. The skippers and crews collected data and samples from a subset of the hauls and brought these data and samples ashore for Marine Institute staff to work up, while adhering to all public health guidelines. This measure has ensured that data flow is maintained and has ensured that the working relationship between the Marine Institute and the industry is preserved.

Each vessel is contacted individually following 4S methodologies for selection in advance of a possible trip and the skipper is trained remotely and supplied with a sampling pack pre sailing. Participating skippers record data on haul start & stop positions, date and time, estimate the Bulk catch, record observations on bird, mammal, reptile interaction record by kg /species what catch is wanted and take one random box of Unwanted catch for measurement ashore by Marine Institute staff. On sailing the participating skipper maintains contact with the Fisheries Liaison Team Leader and quality assurance checks are performed during the trip via WhatsApp. The samples generated by this programme, have resulted in an increased resource requirement ashore which is however offset by the lack of commercial sea time for staff.

In 2021, 63 inshore trips were achieved. 64 demersal trips and 13 pelagic trips were also achieved.

In 2021 The Marine Institute continued the partnership project with the Irish Tuna Fishery Improvement Project FIP (<http://www.irishtunafip.ie/>) where the Irish Tuna fleet employ a crew member to self-sample data during the Albacore fishery working to the Marine Institute's standard operating procedures. The crew member was trained by the Marine Institute and delivered the data to Marine Institute for entry/analysis. This resulted in 3 albacore tuna trips from the Irish fleet fishing in the Bay of Biscay.

The FU16 At Sea Self sampling programme for Nephrops initiated in 2020, another Covid-19 mitigation measure, was continued and expanded in 2021. A number of vessels participated in this new sampling programme with 10 trips achieved.

During 2021 the Marine Institute in conjunction with Inland Fisheries Ireland ran an At Sea Sampling - Angling Charters programme where samplers sailed with commercial charter angling skippers and recorded the catch from recreational fishing. This is part of a wider project to increase the data available for commercial fisheries from the recreational catching sector. A total of 40 trips were carried out on various charter vessel on the Irish Coast.

A welcome addition to the sampling programme in 2021 was the active participation of vessels from the beam trawl fleet. We hope that this introduction via the At Sea Self Sampling programme will lead to greater participation in the Sampler at Sea programme post Covid-19 from this and other fleets.

In 2020 a total of 26 vessels participated in the At Sea Self Sampling Programme, for 2021 this was increased to 35 active vessels, many of which were new to the programme. Assessment is on – going as to the merits of maintaining this dual stream of fisheries dependant data 1) from the self-sampling programme and 2) from the At Sea Sampling (Observer) Programme on board commercial vessels. This approach, continues to facilitate an increase in vessel participation as the At Sea Self Sampling program is not limited by the availability of accommodation on-board vessels for observers.

Throughout 2021 our approach has been first and foremost influenced by the Covid - 19 restrictions as they stand. We hope to expand our At Sea Self Sampling Programme to encompass extra metiers by modifying and developing new protocols and recruiting new vessels to the programme.

Ultimately, post Covid, the aim is to build on the partnerships developed by the Industry Liaison with the At Sea Self Sampling Programmes in the hopes of increasing the number of fishers accommodating observers aboard their vessels when it safe to do so. A first step has been taken in May 2022, with the first off – shore trip being completed successfully, to test updated safety protocols.

It is hoped that the Enhanced Catch Sampler pilot scheme (Having identified the fact that sampler availability was an external factor contributing to shortfalls in previous years, a recruitment campaign was initiated in 2020 for the ‘Enhanced Catch Sampling Pilot Scheme.’ Under this scheme two additional at sea samplers were to be recruited on a contract that ensured a minimum 100 days at sea each, with an additional retainer paid to the sampler to guarantee availability.) will also be re-instated and made operational in 2022 when a full risk assessment has been made, deeming it safe for staff and contractors to return to at sea sampling, on board commercial vessels.

The At Sea Self Sampling Programme will be re-assed post Covid to investigate fully the merits of maintaining a dual stream of fisheries dependant data 1) from the self-sampling programme and 2) from the Observer Programme on board commercial vessels. This approach could also facilitate an increase in vessel participation as the At Sea Self Sampling program is not limited by the availability of accommodation on-board vessels for observers.

## SECTION 5: DATA QUALITY

### **Text Box 5A: Quality assurance framework for biological data**

General comment: This box is applicable to the Annual Report. This box fulfills Article 5 paragraph (2) point (a) of the Implementing Decision (EU) 2016/1701 on the format of the WP. This box is intended to specify data to be collected under Tables 1(A), 1(B) and 1(C) of the Annex of the Delegated Decision (EU) 2019/910 on the multiannual Union programme. Use this box to provide additional information on Table 5A of the Annual Report.

#### **1. Evidence of data quality assurance**

##### All sampling schemes

In order to ensure excellence and continued development in data collection and delivery the Marine Institute has adopted a Data Management Quality Management Framework (QMF) to guide all its data management processes from collection, storage, quality control, provision and statutory reporting. This targets improved data quality by assuring the quality of the data management processes that produce, manage, analyse and report data with associated

metadata. Further information is available at <https://www.dcmmap-ireland.ie/documents/methodologies>

The Marine Institute submitted the QMF to the International Oceanographic Data and Information Exchange (IODE) programme of the Intergovernmental Oceanographic Commission (IOC) of UNESCO to be considered as an ‘accredited’ national data centre - this IODE accreditation was awarded in Feb 2019.

Data management activities are documented using a QMF implementation pack - two further datasets were brought under QMF implementation pack status in 2021, giving a total of 13 fisheries datasets now under IODE accreditation. The flow of data, from collection to end product within the Marine Institute, has been visually described using a process flow. Each flow is linked to the relevant written instructions or Standard Operating Procedures (SOP) which describe the details of each step within the flow. The process of ensuring these SOPs are up-to-date started during 2018 and continues to date.

It should be noted that due to the ongoing restrictions related to the pandemic during 2021 a number of our usual protocols and procedures had to be adapted (e.g. instigating a self-sampling programme to compensate for the temporary suspension of at-sea sampling). For details of the at sea self-sampling programme, please refer to Text Box 1C.

In 2020 a project was started to migrate databases from servers managed by the Fisheries & Ecosystem Advisory services (FEAS) service area to centralised database servers. This will enable more consistent data management processes to be applied throughout the Marine Institute and begins the process of creating shared resources such as vocabulary servers, and common data access methods. The majority of the FEAS databases were migrated during 2021 – the small number remaining will be migrated during 2022.

Work continues on documenting new SOP’s and process flows and in conducting annual reviews and updating of existing SOP’s and process flows, for all aspects of sampling on shore and offshore, through Paradigm 3 (P3) which is the quality and document control software adopted by the Marine Institute.

The documentation available at <https://www.dcmmap-ireland.ie/documents/methodologies> was reviewed, updated, and re-organised during 2021 to make it more useful for end-users.

## **2. Sampling design**

### All sampling schemes

Generally sampling scheme documentation is available at <https://www.dcmmap-ireland.ie/documents/methodologies> in line with internationally agreed best practice, WGCATCH and EU Commission recommendations. Any deviations from this are noted for the individual sampling schemes listed below.

## **3. Sampling implementation**

#### All sampling schemes

Non-responses/ refusals are recorded as per Table 5A. Any deviations from this are noted for the individual sampling schemes listed below.

#### **4. Data capture**

##### All sampling schemes

Generally data checks are available at <https://www.dcmmap-ireland.ie/documents/methodologies> as per Table 5A. Any deviations from this are noted for the individual sampling schemes listed below.

#### **5. Data Storage and 6. Data Processing**

The details of Data Storage and Data Processing are noted below for each sampling scheme from Table 5A. These sections also include details of any deviations for Sampling Design, Sampling Implementation, and Data Capture.

##### Demersal at-sea

#### **Data Storage**

Data is held nationally on the Demersal Discards database – this continues to be maintained and developed. Detailed data is uploaded to the Regional Database (RDB).

#### **Data processing**

Examples of scripts to evaluate precision and bias, and editing and imputation have been uploaded to <https://www.dcmmap-ireland.ie/documents/methodologies>

##### Pelagic at-sea

#### **Data Storage**

Data is held nationally on the Pelagic Discards database – the process to re-specify and upgrade this database application was planned to begin during 2021 but due to other events has been postponed to 2022.

#### **Data processing**

Scripts to evaluate precision and bias, and editing and imputation are currently only available locally. It is intended to upload them to <https://www.dcmmap-ireland.ie/documents/methodologies> once any confidential information (e.g. database connection details) is redacted.

##### Crustacean at-sea (Nephrops)

#### **Data Storage**

Data is held nationally on the Nemesys database – this continues to be maintained and developed. Detailed data is uploaded to the Regional Database (RDB)

### **Data processing**

Scripts to evaluate precision and bias, and editing and imputation are currently only available locally. It is intended to upload them to <https://www.dcmmap-ireland.ie/documents/methodologies> once any confidential information (e.g. database connection details) is redacted.

### Crustacean at-sea (pots) / Molluscs at-sea (whelks/scallops/other bivalves)

### **Sampling implementation**

These schemes do not fall under 4S sampling, so non-responses/refusals are not recorded.

### **Data Storage**

The Shellfish Database is used to store this data nationally – this includes survey, port and at sea observer data collected on a range of shellfish species to include crab, lobster, whelk and bivalves. An Upload Utility has been built in-house to transfer the historic datasets that have been stored in flat Excel files.

A new front end GUI (Graphical User Interface) was completed during 2021 and will be used from 2022 onwards. It includes data validation checks, mandatory fields, links to centrally controlled reference tables and other functions which will enable the user to enter the data in an efficient, quality controlled manner.

### **Data processing**

Scripts to evaluate precision and bias are currently only available locally. It is intended to upload them to <https://www.dcmmap-ireland.ie/documents/methodologies> once any confidential information (e.g. database connection details) is redacted.

The protocols regarding editing and imputation will be completed once the GUI is fully tested and ready for roll out.

### Sampling on shore

### **Data Storage**

Data is held nationally on the Stockman database – this continues to be maintained and developed. For example, changes to sample target reports have been made to better monitor and manage sampling effort during the year. Detailed data is uploaded to the Regional Database (RDB)

### **Data processing**

Examples of scripts to evaluate precision and bias are available at <https://www.dcmmap-ireland.ie/documents/methodologies>, along with a summary of editing and imputation processes.

### Recreational Survey - Angling catch reports in the Burrishoole

**Sampling design**

Documentation available at <https://www.dcmmap-ireland.ie/documents/methodologies>

**Data capture**

Data checks are currently only available locally. It is intended to upload them to <https://www.dcmmap-ireland.ie/documents/methodologies>

**Data Storage**

Data is held nationally on Excel spreadsheets. There is currently no international database for recreational data. Data is published annually in the Newport Research Facility's Annual report. The most recent report can be found here: <https://oar.marine.ie/handle/10793/1725>

**Data processing**

Scripts to evaluate precision and bias, and editing and imputation are currently only available locally. It is intended to upload them to <https://www.dcmmap-ireland.ie/documents/methodologies>

Biological sampling Salmon (electrofishing)**Data capture**

Data checks are currently only available locally. It is intended to upload them to <https://www.dcmmap-ireland.ie/documents/methodologies>

**Data Storage**

Data is held nationally on Excel spreadsheets. There is currently no international database for recreational data.

**Data processing**

Scripts to evaluate precision and bias, and editing and imputation are currently only available locally. It is intended to upload them to <https://www.dcmmap-ireland.ie/documents/methodologies>

Biological sampling/Recreational catches Salmon - National Coded Wire Tagging programme**Sampling design**

Documentation available at <https://www.dcmmap-ireland.ie/documents/methodologies> in line with internationally agreed best practice, and EU Commission recommendations.

**Sampling implementation**

Non-responses/ refusals are not recorded as they are not applicable

**Data capture**

Data checks are currently only available locally. It is intended to upload them to <https://www.dcmmap-ireland.ie/documents/methodologies>

### **Data Storage**

Data is held nationally on an MS Access microtag database. The ICES working group also maintains an international archive of tagging data.

### **Data processing**

Scripts to evaluate precision and bias, and editing and imputation are currently only available locally. It is intended to upload them to <https://www.dcmmap-ireland.ie/documents/methodologies>

## Biological sampling Salmon/Eel Counters & traps

### **Sampling implementation**

Non-responses/ refusals not applicable.

### **Data capture**

Data checks are currently only available locally. It is intended to upload them to <https://www.dcmmap-ireland.ie/documents/methodologies>

### **Data Storage**

Data from the Burrishoole traps are initially transcribed into Excel spreadsheets and these are then uploaded to a national SQL Server database.

Data from the Liffey is stored nationally in Excel spreadsheets.

There is currently no international database for all diadromous data although discussions are ongoing with ICES.

There is now an international database for eel specifically, linked to ICES data calls which Ireland contributes data to. Ireland eel survey data are included in the ICES data call and uploaded to the WGEEL database.

### **Data processing**

Scripts to evaluate precision and bias, and editing and imputation are currently available locally and eel related scripts are also available through ICESGithub.com. It is intended to upload them to <https://www.dcmmap-ireland.ie/documents/methodologies>

## Biological sampling Eel Electro-fishing and Fyke net surveys

### **Sampling implementation**

Non-responses/ refusals are not applicable

### **Data capture**

Data checks are currently only available locally. It is intended to upload them to <https://www.dcmmap-ireland.ie/documents/methodologies>

### **Data Storage**

Data is held nationally on Excel spreadsheets. There is currently no international database for the electrofishing data. There is now an international database for eel data, which included the fyke net survey data, linked to ICES data calls which IRE contributes data to.

### **Data processing**

Scripts to evaluate precision and bias, and editing and imputation are currently available through ICES' GitHub. It is also intended to upload them to <https://www.dcmapp-ireland.ie/documents/methodologies>

Biological sampling Salmon Counters & Restocking (annual) / European Eel (annual)

### **Sampling design**

Documentation available at: [esb-fisheries-non-financial-annual-report-2020](#)

### **Sampling implementation**

Non-responses/ refusals are not applicable

### **Data capture**

Data checks are currently only available on the ESB's local network.

### **Data Storage**

Data is held nationally on Excel spreadsheets. There is currently no international database for the salmon data. There is now an international database for eel specifically, linked to ICES data calls which IRE contributes data to.

### **Data processing**

Scripts to evaluate precision and bias, and editing and imputation for salmon are currently only available on the ESB's local network locally and eel related scripts are also now available through ICES' GitHub. It is intended to upload summaries to <https://www.dcmapp-ireland.ie/documents/methodologies>

## SECTION 5: DATA QUALITY

### **Text Box 5B: Quality assurance framework for socioeconomic data**

General comment: This box fulfills Article 5 paragraph (2) point (b) of the Implementing Decision (EU) 2016/1701 on the format of the WP. This box is intended to specify data to be collected under Tables 5(A), 6 and 7 of the Annex of the Delegated Decision (EU) 2019/910 on the multiannual Union programme. Use this box to provide additional information on Table 5B of the Annual Report.

#### **1. Evidence of data quality assurance**

The same quality assurance frameworks are used across the three sectors. Regarding data quality for economic variables data is sourced from financial accounts and/or companies' accountants to insure it is correct. Prior to 2021, data was collected by a combination of paper-based questionnaire surveys and electronically via interactive PDF forms submitted by email. The MS developed a new online portal for the annual fisheries survey which was launched in 2021 as a means of streamlining the process and allowing for easier transfer into specialised statistical software for detailed analysis.

**2. Section P3 Impartiality and objectiveness**

NA

**3. Section P4 Confidentiality**

NA

**4. Section P5 Sound methodology**

NA

**5. Section P6 Appropriate statistical procedures**

There are many institutes and government bodies which have control of different aspect of data which are pertinent for EU MAP purposes. These agencies have a Data Sharing Agreements (DSA) to ensure clear data usage policy when sharing data for fulfilling Ireland's EC MAP responsibilities. A No was indicated for register data as there is no formal agreements for access and quality of administrative data for this as the MS queries the EU Fleet Register for this purpose

**6. Section P7 Non-excessive burden on respondents**

NA

**7. Section P8 Cost effectiveness**

There is one method of data collection which still uses paper-based data collection so automatic techniques for data capture, do not exist for this part of the programme. 8. Section P9 Relevance

**8. Section P9 Relevance**

NA

**9. Section P10 Accuracy and reliability**

NA

**10. Section P11 Timeliness and punctuality**

NA

**11. Section P12 coherence and comparability**

NA

**12. Section P13 Accessibility and Clarity**

NA