

UK Data Coordination Group

Marine Management Organisation, England

Agri-Food and Biosciences Institute, Northern Ireland

Marine Scotland, Marine Laboratory, Scotland

Centre for Environment, Fisheries & Aquaculture Science, England

Environment Agency, England

Natural Resources Wales

Welsh Government

Seafish

United Kingdom Work Plan for data collection in the fisheries and aquaculture sectors

January 2023

Contents

INTRODUCTION	3
Section 1: Biological Data	5
Section 1A: Sampling Plan Description for Biological Data from Commercial Catches.....	5
Section 1B: Research Surveys at Sea	13
Section 1C: Marine Recreational Fisheries	93
Section 1D: Anadromous and Catadromous Species Data Collection in Freshwater	96
Section 1E: Level of Fishing and Impact of Fisheries on Biological Resources and Marine Ecosystem.....	102
Section 1F: Data Quality - Biological Data Collection.....	105
Section 2: Economic and Social Data	106
Section 2A: Population Segments for Collection of Economic and Social Data for Fisheries.....	106
Section 2B: Aquaculture Data	110
Section 2C: Population Segments for Collection of Economic and Social Data for the Processing Industry.....	116
Section 3: Fishing Activity Data	119
REFERENCES	125

INTRODUCTION

As an independent coastal State, the UK is responsible for meeting a wide range of domestic and international agreements and commitments which involve the collection of fisheries data. Clause 1 of the Fisheries Act 2020 provides for a “scientific evidence objective” where:

1. scientific data relevant to the management of fish and aquaculture activities is collected,
2. where appropriate, the fisheries policy authorities work together on the collection of, and share, such scientific data, and
3. the management of fish and aquaculture activities is based on the best available scientific advice.

In order to meet the Fisheries Act 2020 scientific evidence objective, and to ensure the continuity and consistency of fisheries data collection in the short-term, the UK will follow the data collection requirements of:

- Regulation (EU) 2017/1004 of the European Parliament and of the Council of 17 May 2017 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 (recast) ' (as amended in retained EU law) hereafter referred to as the Data Collection Framework.

Under the Data Collection Framework, each Fisheries Administration may establish a multiannual programme for the collection and management of fisheries data, currently it comprises:

- 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 (as amended in retained EU law), and
- 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 (as amended in retained EU law).

The current multiannual programme is being extended for the period of 1 January 2022 to 31 December 2024¹. This document sets out in detail the data collection activities to be carried out in line with the multiannual programme in 2023, as well as detailing responsibility for this data collection. The UK Work Plan will be reviewed on an annual basis.

Where an administration is unable to fulfil a data collection activity as set out in this Work Plan, the Fisheries Science and Evidence Steering Group (FSESG) will be advised of the

¹ Extension under SI “SEA FISHERIES, The Sea Fisheries (Amendment etc.) (No. 2) Regulations 2021”

deviations as soon as possible and as practicably feasible to seek agreement on the deviation across all four administrations. FSESG may seek advice from the UK Fisheries Science Advisory Panel (UKFSAP) as required. Deviations and the associated rationale will be reported on in the annual report of the Work Plan at the end of the year.

Note: Deviations from the Work Plan will be reserved for exceptional cases only. Accepted rationale for deviations may include, but are not limited to, unforeseen issues that impede data collection such as survey vessel breakdown; poor weather for at sea surveys; impacts of Covid 19 and changes to responsibilities for data collection between fisheries administrations.

Section 1: Biological Data

Section 1A: Sampling Plan Description for Biological Data from Commercial Catches

Ref Tables 1A, 1B, 1H, 1J, 1K

International and domestic commitments

This forms the basis for the fulfilment of paragraph 2 point (a)(i) of Chapter III of the multiannual programme.

These sampling schemes primarily provide the source data, estimates and indices that relate to the removals (landings and dead discards) by commercial fisheries from UK stocks and are required for international assessments. These data are processed and submitted for use at ICES expert groups and for other RFMO assessments including ICCAT and to the IOTC for some distant water fishing. Bycatch data from the at-sea observer trips are used in national and international assessments on the impact of fishing on protected, endangered, and threatened species. These programmes are also used to derive UK Marine Strategy indicators on current environmental status and provide the source information for national assessments on management measures - for example changes in gear selectivity and impact of the landing obligation.

Key end users

ICES, ICCAT, IOTC, UK Fisheries Administrations

Data collection

The fishing industry activity and sampling activity was affected by the COVID19 pandemic from March 2020. The programmes presented here represents what sampling is currently required irrespective of any COVID19 health and safety restrictions and mitigation measures. Most market and onshore sampling schemes are back up to speed and expected to operate at pre-COVID19 levels in 2023. However, some offshore observer programmes continue to be restricted. Interim methods for collecting the same data have been adopted by administrations where possible, as pilots, and these will be summarised below as they may continue into 2023.

ALL REGIONS IV, VI, VII, VIII

Northern Ireland sampling schemes: All regions

UK-NIR-Market: “Market sampling schemes undertaken by UK Northern Ireland (AFBI lead)”

NIR-N1: Area frame of sampling main ports with > 90% of landings. Providing access to vessels using otter trawlers, seine netters and dredge. Sampling events identified at random on days ports are active.

NIR-N2: Area frame of peripheral locations with < 10% of landings, active for 45 days a year each. Sampling of these is not currently undertaken.

UK-NIR-Selfsampling: “Fishery self-sampling schemes undertaken by UK Northern Ireland (AFBI lead) ”

NIR-N3: A reference fleet of vessels for Nephrops catch sampling through fisher self-sampling. Selected vessels are from main Northern Irish ports. The reference vessels selection is designed to be representative of the entire fleet with systematic rota sampling.

UK-NIR-Observer at Sea: “Observations at sea undertaken by UK Northern Ireland (AFBI lead) ”

NIR-N5: List frame of GBN - registered vessels operating out of Northern Irish ports, for use in selecting vessels for at sea sampling of the mid-water trawl fleet segment. Vessels must apply for permit from control authority for any trip. A condition of this permit is a requirement to be observed. Observations are systematically identified to ensure equal coverage.

NIR-N6: List frame of GBN registered vessels operating from Northern Irish ports, with targeted selection of vessels engaged in seasonal queen scallop fishery.

NIR-N9: Unsampled GBN registered restricted to infrequent small-scale fisheries, polyvalent gears and those trips perusing pelagic mid-water fisheries landing into other EU countries.

NIR-N4; NIR-N7; NIR-N10; NIR-N11: List frame of GBN registered vessels operating from Northern Irish ports, with random selection of vessels.

UK-NIR-Processor: “Sampling at fish processors undertaken by UK Northern Ireland (AFBI lead) ”

NIR-N8: Samples taken at processors of herring, from identifiable landings

Scotland sampling schemes: All regions

Scottish at-sea sampling

“UK-SCT at-sea catch sampling scheme” code in table 1H

The at-sea sampling design collects biological data for fish species for the otter trawler fleets targeting demersal fish and shellfish. The catch components recorded are landed, unwanted catch and BMS fractions. The trawler fleets sampled account for approximately 91% of the demersal fish species landed and ~ 66% of the total demersal and shellfish landings from the Scottish fleet. The non-sampled components are mainly small, often single manned under 10m vessels operating pots and trap which account for ~ 25% of the landed shellfish

The vessels are divided into 8 sampling strata, based their target species and main operating area: North Sea and West Coast demersal trawlers; and inshore trawlers targeting Nephrops in their predominant Nephrops functional unit (Clyde, Firth of Forth, Moray Firth, North Minch, and South Minch) and offshore trawlers targeting Nephrops (mainly in Fladen)

At-sea observers use a randomised vessel selection form for each scheduled trip. This form consists of a uniquely randomised draw from the sampling frame for the stratum. The observer contacts the vessels in the randomised order, recording the outcome of the contact for each vessel, until a trip is arranged and conducted. Non-response and refusal rates are calculated from the vessel selections forms.

When at-sea, a sample of the unwanted catch and BMS fraction is collected for each haul, usually two mixed species baskets, from which all individuals are identified to species and length measurements are taken. Length stratified collection of age structures is undertaken for 7 predetermined species. For trawlers targeting Nephrops the sampling of Nephrops and fish is by alternate days. Incidental by-catch is recorded for each haul as encountered.

A ratio estimator is used to estimate the total weight and numbers-at-age or length of unwanted catch by species, and bootstrapping is used to estimate corresponding standard errors and confidence intervals for these estimates. Data are stored in the national database and also in spreadsheets and are compiled into a documented R package for analyses. At each stage, rigorous quality checking procedures are followed.

On-shore market sampling

“UK-SCT on-shore market sampling” scheme code in table 1H

The six main Scottish fish markets provide the access points for the landings of demersal species, and collectively account for 68% of the Scottish landings of these species. Non-sampled landings are largely non accessible; a percentage is from foreign or national vessels with point of first sale out with Scotland. A further 16% are sold direct to buyers and don't appear at fish markets. Approximately 65 demersal species are landed into Scotland, of which 45 are sold at the markets, the remainder mainly being relatively small landings of deep-water species. The 6 markets in Scotland are stratified into 4 mainland and 2 Shetland markets. Each stratum is sampled 36 weeks of the year, with one Shetland market and 3 randomly selected mainland market being sampled each week. At the market landings are selected at random using a vessel selection form, on which non-response and refusals are recorded. Vessels are not stratified. The species to sample are selected at random using a species selection form, stratified into common, less common and rare species, in which non-response and refusals are recorded. One box of fish is sampled from each sales category – these boxes are selected at the discretion of the sampler. The lengths of each fish in the box are recorded, and if otoliths are taken, the first otolith from each cm length class is selected. A ratio estimator is used to estimate landed numbers-at-age or length and bootstrapping is used to estimate corresponding standard errors and confidence intervals for these estimates. Data are stored in the national

database and also in spreadsheets and are compiled into a documented R package for analyses. At each stage, rigorous quality checking procedures are followed.

On-shore pelagic sampling

“UK-SCT pelagic onshore” scheme code in table 1H

The pelagic co-sampling sampling design collects biological data for landings of pelagic species. . 20 Scottish SPFA vessels participate in this scheme. The main pelagic species are mackerel, herring, and blue whiting, with some horse mackerel and sprat. Landings are stratified by fishery (target species). The landings of these pelagic species caught by other fleets amount to 0.38% of the total pelagic landings by weight.

Each fishing trip is entered into a randomised selection process to determine whether a sample is required. As this process is not automated but carried out in person, some fishing trips are missed for logistical reasons, e.g. at weekends.

One small box of mixed unsorted catch is sampled from each haul of a selected trip on board. The sample frozen by the vessel and collected from the processor for sampling in the laboratory. All fish in the sample are identified and recorded for length. The first individual from each cm length class is selected for the collection of otoliths, and the recording of sex and maturity. . A ratio estimator is used to estimate landed numbers-at-age or length and bootstrapping is used to estimate corresponding standard errors and confidence intervals for these estimates. Data are stored in the national database and also in spreadsheets and are compiled into a documented R package for analyses. At each stage, rigorous quality checking procedures are followed.

Shellfish onshore sampling

“UK-SCT on-shore Shellfish sampling” scheme code in table 1H

The onshore shellfish sampling schemes collect biological data on five shellfish species, Nephrops, Scallops, Lobster and two species of Crab (Edible and Velvet).

Two distinct schemes are used on mainland Scotland and on the Shetland Isles. The scheme on mainland Scotland, which includes sampling in the Orkney Islands and the islands off the west of Scotland, is divided into 15 sampling strata, where any and all of the 5 shellfish species encountered will be sampled. The mainland sampling strata are based on the geographical region and contain landing ports and the local processors that receive shellfish landings from these ports. Collectively the scheme has the potential to cover 78% of the shellfish landed into Scotland, the remaining 22% is typically by small, mainly under 10m, vessels landing infrequently into small and often remote ports. Visits to sampling strata are by designated sampling weeks with observer directed sampling to determine locations and opportunities for data collection. There are at present no probability-based selection methods employed, sampling being ad hoc and opportunistic.

Shellfish sampling in Shetland is sub-contracted and the MOU governing its operation sets out target numbers by species of the data to be collected. Data on the landings of 4 species are collected (there are no Nephrops landings into Shetland)

For all individuals the appropriate carapace/shell length measures are taken, for Nephrops sex and breeding condition is recorded, for scallop meat weight.

A ratio estimator is used to estimate landed numbers-at-age or length and bootstrapping is used to estimate corresponding standard errors and confidence intervals for these estimates. Data are stored in the national database and also in spreadsheets and are compiled into a documented R package for analyses, at each stage, rigorous quality checking procedures are followed.

Co-sampling pilot

“UK-SCT co-sampling pilot” scheme code in table 1H

A pilot scheme to collect samples from demersal otter trawlers has been introduced in August 2021. Currently a small selection of vessels from the fleets used in the at-sea observer scheme are trialling the scheme. These fleets are grouped into 3 design strata for the pilot. The vessels follow an agreed protocol to record data from the trip, and collect representative samples of either unsorted catch or unwanted catch (depending on the fleet) from selected hauls to bring back for processing onshore by scientists.

English and Welsh sampling schemes: All regions

Schemes are run concurrently to collect size data from all categories of commercial catch. Other data collected is dependent on species but will include age, sex, maturity and weight.

Offshore sampling scheme: UK-E+W Observer at sea

Access to the population is through a regularly updated list frame of fishing vessels, from which a stratified random selection is made for direct observation by Cefas observers. The sampling frame is a virtual frame of all fishing trips of the vessels in the list, which comprises all commercial fishing vessels [registered in E&W]. The list of active vessels is updated quarterly to capture the polyvalent and seasonal nature of regional fisheries.

The overall sampling effort is largely constrained by financial and staff resources – currently ~475 staff days are available for at-sea observer sampling.

The list of vessels in the sampling frame is stratified by coastal region; 2 strata in the North Sea and Eastern Arctic and 3 in the North Atlantic and predominant fishing method (nets, trawls, lines, beam trawl and scallop dredge). In addition, some region / fishing method strata are further stratified by vessel LOA (<10m; 10m+). In most regions the nets, trawls and lines are combined into single strata but in some regions where gear specific fisheries are more distinct Nets and Trawl are separated. Beam trawl and Scallop dredge vessels

are also kept distinct but cover all regions - the North Sea and North East Atlantic to capture the nomadic nature of a lot of these vessels.

Some vessels are excluded from the sampling frame

1. vessels less than 7m, excluded for health & safety reasons
2. vessels considered unsafe to take observers for reasons other than size.
3. vessels specialising in fishing methods or target species for which a derogation has been granted:
4. clam, oyster and cockle dredgers
5. some pelagic vessels
6. potting vessels
7. vessels fishing from foreign ports or outside England and Wales. Vessels subject to bilateral agreements to be sampled in another country, or where the metier is effectively sampled by another country.

Teams of regionally based observers work to quarterly targets and use shared drawlists of randomly ordered vessels. Each vessel in turn is approached and non response and refusals are recorded.

Co-sampling pilot – November 2020 to date

Vessels are selected in the same way from the same strata described above and arrangements are made for the vessel to follow an agreed protocol to record data from the trip, and collect representative samples of unwanted catch from selected hauls to bring back for processing ashore by Cefas observers. Not all strata are sampled for logistical reasons and not all the data an observer would normally collect are collected by the industry. This may limit what indices might be derived for some species but the indices required for most of the assessed stocks can be derived from the information collected.

Onshore sampling schemes: UK-E+W Crustacean on shore; UK-E+W Demersal on shore; UK-E+W Pelagic on shore

Target population is all fish and shellfish species landed into England and Wales for which estimates of length and/or age composition for the landed component are required.

Access to the population is through a list frame of fishing ports at which all or a defined proportion of the total landings are accessible at auctions, processors, or other onshore locations, and from which a stratified random selection of ports and days is made for sampling trips by Cefas staff. The overall sampling effort is largely constrained by the financial and staff resources made available for this work – currently ~ 1200 staff days are available for port sampling.

The Primary Sampling Unit (PSU) is a port (or harbour or processor) on a specific day when landed catch is available. Landings into many small ports are transported to neighbouring larger ports where they can be sold by auction. A PSU is therefore a port where landings are available and implicitly includes all satellite ports from which catch is transported. Ports with auctions vary widely in size, from Lowestoft which deals with

irregular infrequent landings from a dispersed fleet of under 10m vessels to Brixham which deals with regular large landings from a large fleet of over 10m vessels and a large fleet of inshore vessels.

The sampling frame is a frame comprising auction ports and ports of sale in England and Wales, and days of the year. The frame excludes the following locations:

1. very small ports, harbours, or other landing sites including beaches, where fish are disposed of locally rather than at auction sites, and where considerable effort would be required to sample very small amounts.
2. ports where access has been denied may be excluded within the frame to capture nonresponse rates and record the potential biases.

The Cefas port sampling programme currently targets three distinct types of fishery, each will effectively have its own separate sampling programme. These are:

1. demersal onshore (including cephalopods and Nephrops)
2. crustacean onshore
3. pelagic

Whilst there is some overlap (many ports land finfish and shellfish), this does not represent overlapping PSUs as each of the three fishery groups is treated as an independent frame with an independent sampling scheme and the access points are often quite distinct.

The list of ports in each of the three sampling frames is stratified by:

1. quarter,
2. coastal region (6 strata) Lists of ports that map closely to ICES divisions, stock boundaries and fleet activities - 1Northeast, 2East, 3Southeast...
3. port "size" based on the relative importance of that port within that region
4. gear group although only 1 or 2 groups may be specific to the frame.
 - E1 - Demersal trawlers, netters + liners
 - E3 - Pelagic ring netters, liners and trawlers
 - E4 - Shellfish pot & trap vessels
 - E5 - Beam trawlers
 - E6 - Scallop dredgers

On the given day at the auction site a sampler will use a unique randomised list of numbers to select the trip to sample and then a similar list to sample the species available. Non-response rates and refusals will be recorded. The vessel selection scheme works in large auctions but at merchants, staff are often limited to sampling what arrives or is available at the time they are there. Therefore, the port and day selection process differ between regions.

The pelagic scheme includes directed sampling at fish markets and for biological data where scheduled samples are bought from merchants and processors to be sampled remotely.

Onshore self sampling schemes - UK-E+W Nephrops on shore; UK-E+W Pelagic self sampling; UK-E+W Scallop self sampling

Three species specific self sampling schemes run concurrently with the landings sampling schemes and have been adopted either as the only access to particular fisheries or other biological parameters not available on the market; to guarantee catch samples from domains within other onshore programmes. In the Nephrops scheme and Scallop the scheme the vessels are contacted whilst at sea or before heading to sea to bring back samples from particular hauls or areas where they are fishing. The scallop vessels are contacted by their agents if they are seen, on AIS, to be fishing in the required areas.

The pelagic self sampling is dependent on scheduled sampling by processors and fishers: Fishers in the sardine ringnet fishery and sprat trawl fishery collect logbook data which includes catch and bycatch data for every trip. A vessel-tailored random calendar schedules the collection of length data from a fixed volume of each species.

Processors as part of their normal QA procedures collect individual weights from each sprat and pilchard landing. For a minimum of 2 trips per species per month, length data is also collected by the processors with the weights.

Section 1B: Research Surveys at Sea

Ref Tables 1F, 1G

International and domestic commitments

This fulfills Chapter IV of the multiannual programme. This section lists ongoing fishery independent research surveys at sea grouped by sea region and provides information on objectives, coverage, and coordination supplementary to the survey details provided in Tables 1F and 1G of the Workplan.

These surveys primarily provide population data and indices for UK commercial fish stocks, other species of interest and regional ecosystems required for international stock and ecosystem assessments. Some of these surveys are coordinated internationally at ICES and indices and raw data from some of these surveys are submitted to them, published, and made available through their databases. Environmental data from these surveys are submitted to OSPAR. These surveys are also used to derive UK Marine Strategy indicators for the UK on current environmental status.

Key end users

ICES, OSPAR, UK Fisheries Administrations. Details are provided for each survey in Ref tables and text below.

Data collection

Research surveys undertaken across the UK's Fisheries Administrations are set out in this section.

North Sea (ICES areas IIIa, IV and VIId) and Eastern Arctic (ICES Areas I& II)

International Bottom Trawl Survey, IBTS Q1; UK Scotland component IV

1. Survey objectives

A pre-recruit survey undertaken during Q1 in the North Sea as one component of the ICES International Bottom Trawl Survey (IBTS). The survey is targeted towards young (1-group) cod, haddock, whiting, saithe, Norway pout, herring, and mackerel by utilising a GOV trawl fitted with an internal 20 mm liner. In addition, pre-metamorphosing herring larvae are sampled at night by deploying a Methot mid-water net.

2. Survey methods

The survey will be undertaken by MRV Scotia. Approximately 57 pseudo-random stations will be surveyed hydrographic information coupled with the deployment of a GOV trawl for 30 minutes within the allocated area plotted below. Numbers at length and age will be acquired for all target species with all other fish species being measured and counted. All marine litter encountered within the bottom trawl or MIK samples will be recorded and weighed.

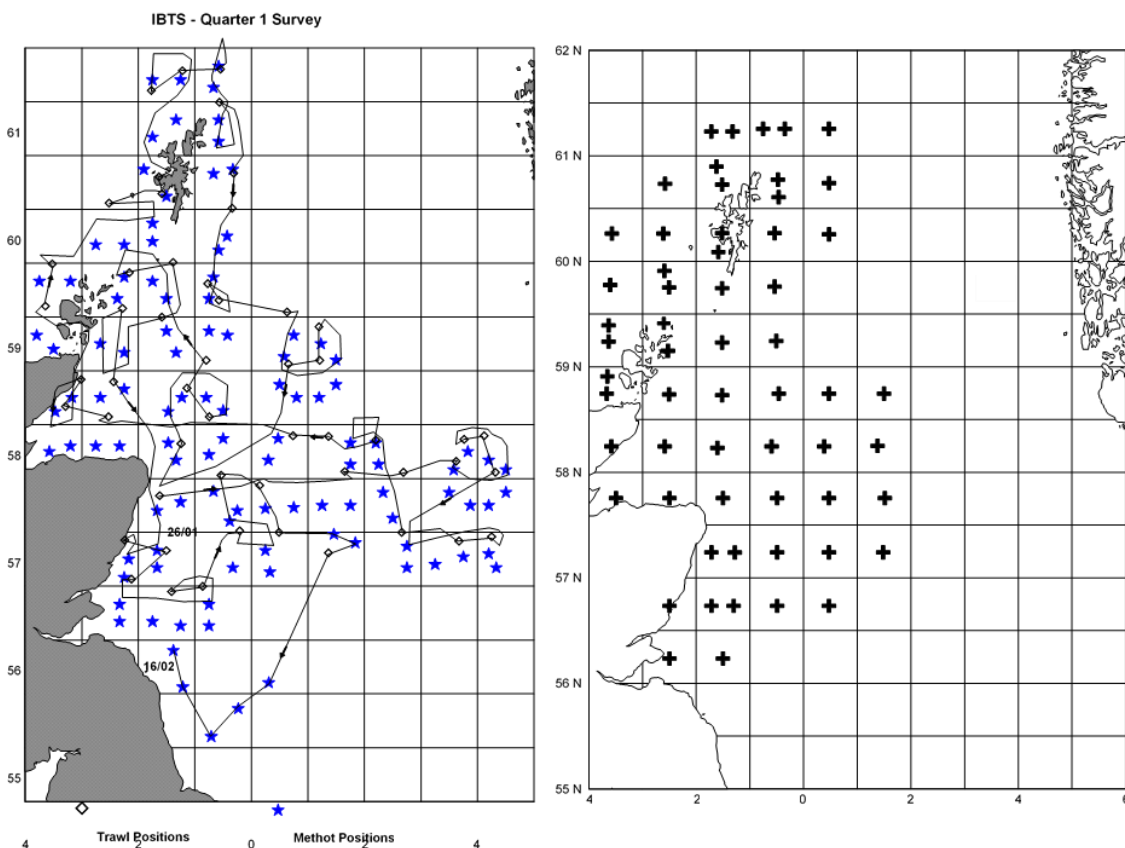


Figure 1. Map showing survey area for IBTS Q1; UK Scotland component

Data will be stored electronically in the Marine Scotland Science FSS system and uploaded to the ICES DATRAS database. Plankton samples (from Methot net) will be stored locally prior to being uploaded to the ICES Egg and Larval Database.

3. For internationally coordinated surveys - Countries/vessels and relevant international group in charge of planning the survey

ICES International Bottom Trawl Survey Working Group IBTSWG

Data used by WGNSSK for assessments.

Svea (Sweden); Dana (Denmark); Scotia (UK-Scotland); Thalassa (France); Tridens (Netherlands); Walther Herwig III (Germany)

International Bottom Trawl Survey, IBTS Q3 (SCO); North Sea; UK Scotland component IV

1. Survey objectives

A pre-recruit survey undertaken during Q3 in the North Sea as one component of the ICES International Bottom Trawl Survey (IBTS). The survey is targeted towards young (0 and 1-group) cod, haddock, whiting, saithe, Norway pout, herring, and mackerel by utilising a GOV trawl fitted with an internal 20 mm liner.

2. Survey methods

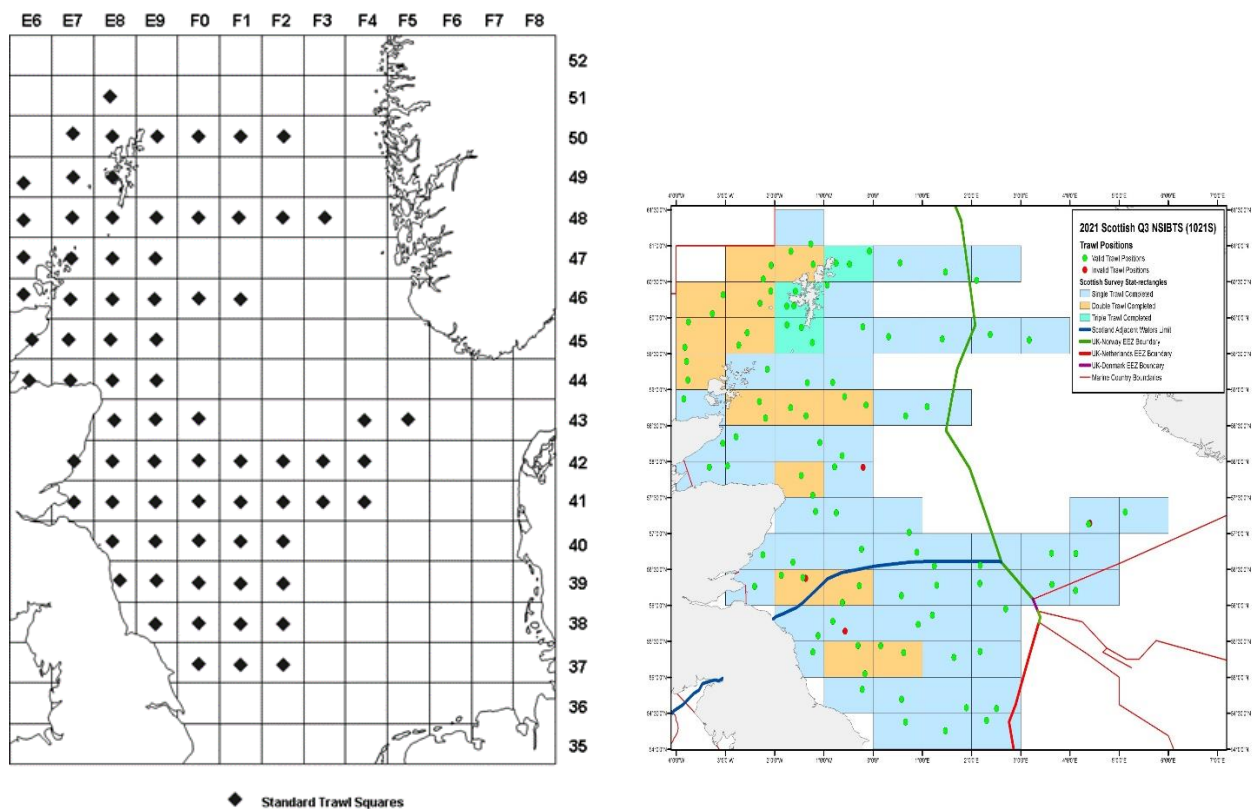


Figure 2 Map showing positions of survey area for IBTS Q3 (SCO); UK Scotland component IV

The survey will be undertaken by MRV Scotia. Approximately 90 pseudo-random trawl stations will be surveyed for hydrographic information coupled with the deployment of a GOV trawl for 30 minutes within the allocated area plotted below. Numbers at length and age will be acquired for all target species with all other fish species being measured and counted. All marine litter encountered within the bottom trawl will be recorded and weighed.

Data will be stored electronically in the Marine Scotland Science FSS system and uploaded to the ICES DATRAS database.

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

ICES International Bottom Trawl Survey Working Group

Data used by WGNSSK for assessments.

Dana (Sweden & Denmark); Walther Herwig III (Germany); Johan Hjort (Norway); CEFAS Endeavour (UK-England); Scotia (UK-Scotland); Norway

International Bottom Trawl Survey, IBTS Q3 (ENG); UK England component IV

1. Survey objectives

The survey provides estimates of abundance of recruiting year classes and CPUE-at-age series for cod, haddock, whiting, saithe and Norway pout to the North Sea and Skagerrak Demersal Working Group (WGNSSK). These are used for tuning purposes.

2. Survey methods

The survey will be conducted on the RV Cefas Endeavour. A total of 77 prime stations over 30 days are planned in area IV between 51 to 62 deg. N, and between 4 deg. W to 8 deg. E. All fish caught will be identified to species and measured. Age samples and biological parameters will be taken from all target species and species listed in DCR Appendix VII. Benthic by-catch information is collected at each station. Hydrographic data will be collected at two stations per day. Any anthropogenic waste material will be recorded and weighed.

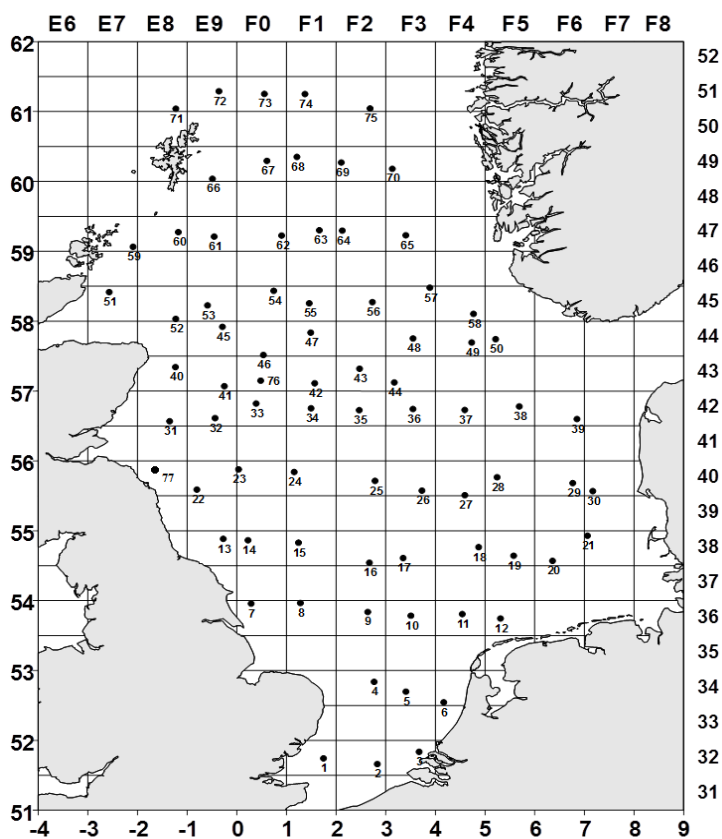


Figure 3. Map showing positions of survey stations IBTS Q3 (ENG); UK England component IV

The resultant data will be input to a Cefas surveys database (FSS) using the Cefas Electronic Data Capture (EDC) System. All data will also be transmitted to ICES for input to the DATRAS database.

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

ICES International Bottom Trawl Survey Working Group IBTSWG

Data used by WGNSSK for assessments.

Svea (Sweden); Dana (Denmark); Scotia (UK-Scotland); Thalassa (France); CEFAS Endeavour (UK-England); Walther Herwig III (Germany)

North Sea Beam Trawl Survey, BTS; Q3 Southern North Sea; UK England component IV

1. Survey objectives

To provide estimates of abundance of recruiting year classes and CPUE-at-age series for plaice and sole to the North Sea and Skagerrak Demersal WG

(WGNSSK). These are used for tuning purposes.

2. Survey methods

The survey will be conducted on the RV Cefas Endeavour. A total of 85 prime stations over 14 days are planned, and all fish caught will be identified to species and measured. Age samples and biological parameters will be taken from all target species and species listed under Appendix VII of the DCR which are caught. Benthic by-catch information is collected at each station. Hydrographic data will be collected at a minimum of two stations per day. Any anthropogenic waste material will be recorded and weighed.

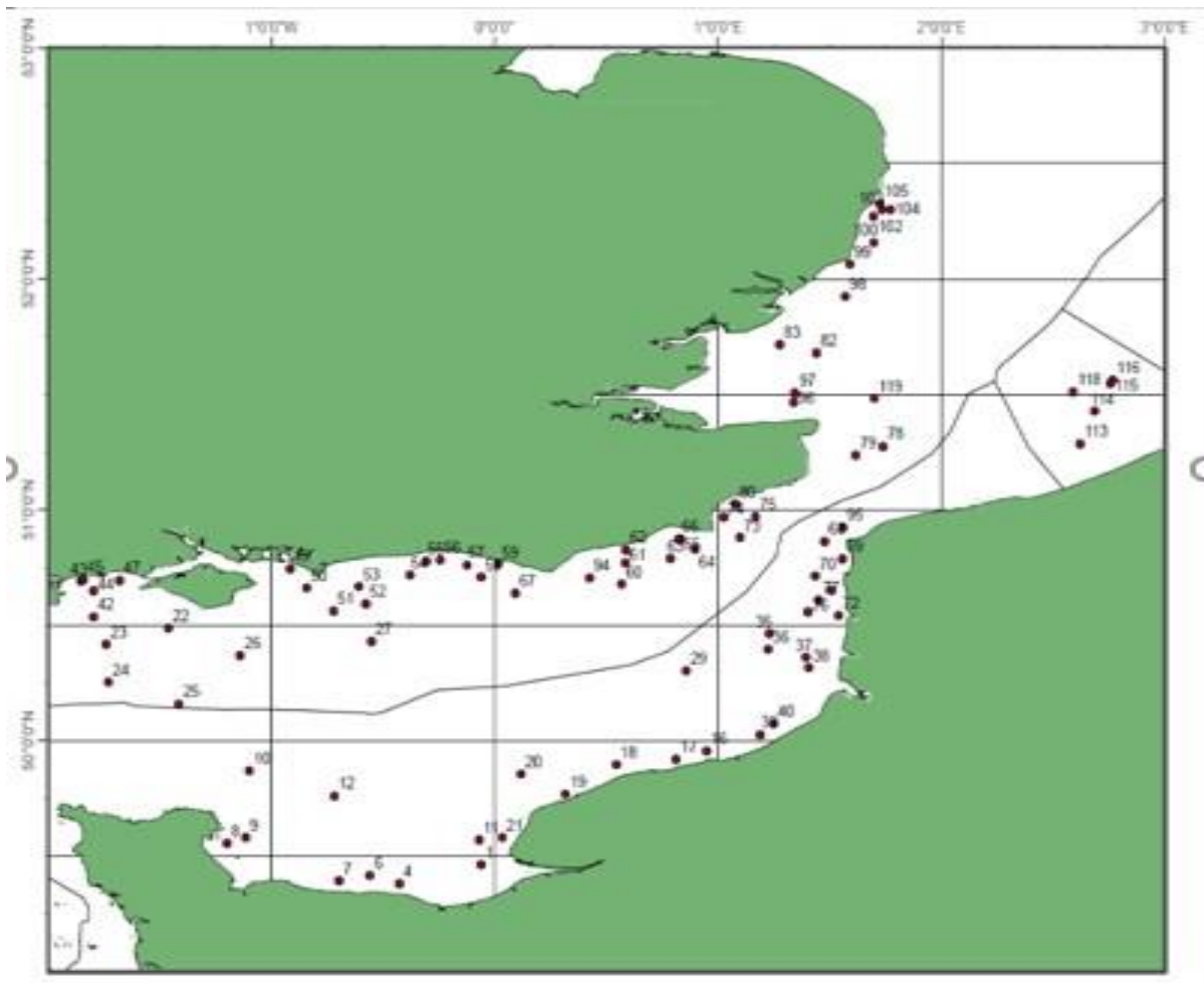


Figure 4. Map showing positions of survey stations BTS, Southern North Sea; UK England component IV

The resultant data will be input to a Cefas surveys database (FSS) using the Cefas Electronic Data Capture (EDC) System. All data will also be transmitted to ICES for input to the DATRAS database.

3. Participating Countries/vessels and the relevant international group in charge of planning the survey - internationally coordinated surveys

Standardised and agreed methodologies are coordinated at Beam Trawl Working Group (WGBEAM) to assure independent indices for each national survey.

Data used by WGNSSK for assessments.

No other countries/vessels participate in this survey.

International Ecosystem Survey in Nordic Seas (IESNS) – Atlanto-Scandian Herring/Norwegian Spring Spawning Herring (ASH/NSSH).

International Ecosystem Survey in Nordic Seas in the Northeast Atlantic covering the distribution of the herring stock, where Cefas, England will conduct the southern element (during May). The UK will contribute to this survey by conducting a 12 day survey in the eastern portion of the Norwegian Sea/northern North Sea (south of 62°N).

1. Survey objectives

To carry out annual herring (ASH/NSSH) acoustic surveys (ICES) for the purposes of determining the size, distribution, and migrations of the herring stock for input to the annual stock assessment of this herring stock. In addition, this survey will collect adult fish samples, by trawling to characterise the herring stock (biological characteristics) and for the purposes of identifying which stocks are in the survey area. This survey also contributes to a recruitment index for blue whiting. Additional sampling of the hydrographic conditions and plankton abundance in the area are used to monitored and investigate the how the distribution and migration of herring and other pelagic fishes are influenced by environmental conditions.

The survey estimates are submitted annually to the ICES Working Group on Widely distributed Stocks (WGWIDE) for inclusion in the assessment of ASH/NSSH.

2. Survey methods

The survey will be conducted on the MFV Resolute. In 2023 the acoustic survey will be conducted between 59°N and 62°N and 4.5°E and 9°W in the northern North Sea and eastern Norwegian Sea (See Figure 5), the exact sample coverage by the UK will be determined through consultation with ICES WGIPS and the survey co-ordinator. Abundance will be determined using internationally accepted acoustic methodologies and protocols and biological samples will be collected using a trawl. The survey will be conducted using the ICES protocols adopted for the IESNS (see ICES 2015).

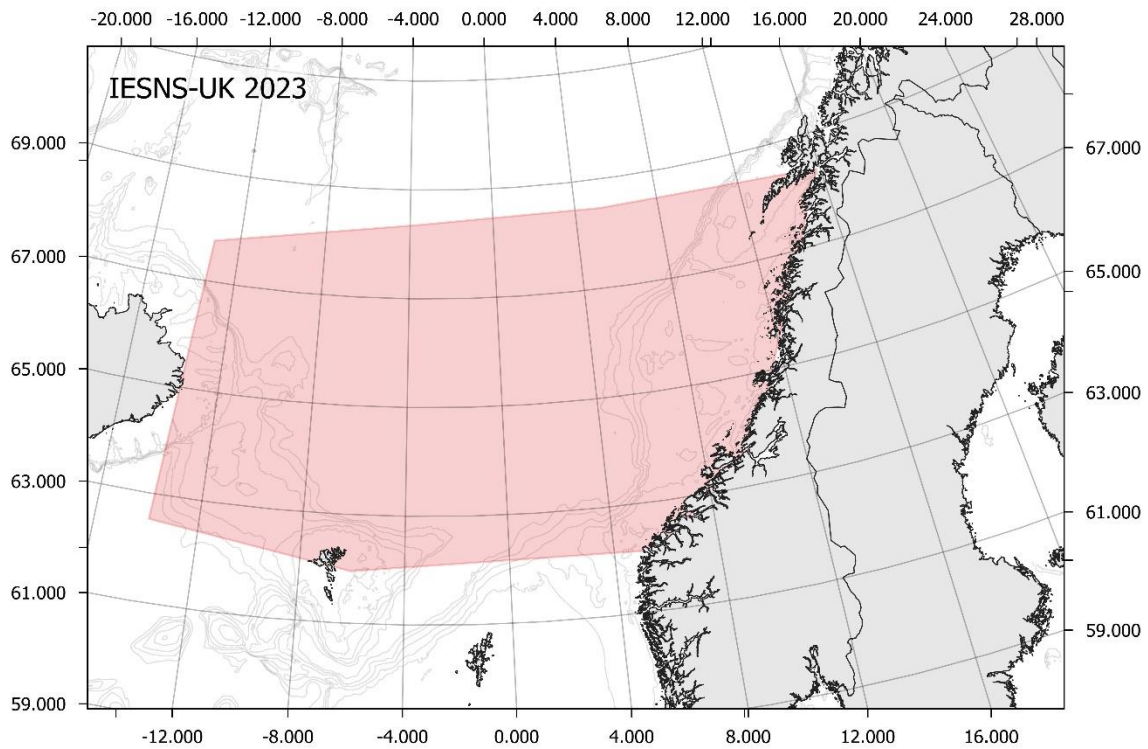


Figure 5. Map showing 2023 acoustic survey coverage with actual Cefas coverage within the highlighted area (outlined in red) to be determined.

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

Other countries participating in the international survey are the EU-Denmark, Norway, Faroe Islands, and Iceland. The international ICES planning group for this survey is ICES WGIPS (the working group of international pelagic surveys).

Mackerel egg Survey (triennial), NSMEGS; North Sea, England component IV.

International Mackerel Egg Survey in the North East Atlantic and North Sea which Cefas, England will conduct the North element along with Norway (May/June). This is a triennial survey with the UK contribution starting in 2022. The UK will contribute to this survey by conducting a 24 day survey in the North Sea. There is no survey planned for 2023 with the next planned for 2025.

1. Survey objectives

To carry out mackerel egg surveys (ICES Triennial Survey) within allocated sampling periods of the MEGS survey plan in the North Sea carrying out analysis of mackerel eggs and larvae on survey.

To collect adult fish samples, by trawling and/or rod/line fishing, for atresia and fecundity samples for later analysis.

2. Survey methods

Egg survey will be conducted between 53°N and 62°N in the North Sea, actual area to be confirmed based on the area covered in 2021 by The Netherlands and Denmark. The sample coverage by the UK will be determined based on a collaborative plan for coverage between Norway, Denmark, and the UK. Samples will be collected using a Gulf VII plankton sampler and samples will be analysed on board for mackerel eggs and larvae. Fishing will take place to collect fecundity samples using either rod/lines or a pelagic net. Methods for survey design and sampling will follow processes outlined in ICES SISP6 – MEGS V2.2

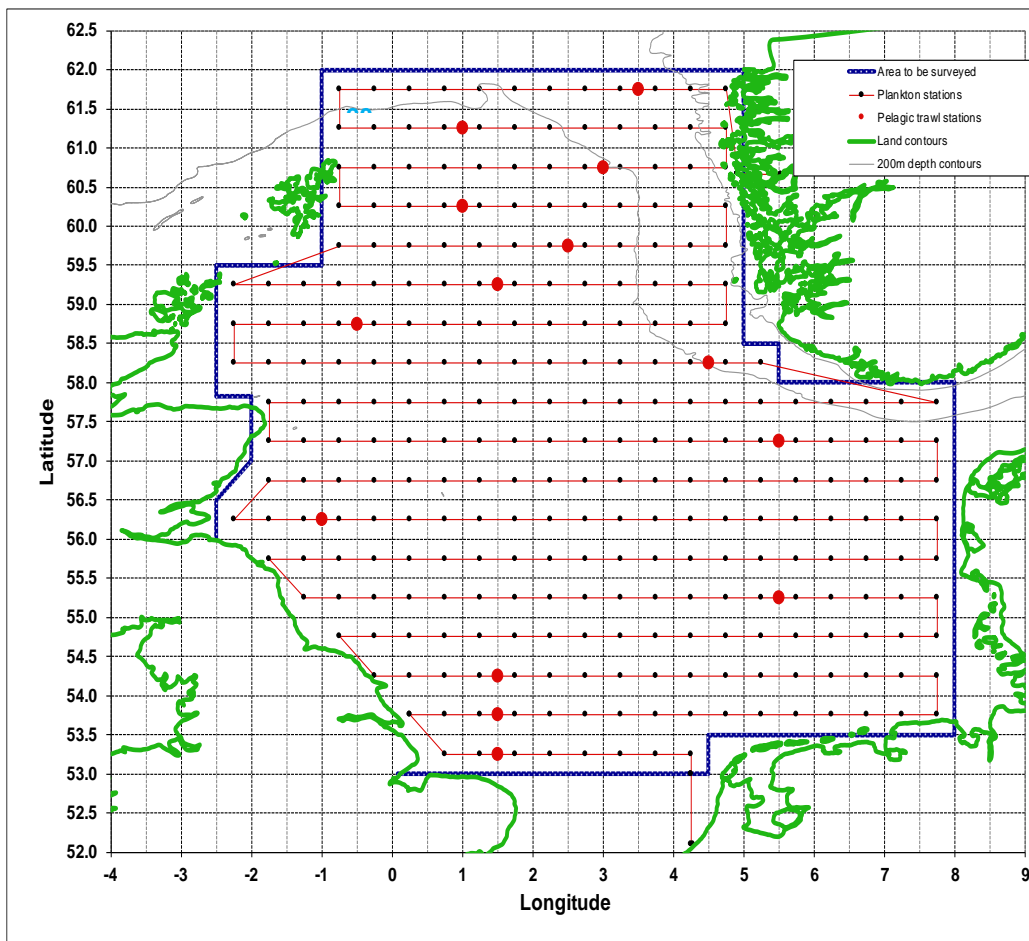


Figure 6. Map showing positions of survey stations NSMEGS; North Sea, England component IV

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

Other countries participating in international survey are Portugal, Spain (IEO), Germany, Netherlands, Spain (AZTI), Norway, Ireland, Scotland, Faroe Islands, with just Norway, England (Cefas) and Denmark conducting the survey in the North Sea. The international ICES planning group for this survey is WGMEGS (the working group on mackerel and horse mackerel egg surveys).

**Herring Acoustic Survey, HERAS. UK Scotland component IV; ICES Q2/3
Coordinated Acoustic Survey in the Skagerrak and Kattegat, the North Sea, West of
Scotland, and the Malin Shelf area; Areas III, IV, VIa, VIIb**

1. Survey objectives

To conduct an acoustic survey to estimate the abundance and distribution of herring in the north western North Sea. The results will be combined with those of Germany, Netherlands, Norway & Denmark to produce an age disaggregated abundance index for North Sea herring. Data collected west of the 4-degree line will be combined with those of Ireland to provide the same for 6a.

2. Survey methods

Scotia will undertake an extended acoustic survey by following a pattern of parallel transects running east to west. It is projected that in excess of 2250 nautical miles will be surveyed at four different frequencies (18, 38, 120 and 200 kHz). A pelagic trawl will be deployed approximately 38 times to 'ground truth' the acoustic data and provide biological samples of herring and sprat. This survey now extends into ICES area VIa, as indicated on the map.

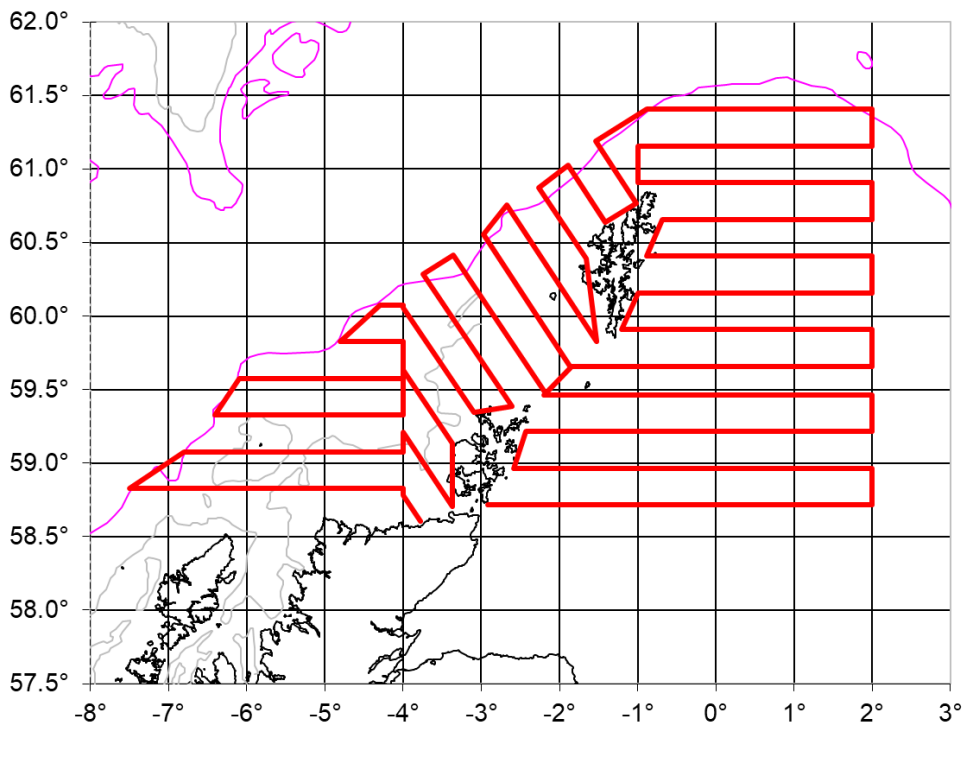


Figure 7. Map showing North Sea and North Atlantic herring acoustic survey transects NHAS; UK Scotland component IV, VIa

All acoustic data will be stored in databases at MSS as well as the ICES acoustic database. Subsequent post survey analysis will be provided to the relevant ICES working groups.

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

ICES Working Group on International Pelagic Surveys WGIPS

Data are used in stock assessments

Celtic Explorer (Ireland); Scotia (UK-Scotland); G.O. Sars (Norway); Tridens (Netherlands); Solea (Germany); Dana (Denmark)

The coverage of the west of Scotland is shared by UK Scotland (MSS) and Ireland (Marine Institute)

Nephrops UWTV survey (FU6), NTV6; UK England, IVb, Farne Deeps.

1. Survey objectives

To obtain estimates of distribution and abundance of Nephrops in the Farne Ground using underwater television. This survey will be conducted by RV Endeavour undertaking one extensive survey on the Farne Deep Grounds. To conform with the list of mandatory surveys under the Data Collection Framework in which separate surveys are listed for these functional units, the physical survey will be FU6.

2. Survey methods

It is planned to complete 110 TV Survey Stations. Additionally, information on swathe data and water samples was also collected.

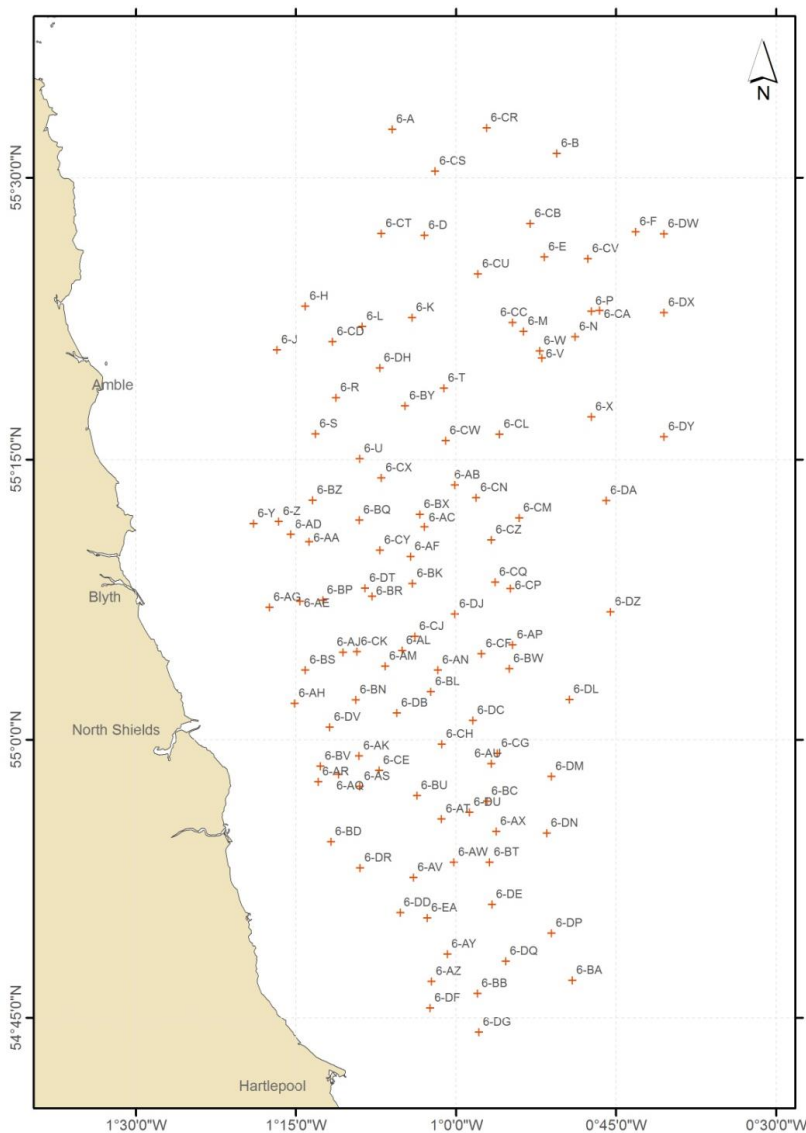


Figure 8. Map showing the location of the surveyed area NTV6; UK England, Farne Deeps

Video recordings are stored in DVD format and other data in an ACCESS database (WGNEPS is currently seeking to develop an international UWTV database and English

data will be transmitted to it when/if it is developed). Video recordings will be analysed, and the results conveyed to the ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK).

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

ICES Working Group on Nephrops Surveys (WGNEPS). Data are used in functional unit assessments

Although Nephrops UWTV surveys are coordinated via WGNEPS, the surveys are generally carried out by individual countries sampling Functional Units in their own 'back yards' rather than defining multi-vessel surveys across entire sea areas.

No other countries/vessels participate in this survey of this FU.

Nephrops UWTV survey (FU7), NTV7; UK Scotland, IVa, Fladen Ground and (FU34), NTV34, IVa, Devil's Hole

1. Survey objectives

To obtain estimates of distribution and abundance of Nephrops burrows in the Fladen Ground using underwater television. This survey will be conducted by Scotia undertaking one extensive survey that includes FU7 & FU34 in the North Sea (IVa) and FUs11-13 in the North Atlantic (VIa). To conform with the list of mandatory surveys under the Data Collection Framework in which separate surveys are listed for these functional units, the physical survey will be divided into two and reported separately by FU7& FU34 and FU11-13.

2. Survey methods

It is planned to complete 70 TV tracks and 2 fishing hauls in FU7 and 10 TV tracks and 1 fishing haul in FU34. Additionally, information on size at maturity will be obtained.

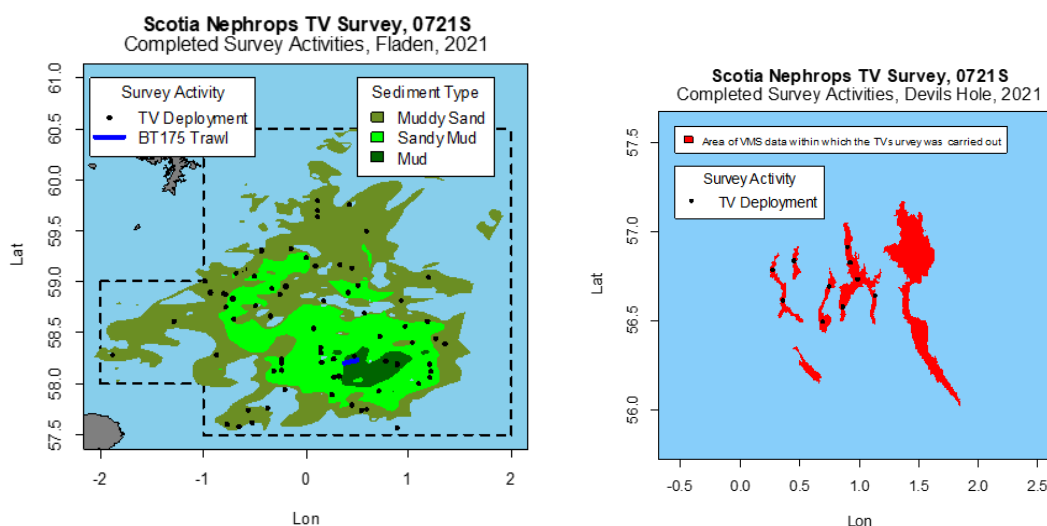


Figure 9. Plots of the Fladen & Devil's Hole grounds showing the location of the TV survey sites (in black) and the trawl (in blue), within the extent of muddy sediments.

Video recordings are stored in DVD format and other data in an ACCESS database (WGNEPS is currently seeking to develop an international UWTV database and Scottish data will be transmitted to it when/if it is developed). Video recordings will be analysed, and the results conveyed to the ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK).

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

ICES Working Group on Nephrops Surveys (WGNEPS). Data are used in functional unit assessments

Although Nephrops UWTV surveys are coordinated via WGNEPS, the surveys are generally carried out by individual countries sampling Functional Units in their own 'back yards' rather than defining multi-vessel surveys across entire sea areas.

No other countries/vessels participate in the survey of these FUs.

Nephrops UWTV survey, NTV8, NTV9; UK Scotland, IVa FU8&9; Moray Firth & Firth of Forth

1. Survey objectives

To obtain estimates of the distribution and abundance of Nephrops burrows in the Firth of Forth, and the Moray Firth using underwater cameras.

2. Survey methods

The survey will be carried out on MRV Alba-na-Mara. It is planned to complete 45 TV tracks and 2 fishing hauls in each of FU8 and FU9 (total 90 tv and 4 hauls) on this combined survey. Additionally, information on size at maturity will be obtained.

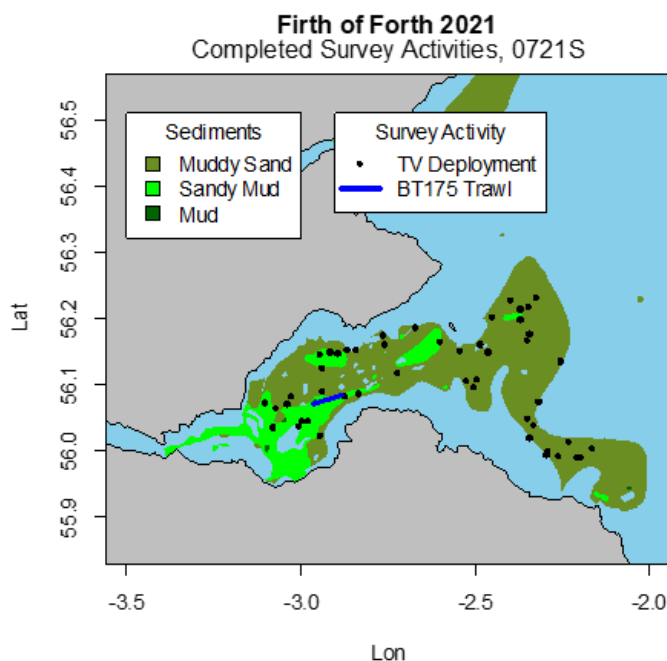


Figure 10. Map showing the location of the Firth of Forth TV survey sites (in black) and the trawl (in blue), within the extent of muddy sediments.

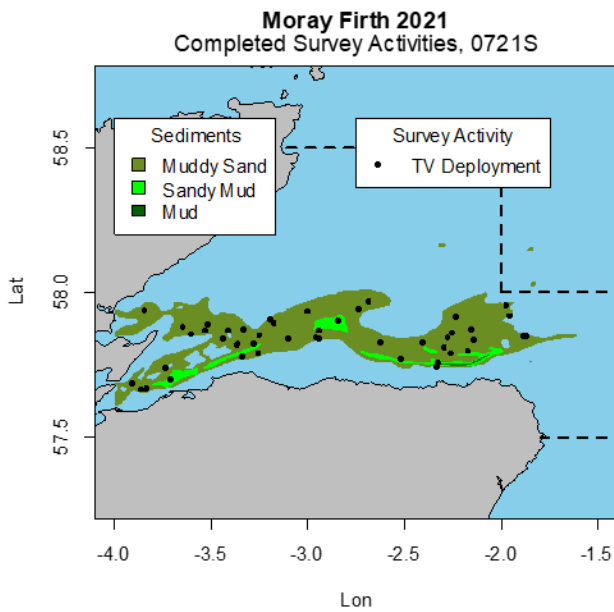


Figure 11. Map showing the location of the surveyed area in the Moray Firth showing the location of the TV survey sites (in black), within the extent of muddy sediments.

Video recordings are stored in DVD format and other data in an ACCESS database (WGNEPS is currently seeking to develop an international UWTV database and Scottish data will be transmitted to it when/if it is developed). Video recordings will be analysed, and the results conveyed to the ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK).

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

ICES Working Group on Nephrops Surveys (WGNEPS)

Data are used in functional unit assessments

Although Nephrops UWTV surveys are coordinated via WGNEPS, the surveys are generally carried out by individual countries sampling Functional Units in their own 'back yards' rather than defining multi-vessel surveys across entire sea areas.

No other countries/vessels participate in the surveys of these FUs.

North Sea sandeel survey, NSSS; UK Scotland component Area IV (Firth of Forth & Turbot Bank)

1. Survey objectives

To determine the abundance, length and age of sandeels (*Ammodytes marinus*) in the sediment in regions east of Scotland covering the Firth of Forth and Turbot bank areas. (ICES IVa).

The AWG splits the North Sea into 7 distinct management areas, 5 of which are commercially fished. Scotland samples SA 4.

2. Survey methods

MRV Alba na Mara will use a modified scallop dredge with 6" teeth, camera trolley with light source and DST logger (temperature and depth). The areas will be surveyed by camera and the dredge deployed 70-75 times to catch samples for biological parameters. Sediment is collected at each station.

TV data are stored in DVD format and other data are stored in data banks at Marine Scotland (MSS).

Subsequent post survey analysis and age data will be provided to ICES HAWG.

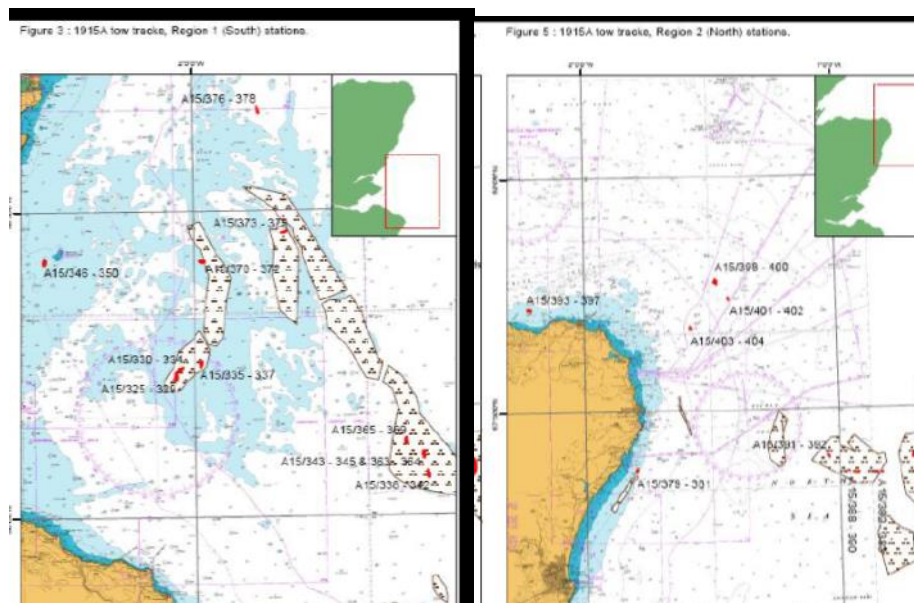


Figure 12. Maps showing the location of the surveyed area NSSS; UK Scotland component Area IV

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

ICES Herring Assessment Working Group (HAWG).

UK (Scotland) data will be amalgamated with survey data provided by Denmark and Norway.

Solent bass trawl survey, SBTS; England, VIld

1. Survey objectives

To provide estimates of abundance of recruiting year classes and CPUE-at-age series for sea bass from a commercial trawler for provision to the Celtic Seas Ecoregion Working Group (WGCSE). These are used for tuning purposes.

2. Survey methods

The survey will be conducted on the MFV Angelle Marie. A standard grid of stations are fished annually. Age samples and biological parameters will be taken from all target species.

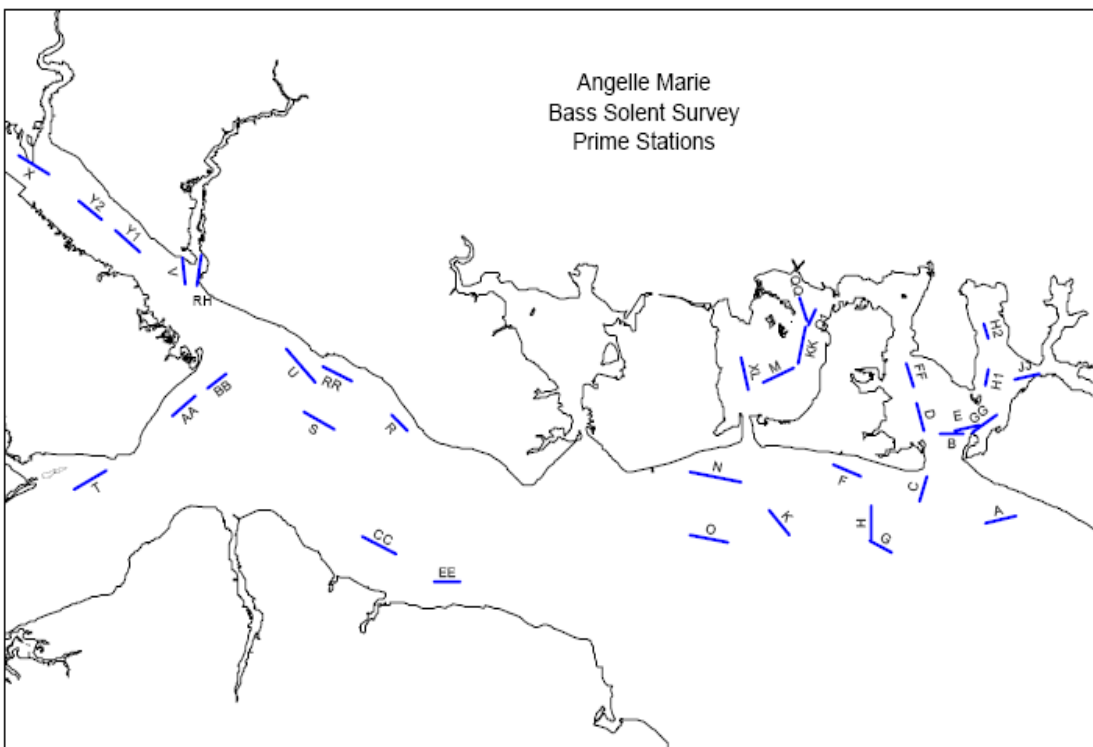


Figure 13. Map showing positions of trawl stations SBTS; UK England, VIld

The resultant data will be input onto the Cefas Fisheries surveys database (FSS).

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

N/A

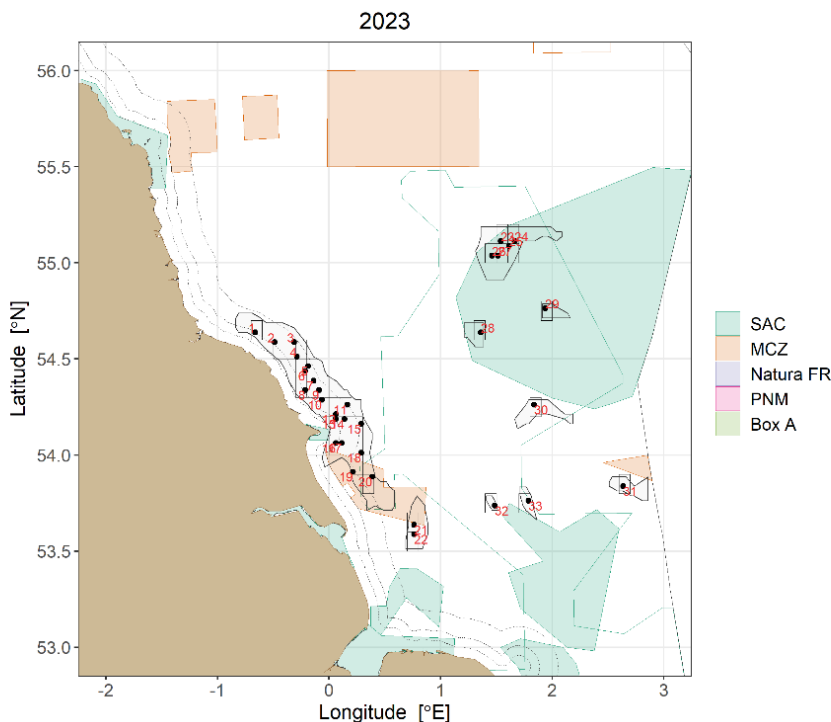
Eastern Channel & North Sea scallop dredge survey, EECSDS; England, VIId, IVb

1. Survey objectives

To obtain estimates of distribution and harvestable biomass of King Scallop in the Eastern English Channel and North Sea. This survey will be conducted annually each September by a chartered commercial vessel using both commercial and modified dredges on exploited grounds described by historic VMS data. The data are the primary input to the annual scallop stock assessments published on the government website in April each year.

2. Survey methods

Approximately 22 tows are carried out in the North Sea and a further 71 tows are carried out in the Eastern Channel (total 94). The survey methodology continues to undergo evolution with redefinition of the assessment areas and exploited beds expected to change with the fishery. The survey is a swept area method relying on substrate specific gear efficiency estimates to convert survey catch rates to density on the seabed. Harvestable biomass is estimated from the size distributions of the catch using L-W factors.



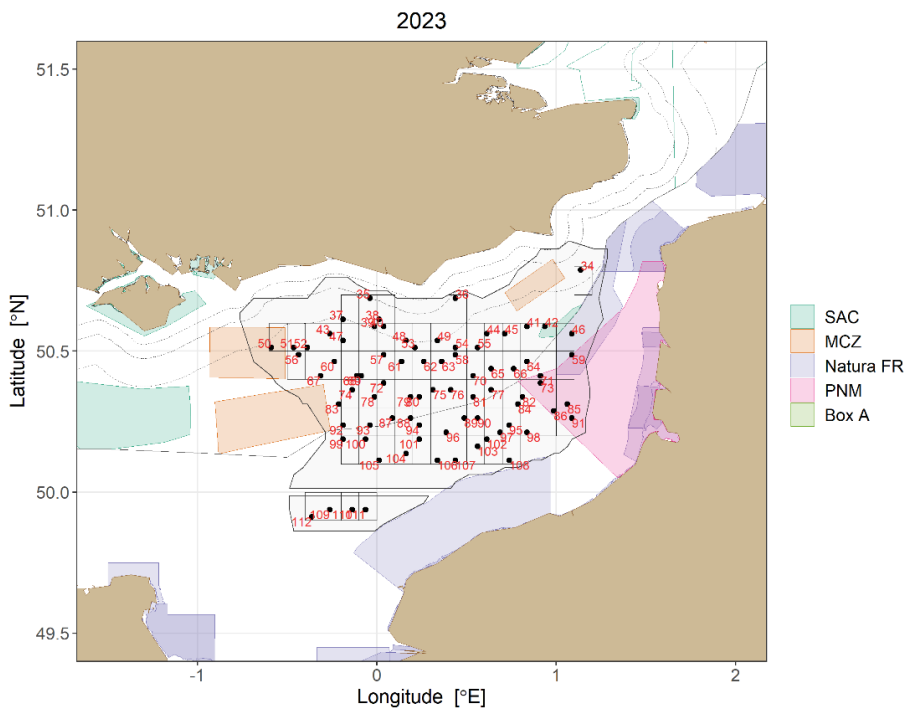


Figure 14. Proposed survey sites in the North Sea (33 stations) and Eastern Channel (79 stations) EECSDS; UK England, VIId, IVb. N.B. Survey sites in the French EEZ and Central North Sea are subject to permissions and may not be carried out.

Exploitation levels are presented in the annual stock assessment as the total realised or estimated removals as a proportion of the estimated harvestable biomass.

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

The survey is not internationally coordinated but results are presented, and methodology periodically reviewed by ICES Working Group on scallops (WGScallop).

East Coast Scallop Dredge Survey, ECSS; UK Scotland, ICES area IVa

1. Survey objectives

The objectives of the East Coast king scallop survey are:

- to carry out a survey of scallop stocks around the East coast of Scotland.
- to age, measure and assess shell damage on all scallops caught.
- to collect information on by-catch of other commercial fish and shellfish species.
- to identify and quantify numbers of starfish species in all dredge tows.
- to collect frozen whole scallops for heavy metal testing as part of the OSPAR assessment of hazardous substances in the marine environment.
- to record and retain marine litter obtained during the dredging process (for MSFD).

2. Survey methods

The commercial fishery for the king scallop (*Pecten maximus*) is the second most valuable shellfish fishery in Scotland. Dredge surveys of the major scallops grounds around Scotland have been carried out annually by Marine Scotland Science (MSS) since the mid-1990's. The scallop survey data are used in the regional stock assessments.

The survey gear on the starboard side consists of six standard commercial spring-loaded Newhaven type dredges (75 cm wide, 9 tooth bar, 80 mm internal diameter belly rings). The port side has six smaller configured sampling dredges (75 cm wide, 11 tooth bar, with 60 mm internal diameter belly rings). At each station (Figure 1) the dredges are towed at ~2.5 knots for 30 minutes and all king scallops caught are aged, measured (length to the 0.5 cm below) and damage assessed. All bycatch is identified, measured, sexed where appropriate and damage assessed. All starfish are identified and damage assessed.

The survey is planned for May/June, lasting approximately 20 to 23 days. There are 110 fixed stations to select from, weather dependent.

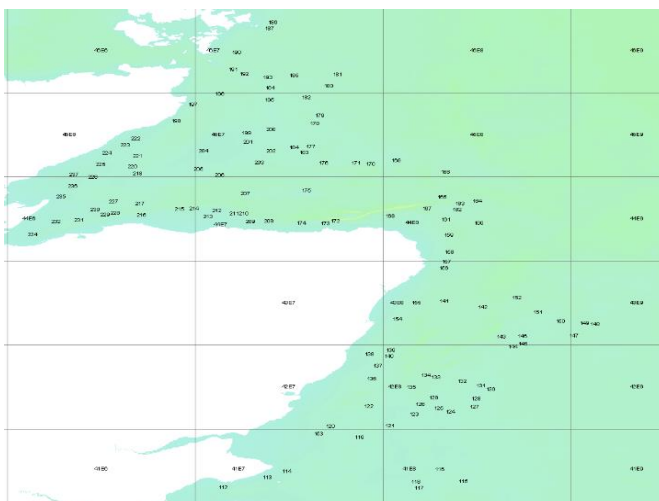


Figure 15. Map of scallop dredge stations; UK Scotland, IVa

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

Not internationally coordinated. Data are used in national stock unit assessments

Scallop survey data are discussed and detailed at ICES WGSCALLOP.

Shetland Scallop Dredge Survey, SHETSS; UK Scotland, ICES area IVa

1. Survey objectives

The objectives of the North Sea Shetland king scallop survey are:

- to carry out a survey of scallop stocks around the Shetland Islands.
- to age, measure and assess shell damage on all scallops caught.
- to collect information on by-catch of other commercial fish and shellfish species.
- to identify and quantify numbers of starfish species in all dredge tows.
- to collect frozen whole scallops for heavy metal testing as part of the OSPAR assessment of hazardous substances in the marine environment.
- to record and retain marine litter obtained during the dredging process (for MSFD).

2. Survey methods

The commercial fishery for the king scallop (*Pecten maximus*) is the second most valuable shellfish fishery in Scotland. Dredge surveys of the major scallops grounds around Scotland have been carried out annually by Marine Scotland Science (MSS) since the mid-1990's. The scallop survey data are used in the regional stock assessments.

The survey gear on the starboard side consists of six standard commercial spring-loaded Newhaven type dredges (75 cm wide, 9 tooth bar, 80 mm internal diameter belly rings). The port side has six smaller configured sampling dredges (75 cm wide, 11 tooth bar, with 60 mm internal diameter belly rings). At each station (Figure 16) the dredges are towed at ~2.5 knots for 30 minutes and all king scallops caught are aged, measured (length to the 0.5 cm below) and damage assessed. All bycatch is identified, measured, sexed where appropriate and damage assessed. All starfish are identified and damage assessed.

The survey is planned for January, lasting approximately 15 days. There are 45 fixed stations to select from, weather dependent.

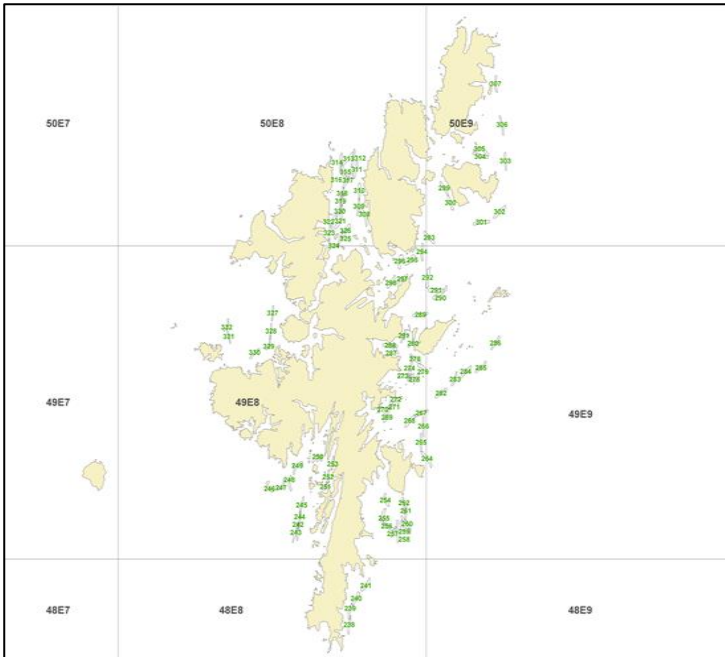


Figure 16. Map of scallop dredge stations; UK Scotland, IVa (Shetland)

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

Not internationally coordinated. Data are used in national stock unit assessments

Scallop survey data are discussed and detailed at ICES WGSCALLOP.

North Sea (ICES areas IIIa, IV and VIId) and Eastern Arctic (ICES Areas I& II) and North Atlantic (ICES Areas V-XIV and NAFO areas)

Blue whiting survey, IBWSS; International Blue whiting spawning stock survey Areas I, II, III, IV, VI.

In 2023 UK-Scotland plans to undertake a 15 day blue whiting survey. Discussions with WGIPS and the other countries are continuing to finalise the area to be covered by Scotland.

Procurement difficulties may prevent this survey going ahead in 2023. Should the survey not proceed Marine Scotland will supply staff to assist with the international survey effort.

1. Survey objectives

An acoustic survey of blue whiting spawning biomass in the northeast Atlantic

2. Survey methods

Figure 17 shows a map of the full survey area historically covered by the Dutch and Irish.

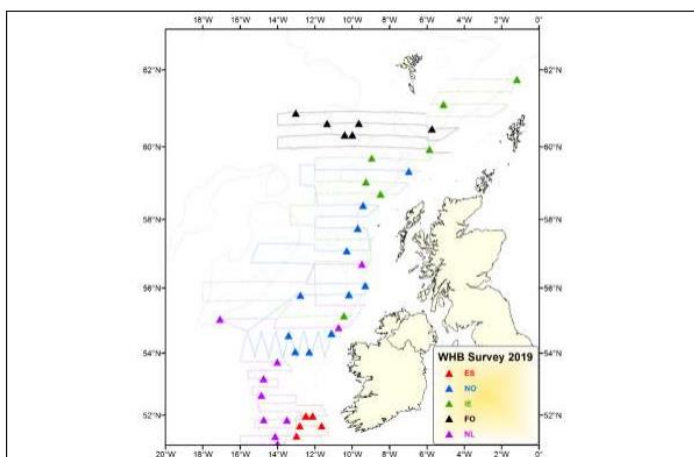


Figure 2. 2019 **Blue whiting** survey cruise track by nation and trawl stations (triangle).

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

Figure 17. Indicative survey area anticipated based on 2019 survey effort. Precise survey plans for future years are currently under development.

UK Scotland is expected to cover part of the cruise area shown above.

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

ICES Working Group on International Pelagic Surveys

UK Scotland; Fritjof Nansen (Russia); Celtic Explorer (Ireland); Magnus Heinason (Faroe Islands); Tridens (Netherlands); G.O. Sars (Norway)

Until 2021 the UK (Scotland) made a financial contribution to the international blue whiting spawning stock survey, co-funding the Dutch and Irish parts of the survey (i.e., the EU participants) and also provided one member of staff to participate in the survey.

Scottish Irish Anglerfish Megrin Industry Science Survey - SIAMISS UK Scotland IVa, VIa, VIb

1. Survey objectives

The main objective of the survey is to estimate the distribution, abundance, length structure and biomass of anglerfish and megrim stocks in ICES divisions 27.4.a, 27.6.a, 27.6.b. In addition, information is collected on cod and some skate species. Otoliths are collected for anglerfish and cod. The survey is conducted annual each April.

2. Survey methods

Historically, the Scottish component of the survey has been undertaken in partnership with industry, using MRV Scotia, and chartered demersal trawlers, each covering part of the survey area. In 2023 the aim is that alongside Scotia, a Scottish industry vessel will also be present to participate in the survey, providing additional coverage in Scottish waters of 27.4.a and 27.6.a (North of 58°N), although this is still to be confirmed.

A minimum of 88 one-hour trawl hauls is planned throughout the survey using a bespoke anglerfish trawl, Jackson BT195. The net will be deployed down to a maximum 1000m in the Atlantic and 500m in the North Sea. From each haul full biological sampling will be recorded for *Lophius* spp. *Lepidorhombus* spp, cod, and some rarer skate species will be sub sampled, if and when time is available, on Scotia, all other species will be measured for length.

Sampling protocols were agreed between MSS scientists and representatives from the fishing industry who specifically target *Lophius*. These protocols also follow the IBTS guidelines.

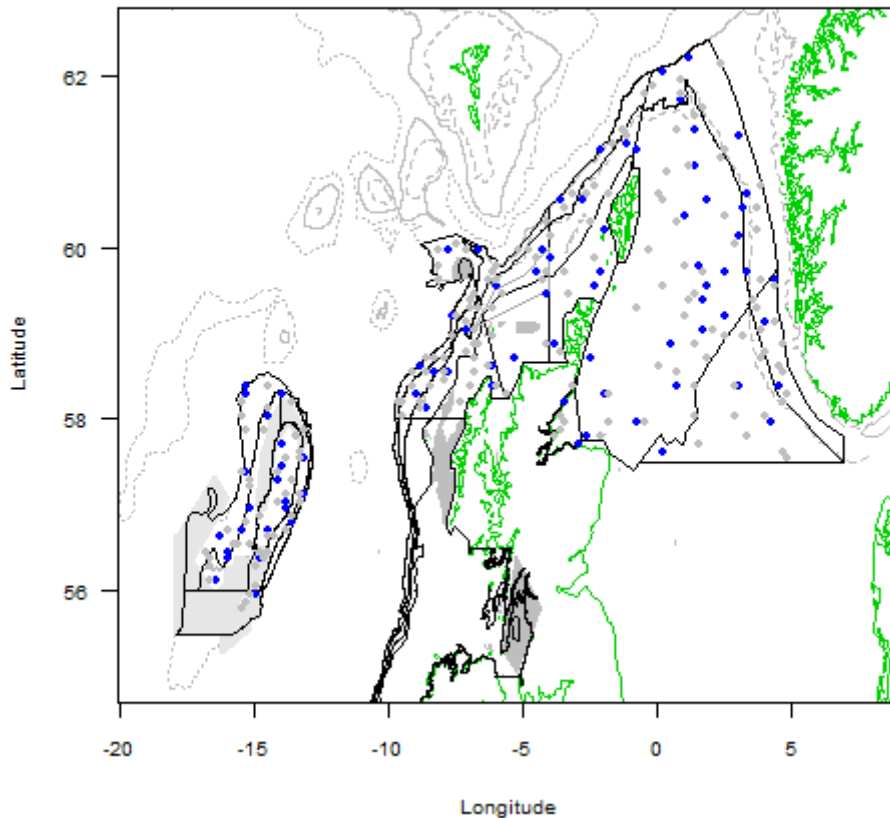


Figure 18. Map showing the SIAMISS survey areas and planned stations for Scotia in 2023.

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

The survey is coordinated with the Scottish fishing industry and with Ireland. Ireland has surveyed 27.6.a South of 58°N since 2017 with Celtic Explorer. Scotland surveys 27.4.a, 27.6.a North of 58°N and 27.6.b. There is no official international coordination group, but the protocols follow IBTSWG guidelines.

Data are held in the Marine Scotland Science FSS database and used at ICES WGCSE to assess anglerfish and megrim stocks.

Triennial Mackerel/Horse Mackerel Egg Survey, MEGS; UK Scotland component Areas VI to IX

In 2022 UK- Scotland undertook 3 MEGS surveys and the intention is that, for the next survey in 2025, Scotland will again undertake 3 dedicated MEGS surveys.

Although the maps shown below correspond to 2019 surveys, they broadly mirror the likely extent of the coverage for the 3 planned MEGS surveys in 2025.

1. Survey objectives

To carry out mackerel and horse mackerel egg surveys (ICES Triennial Survey) within allocated sampling periods of the 2025 MEGS survey plan along the NE Atlantic shelf. To collect adult fish samples, by trawling, for atresia and fecundity analysis back at the laboratory.

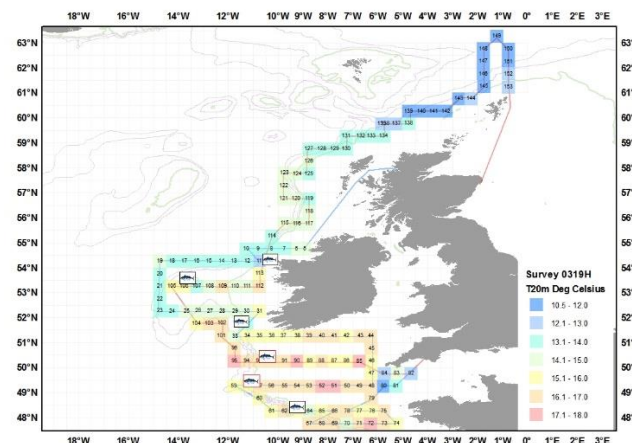
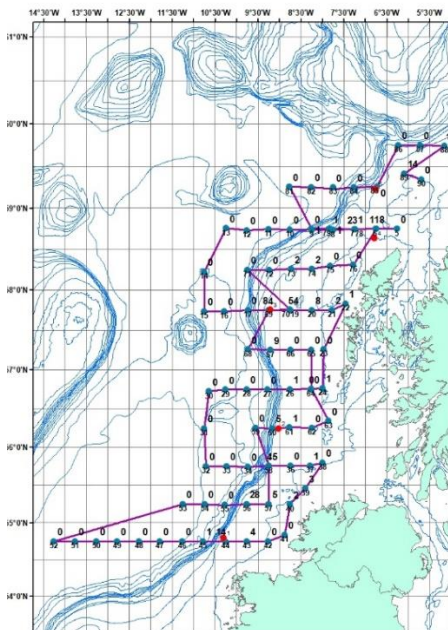
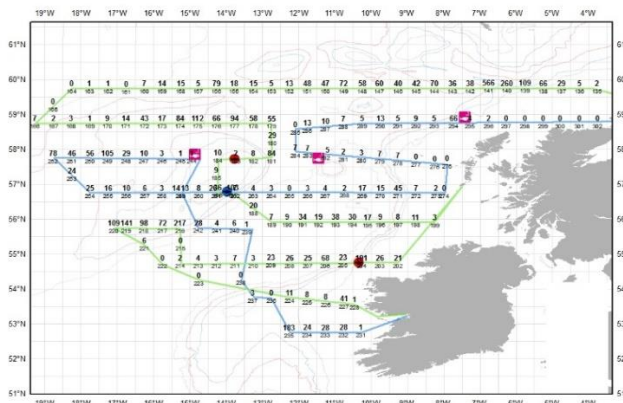


Figure 19. Maps showing positions of survey and track for the 2019 surveys undertaken in (clockwise from top right) April, May and July and reflect the expected periods and areas to be completed during the 2025 MEGS survey programme; MEGS; UK Scotland

2. Survey methods

The Egg survey will be conducted between 36°N and 66°N in the Northeast Atlantic, and will be broadly based on the area covered by the MEGS survey in 2022. UK-Scotland will almost certainly be allocated the same areas as previously albeit precise areas to be sampled will be provided by the MEGS survey coordinator during the WGMEGS survey planning meeting in 2024. Samples will be collected using a Gulf VII plankton sampler and samples will be analysed on board for mackerel and other target species of eggs. Fishing will take place to collect fecundity samples using either a pelagic net or rod and lines. Methods for sampler deployment and sample processing will adhere closely to those outlined in ICES SISP6 – MEGS V2.2

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

Working Group on Mackerel and Horse Mackerel Egg Surveys (WGMEGS).

Scotland, Portugal, Spain, Germany, Netherlands, England (in the North Sea), Ireland, Faroes, Iceland

Deepwater Survey, DEEPWATER; UK Scotland VIa; Deepwater slope west of the Hebrides and Rosemary Bank

1. Survey objectives

To map the composition, distribution and abundance of continental slope species including invertebrates on the deep-water slope west of the Hebrides and Rosemary Bank to depths of 2000m. In addition, samples (genetics and otoliths) will be collected for key species for population studies.

This is a biennial survey, with surveys taking place in odd-numbered years (i.e., 2019, 2021, 2023)

2. Survey methods

Approximately 35 deep-water trawl hauls will be carried out at depths between 500m and 2000m. Catch rate and length-frequency distribution for all fish species are collected and adjusted to a standardised trawl-haul duration. Temperature at depth is collected to

characterise the species' environment. Benthic invertebrates are sorted quantified and recorded from trawl hauls.

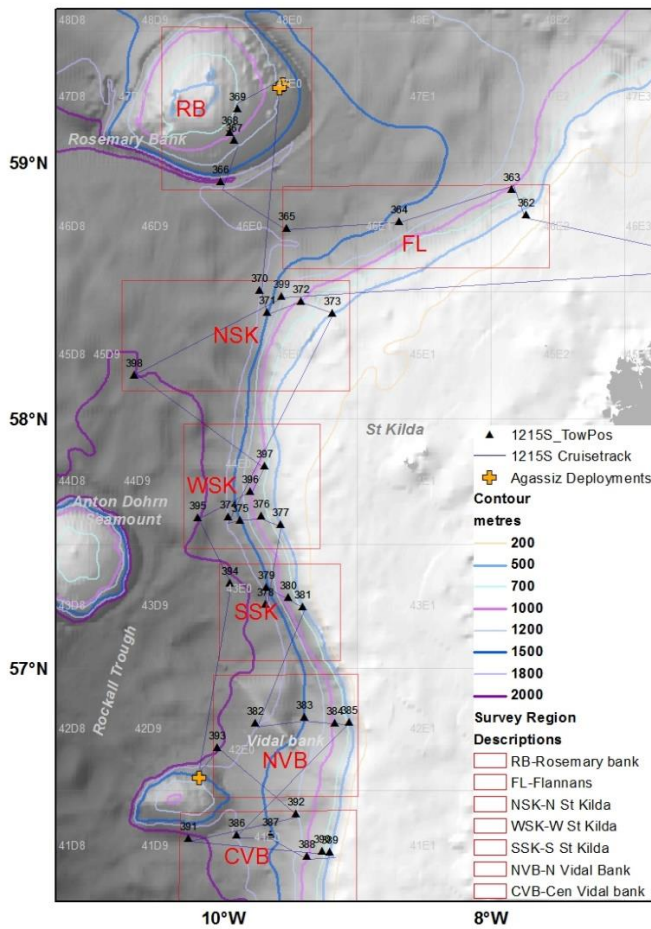


Figure 20. Map showing positions of survey stations DEEPWATER; UK Scotland via; Deepwater slope west of the Hebrides and Rosemary Bank

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

Data are held in the Marine Scotland FSS database system as well as being reported to the ICES Deepwater Working Group (WGDEEP) in the form of abundance/biomass indices that feed into the assessment process for several commercial deep-water species. VME data collected from this survey are also routinely submitted to the ICES Working Group on Deepwater Ecology (WGDEC).

Scallop UWTV Survey, UWTVScallop; UK England, IVb, VIId, VIle-g; Bristol Channel and Western approaches; Eastern English Channel; North Sea

1. Survey objectives

Carry out UWTV survey for scallop in undredged areas for biomass estimates to be used in English Scallop assessment and advice for the UK Fisheries Management Plans.

2. Survey methods

The survey is undertaken in the second quarter. Sea areas are surveyed on a rotational basis. Within each bed to be surveyed, stations are set using randomised algorithms (see map). Some additional stations are placed in dredged areas to allow direct comparison with the dredge surveys results (WECSDS, EECSDS). Video footage is saved in high definition and duplicate/triplicate counts undertaken to assess scallop abundance on footage. The STR SeaSpyder drop frame camera system consists of HD video and stills capability attached to surface via optical fibre umbilical. The drop frame is towed with the tide at 0.4 knots approximately 0.5m off the seabed for 20 minutes at each site. Different camera systems can also be fitted to available frame and trialled at selected sites (Rayfin, RFID etc).

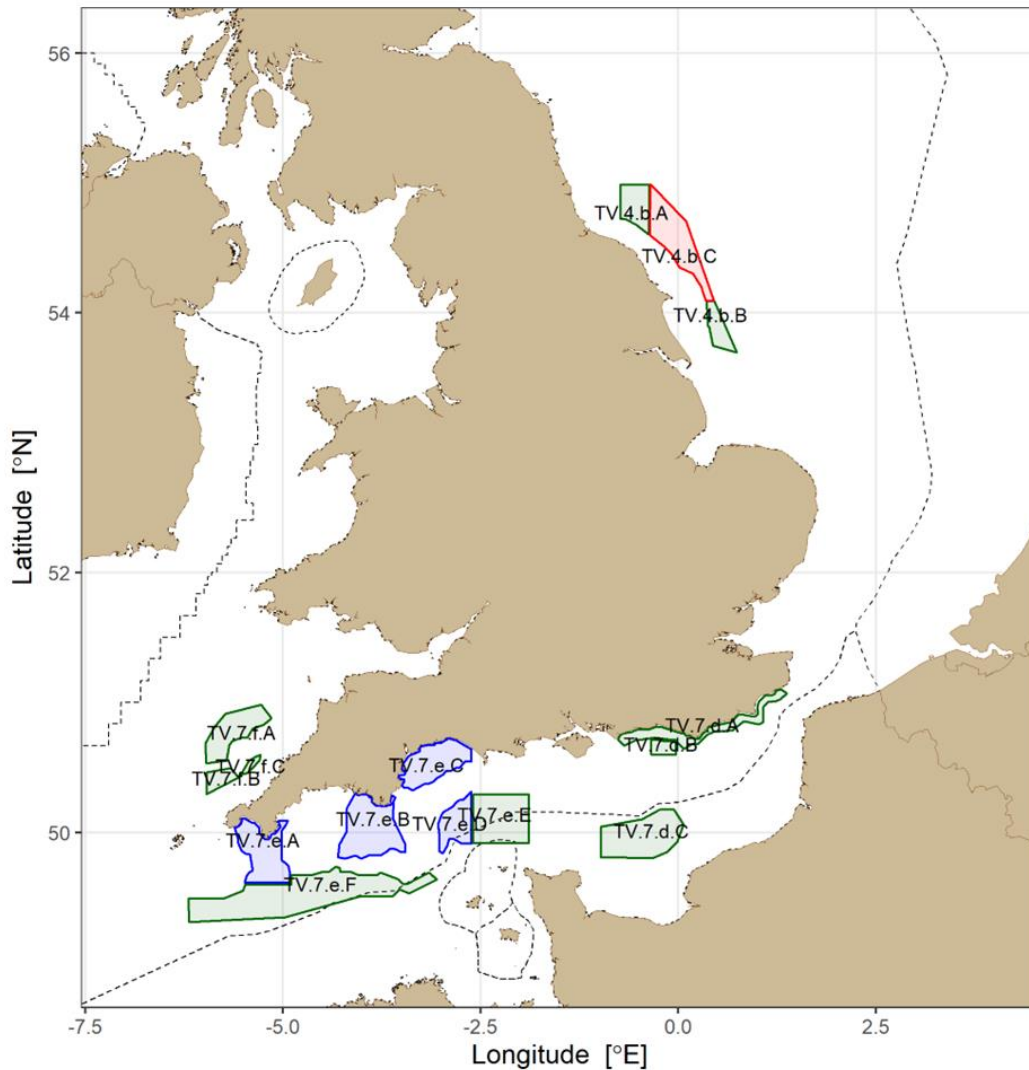


Figure 21. Overview of undredged areas suitable for UWTV Scallop; UK England, IVb, VII d, VII e-g

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

Not internationally coordinated. Data are used in national stock unit assessments

Scallop UWTV surveys are discussed and detailed at ICES WGSCALLOP. Surveys are generally carried out by independent countries for fisheries within their EEZ with cooperation when undredged areas extend into neighbouring countries waters.

North Atlantic (ICES Areas V-XIV and NAFO areas)

Scottish West Coast Groundfish Survey, Quarter 4, SCOWCGFS-Q4; Western waters; UK Scotland component VIa, VIIb

1. Survey objectives

A young fish survey undertaken during Q4 in ICES subarea 6A as one component of the ICES western waters bottom trawl surveys. The survey is targeted towards young (0 and 1-group) cod, haddock, whiting, saithe and Norway pout, herring, and mackerel by utilising a GOV trawl fitted with an internal 20 mm liner.

2. Survey methods

The stratified random design survey will be undertaken by MRV Scotia. Approximately 60 to 62 random stratified stations will be surveyed for hydrographic information coupled with the deployment of a GOV trawl for 30 minutes. Station locations are randomly distributed among 11 sampling strata and the age length data generated is used to produce age disaggregated abundance indices for several target species. Numbers at length and age are acquired for all target species with all other fish species being measured and counted. A separate stratum in subarea VII exists specifically to provide abundance information on juvenile mackerel for the assessment process.

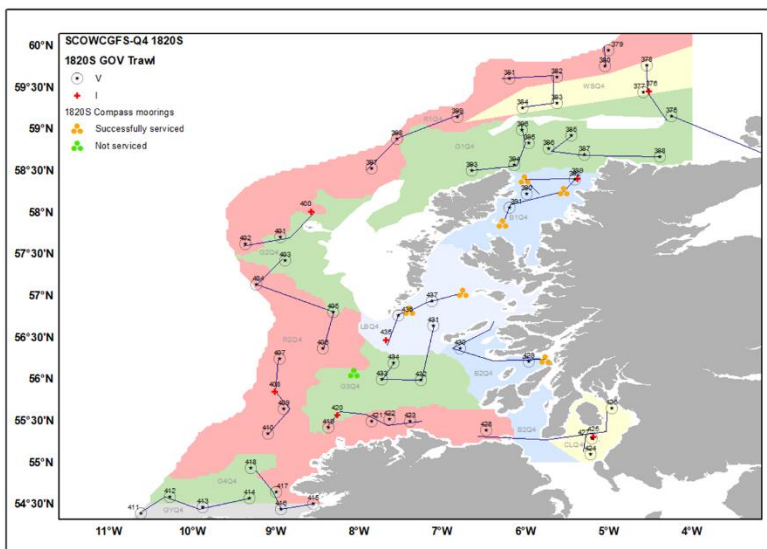


Figure 22. Map showing survey strata and positions for SCOWCGFS-Q4; Western waters; UK Scotland component VIa, VIIb

Data will be stored electronically in the Marine Scotland Science FSS system and uploaded to the ICES DATRAS database.

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

ICES International Bottom Trawl Survey Working Group

Data used by WGCSE for assessments.

Scotia (UK-Scotland); Corystes (UK-Northern Ireland); Celtic Explorer (Ireland); Thalassa (France); Miguel Oliver (Spain); Noruega (Portugal)

Scottish West Coast Groundfish Survey, Quarter 1, SCOWCGFS-Q1; Western waters; UK Scotland component (VIa)

1. Survey objectives

A young fish survey undertaken during Q1 in subarea 6A. The survey is targeted towards young 1- 2 group cod, haddock, whiting, saithe, Norway pout, herring, and mackerel by utilising a GOV trawl fitted with an internal 20 mm liner. Identical in design to the SCOWCGFS-Q4 survey albeit the strata differ slightly reflecting the seasonal changes in abundance observed for target species.

2. Survey methods

The stratified random design survey will be undertaken by MRV Scotia. Approximately 60 to 62 random stratified stations will be surveyed for hydrographic information coupled with the deployment of a GOV trawl for 30 minutes. Station locations are randomly distributed among 11 sampling strata and the age length data generated is used to produce age disaggregated abundance indices for several target species. Numbers at length and age are acquired for all target species with all other fish species being measured and counted.

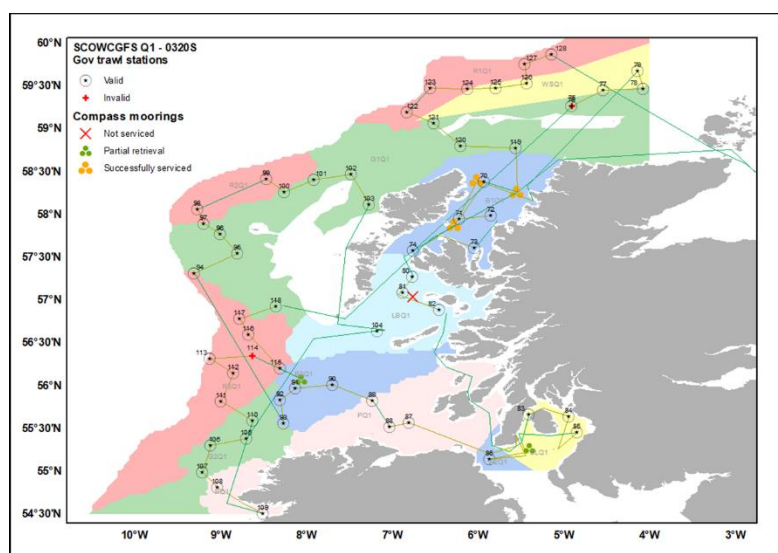


Figure 23. Map showing survey strata and positions for SCOWCGFS-Q11; Western waters; UK Scotland component (VIa)

Data will be stored electronically in FSS database within MSS and then uploaded to ICES DATRAS database.

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

ICES International Bottom Trawl Survey Working Group- Data used by WGCSE for assessments.

Scotia (UK-Scotland); Corystes (UK-Northern Ireland); Spain (Miguel Oliver)

Irish Sea, Bristol Channel and Celtic Sea Beam Trawl Survey, ISBCBTS; 3rd quarter, UK England VIIa,f,g

1. Survey objectives

To provide estimates of abundance of recruiting year classes and CPUE-at-age series for plaice, sole, cod and haddock to the Celtic Seas Ecoregion Working Group (WGCSE). These are used for tuning purposes.

2. Survey methods

The survey will be conducted on the RV Cefas Endeavour. A total of 108 stations have been planned over 20 days. Age samples and biological parameters will be taken from all target species and all species listed under Appendix VII of the DCR which are caught. Benthic by-catch information is collected at each station. Hydrographic data will be collected at a minimum of two stations per day. Any anthropogenic waste material will be recorded and weighed.

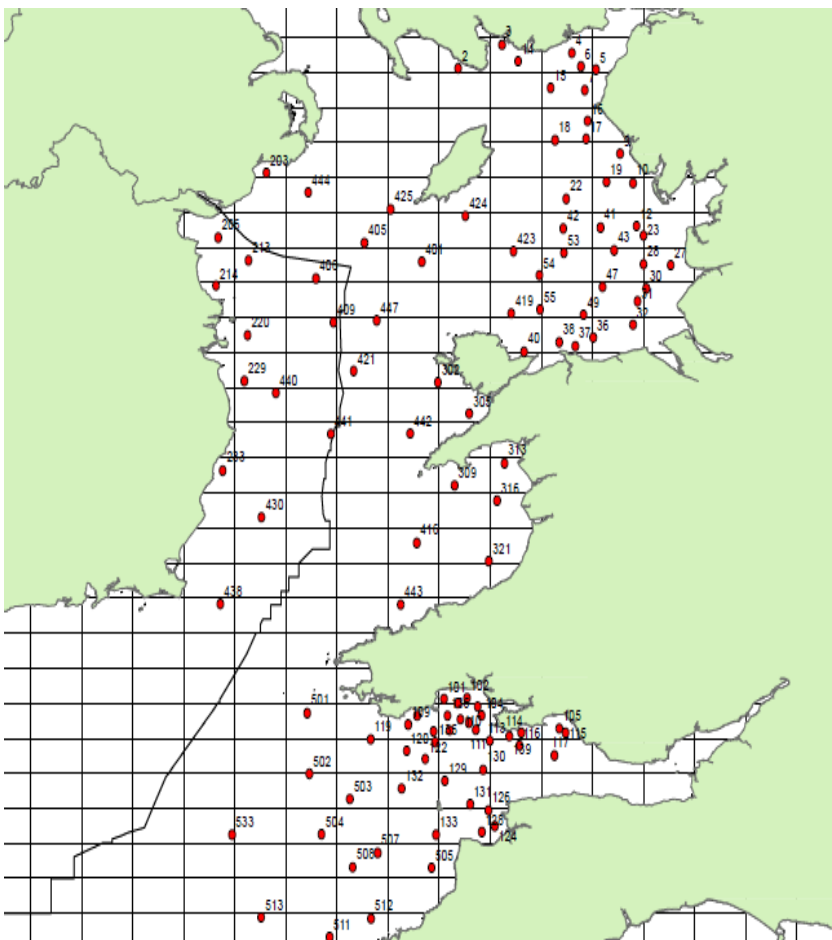


Figure 24. Map showing positions of survey stations ISBCBTS; Western waters; 3rd quarter, UK England VIIa,f,g

The resultant data will be input to a Cefas surveys database (FSS) using the Cefas Electronic Data Capture (EDC) System. All data will also be transmitted to ICES for input to the DATRAS database.

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

Standardised and agreed methodologies are coordinated at Beam Trawl Working Group (WGBEAM) to assure independent indices for each national survey.

Data used by Celtic Seas Ecoregion Working Group (WGCSE) for assessments.

No other countries/vessels participate in this survey.

Spawning/Pre-spawning Herring acoustic survey, NIRS-AS; UK Northern Ireland VIa, VIIa

1. Survey objectives

The primary objective is to estimate the distribution, abundance and population structure of herring and sprat in the Irish Sea by echo-integration and targeted midwater trawling in the Irish Sea (VIIa) and west of Scotland (VIa). A secondary objective is to conduct visual Marine Mammal Observation (MMO) and when possible Passive Acoustic Monitoring (PAM) of cetacean species to obtain the data required to determine species occurrence, density estimates and identify important habitats

2. Survey methods

The survey will be carried out in two phases whereby phase one will occur in the North Channel, western Irish Sea, North Wales coast and eastern Irish Sea (VIIa) and phase 2 will occur Survey of Scottish (VIa) and Manx coastal waters. Sampling will be carried out on a systematic grid of stations covering the spawning grounds and surrounding regions in the NE and NW Irish Sea. A total of approximately 1200 nautical miles are planned to be surveyed by echo-integration using a Simrad EK-60 echosounder (see below). Additional pelagic trawls (approx. 24) are to be carried out to obtain corresponding samples to validate estimates from acoustic data. Species compositions and length frequencies will be recorded from all trawl catches. Samples of up to 50 herring will be taken from each catch for recording of age and other biological parameters. Length-weight parameters will be estimated for fish species contributing significantly to the acoustic integrals. An additional intensified grid may be surveyed around the Isle of Man to investigate the effect of the timing of the spawning migration if timing allows.

Survey manual:

[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)

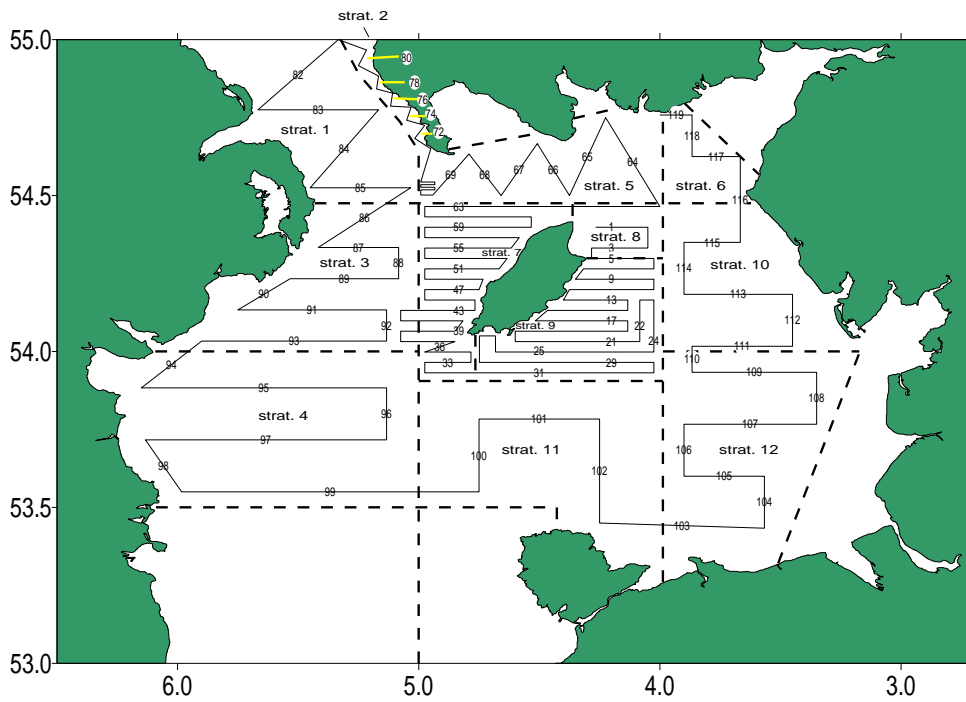


Figure 25. Transects and stratum boundaries for the NIRS-AS; Northern Irish Spawning/pre-spawning Herring Acoustic Survey

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

The survey is coordinated by ICES WGIPS. At present the survey in this area is only conducted onboard the RV Corystes (UK-Northern Ireland).

Nephrops UWTV survey (offshore), UWTV (FU11-13); UK Scotland, VIa FU11-13; North Minch, South Minch, Clyde Sea, Stanton Bank

1. Survey objectives

To obtain estimates of distribution and abundance of Nephrops burrows in functional units to the west of Scotland using underwater television. This survey will be conducted by Scotia undertaking one extensive survey that includes both FUs11-13 (VIa) and FU7 / FU34 (IVa). To conform with the list of mandatory surveys under the Data Collection Framework in which separate surveys are listed for these functional units, the physical survey will be divided into two and reported separately by FU11-13 and FU7.

2. Survey methods

It is planned to complete 120 TV tracks and 3 fishing hauls. Additionally, information on size at maturity will be obtained.

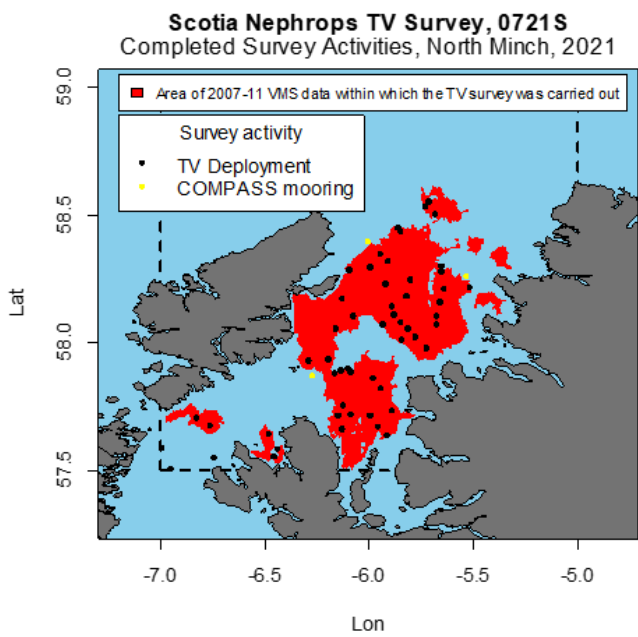
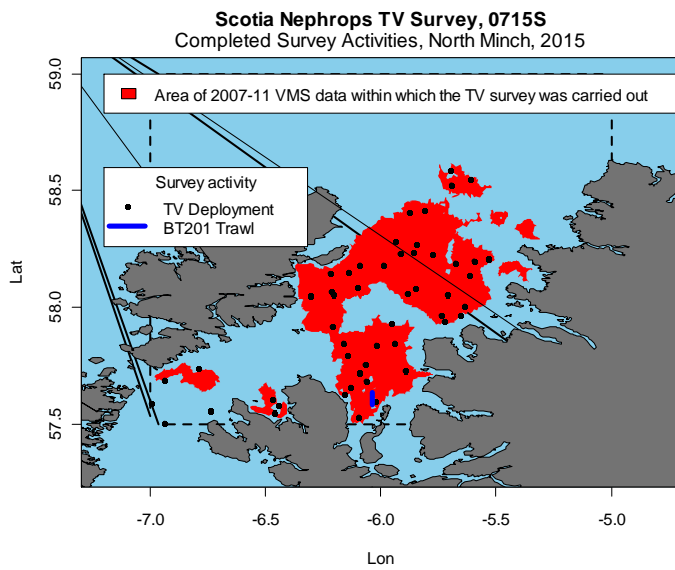


Figure 26. Map showing the location of the TV survey sites (in black) carried out during survey UWTU FU11-13 North Minch, within the extent of the study area based on 2007-2011 VMS data. The yellow icons represent the locations where moorings forming part of the COMPASS project were first recovered and replacement devices were deployed.

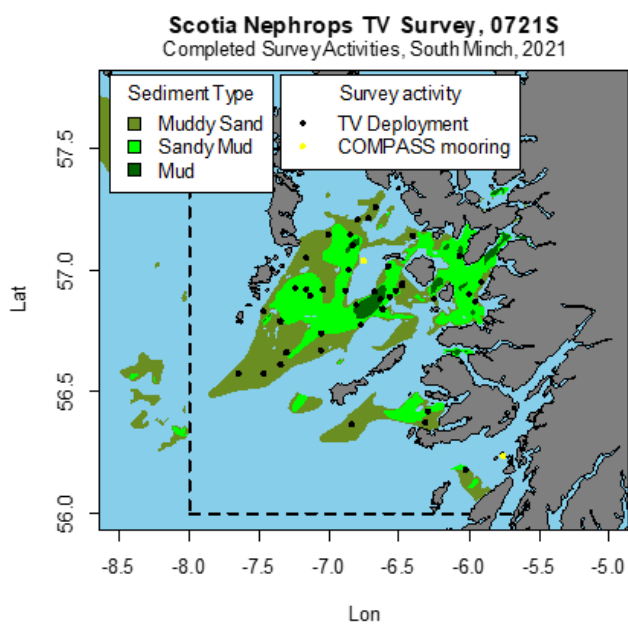
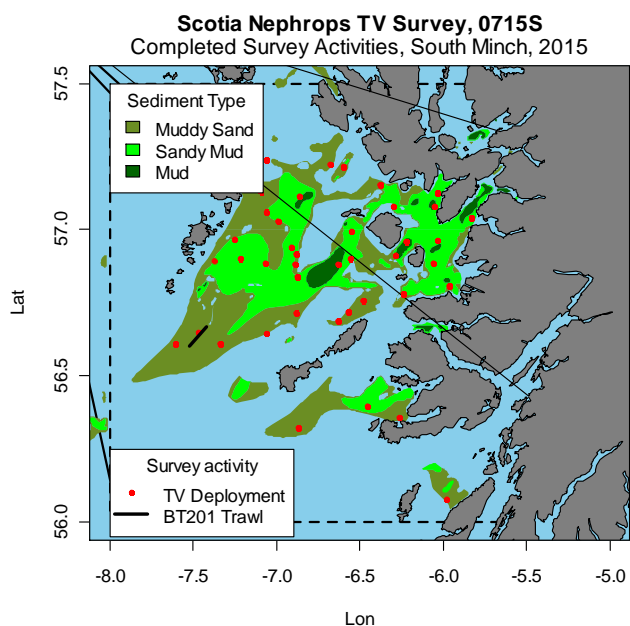


Figure 27. Map showing the location of the TV survey sites (in black) carried out during survey UWTV FU11-13, UK Scotland, South Minch, within the extent of the muddy sediments as described by BGS. The yellow icons represent the locations where moorings forming part of the COMPASS project were first recovered and replacement devices were deployed.

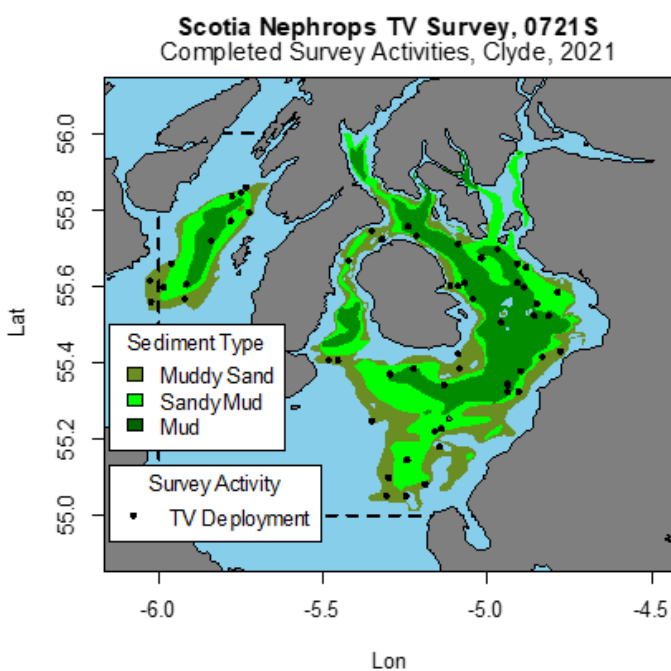
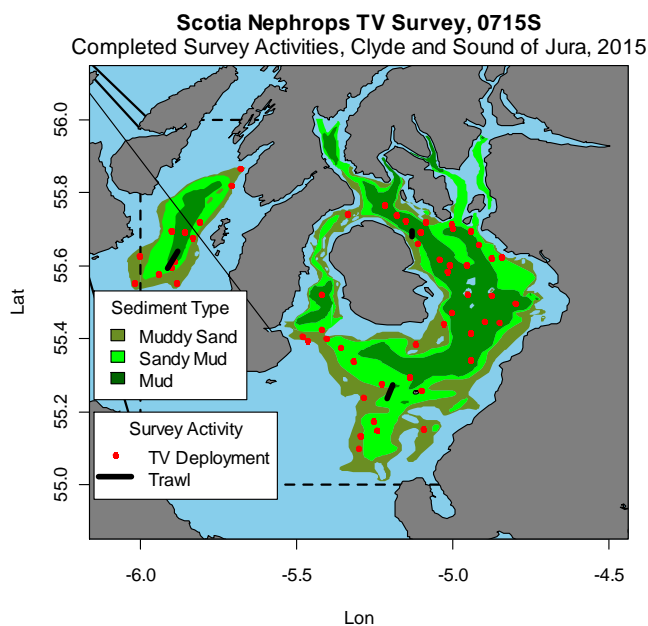


Figure 28. Map showing the location of the surveyed area showing the location of the TV survey sites (in black) carried out during survey UWTW (FU11-13); UK Scotland, Clyde and Sound of Jura, within the extent of the muddy sediments as described by BGS. The yellow icon represents the location where a mooring forming part of the MarPAMM project was recovered.

Video recordings are stored in DVD format and other data in an ACCESS database (WGNEPS is currently seeking to develop an international UWTW database and Scottish data will be transmitted to it when/if it is developed). Video recordings will be analysed, and the results conveyed to the ICES Working Group on Celtic Seas Ecoregion (WGCSE).

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

ICES Working Group on Nephrops Surveys (WGNEPS)

Data are used in functional unit assessments

Although Nephrops UWTV surveys are coordinated via WGNEPS, the surveys are generally carried out by individual countries sampling Functional Units in their own 'back yards' rather than defining multi-vessel surveys across entire sea areas.

No other countries/vessels participate in the survey of these FUs.

Nephrops UWTV Irish Sea, UWTV (FU14); UK Northern Ireland Eastern Irish Sea, Vlla

1. Survey objectives

To investigate the distribution, biology, and population structure of *Nephrops* (*Nephrops norvegicus*) in the eastern Irish Sea, using underwater television.

2. Survey methods

The *Nephrops* UWTV (FU 14) will take place in the Eastern Irish Sea (see below) during the last week in July. The total duration of the cruise is planned to be 3 days. In FU 14 the aim is to complete 38 camera tracks. The camera tracks will be of 15 minutes duration whereby within each minute the number of *Nephrops* burrows will be counted by a minimum of two experienced surveyors.



Figure 29. Map showing the survey area and stations UWTV (FU14); UK Northern Ireland Eastern Irish Sea, Vlla

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

The survey is coordinated by ICES WGNEPS. At present the survey is conducted onboard the RV Corystes (UK-Northern Ireland).

No other countries/vessels participate in the survey of this FU.

Staff exchange occurs from the Irish Marine Institute and the Agri-food and Bioscience Institute. Staff from the Marine Institute provides technical and physical support during the UWTV stage of the survey.

Nephrops UWTV Irish Sea, UWTV (FU15); UK Northern Ireland, Western Irish Sea, VIIa

1. Survey objectives

To investigate the distribution, biology, and population structure of Nephrops (Nephrops norvegicus) in the western Irish Sea, using underwater television.

2. Survey methods

The Nephrops UWTV (FU 15) will occur in the Western Irish Sea (see below) during the last week in July. The UWTV phase of the survey is planned to last 7 days. In FU15 the aim is to complete 100 camera tracks. The camera tracks are planned for 15 minutes whereby within each minute the number of Nephrops burrows are counted by a minimum of two experienced surveyors. A trawling phase of the survey is planned to last 5 days with 24 trawl stations to be sampled using a commercial Nephrops otter-trawl with 70mm mesh net and 45mm cod end for a 30-60 minute tows at fixed-position stations to investigate the distribution, biology, and population structure of Nephrops in the western Irish Sea. The trawl catch will be sorted and quantified at the species level, and length compositions to be recorded for all species. Data on Nephrops is to be collected by sex and maturity stage. Additional data on epibenthos will be recorded using a small beam trawl.



Figure 30. Map showing the survey area and UWTV stations UWTV (FU15); UK Northern Ireland Western Irish Sea, VIIa

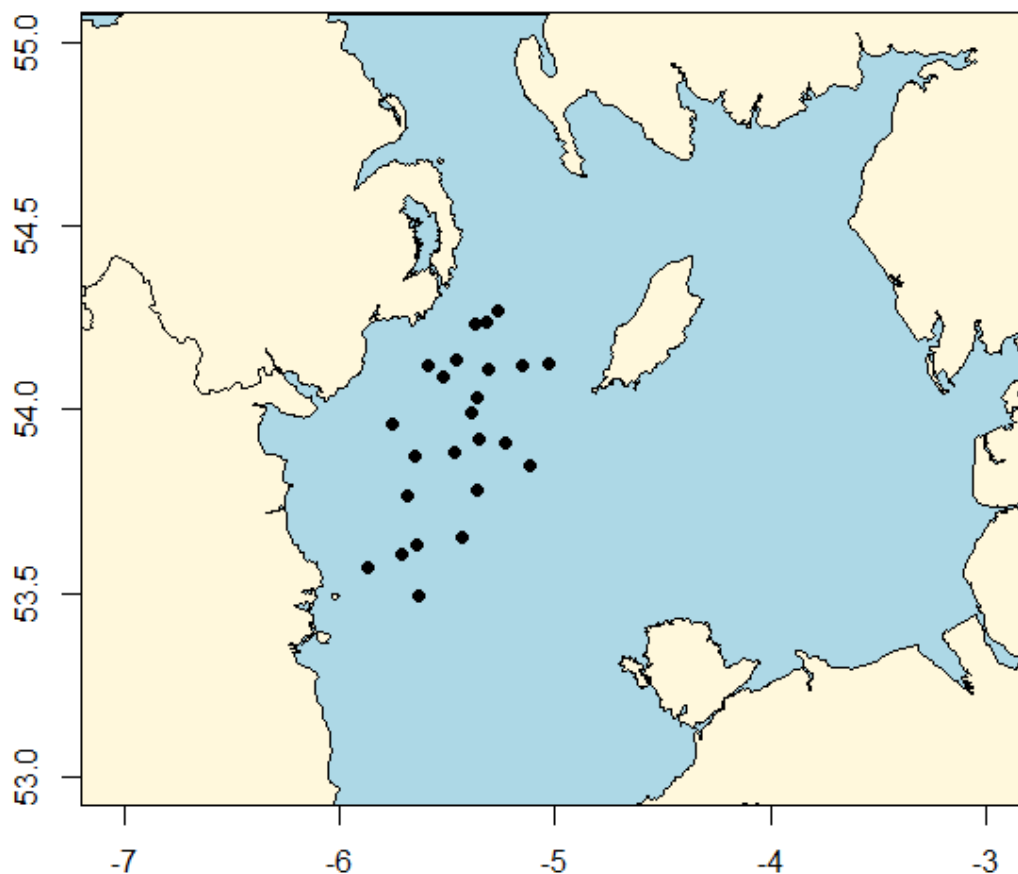


Figure 31. Map showing the trawl stations UWTV (FU15); UK Northern Ireland Western Irish Sea, Villa

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

The survey is coordinated by ICES WGNEPS. At present the survey is conducted onboard the RV Corystes (UK-Northern Ireland).

No other countries/vessels participate in the survey of this FU.

Staff exchange occurs from the Irish Marine Institute and the Agri-food and Bioscience Institute. Staff from the Marine Institute provides technical and physical support during the UWTV stage of the survey.

Rockall Haddock survey, SCOROC - Q3; UK Scotland component Rockall (VIb)

1. Survey objectives

To carry out a bottom trawl survey of haddock on the Rockall Plateau to depths of 350m. Temperature and salinity profiles are collected at selected stations as well as biological samples (genetics and otoliths) of other key species for population studies (haddock, mackerel, whiting, cod, saithe, skates/rays)

2. Survey methods

The survey design is random stratified with the survey divided into 4 depth strata bounded overall by the 350m depth contour. The survey excludes two areas that lie largely within this zone. Both are North East Atlantic Fisheries Commission (NEAFC) closures designed to protect vulnerable marine ecosystems (VMEs). 45 30-minute trawl hauls are planned.

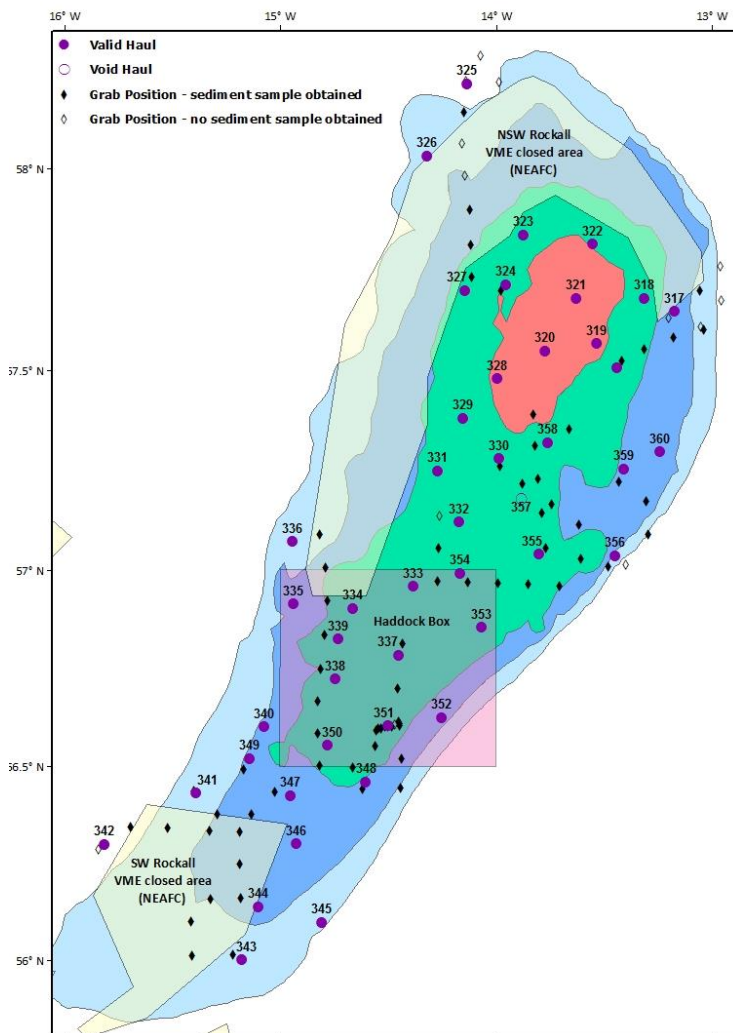


Figure 32. Map showing positions of survey stations SCOROC Q3; UK Scotland component Rockall (VIb)

Data will be stored electronically within FSS database at MSS prior to be uploaded to the ICES DATRAS database.

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

ICES International Bottom Trawl Survey Working Group. Data sent to WGCSE and for assessments.

Scotia (UK-Scotland); Vizcondede Eza (Spain)

Western Channel Beam Trawl Survey, VIIe, 1st quarter, SWECOS; UK England, Ecosystem survey VIIe,f,g,h,j

1. Survey objectives

To provide estimates of abundance of recruiting year classes and CPUE-at-age series for plaice and sole to the Celtic Sea Ecoregion Working Group (WGCSE). These are used for tuning purposes. As the Celtic Sea time series grows, further species tuning indices will be provided to assessment WGs.

2. Survey methods

The survey will be conducted on the RV Cefas Endeavour. A total of 131 stations have been planned over 30 days. Age samples and biological parameters will be taken from all target species and all species listed under Appendix VII of the DCR which are caught. Benthic by-catch information is collected at each station. Hydrographic data will be collected at a minimum of two stations per day. Any anthropogenic waste material will be recorded and weighed.

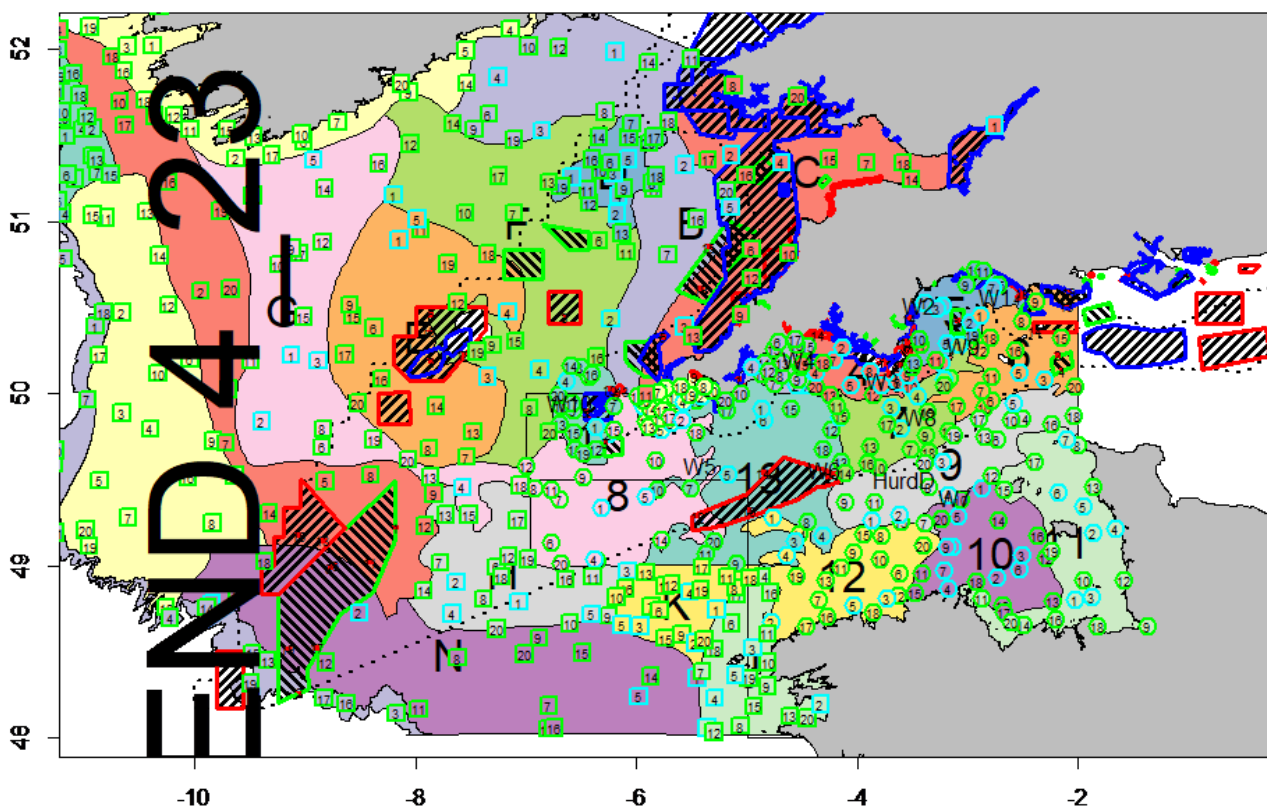


Figure 33. Map showing positions of example survey stations SWECOS; UK England, Ecosystem survey VIIe,f,g,h,j

The resultant data will be input to a Cefas surveys database (FSS) using the Cefas Electronic Data Capture (EDC) System. All data will also be transmitted to ICES for input to the DATRAS database.

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

Standardised and agreed methodologies are coordinated at Beam Trawl Working Group (WGBEAM) to assure independent indices for each national survey.

Data used by Celtic Seas Ecoregion Working Group (WGCSE) for assessments.

No other countries/vessels participate in this survey.

Quarter 1 Irish Sea Groundfish Survey, NIGFS Q1; Northern Ireland, VIIa

1. Survey objectives

The Northern Irish Groundfish Survey (NIGFS Q1) Irish Sea survey aims to collect data on the distribution and relative abundance, and biological information of commercial fish in VIIa. The primary species of interest are cod, haddock and whiting, herring, and plaice.

2. Survey methods

The survey will be carried out in the Irish Sea (see below) and aims to depart at the start of March with a duration of 23 days (weather dependent). A target of 62 stations of fixed positions are towed using a rock-hopper otter trawl with a 17m footrope fitted with 250 mm non-rotating rubber discs. The survey is divided in strata defined by length and substratum. Scanmar sensors were fitted to gear and trawl parameters recorded. In addition, temperature and salinity are recorded at each station. The species composition of each catch is to be recorded by total weight of species caught and length frequencies recorded for all species. Dependent of the number of individual fish caught all samples of cod, haddock, herring, and whiting have length, weight, sex, and maturity recorded and otoliths are to be obtained for aging. If the number of individual fish is large, an appropriate sub-sample should be taken. The biological samples of cod and herring may be further analysed for parasite burden.

Survey manual:

[http://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20\(SISP\)/SISP1-IBTSVIII.pdf](http://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP1-IBTSVIII.pdf)

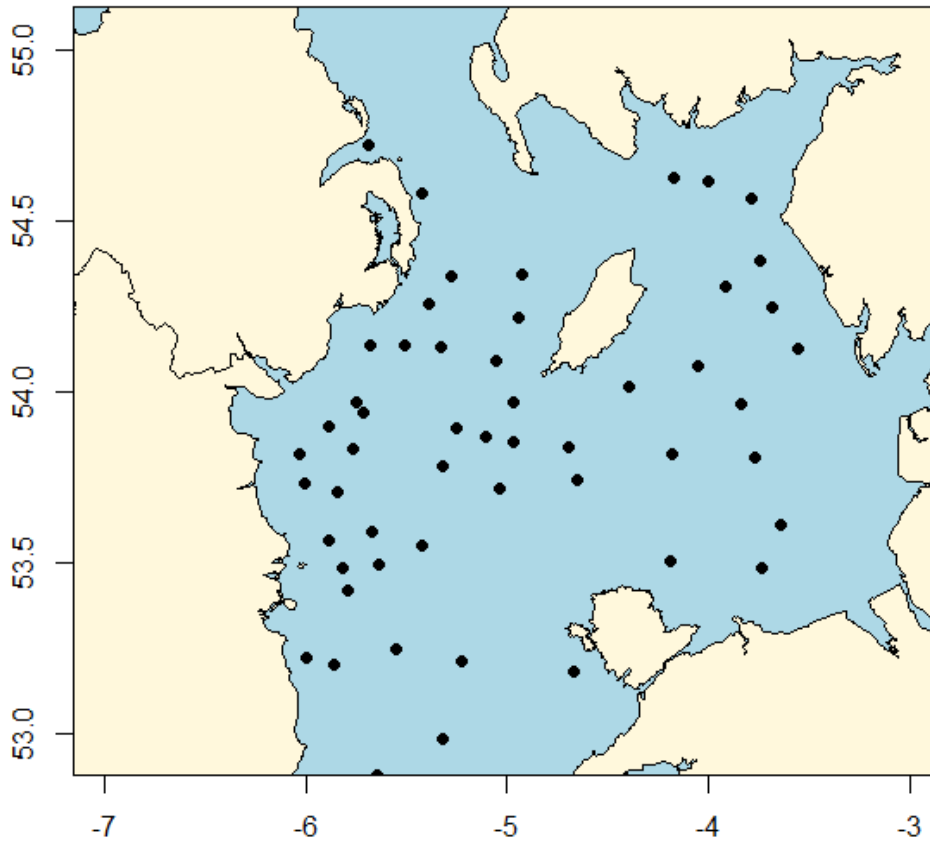


Figure 34. Map showing positions of trawl stations NIGFS Q1; Northern Ireland, VIIa.

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

The survey is coordinated by ICES IBTSWG. At present the survey is conducted onboard the RV Corystes.

Scotia (UK-Scotland); Corystes (UK-Northern Ireland); Celtic Explorer (Ireland); Thalassa (France); Miguel Oliver (Spain); Noruega (Portugal)

Quarter 4 Irish Sea Groundfish Survey, NIGFS Q4; Northern Ireland, VIIa

1. Survey objectives

The Northern Irish Groundfish Survey (NIGFS Q4) Irish Sea survey aims to collect data on the distribution and relative abundance, and biological information of commercial fish in VIIa. The primary species of interest are cod, haddock and whiting, herring, and plaice.

2. Survey methods

The survey will be carried out in the Irish Sea (VIIa; see below) and aims to depart at the start of March with a duration of 19 days (weather dependent). A target of 62 stations of fixed positions are to be towed using a rock-hopper otter trawl with a 17m footrope fitted with 250 mm non-rotating rubber discs. The survey will be divided in strata defined by length and substratum. Scanmar sensors will be fitted to gear and trawl parameters recorded. In addition, temperature and salinity are to be recorded at each station. The species composition of each catch will be recorded by total weight of species caught and length frequencies recorded for all species. Dependent of the number of individual fish caught all samples of cod, haddock, herring, and whiting will have length, weight, sex, and maturity recorded and otoliths obtained for aging. If the number of individual fish is large, an appropriate sub-sample should be taken. The biological samples of cod and herring may be further analysed for parasite burden.

Survey manual:

[http://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20\(SISP\)/SISP1-IBTSVIII.pdf](http://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP1-IBTSVIII.pdf)

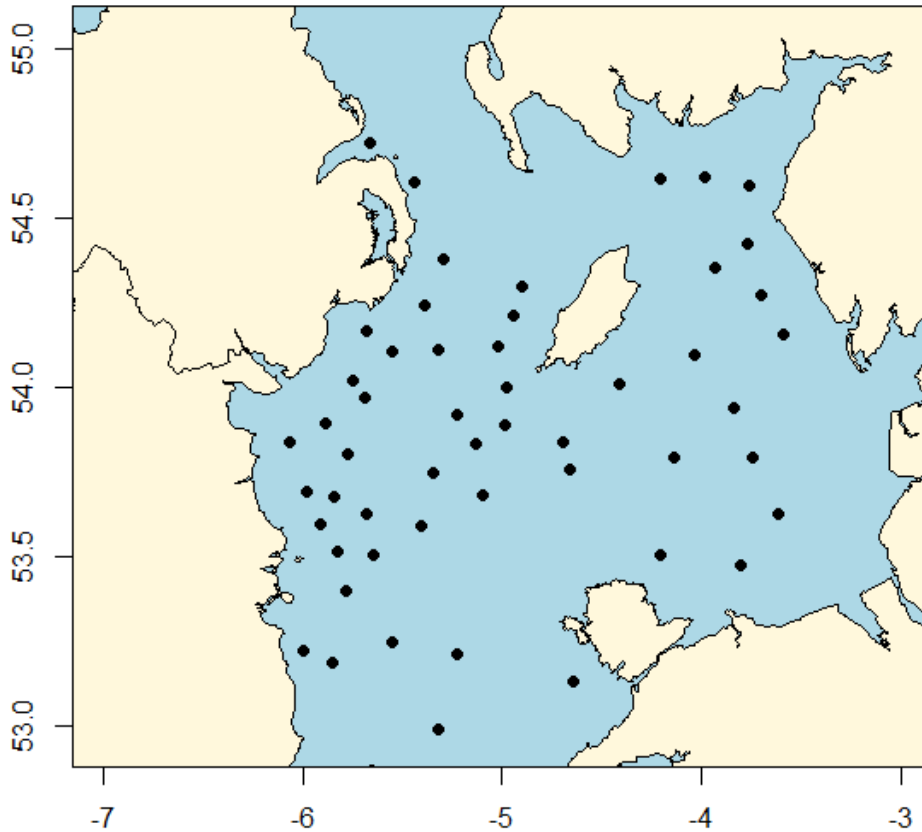


Figure 35. Map showing positions of trawl stations NIGFS Q4; Northern Ireland, VIIa.

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

The survey is coordinated by ICES IBTSWG. At present the survey is conducted onboard the RV *Corystes*. *Scotia* (UK-Scotland); *Corystes* (UK-Northern Ireland); *Celtic Explorer* (Ireland); *Thalassa* (France); *Miguel Oliver* (Spain); *Noruega* (Portugal)

Northern Irish MIK net survey, NI-MIK; Northern Ireland, VIIa

1. Survey objectives

The objectives of the NI-MIK survey are:

- to investigate the distribution and abundance of juvenile gadoids in management area VIIa(N).
- to collect zooplankton, fish larvae and environmental data using the GulfVII.
- to monitor jellyfish abundance in the Irish Sea survey area.

2. Survey methods

The survey will take place in the Irish Sea (VIIa) between May-June lasting approximately 19 days, split across two phases. A grid of approximately 122 stations will be sampled with the high-speed plankton sampler (GulfVII) and 90 stations using the MIK net. MIK net sampling during the hours of darkness (sunset to sunrise). The nets are to be deployed to ~5m off the seabed. The deployment of the MIK net will be controlled using the Scanmar catch control system and towed at approximately 3knots. The GulfVII being towed at between 3-4knts. A member of the scientific staff will monitor the deployment of the MIK net and will require communication with the winch man from the bridge (VHF).

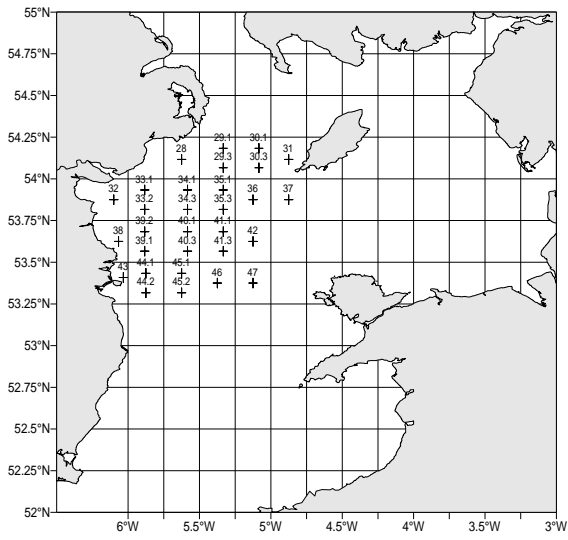


Figure 36. MIK net sampling stations NI-MIK phase i.

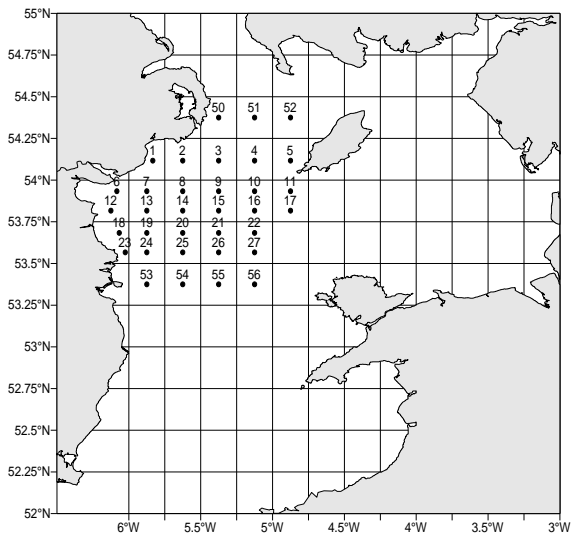


Figure 37. GULFVII sampling stations NI-MIK phase i

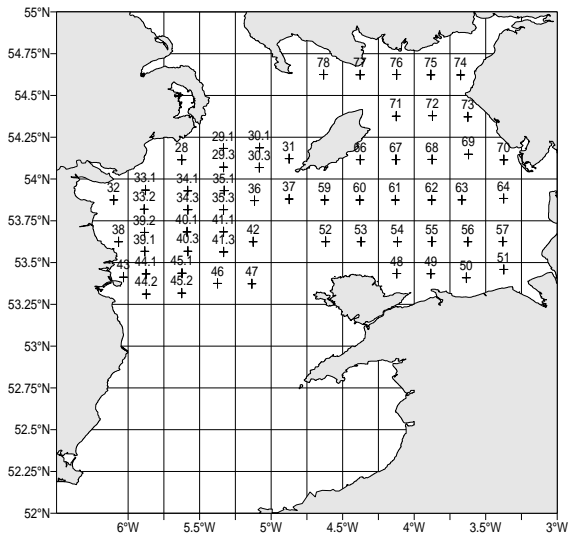


Figure 38. MIK sampling stations for NI-MIK phase ii.

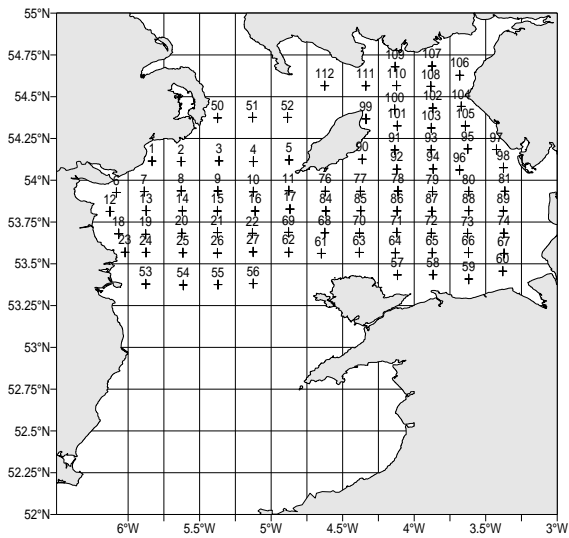


Figure 39. Gulf VII sampling stations for NI-MIK phase ii

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

N/A

Irish Sea queen scallop survey, ISQSS; Northern Ireland, Vlla

1. Survey objectives

The objectives of the Vlla queen scallop survey are:

- to obtain information on spatial patterns of abundance of different size-classes of queen scallops in the Irish Sea and off the north coast;
- to collect biological information from queen scallops and scallops by area, including tissue samples;
- to collect information on by-catch species;
- to collect additional biological information on fish species.

2. Survey methods

The survey will occur at the end of June lasting approximately 4 days. A total of 30 stations will be selected at random from a fixed grid $0.03^* 0.03$ decimal degrees. The number of stations within strata selected will be from a function of historic queenie fishery within that strata and strata area. In addition, it is planned that 7 tows will take place using four dredges towed abreast, the outer dredges were as used by the commercial vessels for targeting queen scallops (width = 725 mm). The inner dredges were as used to target king scallop (width = 745 mm). These dredges will be selected based expert judgement from the camera tows.

At all stations the camera and sledge will be deployed. Film data from 15-minute tows at each station will be stored on DVDs. A USBL system is also to be used to enable the course taken by the sledge during tows to be tracked. This information is an essential input to calculation of the area of seabed swept during each tow.

All catch will be processed separately from the each of the dredge types. Length frequencies of all queen scallops will be taken and two from each length class (0.5cm) retained for biological sampling - length, breadth, and abductor muscle and gonad weights. Length frequencies of all finfish bycatch and counts of benthos are also to be recorded.

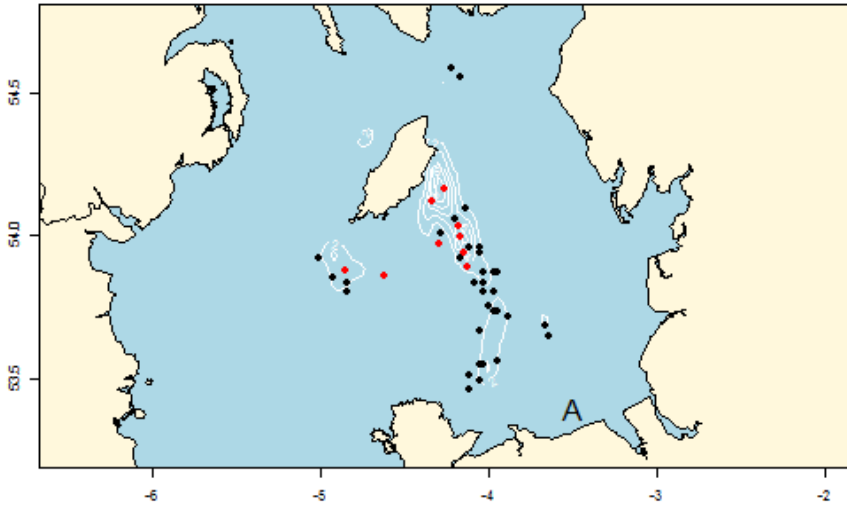


Figure 40. Indicative stations surveyed within the Irish Sea area of the ISQSS; UK Northern Ireland, Vlla survey. Stations surveyed by UWTV in black and dregde samples in black.

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

N/A

Vla queen scallop survey, NCQSS; Northern Ireland, Vla

1. Survey objectives

The objective of the Vla queen scallop survey are:

- to obtain information on spatial patterns of abundance of different size-classes of queen scallops;
- to collect biological information from queen scallops and scallops by area, including tissue samples;
- to collect information on by-catch species;
- to collect additional biological information on fish species.

2. Survey methods

The survey is planned for the start of July lasting approximately 6 days. A total of 40 stations are planned to be selected at random from a fixed grid 0.03* 0.03 decimal degrees. The number of stations within strata will be a function of historic queenie fishery within that strata and strata area. In addition, it is planned that 10 tows will take place using four dredges towed abreast, the outer dredges were as used by the commercial vessels for targeting queen scallops (width = 725 mm). The inner dredges were as used to target king scallop (width = 745 mm). These dredges will be selected based expert judgement from the camera tows.

At all stations the camera and sledge will be deployed. Film data from 15-minute tows at each station to be stored on DVDs. A USBL system is to be used to enable the course taken by the sledge during tows to be tracked. This information is an essential input to calculation of the area of seabed swept during each tow.

All catch should be processed separately from the each of the dredge types. Length frequencies of all queen scallops are to be taken and two from each length class (0.5cm) retained for biological sampling - length, breadth, and abductor muscle and gonad weights. Length frequencies of all finfish bycatch and counts of benthos will be recorded.

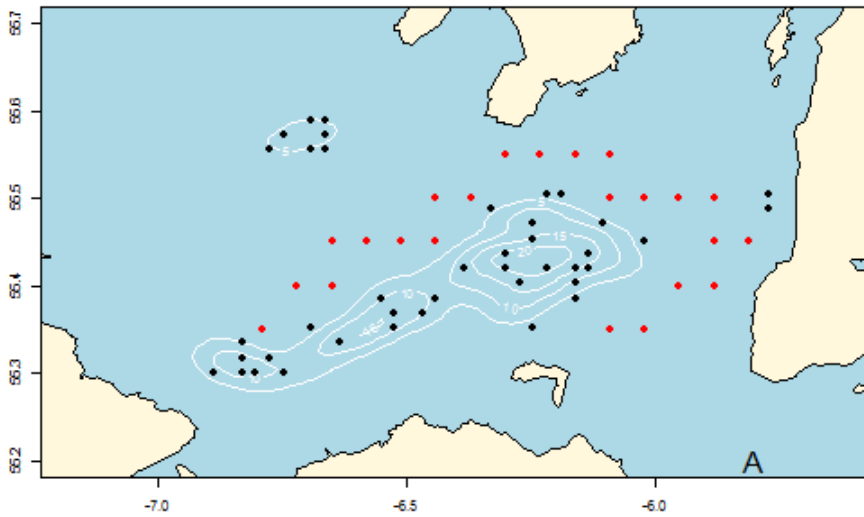


Figure 41. Stations surveyed within the North Coast area of the NCQSS; UK Northern Ireland, Vla survey. Stations surveyed by UWTV, red - exploratory stations; black – core fishery area stations.

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

N/A

Vla & Vlla Scallop survey, NIKSDS; Northern Ireland, Vla and Vlla

1. Survey objectives

The aim of the survey is to assess the scallop (*Pecten maximus*) grounds off the County Down coast and collect the following scallop data:

- catch per unit effort.
- scallop age composition
- weight, height, and length of individual scallops.
- abductor muscle and gonad weights.
- scallop shell samples were retained for morphometric study.

Identify and quantify macrofauna associated with scallops.

Collect samples of scallop abductor muscle and gonad for contaminant analysis.

2. Survey methods

The scallop survey will occur in mid-February for duration of approx. 5 days (weather dependent). 35 stations of fixed position are to be dredged using a beam with four 2-foot dredges and from the starboard trawl winch on 24mm warp. A fine mesh (<10mm) liner will be attached to one dredge to retain small benthic fauna. Catches are to be sorted and the associated fauna identified and counted. Scallops are to be weighed and shell length and height measured. Meat yield will be determined by measurement of the abductor muscle and gonad weight. Shells are to be aged by examination of growth bands on the flat shell and flat shells are retained for microscopic examination of hinge ligament scars after the cruise.

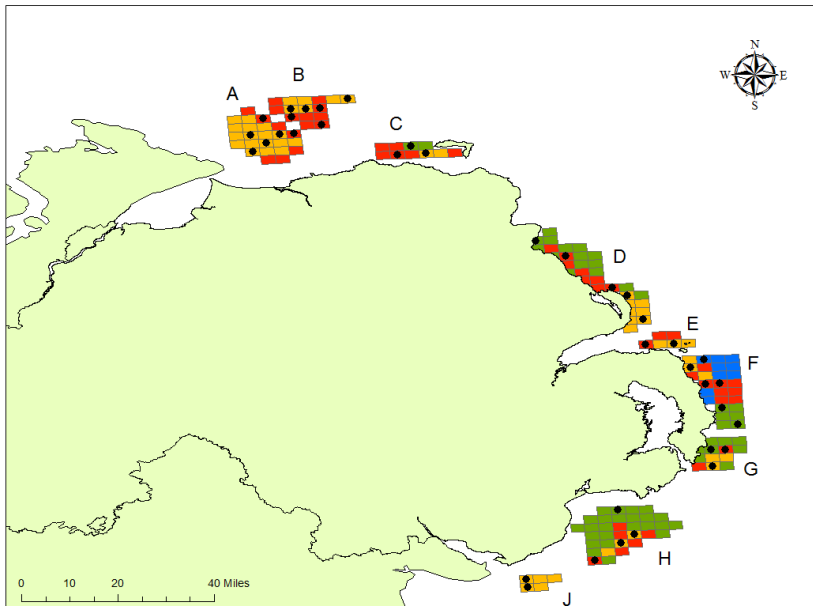


Figure 42. Location of stations (black dots) for dredging in the NIKSDS; UK Northern Ireland, VIa and VIIa survey. The different colours represent the different substrata types.

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

N/A

Western Channel Celtic Sea Pelagic survey, PELTIC; UK England, VIIe, VIIf, VIIg

1. Survey objectives

To carry out an acoustic survey to estimate the abundance and distribution of the small pelagic fish community (sprat, sardine, anchovy, mackerel, horse, mackerel) in the western English Channel and eastern Celtic Sea (ICES area VIIe,f and g; the “Mackerel Box”). This survey provides the only fishery independent data for these species in the area. Estimates of the abundance of sprat are presented at HAWG to feed into the stock assessment of sprat in VIIde; sardine abundances are provided to WGHANSA and used in the stock assessment of ICES area VII sardine; northern anchovy data will also be presented at WGHANSA although no stock assessment currently exists. Additional abundance data on mackerel, horse mackerel, boarfish and herring are calculated and may be used as (recruitment) indices.

To provide the associated environmental and ecological context for the estimates, other relevant sampling methodologies will be integrated to better understand the effect of such processes. These will inform not only on the development of future stock dynamics of the survey’s target species but will also help to develop a better understanding how the pelagic processes affect particularly demersal species surveyed in the area by other surveys.

In 2020 and 2021 the PELTIC survey was extended into Welsh waters (Cardigan Bay). The continuation of this extension as an annual survey is being finalised. This extension would be reported on in the annual report for 2022.

2. Survey methods

Approximately 2200 nautical miles will be surveyed with ~40 ad hoc pelagic trawl operations to ground-truth acoustic data and collect biological samples. All fish and cephalopods caught will be identified to species and measured. Age samples and biological parameters will be taken from all target species (sprat, sardine, mackerel, anchovy, horse mackerel, herring, boar fish, blue whiting, garfish, and saury pike) and species listed under Appendix VII of the DCR which are caught.

Sardine eggs and larvae from 90 plankton stations, will be counted, staged, and aged and presented to WGACEGG to establish spawning areas and estimate sardine SBB. Meso zooplankton samples and vertical profiles of temperature and salinity are collected at the same 90 stations. Further discrete samples for phyto-and micro zooplankton, as well as oceanographic data (including chlorophyll and nutrients), will be collected at a subset of 40 of those fixed primary stations, which, combined with continuous sub-surface oceanographic sampling, provide an ecological context of the observations. In addition, these environmental data are used to monitor the ecosystem health under OSPAR and MSFD descriptors. Seabirds and marine mammal observations are recorded along transects by observers.

Data will be held in a surveys database at CEFAS and provided in summarised form to WGACEGG and WGIPS. Fisheries acoustic data, partitioned by species and, where possible, age and length categories will be stored in formats coordinated by WGIPS and WGACEGG and made available to ICES through the respective working group databases. Pelagic trawl catch data will be recorded using the CEFAS Electronic Data Capture System. Oceanographic data and outcome of plankton samples analysis will be stored in the Cefas Data Repository, linked to the survey.

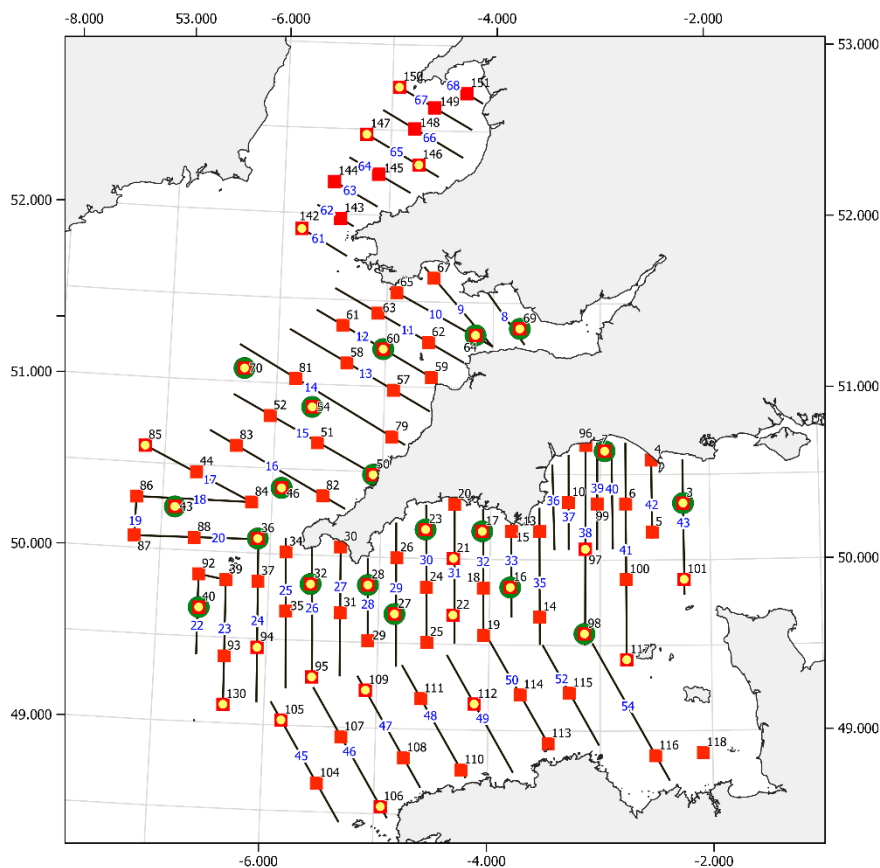


Figure 43. PELTIC; UK England, VIle, VIIf, VIlg; 4th Quarter (English Integrated Pelagic Survey). Acoustic transects (black lines), zooplankton stations (red boxes) and Rosette stations (yellow) high priority stations in green. Recent extension into Cardigan included.

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

WGACEGG: Working Group on Acoustic and Egg surveys for small pelagic fish in the Northeast Atlantic. WGIPS: Working Group on International Pelagic Surveys

No other countries/vessels participate in this survey.

Western Channel Sole and Plaice Industry survey, WCSPI; England VIIe (Formerly a Fisheries Science Partnership Survey)

1. Survey objectives

To provide estimates of abundance of recruiting year classes and CPUE-at-age series for plaice, sole from a commercial beam trawler for provision to the Celtic Seas Ecoregion Working Group (WGCSE). These are used for tuning purposes.

2. Survey methods

The survey will be carried out on the MFV Carhelmar. A standard grid of stations are fished annually over two surveys (usually), one in the east of VIIe and the other in the west. Age samples and biological parameters will be taken from all target species.

The resultant data will be input to a Cefas surveys database (FSS) FSP version.

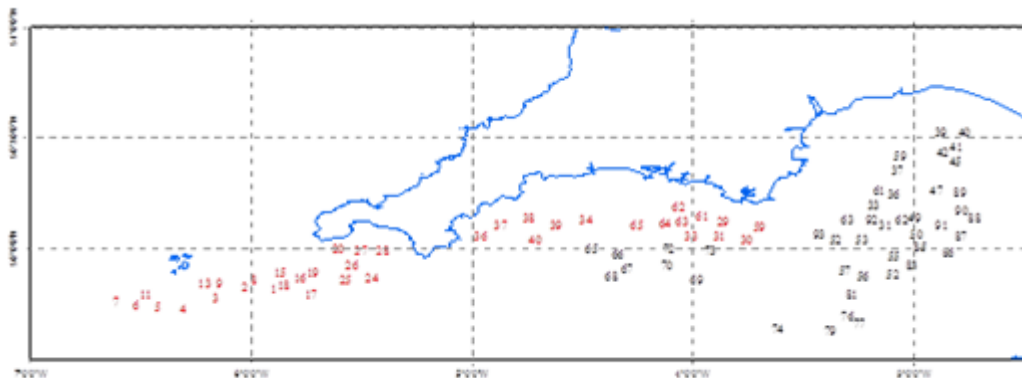


Figure 44. Map showing positions of survey stations WCSPI; UK England VIIe

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

N/A

Western Channel & Bristol Channel scallop dredge survey, WECSDS; UK England, VIIe, VIIf.

1. Survey objectives

To obtain estimates of distribution and harvestable biomass of King Scallop in the Western English Channel and Approaches to the Bristol Channel. This survey will be conducted annually each May by a chartered commercial vessel using both commercial and modified dredges on exploited grounds described by historic VMS data. The data are the primary input to the annual scallop stock assessments published on the government website in April each year.

2. Survey methods

Approximately 141 stations are carried out in the Western Channel and a further 14 stations are carried out in the Approaches to the Bristol Channel (total 155). The survey methodology continues to undergo evolution with redefinition of the assessment areas and exploited beds expected to change with the fishery. The survey is a swept area method relying on substrate specific gear efficiency estimates to convert survey catch rates to density on the seabed. Harvestable biomass is estimated from the size distributions of the catch using Length and Weight (L-W) factors.

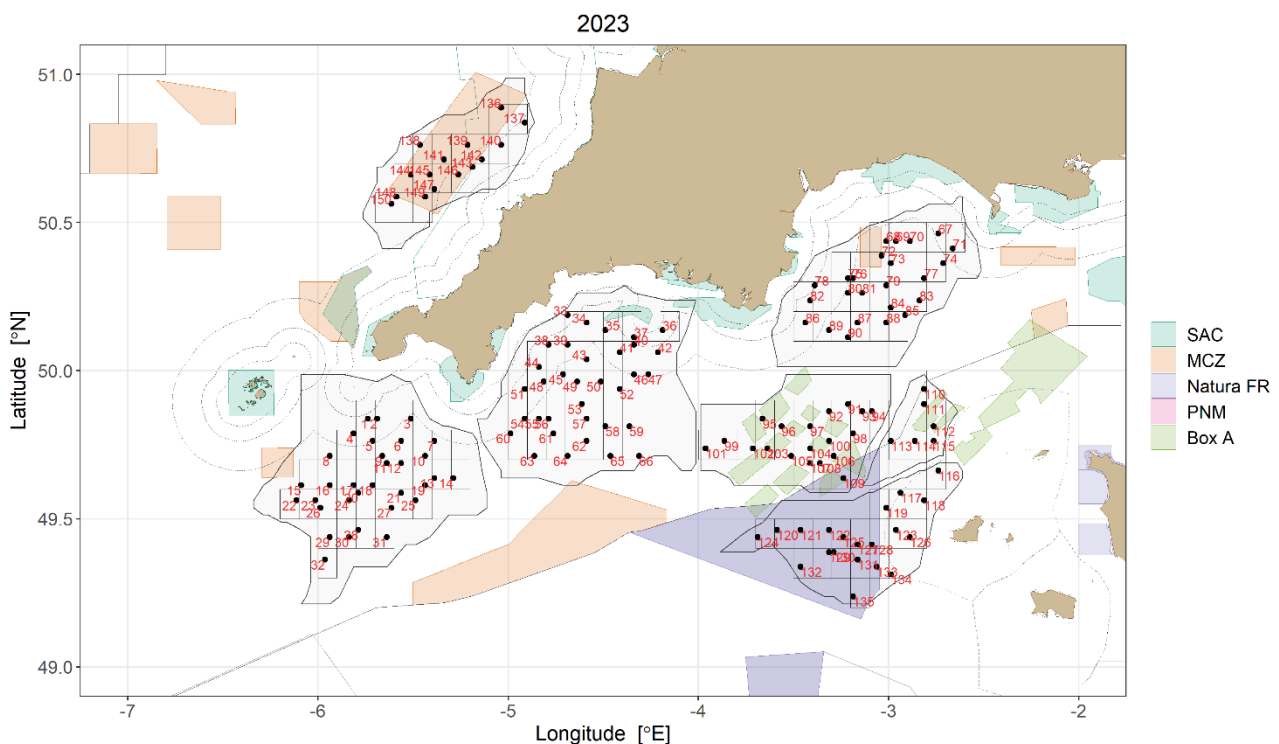


Figure 45. showing the proposed survey sites in the Western English Channel (135 stations) and Approaches to the Bristol Channel (15 stations) WECSDS; UK England, VIIe, VIIf. N.B.

Survey sites in the French EEZ and MPAs are subject to permissions and may not be carried out.

Exploitation levels are presented in the annual stock assessment as the total realised or estimated removals as a proportion of the estimated harvestable biomass.

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

The survey is not internationally coordinated but results are presented, and methodology periodically reviewed by ICES Working Group on scallops (WGScallop).

West Coast Scallop Dredge Survey, WCSS; UK Scotland, ICES area VIa

1. Survey objectives

- to carry out a survey of scallop stocks around the West coast of Scotland.
- to age, measure and assess shell damage.
- to collect information on by-catch of other commercial fish and shellfish species.
- to identify and quantify numbers of starfish species.
- to collect frozen whole scallops for heavy metal testing as part of the OSPAR assessment of hazardous substances in the marine environment.
- to record and retain marine litter obtained during the dredging process (for MSFD).

2. Survey methods

The commercial fishery for the king scallop (*Pecten maximus*) is the second most valuable shellfish fishery in Scotland. Dredge surveys of the major scallops grounds around Scotland have been carried out annually by Marine Scotland Science (MSS) since the mid-1990's. The scallop survey data are used in the regional stock assessments.

The survey gear on the starboard side consists of six standard commercial spring-loaded Newhaven type dredges (75 cm wide, 9 tooth bar, 80 mm internal diameter belly rings). The port side has six smaller configured sampling dredges (75 cm wide, 11 tooth bar, with 60 mm internal diameter belly rings). At each station (Figure 46) the dredges are towed at ~2.5 knots for 30 minutes and all king scallops caught are aged, measured (length to the 0.5 cm below) and damage assessed. All bycatch is identified, measured, sexed where appropriate and damage assessed. All starfish are identified, and damage assessed.

The survey is planned for around April, lasting approximately 20 days. There are 100 fixed stations to select from and the survey fishes as many of them as time and weather allow. The planned target may potentially be reduced due to impact of wind farms.

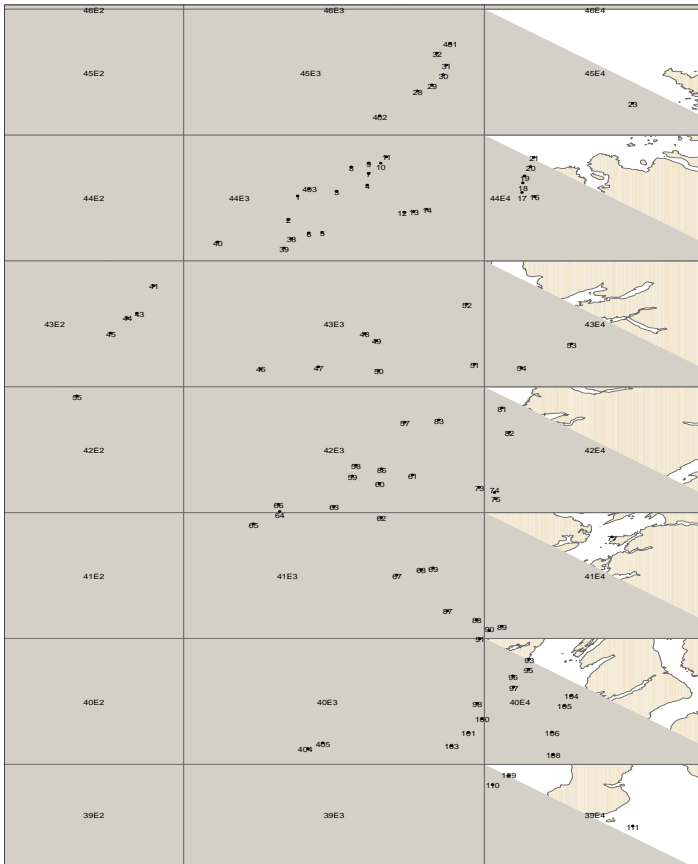


Figure 46. Map of scallop dredge stations; UK Scotland, VIa

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

Not internationally coordinated. Data are used in national stock unit assessments

Scallop survey data are discussed and detailed at ICES WGSCALLOP.

Clyde Scallop Dredge Survey, CLYDESS; UK Scotland, ICES area VIa

1. Survey objectives

- to carry out a survey of scallop stocks in the Clyde region.
- to age, measure and assess shell damage.
- to collect information on by-catch of other commercial fish and shellfish species.
- to identify and quantify numbers of starfish species.
- to collect frozen whole scallops for heavy metal testing as part of the OSPAR assessment of hazardous substances in the marine environment.
- to record and retain marine litter obtained during the dredging process (for MSFD).
- Collect meat weight and ring measurements from a sub-sample of king scallops

2. Survey methods

The commercial fishery for the king scallop (*Pecten maximus*) is the second most valuable shellfish fishery in Scotland. Dredge surveys of the major scallops grounds around Scotland have been carried out annually by Marine Scotland Science (MSS) since the mid-1990's. The scallop survey data are used in the regional stock assessments.

The survey gear on the starboard side consists of six standard commercial spring-loaded Newhaven type dredges (75 cm wide, 9 tooth bar, 80 mm internal diameter belly rings). The port side has six smaller configured sampling dredges (75 cm wide, 11 tooth bar, with 60 mm internal diameter belly rings). At each station (Figure 47) the dredges are towed at ~2.5 knots for 30 minutes and all king scallops caught are aged, measured (length to the 0.5 cm below) and damage assessed. All bycatch is identified, measured, sexed where appropriate and damage assessed. All starfish are identified, and damage assessed.

The survey is planned for around October, lasting approximately 14 days. There are currently 45 fixed stations to select from.



Figure 47. Map of scallop dredge stations; UK Scotland, Vla (Clyde)

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

Not internationally coordinated. Data are used in national stock unit assessments

Scallop survey data are discussed and detailed at ICES WGSCALLOP.

Section 1C: Marine Recreational Fisheries

Ref Table 1C

International and domestic commitments

This fulfills paragraph 2 point (a) (iv) of Chapter III of the multiannual programme.

Sea angling data are needed to support local, national, and regional management of fish stocks, environmental protection, marine spatial planning, development of the blue economy, and physical health and wellbeing. Data on recreational fishing contributes to the 'scientific evidence objective' of the Fisheries Act 2020.

Marine recreational fisheries (MRF) are now embedded in UK fisheries management through the Fisheries Act (2020), alongside the provision for funding for development. Biological, social, and economic data on recreational fisheries are used to inform Fisheries Management Plans, which in turn supports the objectives of the Fisheries Act. In addition, the UK provides data to ICES annually on the numbers and tonnages of recreational catches of cod, seabass, pollack, salmon, eels, elasmobranchs and highly migratory species in the North and Celtic Seas.

Key end users

ICES, Defra

Data collection

The sections below set out the sampling plans for 2023 for each of the countries including proposed approaches, PSU, and proposed sample sizes by region.

England

In 2023, England will continue to use the offsite diary approach outlined which was established between 2016 and 2021. This is used to estimate the participation, effort catches, and economic impacts of MRF in the UK. This is done through the sea angling panel (www.seaangling.org) which combined two surveys:

- an existing nationwide survey of UK residents (Watersports Participation Survey) is used to estimate fishing effort in terms of how many people go recreational sea fishing, and how often they use different methods; and
- a nationwide panel of sea anglers is recruited and use a bespoke diary app and online tool to record all their sea angling activities and catches during the year, from which the average catch per unit effort is calculated.

The Watersports Participation Survey, which provides numbers, locations and demographic information on the sea angling population, has moved from an onsite household based survey to an online survey of 12,000 individuals in a marketing panel due to difficulties sampling face-to-face after covid. However, the online survey gives estimates of angling participation far greater than has previously been observed which appears to be

biased due to the incentives for participation. To estimate the numbers of anglers a bayesian-model of the onsite data from previous years and post-stratification with census-information is being used. Meanwhile attempts to address the apparent bias in the online survey are currently being made. The diary panel is a multispecies survey, with numbers and sizes of all species retained and released recorded, along with trip information (e.g. location, date, weather etc.) and characteristics of the angler (e.g. age, gender). The results from the two surveys are combined and raised to the whole population correcting for differences in avidity and platform, then estimates at individual ICES areas are generated. The associated errors are also calculated to give an idea of the uncertainty that can be accounted for when using the data. These are used to support stock assessments for sea bass and cod.

The target population is sea anglers of 16 years or older in England as this is the main form of MRF in the UK. Individual anglers are the PSU, of which there are around 556,250 (average 2016-19). In 2023, the target is to collect data from at least 350 diarists that fish in the North Sea (4.a, 4.b, 7.d) and 1,100 fishing in the Celtic Seas (7.a, 7.e, 7.f, 7.g, 7.h) (see Table 1C). For species with sufficient data, the numbers and / or tonnages of fish retained and released will be estimated along with associated levels of precision. These will be reported and provided to ICES as part of the development of the draft data set for inclusion in the pilot MRF data tool for ICES Regional Database & Estimation System (RDBES).

Estimates of catches and releases were similar in 2016 – 2021 with reasonable precision, but generally both catches and release rates were higher than 2012. Further work will be done to assess bias and test the sensitivity of the results to analytical approach.

Scotland

The diverse and dispersed nature of sea angling in Scotland makes it difficult and expensive to generate data with an appropriate level of precision to support end users and decision making within Scotland. Marine Scotland will consider the best way forward to generate more robust data on recreational fishing, keeping in mind the limited available resources. No survey of sea angling will be done in Scotland in 2023.

Wales

Recreational sea angling provides significant health, wellbeing, social and community benefits, raises environmental awareness, and has a positive economic impact on coastal communities in Wales. There is growing awareness of the potential impacts of recreational sea angling on fish populations and fisheries management. Wales recognises the importance of collecting sea angling data to ensure the best available evidence is used to support decision-making. This is likely to be through a continued contribution to the Sea Angling Diary programme, employing the same approach as outlined for England. Individual anglers are the PSU, of which there are around 72,250 (average 2016-19) in Wales. In 2023, the target is to collect data from at least 206 diarists from Wales that fish in the Celtic Seas (7.a, 7.f, 7.g) (Table 1C). This proposed sampling rate may change as

discussion around the Sea Angling Diary programme develop and subject to constraints around resourcing.

Northern Ireland

Data and feedback from the UK wide sea angling scheme undertaken in 2016 to 2021 has demonstrated that recruiting sufficient diarist, routinely angling in Northern Ireland has been difficult. The resultant low numbers of diarists have meant that it has been difficult to ensure catch estimates with the appropriate level of precision.

During 2022/2023 a scoping study shall be undertaken to better understand the structure and behaviour of the sea-angling community. This study will inform both the scale and activity of recreational fishers, identify areas of concern, and inform potential future data collection schemes. This study will be conducted with the input from sea-angling stakeholders in the region, policy partners and scientists. No formal sampling of sea angling will be carried out in Northern Ireland in 2023.

Section 1D: Anadromous and Catadromous Species Data Collection in Freshwater

Ref Table 1D

International and domestic commitments – overview

This fulfills paragraph 2 points (b) and (c) of Chapter III of the multiannual programme.

All the governments and intergovernmental commissions requesting and receiving scientific advice from ICES have signed international agreements under the United Nations Convention on the Law of the Sea (UNCLOS). This binds the UK to collect and share fisheries data to support fisheries assessment and management of highly migratory fish stocks. Additionally, the UK's Memorandum of Understanding (MoU) with ICES requires UK to provide relevant data for ICES to undertake stock assessment and provide advice relating to the North Atlantic and its adjacent seas, including advice on fishing opportunities for diadromous fishes. The UK is also a signatory to the Convention of the North Atlantic Salmon Conservation Organization (NASCO), established in 1984, with the aim to conserve and rationally manage Atlantic salmon through international cooperation. NASCO obtains scientific advice for the management of salmon stocks and fisheries from ICES.

Key end users

ICES, NASCO

Salmon

International obligations and temporal frequency of reporting

Data required to meet international commitments for the assessment and management of North Atlantic salmon fall into two categories:

2. data requested annually by the ICES Working Group on North Atlantic Salmon (WGNAS) to undertake an international stock assessment and support reporting to NASCO; and
3. data requested annually by NASCO to inform management.

Some of these are reported as raw data, while others are derived from collected data and reported as such.

ICES requirements

Annual data calls from ICES via the WGNAS require river-specific, regional, or national totals of the following:

- retained catch: reported retained catches of salmon by sea age class (one-sea-winter (1SW) and multi-sea-winter (MSW)) in numbers and weight for commercial and recreational fisheries by location (coastal, estuarine, riverine);

- released catch: the same format as retained;
- unreported catch estimate: the same format as above, for fish retained and released;
- compilation of tags released;
- production of farmed and ranched salmon: weight.

Other information reported to the WGNAS includes:

- fishing effort statistics;
- Catch Per Unit Effort (CPUE);
- exploitation rate indices;
- Conservation Limits (CL): expressed as the numbers of eggs deposited, and annual compliance – the numbers of rivers meeting or exceeding the CL;
- marine return rates for wild and hatchery smolts, reported separately for 1SW and MSW salmon, at monitored sites;
- smolt production at monitored sites.

Other data required by ICES to undertake the stock assessment include information on the biological characteristics of salmon (such as age distribution, sex ratio, and fecundity), and timing of return provided on a periodic basis.

In addition, time-series of data (e.g., returning stock estimates, counts of adult returns, and marine return rates) are needed for the NASCO Framework of Indicators (FWI) and requested through the WGNAS from jurisdictions with timely access to such series.

NASCO requirements

All data reported to ICES are used in the ICES' Scientific Advice to NASCO. However, the UK also reports some data directly to NASCO in the Annual Progress Reports (APR) for the three UK 'jurisdictions' of England & Wales (combined), Scotland and Northern Ireland. This includes:

- progress reports on actions to deliver the objectives of 'jurisdiction's' Implementation Plans (IP) and notification of any changes to the IPs;
- catches (caught and retained in tonnes) for riverine, estuarine and coastal waters;
- unreported catch estimates (tonnes) for riverine, estuarine, and coastal waters;
- number and percentage of salmon caught and released in recreational fisheries.

Designation of waterbodies

Stock assessment methods designate the rivers monitored for salmon: 64 principal salmon rivers across England and Wales; 16 primary salmon rivers across Northern Ireland; and 173 assessment areas (individual rivers, Special Areas of Conservation (SACs), and in some cases groups of between 2 and 6 rivers where fishery catch cannot be assigned to individual rivers) in Scotland.

Data collection

Data collection is managed through separate agencies in the four administrations so there are variations among the specific methods used.

All commercial (net and fixed engine) fisheries for Atlantic salmon (and sea trout) in England and Wales are licenced and operate mandatory carcass tagging and daily catch reporting (logbook) systems. No killing of salmon in commercial fisheries has been permitted since the introduction of national byelaws in England in 2019 and in Wales in 2020. In Scotland, salmon fishery statistics (monthly numbers and total weights of 1SW and MSW salmon) are obtained from proprietors or occupiers of fisheries under legal provisions. There are currently no commercial salmon fisheries in Northern Ireland.

Recreational (rod) fisheries in England and Wales are also licenced and are monitored through obligatory catch returns. In Scotland, salmon fishery statistics (monthly numbers and total weights of 1SW and MSW salmon retained and released) are obtained from proprietors or occupiers of fisheries under legal provisions. In Northern Ireland, any salmon landed must be carcass tagged and rod catch data are collected through a tag return scheme for retained and released fish.

Juvenile abundance surveys for salmon (and trout), both fry and parr, are carried out annually using electrofishing methods. These provide numbers per unit area, individual lengths and age composition, the latter based on ageing from scales for a subsample of catches and/or size-frequency distributions. Outputs are used to evaluate recruitment at site, subcatchment or whole catchment scales, complementing measures of adult stock performance and informing environmental management in rivers. In England and Wales, annual electrofishing surveys comprise (i) a 'temporal' component of fixed sites distributed among all principal salmon rivers and sampled every year and (ii) a 'spatial' element sampling additional sites on targetted catchments on a (6-year) rolling programme basis.

Information on smolt production and marine return rates is collected using in-river traps and mark-recapture methods. Smolt trapping provides catch per unit effort (time) data, alongside individual fish lengths and scale-based age reading from a subsample to update age-length keys. Smolt trapping occurs on the River Dee (Wales), Tamar (England), the Aberdeenshire Dee (Scotland), and the River Bush (Northern Ireland).

Information on the number of adult salmon returning to rivers is collected through fixed traps, electronic counters or derived from rod catches raised by exploitation rates (derived from trap and counter data), and individual lengths, weights and ages are collected from representative biological samples of the adult run on each trapped river. Adult traps operate on the Dee (Wales), Tamar, Lune (England), Bush (Northern Ireland) and on two upper tributaries of the Aberdeenshire Dee (Scotland).

Eels

International obligations and temporal frequency of reporting

ICES requests information on eel stock parameters from countries within the geographic range of the European eel (North Atlantic, Baltic and Mediterranean Seas, and inland waters) via the Working Group of Eels (WGEEL). This generally includes responding to an annual Data Call with, in addition to a number of ad hoc requests, annual updates on:

- commercial landings by Eel Management Unit (EMU), life stage (yellow, silver eels) and habitat type (fresh, transitional, coastal and marine waters): provided in weights;
- recreational landings by EMU, life stage and habitat type: provided in weights;
- other landings (transport/relocation operations) by EMU, life stage and habitat type: provided in weights;
- aquaculture production per EMU and life stage: provided in weights;
- releases (which includes restocking) by EMU, stage and habitat type: provided in numbers and weights;
- time series of glass and yellow eel recruitment derived from fisheries, or fisheries-independent surveys and associated biological characteristics (e.g., length, weight);
- time series of yellow eel abundance (standing stock) and associated biological characteristics (e.g., length, weight, age, sex ratio);
- times series of silver eel escapement and associated biological characteristics (e.g., length, weight, age, sex ratio);
- other biological sampling to inform biological characteristics (e.g., length, weight, age, sex ratio);
- eel quality data (e.g., muscle lipid content, *Anguillicola* proportion etc.) associated with glass, yellow and silver eel time series and other biological sampling (optional for now).

The associated country report submitted to WGEEL includes the summary of all the data provided, explanation on the collection methods and management, as well as additional information on habitat quantity and quality, other non-fisheries sources of mortality, a section on diseases, parasites, pathogens and contaminants and update on any new emerging threats and opportunities.

Since 2007, countries are also required to provide biomass and mortality indicators every three years, which include the following:

- B_0 : the amount of silver eel biomass that would have existed if no anthropogenic influences had impacted the stock;
- B_{current} : the amount of silver eel biomass that currently escapes to the sea to spawn;
- B_{best} : the amount of silver eel biomass that would have existed if no anthropogenic influences had impacted the current stock;
- $\sum F$: the fishing mortality rate, summed over the age-groups in the stock;
- $\sum H$: the anthropogenic mortality rate outside the fishery, summed over the age-groups in the stock;

- $\sum A$: the sum of all anthropogenic mortalities, i.e. $\sum A = \sum F + \sum H$.

Designation of waterbodies

There are 15 EMUs, including one shared with the Republic of Ireland. Most EMUs have been set at the River Basin District (RBD) level, as defined under the Water Framework Directive.

Data collection

Data collection is managed through separate agencies in the four administrations so there are variations among the specific methods used.

Commercial fisheries for eels (recruits, yellow and silver eels) in England is legally required to report catch quantities (weight), effort as days fished, the location and type of water fished. No data are collected on other biological characteristics: maturity and fecundity are not applicable for juvenile life stages exploited and other characteristics are not required for national stock assessments. Catches from the commercial fishery in Lough Neagh (Northern Ireland) are reported to AFBI/DAERA by the Lough Neagh Fishermen's Co-operative Society Ltd. Weekly sampling of 20 yellow eel over 20 weeks (May to September), and 100 silver eel over a 12 week period, provide age and length, weight, fat content, sex, age, stomach contents, and parasite load. Sex ratio of the silver eel population is estimated from size grading the catch into boxes of small (male) and large (female) eels. There are no commercial fisheries for eel in Scotland. The commercial fishery in Wales was closed in 2021.

There are no recreational landings of eel across the UK, and any eel that are caught by recreational fisheries must be returned alive to the water.

The abundance of recruits is estimated from traps in four EMUs (Scotland, Anglian, Thames, South-west) yielding numbers or batch weights of glass eel/elvers and numbers and lengths of yellow eel; from a time-series of CPUE from the commercial fishery in England (Severn); from dragnet surveys twice monthly from March/April to July/August in Northern Ireland (River Bann; Strangford Lough) yielding numbers per kg and length frequencies from 50 juveniles per sample.

The abundance of standing stock is collected from electrofishing surveys across the majority of the EMUs (apart from NI EMUs). Sites are fished every 1 to 3 years, depending on programme specification, and provide numbers per unit area, length frequency distribution and estimated individual weights.

Information on the numbers or weight, and sex ratio of silver eels, is collected annually from 3 EMUs using commercial catch sampling (Northern Ireland), downstream traps (Scotland) or electronic counters (England, numbers only), and once in every EMP reporting period (in accordance with the EU Withdrawal Act in relation to Article 9 of Regulation No. EC 1100/2007) for the remaining 12 EMUs using model-based estimates

derived from yellow eel abundance surveys. The model-based methods are described in the 2021 EMP Progress Report to Defra, at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1042262/Implementation_of_UK_Eel_Management_Plans_2017_to_2020.pdf.

Section 1E: Level of Fishing and Impact of Fisheries on Biological Resources and Marine Ecosystem

Ref Table 1E

International and domestic commitments

This fulfills paragraph 3 point (c) of Chapter III of the multiannual programme for “collection of data to assess the impact of United Kingdom fisheries on marine ecosystems within and outside United Kingdom waters”.

Data collection activity covers three main aspects:

- a) incidental bycatch of Protected, Endangered and Threatened Species (PETS);
- b) data to assess the impact of fisheries on marine habitats;
- c) impact of fisheries on biological resources and marine ecosystem.

Incidental bycatch

Key end users

ICES WGBYC, UK fisheries policy teams for US MMPA Compliance, UK Marine Strategy for populating D1 indicators, UK marine conservation policy.

Data collection

A variety of at sea observer schemes and on shore sampling schemes are operated across the UK FAs and record data on the incidental bycatch of many of the species listed in Table 1E of the MAP. The coverage by geographical area and species group achieved by these schemes is detailed in Table 1F along with the primary drivers and end users for the schemes.

In addition the “UK Bycatch monitoring programme” is coordinated and run by the Sea Mammal Research Unit of St Andrew’s University focussing on the collection of data on bycatch of seabirds and marine mammals. This scheme forms part of the UK Marine Strategy Part 2 (monitoring programmes) contributing to indicators for Descriptor 1 (biodiversity) for seals, cetaceans and birds and helps to meet statutory obligations and supports the implementation of the UK plan of action on seabird bycatch.

It should be noted that in 2021 there is a review of UK bycatch monitoring programmes for fisheries exporting products to the USA for a comparability test against the requirements of the USA Marine Mammal Protection Act. This has the potential to change the nature of some of the bycatch monitoring being undertaken at a UK and administration level.

Impact of fisheries on marine habitats

Key end user

UK Marine Strategy.

Data collection

Both benthic and pelagic habitats have the potential to be impacted by some of the pressures arising from fishing activity, with work under the UK Marine Strategy identifying that the extent of pressures such as seabed abrasion is significant in UK waters. Much of the assessment of impact of fishing is therefore derived from existing data on the distribution of marine habitats from historical and inferred habitat mapping and data collection on fishing activity (See Section 2: Fishing Activity Data). This allows an inferred assessment of the extent of seabed habitat disturbance from (most) fishing activities with significant seabed contact, including bottom / beam trawling which are reported in the UK Marine Strategy assessment.

Direct data collection on the status of marine habitats subjected to pressures from fishing are limited in scope and have tended to be focussed on the monitoring for the UK's Marine Protected Area networks. Both the UK and Scottish MPA monitoring strategies have data collection objectives to determine the impact or recovery of benthic habitats associated with changes in pressures from activities such as fishing as management measures changed in order to achieve specific conservation objectives of protected features. These studies (Type 3 monitoring in these strategies) are extremely expensive to undertake often require long time series to detect change and typically involve detailed underwater observation of habitat state and extent or expensive infaunal analyses of sediment samples to detect changes in diversity of associated communities. As a result these studies cover only a portion of the UK fishing footprint and are not indicative of wider scale impacts on the diversity of marine habitats in UK seas.

Given the lack of data on wide scale impact of fishing on sea bed habitat quality a review is considered appropriate. In 2022/2023 The UK fisheries administrations (through the Data coordination group and in consultation with UK Marine Monitoring and Assessment Strategy (UKMMAS) and Healthy and Biologically Diverse Seas Evidence Group (HBDSEG) for UK Marine Strategy alignment) will conduct a review of evidence gaps and consider additions to the work programme to improve understanding of this issue.

Impact of fisheries on biological resources and marine ecosystem

Key end users

UK Marine Strategy, OSPAR

Data collection

Many of the pressures arising from fishing activity (capture fisheries at sea) have the potential to impact on different receptors in marine ecosystems. The primary biological resource of concern are the populations of targeted and bycaught fish species themselves.

Many of the surveys at sea undertaken annually and detailed elsewhere in this workplan (Table 1G) provide data used to assess the status of fish and cephalopods both as a biological resource (through the international stock assessment processes) and as an important component of the marine ecosystem, biodiversity and food webs.

As detailed in UK Marine Strategy Part 2 (monitoring programmes) the data collected from the surveys in Table 1G are used to populate biodiversity and foodweb indicators (Descriptors 1 and 4) for the fish community (not just the commercially important species) and reported as part of the UK Marine Strategy reporting cycle as well as in national and international marine status assessments (OSPAR QSR, SMA 2020 etc).

Our understanding of marine foodwebs is important both for stock assessments of commercial fisheries, but also for wider assessments of the status of our seas under the Marine Strategy (Descriptor 4). Much of our current understanding is based on historical sampling of stomach contents from fish sampled during the course of previous surveys of the type detailed in 1G. These data are approaching 20 years old and may no longer reflect changes in our marine food webs over that time. There is a clear need to collect more data in this area and there are national and international efforts to aggregate currently available data and plan further data collection to improve our evidence in this area. These plans will not be fully formed by the time of publication of this workplan.

Fishing activity exerts a variety of other pressures that have the potential to impact on other receptors in marine ecosystems and many of the existing monitoring programmes under UK Marine Strategy part 2 are focussed on monitoring the status of those receptors. The relationship between these pressures and the status of receptors will not be well established in all cases. Some examples are given below.

Pressures	Receptors and monitoring programmes in UK MS
Resuspension sediments	Pelagic habitat Descriptor 1
Marine Litter	Marine Litter monitoring Descriptor 10
Underwater Noise	Noise monitoring for Descriptor 11

Section 1F: Data Quality - Biological Data Collection

- to achieve and maintain a high standard of data quality, a framework for data collection planning is formally adopted by the UK Fisheries Science and Evidence Steering Group and coordinated by the UK Data Coordination Group.
- within this process a multiannual programme for data collection is set out by all UK partners. The work plan is reviewed by the UK Fisheries Science Advisory Panel and signed off by Ministers across the Fisheries Administrations before the work plan is formally adopted.
- achievement toward the plan is annually reviewed with deviations explained and justified as per the process outlined in the Introduction. If necessary this reporting allows future plans to be adapted and provides end-users with an understanding of the underlying data quality.
- the process of planning, reviewing and reporting provides the core data quality assurance process to ensure appropriate and suitable data is collected to meet the requirements of end-users.
- structures are in place to ensure data quality control through the adoption of Standard Operating Procedures including the use of internationally coordinated and approved sampling methods and best practice methods for data recording.
- data submission to international databases ensures that data structure, mandatory variables and metadata conform to agreed standards.
- the aim of the data collection programme is to ensure appropriate data is available to inform science and policy end-users. Through these end-user structures feedback and review of data quality is provided with respect to appropriateness of data to inform policy and fishery stakeholders.
- in the case that issues are identified these are taken into account when setting out the Work Plan or through changes in the Standard Operating Procedures for data collection.

Section 2: Economic and Social Data

Section 2A: Population Segments for Collection of Economic and Social Data for Fisheries

Ref Table 2A

International and domestic commitments

This fulfils paragraph 5 points (a) and (b) of Chapter III of the multiannual programme.

Economic and social data on the UK fisheries sector is collected by Seafish Economics on behalf of the UK government and devolved administrations. The economic data collected annually (time series go back to 2005) forms a basis for the UK fishing fleet economic monitoring and future policy development.

The data collected is used:

- for monitoring purposes (e.g. monitoring of the ‘national benefit objective’ defined in the UK Fisheries Act 2020)
- for modelling that forms basis for a variety of impact assessments work streams, such as analysis of financial implications of TACs and quota negotiations with the EU and Norway, impact assessments of past and future fisheries management plans and fleet/area/stock specific policies;
- to inform bio-economic models, spatial area closures, business decisions and financial support measures;
- to contribute economic dimension to balance analyses between fishing opportunities and capacity;
- to conduct other fleet specific and area specific analyses (including analyses published by international organisations, such as ICES, FAO and OECD).
- to inform industry and governmental steering and advice groups

The data is available online for public through Fleet Enquiry Tool published by Seafish.

Key end users

ICES, FAO, OECD

Data collection

Data sources

The UK has chosen to carry out an annual survey in order to collect much of the economic data required, however the response to the survey is entirely voluntary. A short questionnaire is carried out by field researchers and then followed up by request for vessel accounts from vessel owners. These accounts provide the main source of data for most of the economic variables.

Data from accounts is combined with data on transversal variables to ensure consistency between the different sets of data and to minimize the complexity of the economic survey.

The UK combines numerous sources of data collection in order to fulfil MAP obligations. Administrative sources (Fleet register, logbooks and sales notes as well as Individual Quota Allocation Register) are used in combination with face to face interviews carried out by field researchers and accounts collection at the end of financial year. Some data sources are used in combination (questionnaires / accounts and administrative methods) using calculation. For the list of data sources see Table 2A.

Data types

For all UK administrative sources the information is available at Census level. For most of the economic variables and employment (FTE), Non-Probability Sample Survey is used. The survey is implemented in 2 steps: face-to-face interviews in ports followed by phone or e-mail contact at a later date in the year when accounts are available. Based on previous experience this approach is the most efficient method for collecting a sufficient sample size to generate estimates for every vessel on the UK Vessel Register. Collaboration between the MMO, Government and Industry bodies such as Seafish and POs enables the UK to achieve response rates at an acceptable level.

Flexibility is important during the survey as parts of the UK catching sector can occasionally be difficult to meet face-to-face due to the nature of the work and in some cases questionnaires are completed over the phone or by e-mail. Face-to-face interviews are preferable to ensure the quality, robustness and legibility of any data collected.

Sampling frame and allocation scheme

The sampling frame to be used will be the UK fishing fleet register on 31 December including all vessels active during the year. Involvement in the survey is voluntary. As such it involves a degree of self-selection and is not a true random sample of the fleet.

In order to ensure that adequate levels of involvement are achieved, a key aspect of the contact with fishermen is that as well as seeking permission to contact their accountants direct for the required information, agreement is also sought for such access to their financial data to be allowed for subsequent years. As such, the sample for each segment can include some elements of a cohort analysis. It is thought that the benefits of this approach in terms of both ensuring a good level of response for each segment and generating time series information on individuals offsets the introduction of a potential bias from the use of a non-random sampling approach.

The target for the economic data survey is to cover 10% of active fleet in a sample, however intensity of sampling depends on the fleet segment and number of vessels in the fleet, therefore in cases of small inshore (<10 m vessels) fishing fleet the planned sample rate is 5% for main economic indicators and 2.5% for balance sheet related indicators, while for bigger boats (segments including vessels >24 m vessels) planned sample rate is 20% for main cost and income variables and 10% for balance sheet and capital related

indicators. For further details about the sample per vessel groups see Table 2A.

Estimation procedures

The estimation procedures are implemented on the level of a more precise variables list and national fleet segments, which are defined based on gear used, target species, area and engine power/vessel size. In total 21 costs items are extracted from the accounts and estimated for each vessel based on models, which combine administrative sources with segment sample. Estimation procedures for different variables and variable groups are presented below.

Costs and earnings:

Within defined Seafish fleet segments individual costs and earnings items from the collected vessel financial accounts (the segment sample) are added together to create a 'combined segment sample cost structure'. The sum of each cost item in the 'combined segment sample cost structure' is calculated for each vessel within a segment as a proportion of the sum of fishing income available for all vessels from the administrative sources.

Fuel costs and crew share costs are calculated differently from other costs. To calculate fuel costs, we use the capacity (VCUs) and fishing effort (days at sea) of each vessel to estimate its fuel consumption in litres, which is then combined with the average annual red diesel price (excluding duty) to calculate the fuel cost estimates for each vessel.

To calculate crew share costs, we allocate a minimum £100 per day in instances where the actual observed amount within the 'combined segment sample cost structure' is lower.

Following the calculation of fuel cost and crew share, we apply the proportions from all the other costs within the 'combined segment sample cost structure' to the official declared fishing income for each vessel within each fleet segment. We estimate costs and earnings for all vessels involved in the fishery (with recorded landings/catches) during the year.

Engaged crew:

Estimation of engaged crew is based on the survey data collected from vessel owners during face to face interviews, combined with data collected by the Marine Management Organisation. This provides details on the number of engaged crew, both full-time and part-time. With this sample information we then estimate total engaged crew based on the physical characteristics of the individual vessel and the vessel's level of activity. Once the total engaged crew is estimated for all types of vessel in the UK fleet, we estimate Full Time Equivalent (FTE) jobs based on hours worked collected during the face to face survey (an FTE is assumed to be 2,000 hours worked a year).

Value of physical capital:

The UK intends to follow the methods for calculation of the value of physical capital as given in the report of the study N° FISH/2005/03 on the evaluation of the capital value,

investments and capital costs in the fisheries sector. Sample data from vessel accounts will provide a depreciated value for the sample fishing vessel. This sample data can then be applied at a DCF segment level to the entire fleet based on a value per vessel capacity unit to estimate physical capital values.

Subsidies on investment:

The data is directly obtained from Administrative sources, linked to vessel owners or their vessels and aggregated to the level required

Employment by education level and nationality

Following the pilot study conducted in 2017, the data collection of social indicators for fleet was added to fleet survey as additional tables to the first phase of the data collection when interviews are performed in the ports. The data will be collected for the same reference year as when the questionnaire is used. The methodologies used to choose sampling frame and allocation scheme will be the same as for the economic fleet survey. The data collection of social indicators will be conducted in 2021, afterwards the data collection exercise is expected to be in 2024 but may be earlier depending on Departmental evidence needs.

Data quality

The quality of estimates after application of data estimation procedures recorded and applied in STATA statistical software are then evaluated by set of quality checks developed. The quality checks include check of codification, consistency of the time series, check of sample for extreme values (visualised in Tableau) and other using different outputs and visualisations in Excel and Tableau. There are also visualisations and checks developed in R if required.

The majority of the economic data will be collected by a probability sample survey and estimated based on Value of landings using models as described above. For these data, bias will be assessed by calculation of coverage rate, response rate and variability in terms of CV.

For more information on Fleet economic data collection and estimation procedures see UK Economic Fleet Estimates and Fleet Enquiry Tool - Methodology Report, Seafish, 2020

Section 2B: Aquaculture Data

Ref Table 2B

International and domestic commitments

This fulfils paragraph 6 points (a), (b) and (c) of Chapter III of the multiannual programme

The UK's international reporting obligations cover a range of aquaculture variables:

- **FAO:** Production (tonnes) and value (£) by production system and species; Production from hatcheries & nurseries (numbers) by species; Structure of the aquaculture sector
- **FAO-OECD:** No. of employees, by gender and employment status
- **OIE:** Production (tonnes) by species groups; Number of authorised farm sites
- **NASCO:** For relevant species: Production (tonnes) & Production from hatcheries & nurseries (numbers); Containment failure / Escapes (number, events); Escapees in wild populations; Production/ trade by (sterile) genotype; Benthic monitoring.
- **ICES:** For relevant species: Production (tonnes)
- **OSPAR:** For marine net pens: Medicines or treatments administered by type (g); Fish farm annual emissions; Feed inputs

Domestic commitments for collection of UK aquaculture variables reflect retained EU law:

- **food supply variables:** Production (tonnes) and value (£) by species inc. Caviar production (tonnage) and value (£) by species
- **employment variables:** No. of employees, by Gender and FTE
- **economic variables:** Number of enterprises (by number of employees); Other income (£); Personnel costs (£); Value of unpaid labour (£); Energy costs (£); Livestock costs (inc wild inputs) (£); Feed costs (£); Repair and maintenance costs (£); Other operating costs (£); Operating subsidies (£); Subsidies on investments (£); Consumption of fixed capital (£); Total value of assets (£); Financial income (£); Financial expenditures (£); Net investments (£); Debt (£); Weight livestock input (inc wild inputs) (kg); Weight fish feed input (kg); Number of hours worked by employees and unpaid workers (no.)
- **social variables:** Unpaid labour (No.); Employment by age (No.); Employment by education level (No); Employment by nationality (No); Employment by employment status (owner/employer) (No).
- **environmental variables:** Medicines or treatments administered by type (g); Mortalities (%)

Further Economic variables of potential interest to domestic end-users are calculable from those collected: mean wage (gross), total income, total operating costs, Gross Value Added (GVA), Operating Cash Flow (OCF), Earnings Before Interest and Taxes (EBIT), net profit, capital productivity (%), Return On Investment (ROI) (%), Future Expectations Indicator (FEI) (%), Labour productivity, GVA to revenues (GVA margin), Operating cash

flow margin (OCF margin), EBIT margin, Net profit margin, Employees per enterprise, Part-time share, Unpaid share

End-users

International end-users as above include FAO, OECD, OIE, NASCO, ICES and OSPAR.

Domestic end-users range across:

- Government departments: Defra, Department for International Trade, Scottish Government Marine Analytical Unit, Welsh Assembly Government
- Government agencies: Cefas, MMO, VMD, EA, SEPA
- local authorities / councils
- Non-departmental public bodies: Seafish, Seafood 2040
- wider stakeholders: Aquaculture industry including trade associations, certifiers, consultants, farmers; Academia and researchers; Environmental NGOs; Journalists.

Data collection

UK aquaculture population: The UK has a diverse aquaculture sector, with demographic differences between the DAs. The MSS, Cefas and DAERA-NI Fish Health Inspectorates (FHIs) have conventionally been the main regulators collecting aquaculture data for statistical purposes for Scotland, England and Wales, and Northern Ireland respectively. These bodies authorise “Aquaculture Production Businesses” (APBs) and maintain public registers under aquatic animal health legislation. The UK aquaculture population therefore reflects the APBs on these registers.

Segmentation: Segmentation refers to how the aquaculture population is divided into sub-populations for collection and/or reporting of data, i.e., the degree of splitting (or clumping) based on species and culture technique. Simplified segmentation for UK aquaculture is indicated in the table below.

Segmentation of UK aquaculture. Species within each segment indicated, with the identifier “nei” (=not elsewhere identified) used to report uncertain species mixes, hybrids, and anonymise confidential production by grouping.

UKMAP segment	Species included	Notes
Salmon	Atlantic salmon	Split by freshwater and seawater for census data collected in Scotland
Trout	Rainbow trout Sea (brown) trout Arctic char Salmonids nei	Split by freshwater and seawater for census data collected in Scotland
Marine finfish	Atlantic halibut Ballan wrasse Lumpfish Marine fishes nei	
Finfish net-pens in seawater		For reporting of environmental data (mortality and medicinal treatment)
Temperate freshwater finfish	Common carp Cyprinids nei Freshwater fishes nei	Could include sturgeon (caviar) if fledging industry develops. Potential for further inclusion (or new segment) for ornamental fish
Heated RAS (Recirculation Aquaculture System)	Nile tilapia Whiteleg shrimp	To differentiate warm-water species cultured for human consumption
Crustaceans – temperate species	European lobster	

Mussel	Sea mussels nei Common edible cockle	Cockle included as species harvested by mussel enterprises
Oyster	Pacific cupped oyster European flat oyster Northern quahog (=Hard clam) Japanese carpet shell (=Manila clam)	Clams included as species harvested by oyster enterprises
Other molluscs	Great Atlantic scallop Queen scallop	

Data collection methods: Data collection is based on self-reporting by industry. Data provision is largely voluntary as there are no legal requirements for enterprises/farms to provide requested data. (The exceptions are for some Environmental data, and in NI where Section 11(2) of the Fisheries Act (Northern Ireland) 1966, as amended, includes a condition in culture licences that the Holder: keeps a record of inputs and outputs of fish or shellfish, the quantity and value of sales, and provides the information on request). Methods for collecting the data include:

- administrative records – held for all members of the population/segment
- census (survey) - all members of the population/segment are sampled by data collectors
- self-reporting census - all members of the population/segment are required to report data under authorisation requirements (i.e., some Environmental variables)
- (sample) survey - a proportion of the population/segment is sampled by data collectors
- expert opinion
- calculation – quantitative estimation using other variables

Census and survey data are collected by a variety of methods – postal questionnaire, during on-site health inspections, emails, app reporting and via telephone. Responses are encouraged by routine data collection and by follow-up contact. The bodies responsible for data collection are indicated in Figure 48.

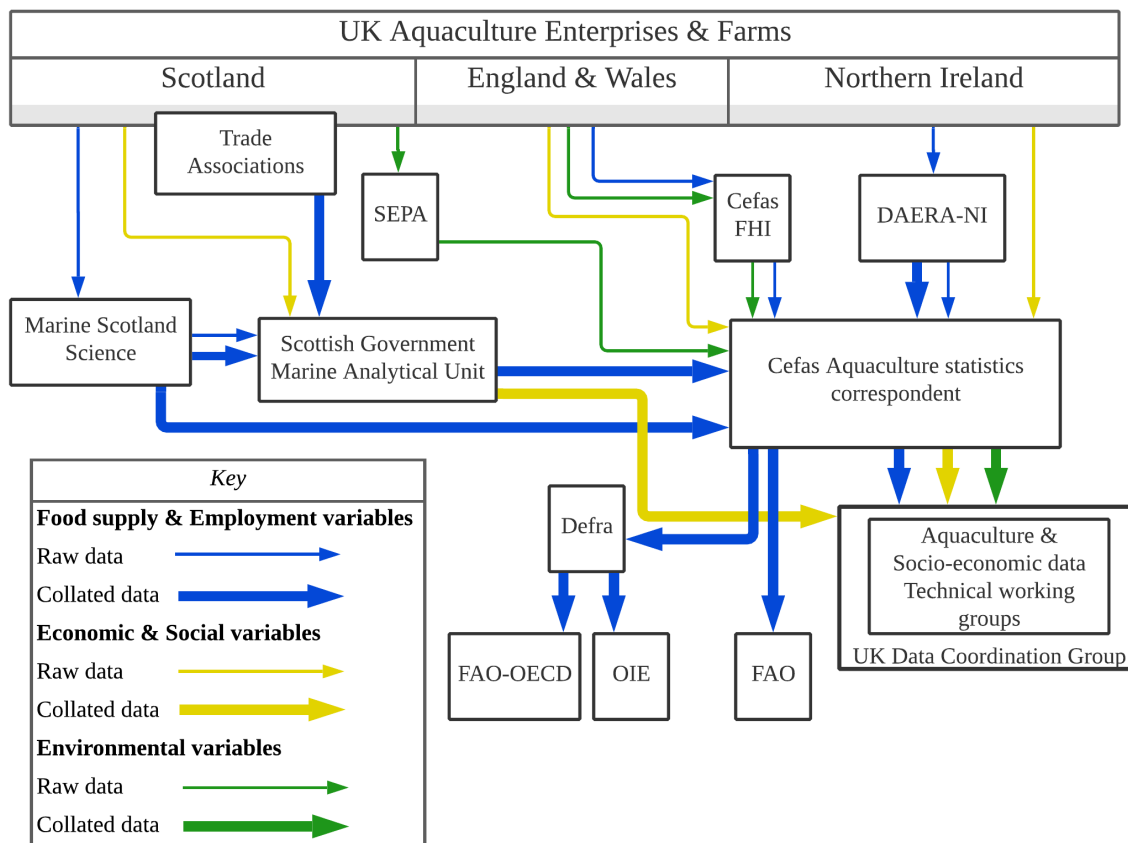


Figure 48. Pathways for the collection of raw data and collated data (statistics) for the main UK aquaculture data requirements, illustrating the bodies involved.

Data quality

Personnel: Regional (DA) data are collected and collated by MSS, MAU, Cefas and DAERA. Staff involved in data collection, entry, collation and work-up: undergo mandatory annual training in Information Protection; use appropriate software, with restricted access to maintain confidentiality of individual enterprises; are trained, experienced, engaged and have a good knowledge of the aquaculture industry. Data are manually checked for anomalies at data entry and collation stages by experienced operators with knowledge of individual enterprises and by comparison to previous years' data. Anomalous and missing values are queried with the enterprises or farms.

Estimation procedures:

- expert opinion (trade associations, traders, individual operators for low volume species) is used to estimate average annual Unit values (£/tonne) which vary temporally and geographically. Independent estimates are derived for the three UK regions (Scotland, Northern Ireland, England, and Wales) which show consistency. Production value (£) per species is imputed from the weight of sales (tonnes) and Unit value (£/tonne).
- employment data collected in the separate DA censuses differ between the three regions and are not fully aligned with FTE and employment status requirements.

FTE estimates for Scotland and Northern Ireland are based upon segment statistics for part-time workers in England and Wales.

- where Economic variable survey responses for Weight (Livestock input, Sales) are given by number and stage rather than weight, conversions are used (Salmon egg = 0.16 g, rainbow trout egg = 0.1 g; brown/sea trout egg = 0.08 g; “Fry” = 2 g, “Fingerling” = 25 g, Smolt” = 80 g).
- where DA/UK totals are calculated from sample survey data, estimates are derived by scaling-up using segment census totals.

Generic governance

- achievement toward the plan is annually reviewed with deviations explained and justified. If necessary, this reporting allows future plans to be adapted and provides end-users with an understanding of the underlying data quality.
- the process of planning, reviewing, and reporting provides the core data quality assurance process to ensure appropriate and suitable data is collected to meet the requirements of end-users.
- structures are in place to ensure data quality control through the adoption of Standard Operating Procedures including the use of internationally coordinated and approved sampling methods and best practice methods for data recording.
- data submission to internationally databases ensures that data structure, mandatory variables and metadata conform to agreed standards.
- the aim of the data collection programme is to ensure appropriate data is available to inform science and policy end-users. Through these end-user structures feedback and review of data quality is provided with respect to appropriateness of data to inform policy and fishery stakeholders.
- in the case that issues are identified these are taken into account when setting out the work-plan or through changes in the Standard Operating Procedures for data collection.

Section 2C: Population Segments for Collection of Economic and Social Data for the Processing Industry

Ref Table 2C

International and domestic commitments

This fulfils footnote 6 of paragraph 1.1(d) of Chapter III of the multiannual programme.

Economic data on the UK seafood processing sector is collected by Seafish Economics on behalf of the UK government and devolved administrations. This data is used to: produce analysis and evidence in the form of Seafish's suite of economic reports; support Seafish economists and economists in Fisheries Departments in the provision of expert advice to decision makers from industry and government and to feed into government analysis and evidence to support policy decisions. The data is publicly available through the online Processing Enquiry Tool published by Seafish.

Key end users

UK Fisheries Administrations

Data Collection

Methodologies used to choose the different sources of data

The definition of processing enterprise is as set out in the retained DCF legislation. There exist a number of data sources that include relevant data on UK seafood processing companies including the Food Standard Agency database. The definitions of what constitutes a processing enterprise contained in these sources differs from that of the retained DCF,. However, these databases provide a starting point for a biennial census of all UK processing sites; this allows the UK seafood processing industry to be defined as per the requirements of the DCF.

The census provides a list of processing sites that derive more than 50% of turnover from processing activities. This list is used to create the list of companies who are contacted annually requesting financial data through a questionnaire or in the submission of financial accounts. These Accounts are seen as the most reliable data source for estimating the performance of the sector. Further financial data is extracted from public records available on Companies House.

Data on number of persons employed, FTE National and number of enterprises is also collected during the biennial census. This is due to the fact that this data is not consistently available in annual accounts and to carry out further data collection on an annual basis would not be cost effective.

Methodologies used to choose the different types of data collection

Due to the large number of potential processing sites identified, face to face interviews would be prohibitively expensive and time consuming. A telephone census is used to

gather data on the types of activities taking place at different sites and total number of employees. On occasion, face to face interviews are carried out with the largest sites to confirm the accuracy of the data and to gather further data on what is driving trends.

Participation in the survey is entirely voluntary in the UK. In the event that we are able to contact a company but they will not provide data we will use previous survey data (if available) combined with our own expertise to create estimates. If we cannot contact a company which is reported to be trading but for which we have no previous survey response, we would estimate the FTEs for the reference year based on a combination of Seafish expertise and other available sources such as published accounts or data from a relevant trade association.

Financial data is collected via questionnaire or hard copies of accounts. For larger enterprises these accounts are publicly available guaranteeing a robust sample size.

Methodologies used to choose sampling frame and allocation scheme

For the census survey the Seafish processing database (containing data from all previous surveys) is used as a starting point. Before starting the census, this list is cross referenced with the Food Standards Agency database and Companies House register and is sense checked by Seafish colleagues. Further to this contact is made with all sites listed as processors in the Food Standards Agency database and any new sites identified by the experts in the Seafish economics team or Seafish regional teams.

The financial survey is a non-probability sample survey. Involvement in the survey is voluntary. As such it involves a degree of self-selection and is not a true random sample of the sector. A high percentage of the largest processing companies in terms of turnover are included in the sample due to the availability of data from published financial accounts.

Methodologies used for estimation procedures

The data collection phase of the project leads to the creation of a sample of completed financial survey questionnaires and published accounts. Where both survey and published accounts data are available for particular variables, the survey data supersede officially published figures. The merging of survey and published accounts is also supplemented by extensive checks to ensure compatibility in terms of variable definitions.

Once the financial datasets are merged, each of the individuals is estimated. Individual estimates are created at the company level, for all companies in the population (aside from those in the sample), applying sample averages on a per-FTE basis, where company FTEs are calculated as the sum of the relevant site(s) FTEs, using site ownership data (for the relevant year).

Data quality

The quality of estimates after application of data estimation procedures recorded and applied in STATA statistical software are then evaluated by set of quality checks.

For the data collected bias will be assessed by calculation of coverage rate, response rate and variability in terms of CV.

Further information can be found in the Seafood Processing Methodology Report. This is a short report which describes the methods used to collect and produce seafood processing industry performance data (3rd Edition). [Seafood Processing Methodology Report — Seafish](#)

Section 3: Fishing Activity Data

Fishing Activity Variables Data Collection Strategy

Ref Table 3A

International and domestic commitments

This fulfills paragraph 4 of Chapter III of the multiannual programme

Fishing activity or Transversal Data consists of information on the activity of the UK fishing fleet and that of non-UK vessels operating in UK waters or landing into UK ports. The scope of the data is as recorded, reported and transmitted under the Control Regulation, Regulation No. (EC) No 1224/2009 as (as amended in retained EU law). This includes landings, fishing effort, vessel monitoring and fleet capacity information collected and processed by officials of the various Fisheries Administrations in the UK, namely the Marine Management Organisation, Marine Scotland, DAERA, the Welsh Government and Fisheries Departments in Jersey, Guernsey and the Isle of Man.

Key end users

Transversal data contributes to a number of elements of the UK's data collection plan including assessing the impacts of fisheries on the marine ecosystem, determining fishing mortality for stock assessment purposes and providing variables required for raising biological samples from fishing vessels to the fleet level. Additionally the data contributes to economic assessments of the performance of the UK fishing fleet.

Data collection legislation requires data to be made available in the form of primary data to the national institutions implementing the work plans. Within the UK, data users include biologists in CEFAS, AFBI, the Welsh Government and the Marine Scotland; economists in the Seafish Industry Authority (Seafish) and UK Fisheries Departments and analysts in other Government agencies including the Marine Management Organisation and the JNCC.

Data are supplied to international organisations for stock assessment and management purposes, most importantly the International Council for the Exploration of the Sea, ICES and to other Regional Fisheries Management Organisations (RFMOs) including NEAFC, NAFO, IOTC, HELCOM, OSPAR and ICCAT. The information is also widely used to support the development of new and revision of existing fisheries policies within the UK. The data are also made available within the public domain for the use of those with an interest in identifying and assessing the types and levels of fishing activity.

Data Collection

Fishing Effort

For over 10m vessels the three key official documents (logbooks, landings declarations and sales notes) are the key source for transversal variables. For effort variables, the

logbook is the principal source of data. Administration systems have been developed such that for any particular fishing gear reported on the logbook there are several associated effort elements that should be reported by fishermen on their logbook, and then captured in the data entry process. These additional effort variables, when combined with system variables automatically generated when the data is entered (e.g. days of fishing activity) and when the activity of vessels are linked to the vessel capacity data, allow the required variables to be derived. For example, for towed gears such as demersal trawls, details of the number of hauls and length of time for the haul are collected. For beam trawl gear additional information is collected on the length of the beam used. For towed lines details of the numbers of lines, hauled, and numbers of hooks per line are collected.

For the 10 metre and under fleet during 2005 the UK introduced a system requiring the registration of buyers and sellers of fish at the point of first sale, and an associated requirement for all such sales to have sales notes reported and provided to fisheries authorities within 48 hours of the sale. More information on this change is available on-line at:

<http://www.defra.gov.uk/marine/fisheries/fishman/regist.htm>

Data from sales notes are captured as part of the UK integrated data systems that have been put in place, with data collected for sales related to all UK vessels, be they under or over 10 metres in length. When the sales note related to activity by 10 metre and under vessels are entered onto data capture systems, estimates of the associated fishing effort are entered at the same time. The use of the data reported on sales notes replaced the historic system of using the knowledge of local data collectors on the activity of the local small fleets and their usual patterns of effort, and of evidence of the observed fish landings seen at local fish markets. The requirement in the UK is for sales notes for all such landings by these smaller vessels to be reported to fisheries authorities, and as such the results are regarded as providing a complete and exhaustive source of information.

In addition to sales notes as mentioned above, many 10m and under vessels also provide voluntarily logbooks and landings declarations covering their activity. For example, those that operate as members of Producer Organisations were generally required to complete such documentation as part of their being able to fish against the allocations of quota given to such groups in the UK. Additionally, those involved in shellfish fishing activity were also required to report their activity in the form of monthly diaries of activity and landings. This information is all received at local port offices around the coast for entry onto computer systems. These local offices carry out local enforcement functions such as licensing, vessel and market inspections etc. As such they have a detailed knowledge of the vessels that operate in their local area.

Landings

Data on landings by 10m and over vessels are derived from the combination of the logbook, landing declarations and sales notes. These provide the key details on the species, presentation, weight and value of fish being landed that is entered onto computer systems at local port offices or via electronic transmission.

Landed weights are used as the data are entered, with live-weights calculated as the products of the landed weight and the appropriate conversion factors for that species and presentation of fish involved. The total landed weight of each species is taken from the landing declaration. Harmonised conversion factors for certain key species and presentations as set out in Commission Regulation 409/2009 are used where they exist or otherwise national conversion factors are applied.

Sales notes information give the details of the breakdown of the landed weight of each species in term of each presentation (and grade) sold. This proportionate breakdown is then applied to the total weight for each species so that the total live weight equivalent of the total landed weight is then allocated across the presentation types seen for the landing.

For vessels of 10m and under overall length, the source of data on landings is as detailed in the section on fishing effort above. A similar process is used as for over 10 vessels, with the exception that in most cases the landed weight of fish is derived from the quantities of landed weight of fish reported in sales notes rather than landings declarations. The same conversion factors as used for over 10m vessels are then applied to the details of species, landed weight and presentation from sales notes to give live weight equivalents of the landed weight.

Average prices for each species are calculated on the basis of live-weight quantities. This effectively weights the overall price thus calculated to the most prevalent presentation used for landings each species for both over 10m vessels and 10m and under vessels.

Fleet Capacity

In the UK, the Marine and Coastguard Agency's Registry of Shipping and Seamen (RSS) and the corresponding registries in the Channel Islands and Isle of Man collect and maintain information on registered fishing vessels including their gross tonnage and their maximum continuous engine power (MCEP) as defined in EU Council Regulation 2930/86, as amended by Council Regulation 3259/94. These data are made directly available to Fisheries Departments by electronic transfer.

The bulk of the UK fishing fleet are registered and operate from the UK mainland and are thus registered by the UK who operate the UK Register of Shipping and Seamen. More information on their procedures can be found on-line at:
<http://www.mcga.gov.uk/c4mca/ukr-home.htm>

Data quality assurance procedures are built into the registration process. For example, every UK fishing vessel must be surveyed before it can be registered. The general principle followed is for this to be carried out by specially employed surveyors from the RSS, but in certain circumstances an external surveyor may be allowed. This survey process includes the validation of the physical measurements and capacity of the vessel both in tonnage and engine power terms.

Fleet management measures in the UK are carried out primarily through the licensing

regime administered by Fisheries Administrations. This seeks to control both the overall capacity of the UK fishing fleet and, critically, access to the various fishing opportunities available to UK vessels. The quota and effort uptake by industry groups is monitored on a regular basis through the use of internal management reports in the UK.

Vessel Monitoring Data

Vessel Monitoring System (VMS)

The Vessel Monitoring System (VMS) is a system of satellite tracking using transmitters on board fishing vessels and records the location, speed and heading of a vessel. The system is a legal requirement under EC Regulation No. 2244/2003 (as amended in retained EU law) and Scottish Statutory Instrument (SI) 392/2004. VMS has been used as a monitoring system for UK vessels of 12 metres and over since 2013. Information must be transmitted once every two hours. There are reciprocal agreements with EU countries and third countries such as Norway and Faroes as well as Regional Fisheries Management Organisations (RFMOs) such as NEAFC, where the requirement to position-report is once every hour. The satellite tracking device installed on UK vessels is configured to automatically change the reporting frequency when a vessel enters and exits these areas.

The UK and EU member states have established 'Fisheries Monitoring Centres' (FMCs) to monitor the activities of their flag fishing vessels wherever they may be and fishing vessels within their waters. In the UK, FMC responsibilities are discharged collectively by Marine Scotland, the Marine Management Organisation (MMO - England) and the Department of Agriculture, Environment and Rural Affairs (DAERA - Northern Ireland).

Inshore VMS (I-VMS)

Following industry consultation on proposals to introduce Inshore Vessel Monitoring Systems (I-VMS) it will soon be a legal requirement for all licensed British fishing boats under 12 metres in length, operating in English waters to report their location details via VMS. Following the initial consultation period the Marine Management Organisation has run a type approval process and is part way through the implementation to the English under 12m fleet (over 2000 vessels). The Statutory Instrument (SI) which will make it a legal requirement to transmit will not come into force until roll out has completed.. Once devices are installed onto vessels, the data will flow into the UK VMS Hub and other Cefas systems.

Scotland are also developing their inshore fleet electronic monitoring through a modernisation programme with three priority areas. These priority areas are to be developed over time. Current coverage of the inshore fleet with electronic monitoring is limited to pilot study subsets led by University of St Andrews.

A pilot study is currently underway within the Northern Irish inshore fleet to explore a potential vessel activity monitoring and electronic catch reporting system. The pilot study is expected to make recommendations for wider application by December 2022.

Since 2012 it has been a requirement for all vessels operating in the Welsh scallop fishery

to use VMS reporting at 10 minute intervals. Welsh Government is currently implementing iVMS for all licensed under 12m fishing vessels that operate in Wales and the Welsh zone. It will become a statutory requirement for these vessels to use iVMS to report every 10 minutes from early 2022. Welsh Government is not currently progressing REM policy but in future will consider its application using a risk based approach.

Priorities:

- 1) Scallop dredge fleet – SIFIDS (Scottish Inshore Fisheries Integrated System).
- 2) <12m static gear fleet – OHIFP (Outer Hebrides Inshore Fisheries Project).
- 3) <12m trawl fleet – to be developed.

GeoFISH

Increasing use is being made of VMS data linked to fishing activity data. The main international reporting requirement was set by ICES who have requested this data from 2016 for HELCOM to evaluate the spatial and temporal effects of fishing; for NEAFC to map the location of vulnerable marine ecosystems and to map the aggregated distribution of fishing by different gear types across the OSPAR and HELCOM areas. There is also considerable interest in use of this information across Government (Defra, MMO, IFCA , Marine Scotland, Welsh Government, the JNCC , etc.) to provide advice covering a number of areas including both fisheries management and monitoring, biodiversity assessments and marine spatial planning.

To address these requirements a database CEFAS has developed GeoFISH as a spatial database built on top of the integrated UK database (IFISH). This not only combines VMS with fishing activity data from logbooks, sales notes and landing declarations, it automates the calculation of relevant fisheries indicators and provides spatial and temporal trends. GeoFISH is built on the Open Science transparency framework , using open source technologies and documented with the related code in a cefas github repository (<https://github.com/CefasRepRes/geoFISH>).

Developments in data collection

From 2019 the Marine Management Organisation and the Welsh Government have been gradually introducing a requirement for under-10 metre licensed fishing vessels owners/skippers to record their catch for each fishing trip they make via an app, website or customer contact centre. This new capability will deliver assurance and market confidence that we have sufficient data to meet sustainability goals. The data required by the record has been designated to provide a clearer picture of the activity of the under-10 metre fleet to and complement the data collected through sales notes. Work is also underway to introduce satellite monitoring of the Under 12 m fleet (I-VMS/Inshore VMS). More information on this is provided above.

Data processing, storage and quality control

The UK maintains the following databases containing primary data meeting both

management and control and wider analytical requirements:

- an integrated UK database exists (known as IFISH) where primary data related to individual trips by UK registered vessels and foreign vessels landing in the UK (species landed weight by presentation, dates, fishing locations, landing port, gear type, mesh size, fishing effort etc.) is stored. This system came into operational use by fisheries administrations in the UK in 2006. It brings together data from the three key administrative data sources - the official logbooks, landings declaration and sales notes - into a centralised data repository. Individual databases also continue to be maintained in England & Wales, Northern Ireland and Scotland, as the data entry for this information is primarily carried out at local port offices around the coast of the UK – this allows for their local knowledge to play a part in the validation of data reported by fishermen.
- the UK fishing vessel register, which maintains a complete and regularly updated list of vessels and associated attributes and is used for providing capacity data.
- the UK Vessel Monitoring System (VMS), which records satellite tracking information for vessels required to provide such data.
- MCSS (Monitoring Control and Surveillance System).

These systems sit within an overall system which carries out a number of cross checks of information between the various sources, including checks between activity data as reported in logbooks and that derived from satellite surveillance systems and other vessel monitoring inspection systems. This cross-check system highlights to administrations various apparent errors in reported data, with actions taken as necessary to resolve the errors.

The measures for control on the reporting of data on fishing activity provided by EU legislation are enforced through the activity carried out by officials within each of the UK fisheries administrations to ensure compliance with these reporting requirements. Where issues are identified with the data, either with the data being reported by individual fishing vessel owners/operators or individual merchants, or where the control regime itself is thought to have weaknesses, additional activities may be carried out to strengthen or supplement the existing reporting systems. In such cases, care is taken to ensure that there is no excessive or inappropriate additional reporting burden placed on those involved in the fishing industry.

Together these activities help to ensure that the data are considered fit for purpose - in terms of coverage and accuracy - as the key source of information with which officials and the industry can manage fishing activity. This includes activities such as the monitoring and management of the uptake of landings against the level of available fish quotas, and also the monitoring of activity by individual fishing vessels to ensure they comply with the limits on fishing effort as set out by various effort control regimes.

REFERENCES

Armstrong, M., Brown, A., Hargreaves, J., Hyder, K., Munday, M., Proctor, S., Roberts, A., Roche, N., and Williamson, K., 2013. Sea Angling 2012 – a survey of recreational sea angling activity and economic value in England. Defra, London, UK. 16pp.

Authorised Aquaculture Production Businesses and Authorised Processing Establishments: registers - gov.scot (www.gov.scot)

Fisheries Act 2020 <https://www.legislation.gov.uk/ukpga/2020/22/contents/enacted>

Hyder, K., Brown, A., Armstrong, M., Bell, B., Bradley, K., Couce, E., Gibson, I., Hardman, F., Harrison, J., Haves, V., Hook, S., Kroese, J., Mellor, G., MacLeod, E., Muench, A., Radford, Z., and Townhill, B., 2020. Participation, catches and economic impact of sea anglers resident in the UK in 2016 & 2017. Cefas, Lowestoft UK. 170pp.

Hyder, K., Brown, A., Armstrong, M., Bell, B., Hook, S., Kroese, J., and Radford, Z., 2021. Participation, effort, and catches of sea anglers resident in the UK in 2018 & 2019. Cefas, Lowestoft UK. 79pp.

ICES 2015.

[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)

Public register of Aquaculture Production Businesses in England and Wales (cefas.co.uk)

Public Register of Authorised Aquaculture Production Businesses | Department of Agriculture, Environment and Rural Affairs (daera-ni.gov.uk)

Radford, Z., Hyder, K., Zarauz, L., Mugerza, E., Ferter, K., Prellezo, R., Strehlow, H.V., Townhill, B., Lewin, W.-C., and Weltersbach, M.S., 2018. The impact of marine recreational fishing on key fish stocks in European waters. PLoS One 13, e0201666.

Seafish - Seafood Processing Methodology Report

<https://www.seafish.org/document/?id=78dbb480-f015-4288-9907-a7f076381255>