Johann Heinrich von Thünen Institute, Germany

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# 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)

# Commission Delegated Decision (EU) 2021/1167 of 27 April 2021

establishing the multiannual Union programme for the collection and management of biological, environmental, technical and socioeconomic data in the fisheries and aquaculture sectors from 2022

# Commission Implementing Decision (EU) 2021/1168 of 27 April 2021

establishing the list of mandatory research surveys at sea and thresholds as part of the multiannual Union programme for the collection and management of data in the fisheries and aquaculture sectors from 2022

# Commission Implementing Decision (EU) 2021/…

laying down rules on the format for the submission of work plans and annual reports for data collection in the fisheries and aquaculture sectors

# German Work Plan for data collection in the fisheries and aquaculture sectors

2022-2024

Version 1.2

[Bremerhaven/Rostock, 19 November 2021]

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SECTION 1: GENERAL INFORMATION

## Data collection framework at national level

*General comment: Use this text box to describe how data collection is organised in your Member State (institutions involved, contact information) and in which regional coordination groups (RCG) your Member State participates.*

The German data collection programme for sampling of fisheries data refers to the DCF Regulation 2017/1004 on the Union framework for the collection, management and use of data in the fisheries sector and the COM Delegated Decision 2021/1167 and COM Implementing Decision 2021/1168 on the multiannual Union programme (EU-MAP) for the collection and management of biological, environmental, technical and socioeconomic data in the fisheries and aquaculture sectors from 2022. It describes the planned actions by sections of the abovementioned legal acts in accordance with the Guidelines for Work Plan (WP) submissions provided by the European Commission.

This national WP covers the forthcoming three years, 2022-2024.

Compared to previous years, the WP has been adapted to the new EU-MAP and WP templates & guidance. The general rationale and methodology of the data collection, however, remains very similar to previous WPs and is based on past experience.

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Tel. +49 531 596-0
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Website: http://www.thuenen.de

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E-mail: info@ble.de
Website: http://www.ble.de

Within these institutions, the following four **institutes and units** are responsible for data collection and reporting:

TI:
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Insitute of Baltic Sea Fisheries (OF)
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Tel. +49 381 66099-102
E-mail: of@thuenen.de
Website: http://www.thuenen.de/of/

Institute of Fisheries Ecology (FI)
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Website: http://www.thuenen.de/fi/

The TI collects biological and economic data, by-catch and survey data as well as data from sampling of commercial fishing vessels under German flag. The TI-OF is responsible for the Baltic Sea and recreational fisheries sampling, while the TI-SF is responsible for the North Sea & Eastern Arctic, North Atlantic and other areas. The TI-FI is responsible for sampling diadromous species.

BLE:
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The BLE unit 531 holds the fishing vessel list including capacity, landings and effort data based on the relevant EU legislation. The BLE unit 223 is responsible for the central database of all national fisheries-related data and central IT services (e.g. national DCF website).

BLE and TI are institutions under the auspices of the Federal Ministry of Food and Agriculture (Bundesministerium für Ernährung und Landwirtschaft, BMEL). Within the institutions of BMEL, responsible persons are appointed in order to co-operate and implement the WP. The TI-SF is the national coordinator.

National co-ordination meetings with all persons involved in the German WP are held once a year (see Table 1.2). The main aim of these meetings is an exchange of experiences during the recent year of WP implementation and forward planning of data collection in the upcoming year(s).

A national portal website for dissemination of information has been established in 2009: http://www.dcf-germany.de

Regional and international coordination, scientific advice:

Germany participates in the Regional Coordination Groups (RCGs) for the Baltic Sea, for the North Atlantic, North Sea and Eastern Arctic (NANSEA) and Long-Distance Fisheries (LDF), see Table 1.2, and their Inter-Sessional Sub-Groups (ISSGs).

| |
|---|
| In addition, Germany has members in various expert groups of the International Council for the Exploration of the Sea (ICES) and in the Scientific Council of the Northwest Atlantic Fisheries Organization (NAFO), supporting the scientific advice on fish stocks, on environmental impacts of fisheries and other relevant topics. |

## Text Box 1a: Test studies description

| |
|---|
| *General comment: This text box fulfils Chapter II, section 1.2 of the EU MAP Delegated Decision annex. This text box applies to the work plan and the annual report.* |
| NA |

## Text Box 1b: Other data collection activities

*General comment: Use this text box to provide information on other data collection activities that relate to your EMFAF operational programme and need to be included in the work plan and the annual report. Describe activities that are funded by the DCF but fulfil objectives under other EMFAF priorities, like marine knowledge, or activities funded by the DCF, but without a direct link to the EU MAP specific requirements or WP template tables, like freshwater fisheries. You can also include one-off specific studies for a particular end-user need that do not enter the regular data collection.*

Under the German EMFAF Programme, an increased focus on the impact of fisheries on marine ecosystems is foreseen. In this respect, existing surveys at sea and expertise will be utilised to record and assess benthic habitats and to investigate possibilities to develop gear technologies that enable a decreased impact of mobile bottom-contacting gears on species inhabiting the seafloor.

National coordination on the detailed implementation of these work tasks, however, has not been concluded by the writing of this WP.

Other activities:

**Title: WFD-diadromous**

1. Aim of the data collection activity

Data collected on biota in the framework of the EU Water Framework Directive (WFD) potentially contains valuable information on the European eel, salmon and sea trout (e.g. abundance, presence/absence, biological data). These data are, however, collected on a regional scale, heterogenous and often not available in an aggregated form that is aimed at supporting the assessment of diadromous species. The aim of this study is therefore to make information available that is collected on diadromous species under the WFD and to highlight potential synergies for future data collection.

2. Duration of the data collection activity

The duration of the study will largely depend on the availability, quality and format of the data available from regional authorities but it is planned to provide a first answer to the aims defined above at the end of this WP, i.e. by 2025.

3. Methodology and expected outcomes of the data collection activity

Details on the methods used to achieve the targets above will to some degree depend on the current state of the data. Briefly, these will encompass:
i) Establish a new, or tap in to existing networks to collate data on diadromous fish from the WFD
ii) Harmonize and format the data concerning issues related to diadromous fish stocks
iii) Explore potential methods to further analyse the available data
iv) Review the available data/information for their potential to provide or improve information requested in the DCF
v) Identify potential synergies between WFD and DCF and provide guidance to improve future data collection

This study can only be performed and accomplished during this WP period, if additional personnel funding is provided by DCF Germany. As this was not finally decided when this WP was drafted, this study is still labelled as “optional”.

**Title: Male silver eels**

1. Aim of the data collection activity

The Eel Regulation (1100/2007) establishes measures for the recovery of the European eel in order to ensure the escapement to the sea of at least 40% of adult eels relative to the escapement levels that would have existed in the absence of human influences. In order to fulfil this management goal, the German eel model (GEM III) estimates silver eel production in any given eel management unit (EMU) by utilizing data and estimates on recruitment, stocking, and mortalities, but also biological based data such as growth, life history stage and length at age. Since these data for most EMUs are derived from eels caught in commercial fisheries, data of the much smaller male silver eels are underrepresented, since fisheries in terms of gear types, minimum landing sizes and fishing regimes in Germany mainly focus on the catch of the larger female eels.
The aim of this test study is to obtain biological data (length, weight, life history stage, age) for male silver eels, in order to improve data availability and growth functions for male eels and thus improve the modelled estimates in every EMU, where possible.

2. Duration of the data collection activity

The study is set to be conducted throughout the entire time frame of the 3 year (2022-2024) WP.

3. Methodology and expected outcomes of the data collection activity

As a first step for the test study, it is planned to query commercial fishers in the river Rhine for catch opportunities of small male silver eels during migration periods. For this, it may be necessary to obtain regional special permissions to catch eels under minimum landing size and to utilize different or modified catch gear, since often mesh sizes and gear types used in German commercial fisheries target larger eels and dismiss small silver males.
It is planned to catch a sufficient number of male silver eels for the river Rhine to establish usable growth functions for an improvement of the currently used GEM and thus eel assessment. It is expected that after the three years, a feasible methodology was found to catch male silver eels, estimate sex ratios in the respective EMU and that a representative growth function for male silver eels can be utilized for this EMU. Findings and resulting knowledge from this test study may then be transferred to also collect and provide these data for the other remaining EMUs in Germany.

This study can only be performed and accomplished during this WP period, if additional personnel funding is provided by DCF Germany. As this was not finally decided when this WP was drafted, this study is still labelled as “optional”.

## Text Box 2.3: Data collection for diadromous species in freshwater

*General comment: This Textbox fulfils Article 5(2)(a), Article 6 (3)(a), (b) and (c) of Regulation (EU) 2017/1004 and Chapter II, point 2.1(b) and point 2.3 of the EU MAP Delegated Decision annex. Use this text box to give an overview of the methodology used to collect data from freshwater commercial fisheries for salmon, sea trout and eel, and from research surveys on salmon and sea trout in freshwater, and on eel in any relevant habitat including coastal waters.*

**Eel (*Anguilla anguilla*)**

As required by Decisions 2021/1167 and 2021/1168, the data collection in all German Eel Management Units (EMUs) will be organised as follows:

- Biological variables (individual length, age, sex, weight and maturity (stage))
  - Silver eels from commercial catches will be sampled twice in each EMU during this WP period. Further individual age readings are not necessary, because reliable growth functions are already established for each EMU (see German progress report 2021).
- Annual catch quantities
  - As reported by fishers and obtained by national/regional catch statistics
- Recruitment
  - Natural recruitment: regional (non-DCF) glass eel monitoring/ICES time series
  - Stocking: number of glass eels and elvers, as reported in national/regional stocking statistics
  - Larval surveys in the spawning area of the European eel (Sargasso Sea) and in the European shelf sea (Bay of Biscay to Gibraltar)
- Abundance of standing stock and silver eel escapement
  - Calculated via German Eel Model III (Oeberst & Fladung 2012)
- Analysis of Water Framework Directive data (optional*)
  - It is planned to investigate, whether and how data from the Water Framework Directive (WFD) can be used for DCF purposes. In Germany, WFD data are assessed at regional level, and data formats, levels of information and data base structures therefore often differ between regional authorities. The planned thorough collection, screening and analysis of German WFD data should clarify, whether they contain useful information on diadromous species (eel, salmon and sea trout) and how these data can be used to increase and improve existing and future DCF data. For further information see Test study *WFD-diadromous*.
- Spawner quality (optional*)
  - The spawner quality of emigrating silver eels from one North Sea and one Baltic Sea EMU will be analysed for spawner quality since it might affect their reproductive success. Possible parameters are parasite infestation, contaminant load, diseases, and fat content. A minimum of 100 individuals per EMU and individual age readings are required for this analysis.
- Investigation of male silver eels (optional*)
  - Information on male silver eel is scarce. This study aims at assessing biological information (length, weight, life history stage, age) on male eels at the River Rhine and to provide information on the feasibility of male-eel-specific surveys. The results shall help to establish similar sampling in other EMUs. For further information see Test study *Male silver eels*.

*The above-mentioned studies on WFD data, spawner quality and male silver eels produce a significant additional work load. As a consequence, they can only be performed and accomplished during this WP period, if additional personnel funding is provided by DCF Germany. As this was not finally decided when this WP was drafted, these studies are still labelled as "optional".

**Salmon (*Salmo salar*)**

German populations of *S. salar* do currently not contribute to the stock assessment by WGNAS and active data collection within the DCF framework is considered not feasible. However, available data and information from regional authorities will be collected annually and provided to relevant end-users in order to ensure regular updates on the state of German salmon populations. In addition, it is planned to establish protocols and infrastructure for an annual data collection in order to improve data flow from regional authorities and stakeholders to DCF and to ensure and improve future data availability.
The above-mentioned analysis of Water Framework Directive data also applies for *S. salar*.

**Sea trout (*Salmo trutta*)**

It is planned to establish protocols and infrastructure for an annual data collection in order to establish data flow from regional authorities and stakeholders to DCF and to ensure and improve data availability.
The above-mentioned analysis of Water Framework Directive data also applies for *S. trutta.*

## Text Box 2.4: Recreational fisheries

*General comment: This text box fulfils Article 5(2)(a), Article 6 (3)(a), (b) and (c) of Regulation (EU) 2017/1004 and Chapter II, point 2.2 of the EU MAP Delegated Decision annex. Use this text box to give an overview of the methodology used for the data collected on marine and freshwater recreational catches.*

Description of the sampling scheme/survey according to Table 2.4.

1. Multispecies off-site survey: A nation-wide representative computer-assisted telephone interview (CATI) screening survey targeting 150,000 Germans has been carried out from October 2020 to April 2021 followed by a one-year diary survey. The off-site CATI survey was designed to identify anglers in the German population, to collect their socio-demographic parameters and information on angler heterogeneity, and to estimate fishing effort as well as to recruit participants for a subsequent diary survey. The CATI survey used a dual frame approach with 70% landline numbers and 30% mobile numbers. A mixture of random-digit dialling and number sampling from an official number registry (landline only) was used to derive telephone numbers and contact households, with selection probabilities being proportional to the number of households per municipality. However, a disproportional sampling approach was chosen to increase the number of marine anglers in the diary survey. Therefore, the probability of sampling telephone numbers originating from federal states that are more close to the German coasts was doubled. A total of 1,541,182 numbers were used to realize 150,232 interviews. Of these numbers, 683,135 (~44%) were mobile numbers and 858,047 (~56%) were land-line numbers. Up to ten attempts were made to contact a household. Thereafter, a telephone number was considered a quality-neutral failure. Household size and number of persons in a household being recreational anglers were determined. An angler was defined as a person who had fished at least once in Germany during the last 12 months preceding the survey. Survey participants had to be older than 14 due to the German Youth Protection Act. All persons that had been fishing in Germany in the last 12 months, or who planned to go fishing there in the next 12 months were asked to participate in a one-year diary survey. This resulted in a total of 1,891 diarists. All diary participants are asked to report every single angling day in Germany over an observation period of 12 months starting from the day they received the diary. For every angling day, the date, time, fishing location, angling platform (boat, charter boat, shore), target species, and the number of fish caught,

harvested and released per species has to be reported. In order to maintain the motivation to participate, to retrieve diary data, and to reduce panel attrition bias, the participants are contacted by telephone at quarterly intervals during the entire observation period. The diary data will be collected between October 2020 and April 2022. In order to obtain representative estimates of the size of the German angler population, the corresponding fishing effort and catches, harvests and releases for all species both the data of the CATI and the diary survey will be weighted and extrapolated in various ways following the data collection.

2. Multispecies on-site survey: The multispecies on-site survey aims in collecting information on fishing characteristics and catch rates, in particular for western Baltic cod. The on-site survey is carried out along the outer German Baltic coastline and uses a stratified random sample of sampling days and access points selected without replacement out of a list of 79 access points (harbours, boat ramps, piers and beaches; Strehlow et al., 2012). The coastline was divided into five strata for sampling, with harbours and beaches as access points and days as primary sampling units. Access points and days (27 days per month) are randomly selected within the strata. The interviews are conducted by six survey agents during peak activity times in the afternoon/evening when most anglers are expected to end their fishing day. The sampling effort is increased for sea-based fishing methods and for those days when anglers most frequently go fishing (weekends and public holidays). Observation time per access point is usually 3-5 hours. The fishing methods are grouped into shore fishing (surf angling and wading), boat fishing (including float tubes and kayaks), and charter vessel fishing. The following data are collected during the interviews: the number of caught and released fish per species, the sociodemographic factors gender, age, place of residence (postal code), avidity (measured as the reported number of fishing days in the German Baltic Sea in the past 12 months), weather conditions and the coastal state and specific location at which the interview took place. Biological data will be collected by scientific observers during monthly onboard samplings (length measurements of all harvested and released fish) of charter boat trips (5 assignments per month) along the German Baltic coast. Sampling date and the individual charter vessel will be randomly selected for each sampling day.

   Reference:
   Strehlow HV, Schultz N, Zimmermann C, Hammer C (2012) Cod catches taken by the German recreational fishery in the Western Baltic Sea, 2005-2010: implications for stock assessment and management. ICES J Mar Sci 69(10):1769-1780.

3. Salmon survey: In Germany, recreational salmon fishing occurs only from specialized trolling boats in a relatively small area off the Baltic island of Ruegen (ICES Subdivision 24). Remote cameras are installed at three marinas (Glowe, Lohme, Wiek) that collectively provide access to > 60% of all trolling boats participating in the German salmon trolling fishery, to quantify launch based fishing effort departing from these marinas (Hartill et al., 2020). Each system consists of a network camera connected to a wireless network router. Images are stored on a 250 GB Solid-State Drive (SSD) connected to the router and data are manually retrieved every two months. Marina entrance choke points are monitored, providing coverage of all boats leaving the marinas. Recording is restricted to the salmon trolling season (December to May) and images are only taken between 5 am and 3 pm when trolling boats are known to leave the marinas to increase cost efficiency. Depending on mounting location, the cameras take 12-20 time-stamped images per minute aiming to reach a census of all boats leaving the marina. This results in 7,200-12,000 images per marina and day. Image analysis and boat counting is conducted via manual visual inspection of the images in time-lapse (30 frames viewed per second). Salmon trolling effort from marinas not monitored by cameras is extrapolated using regular instantaneous trolling boat counts (every two weeks at night or on storm days) covering all relevant marinas with salmon trolling boats and the proportions of trolling boats that went out for fishing derived from the marinas with camera monitoring (Hartill et al., 2020). The camera monitoring is complemented by random on-site interviews (10-12 assignments per month

with replacement) of trolling anglers in four relevant marinas (including the marinas where the camera monitoring is conducted) to determine catch, harvest and release rates (each per boat) and to collect biological catch data and socio-economic information.

Reference:
Hartill BW, Taylor SM, Keller K, Weltersbach MS (2020) Digital camera monitoring of recreational fishing effort: Applications and challenges. Fish Fisheries 21(1):204-215.

## Text Box 2.5: Sampling plan description for biological data

*General comment: This text box fulfils Article 5 (2)(a) and (b), Article 6 (3)(a), (b) and (c) of Regulation (EU) 2017/1004 and Chapter 2, point 2.1(a) and 4.1 of the EU MAP Delegated Decision annex. This text box complements Table 2.5.*

1. **General remark**

Germany is conducting two approaches for the North Sea / North Atlantic (Institute of Sea Fisheries, Bremerhaven) and the Baltic Sea region (Institute for Baltic Sea Fisheries, Rostock) to account for the nature of the fisheries in the different regions.

**a) North Sea / North Atlantic regions:**

Overall, approx. 220 vessels are operating in the North Sea and North Atlantic regions, the majority belonging to the brown shrimp fleet. All other segments operating in the North Sea and North Atlantic consist of only a few vessels (on average 2 to 5 vessels). The same vessels can be belong to more than one sampling frame. For instance, the same pelagic trawlers are targeting North Sea herring or blue whiting in ICES Div. 6b depending on the season.

The sampling frames for biological data are described in Table 2.5. Vessels to be sampled are selected from a telephone list. However, the approach is an opportunistic randomised PSU selection and not fully probability-based due to the low number of vessels within one segment. The primary sampling unit is the vessel x trip, the secondary sampling unit is the haul, the tertiary sampling unit is the fish in the haul.

The only fleet segment with a greater number of vessels is the brown shrimp fishery, yet the target species is not assessed by ICES and there is no TAC. Some segments in the high-seas fisheries might consist only of one trip of a three-month duration by a huge vessel and high catch leading to a nearly exhaustive sampling of the segment.

Overall, the sampling frame is designed to fulfil the sampling obligations according to Table 2.1 and to understand the catch compositions of the important fisheries in these regions qualitatively and quantitatively as well as to enable and secure the data delivery to the assessment working groups. Adaptations to the selected fisheries will be carried out after regional work plans and/or agreements have been established.

For the North Sea and North Atlantic, sampling is undertaken by at-sea-sampling only. This is because in the harbours of the German North Sea coast, there are hardly any auctions and direct fish sales. Landings are directly transferred from the vessel to different processing plants in Germany, but also to processing plants in foreign countries. Overall, 68%, 73% and 69% of the landings occurred in foreign countries in 2018, 2019 and 2020, respectively. Therefore, it is virtually impossible to sample sufficiently at harbours.

**b) Baltic Sea:**

The German fisheries in the Baltic Sea are separated into three fleet segments: 1) Demersal fish, 2) Sprat, 3) Herring.

The demersal fleet is further subdivided into 1a) passive SD2224, 1b) active SD2224, 1c) active SD2532. Each year, a list of vessels is produced using the landings data from the previous year (e.g. the lists for 2018 are compiled 2017 with data from 2016). The lists are sorted by total landings per vessel. The fleet segment lists of 1a, 1b and 1c include all vessels that contributed ~60%, ~90 and ~90% of the total landings, respectively. The list of vessels is then randomised by assigning a random number to each vessel on a list. The sequence of the random number determines the sequence of contacting the vessel. There is only one list for the entire year. If all vessels from a list have been contacted before the year ended, the same list is used again. Sampling is conducted all year-round and the effort is distributed according to fishing seasons. Each phone call with fishers is documented since 2010. This forms the basis for our recordings of success/non-response/rejection/refusal rates. In addition, we record if the sample is random or based on expert knowledge. Expert knowledge partly is used to ensure efficient sampling coverage of periods/strata with very low landings, e.g. demersal species in quarter 3. Flounder, plaice and other flatfishes and fish species are sampled as part of the demersal sampling programme mainly targeting cod. However, if a vessel is selected, any fishing trip is sampled, except for trips targeting freshwater species, herring or sprat (see below).

An at-sea observer catch sampling programme (including concurrent sampling of landings, discards and unwanted by-catches) is conducted for the demersal fleet segments. In addition, a self-sampling programme with fishers is used to collect biological and catch data; unsorted commercial catch samples of usually 200-300 kg from the last or last but one haul are purchased. Diagnostics show that sampled trips are representative of the overall national population of vessels and their spatio-temporal dynamics. In addition, opportunistic sampling of landed discards (BMS cod under the landing obligation) may take place.

The primary sampling unit is the vessel x trip, the secondary sampling unit is the haul, the tertiary sampling unit is the fish in the haul.

The sprat catches mainly originate from two pelagic trawlers. Since 2013, we have a self-sampling programme where each vessel provides one frozen catch sample (5 kg) from each trip. This covers the ICES subdivisions 25-29. In addition, the minor sprat catches in SD22 and SD24 are sampled opportunistically upon expert knowledge and notification from the few fishers that are temporarily targeting sprat.

The fleet targeting herring is subdivided into 3a) passive SD2224, 3b) active SD24. For 3a, five major ports around the Greifswald Bay - the major fishing ground - are sampled using 50 kg unsorted catch samples from a vessel per port. Samples from the ports are taken from a known group of fishers, which are considered representative for the respective fleet given that similar mesh sizes are used. For 3b, a 50 kg unsorted catch sample is taken from an arbitrary (pair) trawler landing in the only German herring processing plant in Neu-Mukran, Rügen island. During the herring season (Nov-Apr), each week either 3a or 3b is sampled. The day of the week is selected according to wind and logistic considerations. In addition, to estimate the by-catches of cod (and other species) of the herring trawlers, the by-catch of 3b landed in Neu-Mukran is sampled once bi-weekly since 2014.

The assessment input data for small pelagics are prepared by quarter, gear (for herring: gillnet, trapnet, pelagic trawl; for sprat: pelagic trawl) and ICES Subdivision (for herring: SD 22 and 24; for sprat: SD 22, 24, 25-29). The landings are raised by the corresponding total length/age-length distributions of the commercial samples.

## Text Box 2.6: Research surveys at sea

*General Comment: This Text box fulfils Article 5 (1)(b), Article 6 (3)(a), (b) and (c) of Regulation (EU) 2017/1004 and Chapters I and II of the EU MAP Implementing Decision. It is intended to specify which research surveys at sea set out in Table 2 of the EU MAP Implementing Decision will be carried out. Member States shall specify whether the research survey is included in Table 2 of the EU-MAP Implementing Decision or whether it is an additional survey.*

Name of the research survey

**Baltic International Trawl Survey (BITS)**

1. Objectives of the survey

Target species are demersal fish species, mainly Baltic cod and flatfish species (flounder, plaice, dab, brill and turbot). The main aim is to determine the year-class strength of the target species. Target data are abundances, weight and length distributions of all fishes and length-weight-age-sex-maturity data of commercially important species as well as hydrographic data (temperature, salinity and oxygen). The collected data are stored in a national SQL database and submitted to the ICES DATRAS database. In addition, marine litter and different biological samples (e. g. stomachs, livers, DNA, etc. from target species) are sampled for national and international studies. The survey is conducted annually in March-April and in October-November.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

DOI: http://doi.org/10.17895/ices.pub.2883

3. For internationally coordinated surveys, describe the participating Member States/vessels.

Denmark (R/V DANA and R/V HAVFISKEN), Sweden (R/V SVEA), Germany (R/V SOLEA), Lithuania (F/V CLV*), Poland (R/V BALTICA), Latvia (R/V BALTICA) and Estonia (F/V CEV**) and Russia (R/V ATLANTIDA). ICES WGBIFS is coordinating the planning of this survey.

* BITS Code for: Commercial Lithuanian Vessel (Charter)

**BITS Code for: Commercial Estonian Vessel (Charter)

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

The ICES survey planning group (WGBIFS) assigns the tasks to the survey participants (e.g. coverage of certain areas in a certain time frame). Each participating country is responsible for the activities conducted on its national part of the international survey. Cost sharing: There is no particular cost sharing agreement in place yet for this survey.

Name of the research survey

**Baltic International Acoustic Survey (BIAS)**

1. Objectives of the survey

Target species are small pelagic fish species, mainly Baltic herring, sprat and additionally European anchovy and pilchard. The main aim is to provide information on stock parameters of small pelagics in the Baltic Sea. Target data are biomass, weight and length distributions and length-weight-age-sex-maturity of small pelagic target species in the Kattegat and western Baltic Sea including Belt Sea, Sound and Arkona Sea as well as hydrographic data (temperature, salinity and oxygen). The data are saved in a national SQL database and storage in the ICES Acoustic Trawl Database has been implemented. The survey is conducted annually in September-October.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

Data collected include 1nm NASCs (aggregated), age and length distribution incl. maturity at age for all clupeids in the investigation area, plus additional samples of cod.

see survey manual:

Manual of International Baltic Acoustic Surveys (IBAS) (ices.dk)

3. For internationally coordinated surveys, describe the participating Member States/vessels.

Denmark (RV "Dana") and Sweden (RV "Dana"), Finnland (RV "Aranda"), Germany (FRV "Solea"), Lithuania (RV "Darius"), Latvia (RV "Baltica"), Poland (RV "Baltica"), Estonia (RV "Ulrika") and Russia (RV "Atlantniro"). ICES WGBIFS/WGIPS are coordinating the planning of this survey.

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

The ICES survey planning group (WGBIFS) assigns the tasks to the survey participants (e.g. coverage of certain areas in a certain time frame). Each participating country is responsible for the activities conducted on its national part of the international survey. Cost sharing: There is no particular cost sharing agreement in place yet for this survey.

Name of the research survey

**Baltic Acoustic Spring Survey (SPRAS)**

1. Objectives of the survey

Target species is sprat. The main aim is to provide information on stock parameters of sprat in the Baltic Sea. Target data are biomass, weight and length distributions and length-weight-age-sex-maturity of sprat in the Baltic proper including ICES subdivisions 24-29 as well as hydrographic data (temperature, salinity and oxygen). The collected data are saved in an Access-database and the ICES acoustic trawl database. The survey is conducted annually in May.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

see survey manual: http://www.ices.dk/community/groups/Pages/WGBIFS.aspx

3. For internationally coordinated surveys, describe the participating Member States/vessels.

Sweden (R/V Svea), Germany (R/V WALTER HERWIG), Lithuania (R/V 652), Poland (R/V BALTICA), Estonia (R/V Baltica) and Latvia (R/V BALTICA).

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

The ICES survey planning group (WGBIFS) assigns the tasks to the survey participants (e.g. coverage of certain areas in a certain time frame). Each participating country is responsible for the activities conducted on its national part of the international survey. Cost sharing: There is no particular cost sharing agreement in place yet for this survey.

Name of the research survey

**Rügen Herring Larvae Survey (RHLS)**

1. Objectives of the survey

Target species is the western Baltic spring-spawning herring. The main aim is to monitor spawning activity and reproductive success of the spring-spawning herring of the Western Baltic Sea in its main spawning area, the Greifswald Bay. Target data are high-resolution spatial and temporal records of the larval abundance during the entire spawning period as well as hydrographic data (temperature, salinity and oxygen). The collected data are stored nationally and in the ICES Fish Eggs and Larvae data base. The survey is conducted annually in February to June and November.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

Detailed descriptions of the survey design are provided in:

Polte P (2013) Ruegen herring larvae survey and N20 larval index. Working Document WKPELA. Benchmark Workshop on on Pelagic Stocks (WKPELA): 4-8 February 2013. Copenhagen: ICES, 10 p

Polte P, Kotterba P, Hammer C, Gröhsler T (2014) Survival bottlenecks in the early ontogenesis of Atlantic herring (*Clupea harengus*, L.) in coastal lagoon spawning areas of the western Baltic Sea. ICES J Mar Sci 71(4):982-990, doi:10.1093/icesjms/fst050

Oeberst R, Klenz B, Gröhsler T, Dickey-Collas M, Nash RDM, Zimmermann C (2009) When is year-class strength determined in western Baltic herring? ICES J Mar Sci 66(8):1667-1672, DOI:10.1093/icesjms/fsp143

3. For internationally coordinated surveys, describe the participating Member States/vessels.

not applicable

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

not applicable

Name of the research survey

**Fehmarn Juvenile Cod Survey (FEJUCS)**

1. Objectives of the survey

Target species is the western Baltic cod. The main aim is to monitor the cohort strengths of age-0 and age-1 cod during autumn in the Western Baltic Sea. Target data are length-frequency distributions of undersized cod caught in commercial pound nets located near Fehmarn (the centre of the main spawning area of western Baltic cod). The collected data are stored and processed nationally. The survey is conducted annually in September to December.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

The method is described in the Working Document Number 18, p. 293-310 of ICES 2019, Benchmark Workshop on Baltic Cod Stocks (WKBALTCOD2). ICES Scientific Reports. 1:9. 310 pp. http://doi.org/10.17895/ices.pub.4984.

3. For internationally coordinated surveys, describe the participating Member States/vessels.

National survey only.

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

National survey only.

Name of the research survey

**International Bottom Trawl Survey, Quarter 1 (IBTS Q1) (in the North Sea, Channel, Skagerrak and Kattegat)**

1. Objectives of the survey

- To determine the distribution and relative abundance of pre-recruits of the main commercial species with a view of deriving recruitment indices;
- To monitor changes in the stocks of commercial fish species independently of commercial fisheries data;
- To monitor data for the determination of biological parameters for selected species;
- To collect hydrographical and environmental information;
- To determine the abundance and distribution of late herring larvae in order to provide the ICES Herring Assessment Working Group (HAWG) with a recruitment index for the North Sea herring stock.

Major target species trawling (GOV): herring, sprat, cod, haddock, whiting, saithe, Norway pout, mackerel, plaice
Major target species plankton tows (MIK): herring
In addition, the distribution and relative abundance of all fish species and selected invertebrates is recorded.
The survey is conducted annually in January-February.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

Bottom trawling with a standard GOV trawl; CTD casts; Plankton net haul with a MIK net;

Survey manuals:
ICES. 2020. Manual for the North Sea International Bottom Trawl Surveys. Series of ICES Survey Protocols SISP 10-IBTS 10, Revision 11. 102 pp. http://doi.org/10.17895/ices.pub.7562
and
ICES. 2017. Manual for the Midwater Ring Net sampling during IBTS Q1. Series of ICES Survey Protocols SISP 2. 25 pp. http://doi.org/10.17895/ices.pub.3434

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

France: RV Thalassa, The Netherlands: RV Tridens, Germany: RV Dana (charter in replacement of Walther Herwig III) , Denmark: RV Dana, Sweden: RV Dana, Norway: RV G.O. Sars, Scotland: RV Scotia
Coordinating bodies are the ICES International Bottom Trawl Survey Working Group (IBTSWG) for trawl samples and the ICES Working Group on Surveys on Ichthyoplankton in the North Sea and adjacent seas (WGSINS) for plankton sampling.

3. For internationally coordinated surveys, describe the participating Member States/vessels.

France: RV Thalassa, The Netherlands: RV Tridens, Germany: FRV Walther Herwig III , Denmark: RV Dana, Sweden: RV Svea, Norway: RV G.O. Sars, Scotland: RV Scotia

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

Individual tasks to the survey participants (e.g. coverage of certain areas in a certain time frame) are allocated by the IBTSWG. Each participating country is responsible for the activities conducted on its national part of the international survey. Cost sharing: There is no particular cost sharing agreement in place yet for this survey.

Name of the research survey

**International Bottom Trawl Survey, Quarter 3 (IBTS Q3)**

1. Objectives of the survey

The main objective of the IBTS Q3 is to provide abundance indices of the target species haddock, cod, saithe, whiting, Norway pout, herring, sprat, mackerel and plaice in the North Sea and the Skagerrak. Germany participates as one of six nations in the internationally coordinated Q3 survey. Apart from abundance indices, information is collected on individual length, weight and age for the target species. Additional age data are obtained for selected fish species to be evaluated for future use in assessments. Furthermore, abundance, weight and length data are collected for all fish species caught. This serves the second objective to obtain information on changes in the abundance and distribution of fish species not commercially targeted, and in the composition of regional groundfish assemblages.
The survey is conducted annually in July-August.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

Types of data collected include biological data for the groundfish community, as well as additional data on the bycatch of benthic invertebrates. The German part of the survey includes a dedicated sampling programme of benthic epifauna and sediments. Further accompanying data recorded include information on stations and gear performance, hydrographic data, observations of weather and sea state. The data are stored locally in databases in the national institutes and submitted to public international databases at ICES. - A detailed description of the survey methods can be found in the corresponding survey manual:
https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%2010%20%E2%80%93%20Revision%2011_Manual%20for%20the%20North%20Sea%20International%20Bottom%20Trawl%20Surveys.pdf

3. For internationally coordinated surveys, describe the participating Member States/vessels.

UK England: RV Endeavour, Germany: FRV Walther Herwig III, Denmark: RV Dana, Sweden: RV Svea, Norway: RV Kristine Bonnevie, UK Scotland: RV Scotia

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

Individual tasks to the survey participants (e.g. coverage of certain areas in a certain time frame) are allocated by the IBTSWG. Each participating country is responsible for the activities conducted on its national part of the international survey. Cost sharing: There is no particular cost sharing agreement in place yet for this survey.

Name of the research survey

**North Sea Beam Trawl Survey (BTS)**

1. Objectives of the survey

Target species of this survey are mainly sole and plaice but also associated species. The survey provides densities (abundance and biomass) indices for the target species as well as hydrographic data. The survey is conducted annually in August-September.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

All surveys coordinated by WGBEAM are carried out with a beam trawl. Depending on the local circumstances and the ship's capacity, the width and rigging of the beam trawls varies. Germany uses a light 7.2 m beam trawl.
Manual:
https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%2014%20-%20Manual%20for%20the%20Offshore%20Beam%20Trawl%20Surveys%20(WGBEAM).pdf

3. For internationally coordinated surveys, describe the participating Member States/vessels.

The Beam Trawl Survey in the North Sea and Eastern English Channel is carried out by Belgium, Germany, Netherlands and UK-Cefas.
The research vessels are BELGICA for Belgium, SOLEA for Germany, TRIDENS for The Netherlands and CEFAS ENDEAVOUR for the UK.

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

Individual tasks to the survey participants (e.g. coverage of certain areas in a certain time frame) are allocated by the WGBEAM. Each participating country is responsible for the activities conducted on its national part of the international survey. Cost sharing: There is no particular cost sharing agreement in place yet for this survey.

Name of the research survey

**Demersal Young Fish Survey (DYFS)**

1. Objectives of the survey

The aim of the survey is to provide abundance indices of sole, plaice, whiting and cod as well as of other demersal young fish and brown shrimp. The indices are part of a time series which started in the early 1970's. The collected data are stored locally in a national data base and will be submitted to the ICES DATRAS. Data are used by ICES WGNSSK, WGBEAM and WGCRAN and are relevant to the trilateral Wadden Sea Monitoring Programme (TMAP). Comparable investigations are conducted by NDL and BEL. The German part of the survey consists of short trips on chartered commercial cutters and the RV Clupea annually in September-October.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

The survey gear is a 3m shrimp beam trawl which is deployed in the coastal area of the German Bight. Fishing vessels (shrimpers) are chartered to cover the gully systems in the Wadden Sea. Additionally the German research vessel Clupea covers the whole coast along the German Bight within the 12nm zone (fixed station grid). Biological sampling (otoliths for plaice) is based on statistical areas along the coast.

3. For internationally coordinated surveys, describe the participating Member States/vessels.

Belgium covers the Belgian coast with one RV. The Netherlands cover the Dutch Wadden Sea with two smaller RVs and the coastal area with RV Isis. Germany covers the German Wadden Sea areas and coastal zone along the German Bight coast with RV Clupea.

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

Individual tasks to the survey participants (e.g. coverage of certain areas in a certain time frame) are allocated by WGBEAM. Each participating country is responsible for the activities conducted on its national part of the international survey. Cost sharing: There is no particular cost sharing agreement in place yet for this survey.

Name of the research survey

**International Ecosystem Survey in the Nordic Seas (ASH)**

1. Objectives of the survey

This survey is conducted by Denmark. For description and quality annex, see Danish WP.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

See above

3. For internationally coordinated surveys, describe the participating Member States/vessels.

See above

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

Germany is participating by financial contribution and supply of scientific staff.

Name of the research survey

**International Herring Larvae Surveys (IHLS)**

1. Objectives of the survey

The main objective of the survey is helping to assess the herring stocks in the North Sea. The results of the herring larvae surveys are used to calculate an overall biomass index of the SSB of North Sea autumn-spawning herring as well as the relative contribution of different stock components on the total herring reproduction. The surveys monitor the annual distribution and abundance of herring larvae at the main spawning locations, the length frequency of herring larvae, as well as ambient water temperature and salinity. All relevant herring larvae data are stored together with basic hydrographic information in the ICES eggs and larvae database. The surveys are conducted annually during autumn (September) and winter (January).

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

Herring larval abundance is surveyed at the major herring spawning grounds in the North Sea, e.g. in the Orkney/Shetland area, the Buchan region, the Central North Sea and the Southern North Sea. Standard gears are high-speed GULF samplers, deployed in a double oblique manner to near the sea bed and back to surface. Stations are located on a 10 by 10 nautical miles grid. This grid includes every square that is known to contain herring larvae less than 10 mm. Herring larvae are sorted from the samples and length-measured. The number of larvae per m2 at each station is used to calculate mean numbers of larvae per $m^2$ for each ICES rectangle (consist of nine IHLS stations in total). These values are raised by the sea surface corresponding to the relevant rectangle and summed over the total area to obtain larvae abundance indices. The manual of the IHLS is available as Annex 7 to the ICES WGIPS Report 2010.

3. For internationally coordinated surveys, describe the participating Member States/vessels.

Germany and The Netherlands participate in the IHLS sampling. With regard to the prevailing weather conditions, they most frequently use larger research vessels, e.g. FRV "Walther Herwig III" and RV "Tridens".

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

Individual tasks to the survey participants (e.g. coverage of certain areas in a certain time frame) are allocated by WGSINS. Each participating country is responsible for the activities conducted on its national part of the international survey. Cost sharing: There is no particular cost sharing agreement in place yet for this survey.

Name of the research survey

**North Sea Herring Acoustic Survey (NHAS)**

1. Objectives of the survey

The survey aims to provide an annual estimate of the distribution, abundance and population structure to inform the assessment of the following herring and sprat stocks: Western Baltic spring-spawning herring (in ICES Divisions 4 and 3a), North Sea autumn-spawning herring (in 4, 3a and 7d), West of Scotland herring (in 6aN), Malin Shelf herring (west of Scotland/Ireland in 6aN-S and 7b,c), North Sea sprat (in 4) and sprat in 3a (Skagerrak/Kattegat). The derived estimates and age structure of herring and sprat are used as tuning indices in the respective assessments and are submitted annually to the ICES Herring Assessment Working Group (HAWG). The survey is conducted annually in June-July.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

Data collected include 1nm NASCs for clupeid fishes (aggregated and disaggregated acoustic data), age and length distribution for all clupeids in the investigation area, maturity at age.
Survey manual:
https://www.ices.dk/sites/pub/Publication Reports/ICES Survey Protocols (SISP)/SISP 9 Manual for International Pelagic Surveys (IPS).pdf

3. For internationally coordinated surveys, describe the participating Member States/vessels.

Participants (countries/vessels) of this internationally coordinated survey include: IRL (RV "Celtic Explorer"), SCO (RV "Scotia"), NOR (RV "Johan Hjort"), DEN (RV "Dana"), NED (RV "Tridens"), GER (FRV "Solea"). The survey is planned, coordinated and evaluated by the ICES Working Group of International Pelagic Surveys (ICES WGIPS).

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

Individual tasks to the survey participants (e.g. coverage of certain areas in a certain time frame) are allocated by WGIPS. Each participating country is responsible for the activities conducted on its national part of the international survey. A survey coordinator is monitoring and planning the individual national contributions. Cost sharing: There is no particular cost sharing agreement in place yet for this survey.

Name of the research survey

**International Deep Pelagic Ecosystem Survey (IDEEPS) / REDTAS**

1. Objectives of the survey

This survey is part of a co-ordinated effort of ICES to undertake an International Deep Pelagic Ecosystem Survey in the Irminger Sea and adjacent waters in June/July, estimating the abundance and biomass of the pelagic beaked redfish (*Sebastes mentella*) stocks and conducting additional observations relevant to integrated ecosystem assessment in the area. The survey is conducted triennially in June-July.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

The international trawl/acoustic survey on pelagic redfish in the Irminger Sea and adjacent waters in June/July is carried out by two vessels from Germany and Russia. In the depth zone that can be surveyed by hydroacoustic measurements, i.e. shallower than the deep-scattering layer (DSL; down to about 350 m), hydroacoustic measurements and identification trawls are carried out. Within and below the DSL (down to about 500 m), redfish abundance is estimated by trawls. At depths below 500 m, redfish abundance is estimated by trawls at three depths layers (headline: 550 m, 700 m and 850 m). Biological samples are collected from the redfish caught in the pelagic trawls and hydrographical measurements are taken on regular stations on the survey tracks. For details, see: http://www.ices.dk/community/groups/Pages/WGIDEEPS.aspx

3. For internationally coordinated surveys, describe the participating Member States/vessels.

The survey takes place every three years and is scheduled to be a joint survey by Germany with the FRV "Walther Herwig III" and by Russia (RV "Vilnyus") and usually Iceland. In November 2020, Iceland informed the responsible survey planning working group that they would not participate in the survey in 2021.

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

Individual tasks to the survey participants (e.g. coverage of certain areas in a certain time frame) are allocated by WGIDEEPS. Each participating country is responsible for the activities conducted on its national part of the international survey.

Name of the research survey

**Greenland Groundfish Survey (GGS)**

1. Objectives of the survey

The objective is to obtain data for the assessment of cod, demersal redfish and other demersal species off Greenland. The survey is conducted annually in October-November.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

Demersal trawling, plankton sampling and CTD casts for physical oceanographic measurements along standard transects are carried out. The survey started in 1982 and was primarily designed for the assessment of cod, but covers the entire groundfish fauna down to 400 m depth. It is carried out annually during the 4th quarter and provides the only fishery-independent information about the abundance & biomass of groundfish off Greenland (ICES Div. 14b and NAFO Div. 1B-1F). Designed as a stratified random survey, the hauls are allocated to 14 strata (7 geographic areas * 2 depth strata, 0-200m, 201-400m) off West and East Greenland. The fishing gear used is a standardised 140-feet bottom trawl. Biological data from the catches (length distributions for all species, individual weights, gonad and liver weights as well as sex and maturity for the commercial species) are collected, population data raised to the total surveyed area and submitted to the ICES North-Western Working Group (NWWG) and NAFO Scientific Council and used in the respective stock assessments. In addition, hydrographic (CTD) and weather data are collected. The survey is carried out every October/November on FRV “Walther Herwig III”.

3. For internationally coordinated surveys, describe the participating Member States/vessels.

The survey is regularly evaluated through ICES NWWG. DEU is the only EU Member State to undertake this survey. The current vessel used for the survey is FRV Walther Herwig III.

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

No task sharing with other countries for the autumn survey. Greenland conducts a parallel spring survey with its own vessel. Data from the two seasons are combined in assessment.

Name of the research survey

**Blue whiting survey (IBWSS)**

1. Objectives of the survey

This survey is conducted by The Netherlands. For description and quality annex, see Dutch WP.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

See above

3. For internationally coordinated surveys, describe the participating Member States/vessels.

See above

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

Germany is participating by financial contribution and supply of scientific staff.

Name of the research survey

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

1. Objectives of the survey

The main objective of this triennial survey is to produce both an index and a direct estimate of the biomass of the North East Atlantic mackerel stock and an egg production index of the southern and western horse mackerel stocks. The survey is conducted triennially in March-April.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

The general method is to quantify the freshly spawned eggs in the water column on the spawning grounds and to determine the fecundity of the females. This is done by sampling sufficient numbers of gonads before during and after the spawning. These are then histologically analysed. In combination, the realised fecundity (potential fecundity minus atresia) of the females and the actual number of freshly spawned eggs in the water render an estimate of the spawning stock biomass. Plankton samples are taken with a modified Gulf high speed sampler ("Nackthai") with a build-in in-situ CTD cast. Adult fish is sampled with a pelagic trawl ("PSN205").
Survey Manual: ICES 2014. Manual for the mackerel and horse mackerel egg surveys (MEGS): sampling at sea. Series of ICES Survey Protocols. SISP 6 - MEGS V1.3. 62 pp.
Manual for the mackerel and horse mackerel egg surveys (MEGS): sampling at sea. Version 1.3 (ices.dk)

3. For internationally coordinated surveys, describe the participating Member States/vessels.

Portugal: RV Noruega, Spain: RV Vizconde de Eza + RV Ramon Margalef, The Netherlands: RV Tridens, Germany: FRV Walther Herwig III, Ireland: RV Celtic Explorer + RV Corystes (2019), Faroe Islands: RV Magnus Hendersson,; UK Scotland: RV "Scotia" plus chartered vessels, Norway: chartered vessel Brennholm (2019), Denmark: RV Dana

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

Individual tasks to the survey participants (e.g. coverage of certain areas in a certain time frame) are allocated by WGMEGS. Each participating country is responsible for the activities conducted on its national part of the international survey. Cost sharing: There is no particular cost sharing agreement in place yet for this survey.

Name of the research survey

***Non-mandatory survey:*** **Eel Larvae Survey (EELS)**

1. Objectives of the survey

A) Regular and standardized monitoring of larval eel (*Anguilla anguilla*) abundance in the Sargasso Sea as a basis for the establishment of a stock-recruitment relationship and stock assessment.
B) Larval abundance and distribution in the Sargasso Sea in relation to glass eel recruitment and hydrographic conditions in order to evaluate the effect of climate change on larval survival, retention and drift.
Data on larval abundance in the spawning area are poor and the existence of a stock-recruitment-relationship is unproven. Until today, European eel stock assessment is largely based on fluctuations in glass eel recruitment along European coasts. However, the age of arriving glass eels is scientifically disputed with estimations reaching between 1 and 3 years. In addition, oceanic factors influencing larval survival until metamorphosis into glass eel stages are still debated as potential drivers for the eel stock decline. The regular monitoring of larval abundance in the Sargasso Sea is aiming to provide information that is required to evaluate whether management measures (e.g. increase of spawner escapement) increase the reproduction success of *A. anguilla*. By comparing larval abundances with glass eel recruitment of the following years, the surveys also provide insights into the effect of oceanic factors on eel stock development. It is investigated how climatic changes affect the survival and distribution of eel larvae and to what extent the drift towards European waters might be impeded by hydrographic conditions.
The survey is conducted triennially in February to April.

2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

The study area ranges from 31° - 22°N and 70° - 50°W. Inside this area, a core sampling area is defined in accordance with larval distribution. Sampling takes place with an Isaac Kidd Midwater Trawl (net opening 6.3 m², mesh size 500 µm) at approximately 50 stations along north-south transects. Species identification and length measurements of all leptocephalus larvae are done on board. Hydrographic conditions are monitored by CTD throughout the sampling area.

3. For internationally coordinated surveys, describe the participating Member States/vessels.

National survey only.

4. Where applicable, provide more details on the type of participation and/or threshold agreement applied.

National survey only.

## Text Box 3.1: Fishing activity variables data collection strategy

| |
|---|
| *General comment: This text box fulfils Article 5 (2)(c), Article 6 (3)(a), (b) and (c) of Regulation (EU) 2017/1004 and Chapter II point 3.1 of the EU MAP Delegated Decision annex. It is intended to describe the method used to derive estimates for representative samples where data are not to be recorded under Control Regulation (EC) No 1224/2009 or where data collected under Regulation (EC) No 1224/2009 are not at the right aggregation level for the intended scientific use. Text Box 3.1 should be filled only if complementary data collection is planned* |
| For vessels without logbook obligation (<8m in the Baltic, <10m elsewhere), an additional survey on effort variables is planned.<br>The questionnaire on effort is combined with the questionnaire on economic variables. Thus, the sampling characteristics will be identical: probability sampling proportional to size. In that case "size" is the value of landings.<br>For time-related effort variables (days at sea etc.), the monthly sales declarations (which are available for the entire fleet without logbooks) will be used as additional information to raise the sample: i.e. the sampling results will be set in relation to the number of monthly declarations, then the average number of days fished per month is estimated, and that ratio will be applied to the entire segment. The information on gear (net size, number of hooks, traps etc.) will be raised using the same ratio. |

## Text Box 3.2: Fishing activity variables data collection strategy (for inland eel commercial fisheries)

| |
|---|
| *General comment: This text box fulfils Article 5(2)(c), Article 6(3)(a), (b) and (c) of Regulation (EU) 2017/1004 and Chapter II point 3.2 of the EU MAP Delegated Decision annex. It is intended to describe the methods and data sources used to estimate fishing capacity, effort and landings data.* |
| Inland fisheries in Germany are regulated under state law, meaning that all fisheries law affairs are within the range of authority of the German federal states. As a result, collection of latest capacity, effort and landings for each jurisdiction are directly derived from respective German federal states. Data sources are based on number of registered fishing licenses and self-reporting of number and type of used gears and effort data in terms of fishing days.<br>Following Council Regulation 1100/2007, federal states in Germany produce an implementation report on a 3-year cycle, in which the states document their efforts and results to fulfil their 40% silver eel escapement goals. The report compiles available data from the federal states including capacity, effort and landings.<br><br>MS will extract data from the implementation report and provide the requested data, described below. |

Commercial eel fishing effort is collected based on fishing days as well as amount and type of used gear. Eel commercial inland fisheries in Germany is generally dominated by the use of different types of fyke nets. However, besides small and large fyke nets, also longlining (in 100 hook – units), number of traps, stow nets, stationary eel traps and electrofishing may be used by commercial eel fisheries in Germany and are reported in number of units and number of days used per year and EMU.

Recreational eel fishing effort is estimated based on number of licensed anglers. Since only a comparably small share of licensed anglers in Germany fish regularly for eels, best estimates for recreational landings are estimated based on regional catch statistics and studies for each EMU.

Landings (fishing mortality) are reported in tonnes per EMU based on self-reporting of commercial fisheries and estimates of recreational landings.

## Text Box 4.2: Incidental catches of sensitive species

*General comment: This text box fulfils Article 5(2)(a) and (b), Article 6(3)(a), (b) and (c) of Regulation (EU) 2017/1004 and Chapter 2 point 4.1 of the EU-MAP Delegated Decision annex. This text box complements Table 2.5.*

General remark:
The Thünen Institutes of Sea Fisheries and Baltic Sea Fisheries routinely record on each at-sea-observer trip the absence or presence of incidental bycatches. If bycatch occurs, details on the bycatch and parameters on the gear such as the number of units, their heights and lengths and the amount of the observed hauling process are recorded (e.g. in case of gillnets). These data are annually submitted for the WGBYC data call and will be included in the future submission of RDBES data when respective tables and parameters are in place. A dedicated sampling program on incidental bycatch is neither planned nor is a specific monitoring program intended in the national WP for 2022-2024.

- Has an assessment of the relative risk of bycatch for the different gear types/metiers taken place and been taken into account for the sampling design?

Yes.

- What are the gear types/metiers that present the highest risk of bycatch per species/taxa of PETS in a given region?

Gillnets in the Baltic Sea

- What methods are used to calculate the observation effort?

Percentage of observed fishing trips vs. total number of fishing trips

- Does the sampling design and protocol follow the recommendations from relevant expert groups? Provide appropriate references. If there are no relevant expert groups, the design and protocol have to be explained in the text.

The sampling covers all bird and marine mammal species (no reptiles occur in our fishing areas). In case of a bycatch detected by an observer, the species is identified to the lowest possible taxon (species level). Birds are usually dead; they are collected and forwarded to the Institute for Terrestrial and Aquatic Wildlife Research of the University of Veterinary Medicine Hannover (ITAW) in Büsum, Germany. Cormorants are not collected. Carcasses are provided to the ITAW or to the Meeresmuseum in Stralsund, Germany.

Additional information on observer protocols (if already filled in in Annex 1.1, indicate where it can be found): https://www.dcf-germany.de/

- Does the on-board observer protocol contain a check for rare specimens in the catch at opening of the cod-end? If YES, is the observer instructed to indicate if the cod-end was NOT checked in a haul?

The observer is advised to check the cod-end.

- In gill nets and hook-and-line fisheries: does the on-board observer protocol instruct the observer to indicate how much of the hauling process has been observed for (large) incidental bycatches that slip out of the net?

For the Baltic: yes. Gill nets are only used by very few vessels in the North Sea and north-western waters. Due to the negligible effort, these vessels are not included in the observer program.

- In large catches: does the protocol instruct the observer to check for rare specimens during sorting of the catch (i.e. at the conveyor belt)? Is the observer instructed to indicate what percentage of the sorting or hauling process has been checked at "haul level"?

In general, the observer is advised to give an indication to which amount he/she was able to check the fishing activities for accidental by-catch.

## Text Box 4.3: Fisheries impact on marine habitats

*General comment: This text box fulfils Article 5 paragraph 2(a) and 2(b), Article 6 paragraph 3(a), 3(b) and 3(c) of Regulation (EU) 2017/1004 and Chapter 2, section 4.2 of the EU MAP Delegated Decision annex. It contains information on additional studies on the fisheries impact on marine habitats.*

1. Aim of the study
Improved identification of sensitive epibenthic organisms and habitat observations for monitoring the impact of fisheries on vulnerable marine ecosystem (VME) on the East Greenland shelf.

2. Duration of the study
January 2022 - December 2024

3. Methodology and expected outcomes of the study
On the mandatory annual Greenland Groundfish Survey (GGS), sensitive epibenthic organisms have been observed in the bottom trawl hauls occasionally, but taxonomic expertise was lacking and systematic recording of species (or higher-order taxa) has not taken place so far. Based on the ICES VME data call, opportunities for determination, recording and observations of VME organisms have been considered. Given available expertise and equipment, VME organisms caught in the GGS hauls will be determined to the lowest taxonomic level possible and direct observations of the seafloor by cameras will be attempted.
In a second step, it is attempted to compare the taxonomic composition and habitat structure of East Greenland shelf VMEs in areas with high and low fishing pressure, based on direct observations of the seafloor.

## Text Box 5.2: Economic and social variables for fisheries data collection

*General comment: This text box fulfils Article 5(2)(d), Article 6(3)(a), (b) and (c) of Regulation (EU) 2017/1004, and Chapter II point 5 of the EU MAP Delegated Decision annex. It is intended to specify the data to be collected under Tables 7, 8 and 9 of the EU MAP Delegated Decision annex.*

1. Description of clustering

In the German fleet, clustering is performed for confidentiality reasons only.
The introduction of an 8m threshold for segments in the Baltic implies some mismatch with the length classes to be applied for the North Sea. In fact, there are two vessels with PG gear in the North Sea which would fall under the 0-10m length class. These are clustered with the PG0-8m segment. For the same reason, the PG10-12m segment (at current state no vessels identified, though, in 2021) is clustered with the PG08-12m segment. All clustered PG segments are very similar.
The segments TBB0010 (3 vessels) and TBB1012 (4 vessels) are clustered as the vessels are very similar. The same applies to the segments TBB2440 (6 vessels) and TBB40XX (2 vessels). The original cluster DFN2440* (2 vessels, together with one FPO2440 vessel) has to be clustered with DFN1218 (4 vessels) for confidentiality reasons. Even though these vessels are not necessarily similar, there is no other reasonable option of clustering as there are no other segments which would have more similarities.
As in preceding years, all pelagic trawlers are clustered in one segment, regardless of the length class. At the current state there is only one vessel below 40m and five vessels above 40m. These five vessels belong to the same company.
The clustered segment "DTS10-12*" has been kept for the reason of time series consistency. Since the introduction of the new length class 8-12m" for the Baltic, the length class "10-12m" would apply only to vessels in the North Sea.

2. Description of activity indicator
For the fleet segments <12m using passive gear (PG0008, PG0812), a threshold of €10.000 of annual value of landings is applied to distinguish between low activity and normal activity vessels. The threshold has been selected as pragmatic compromise, taking into account tax offset and poverty line in Germany. It is assumed that fishing activities do not contribute to a sensible extent to the household income if the annual earnings are below €10.000. This threshold is below the minimum wage (~€17.000), which was regarded the preferred parameter at the 2017 WS on thresholds (The Hague), but with that parameter most vessels in the segment would have been regarded low active.

3. Deviation from the RCG ECON (ex. PGECON) definitions
Concerning methodology, Germany will, like for unpaid labour, derive figures for "paid labour" from other surveyed variables, i.e. crew size information from the fleet register, effort and earnings, in combination with totals from the Employer's Liability Insurance Association.
German employment data (both paid and unpaid labour) follow the approach of minimum requirements of activity, i.e., a person that goes fishing for twenty days or less during the year is not accounted for one employed person. Fulltime equivalents are estimated with reference to the days-at-sea and the crew size. The total number of jobs is then derived by the ratio of total number vs. FTE as observed in panel data. Due to this approach the data correspond to official employment statistics. If one day at sea would qualify for counting a "person employed" figures would exceed official statistics by about 30-50%.

## Text Box 6.1: Economic and social variables for aquaculture data collection

*General comment: This text box fulfils Article 5(2)(e), Article 6(3)(a), (b) and (c) of Regulation (EU) 2017/1004, and Chapter II point 6 of the EU MAP Delegated Decision annex. It is intended to specify data to be collected under Tables 10 and 11 of the EU MAP Delegated Decision annex.*

1. Description of the threshold application

2,499 German aquaculture farms produced more than 38,074 tons of fish, crustaceans, molluscs and other aquatic organisms in 2019 (Destatis, 2020). The main species produced are rainbow trout, common carp and blue mussels. According to the last estimated EUROSTAT aquaculture production data, the German production represents a share of 3.4 % of the total EU-28 production. Taking into account the defined thresholds of the EU MAP (Implementing Decision 2021/1168 Annex chapter II.7), social and economic data on aquaculture will be collected.

2. Deviation from the RCG ECON (ex. PGECON) definitions

No deviations.

## Text Box 7.1: Economic and social variables for fish processing data collection

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|---|
| *General comment: This text box fulfils Article 5(2)(f), Article 6(3)(a), (b) and (c) of Regulation (EU) 2017/1004, and Chapter II point 7 of the EU MAP Delegated Decision annex. The Member State should provide justifications for complementary data collection for fish processing.* |
| The Federal Statistical Office in Germany (Destatis) holds a database with data on enterprises and employees. In addition to this, Destatis conducts a probability sample survey on several cost items with a threshold of companies with 20 and more employees. Furthermore, the Federal Employment Agency registers all persons employed belonging to the social security scheme in Germany together with certain additional characteristics.<br><br>For the variables that are not included in any of the above-mentioned available national statistics and cannot be obtained by any other administrative bodies (as it is the case for *Financial income, Gross debt*, *Subsidies on investments, Total value of assets, Weight of raw material by country of origin, Weight of raw material by production environment, Weight of raw material by species* and *Weight of raw material by type of processed material*) or where data on employment figures are not sufficiently covered by the Employment Agency (as it is the case for *Employment by level of education* and *Employment by age*), the Thünen Institute of Sea Fisheries conducts an additional standardized survey. |

ANNEX 1.1 - QUALITY REPORT FOR BIOLOGICAL DATA SAMPLING SCHEME

*The quality report fulfils Article 6(3)(d) of Regulation (EU) 2017/1004. This document is intended to specify data to be collected under Chapter II, point 2 of the EU MAP Delegated Decision annex: 'Biological data on exploited biological resources caught by Union commercial and recreational fisheries'. Use this annex to state whether documentation in the data collection process (design, sampling implementation, data capture, data storage, sample storage and data processing) exists and identify where this documentation can be found. Names of sampling schemes and strata shall be identical to those in Tables 2.2, 2.3, 2.4, 2.5, 2.6 and 4.1 of the WP/AR. For quality information on scientific surveys, use the survey acronym as a sampling scheme identifier. For mandatory surveys, refer to Table 1 of the EU MAP Implementing Decision annex, see also MasterCodeList 'Mandatory survey at sea'.*

| |
|---|
| **MS : DEU** |
| **Region: Baltic Sea / North Sea and Eastern Arctic / North East Atlantic** |
| **Sampling scheme identifier: = Eel_ComFish** |
| **Sampling scheme type: NA** |
| **Observation type: NA** |
| **Time period of validity:** 2022-2024 |
| The sampling of commercial eel fisheries is carried out in all German Eel Management Units (EMUs), with sampling design and implementation as well as data capture, storage and processing being largely identical. Therefore, a single sampling scheme is reported referring to biological data from all relevant EMUs (namely DE_Ems, De_Eider, DE_Elbe, DE_Wese, DE_Rhe and DE_Schl). DE_Maas has no commercial fishery, for DE_Warnow data is reported from a scientific monitoring and DE_Oder is reported as entire EMU Oder by Poland, based on a bilateral agreement. |
| **Description of the population** |
| **Population targeted:**<br>Biological data from silver eels from commercial eel fisheries from every German EMU.<br><br>**Population sampled:**<br>Biological data from silver eels from commercial eel fisheries from every German EMU. Recruitment and yellow eels are not directly sampled. Information on arriving recruits are obtained by regional (non-DCF) glass eel monitoring/ICES time series and yellow eel standing stock is calculated via German Eel Model III.<br><br>**Stratification:**<br>Eel Management Units (EMUs) as defined by the German Eel Management Plans. Sampling takes place during silver eel migration in autumn. |
| **Sampling design and protocols** |
| **Sampling design description:**<br>Silver eel fishery in each German EMU (as defined in the German Eel Management Plans) is sampled during silver eel migration in autumn. Entire silver eel catches or subsamples are sampled twice during the WP-period.<br><br>**Is the sampling design compliant with the 4S principle?:**<br>NA<br><br>**Regional coordination:** |

No

**Link to sampling design documentation:**
Sampling design is described in the "Data Quality document for eel sampling & analysis within the German DCF programme" and available from the German DCF website (https://www.dcf-germany.de/fileadmin/sites/default/downloads/DataQuality_DCF_eel_Germany.pdf)

**Compliance with international recommendations:**
Starting in 2018 until today, given that there was no longer a distinct end-user need for age data, eels were no longer killed but biological data were collected on-site and eels were retained by fishers, thus drastically reducing the number of sacrificed fishes. Since sufficient spatial coverage to derive meaningful information from silver eel catches is hardly achievable, sampling was focused on silver eels in downstream locations, since this life stage is considered to provide the best possible profile of the overall population in an EMU. However, the availability of catches is still is a limiting factor, and due to the potentially insufficient temporal coverage, samples often reflect periods of peak migration. The primary objective of the current data collection is to provide biometric time series and further provide data towards the application and validation of the currently used stock assessment model. In some cases, non-representative data are collected, e.g. because a specific size class is required for a growth function, which is indicated in the data. Also, often additional data relevant to the stock assessment, e.g. on eel spawner quality (fat content, contamination) is collected, which is stored alongside the base data.

**Link to sampling protocol documentation:**
The sampling protocol follows the EU-MAP requirements and contains the following information:
Individual ID, Location, Catch date, Catch gear, Time (UTC), Total length (cm), Weight (g), Eye diameter (mm), Pectoral fin length (mm), Sex. In cases spawner quality is assessed, analysis on age, fat content, *Anguillicola crassus* infestation and contaminant load may be performed and documented in the sampling protocol.

**Compliance with international recommendations:**
The sampling protocol follows the EU-MAP requirements and contains the following information:
Individual ID, Location, Catch date, Catch gear, Time (UTC), Total length (cm), Weight (g), Eye diameter (mm), Pectoral fin length (mm), Sex. In cases spawner quality is assessed, analysis on age, fat content, *Anguillicola crassus* infestation and contaminant load may be performed and documented in the sampling protocol.

**Sampling implementation**

**Recording of refusal rate:**
Y. Fishers are contacted via phone calls. Refusal rate is documented and available on request.

**Monitoring of sampling progress within the sampling year:**
If silver eel fisheries cannot be sampled in certain EMUs due to refusal or low/no catches, additional fishers in the respective EMU are contacted in order to fulfil sampling requirements.

**Data capture**

**Means of data capture:**
Scale, measuring board, Photos, ImageJ-Software.

**Data capture documentation:**
Data capture is described in the "Data Quality document for eel sampling & analysis within the German DCF programme" and available from the German DCF website (https://www.dcf-germany.de/fileadmin/sites/default/downloads/DataQuality_DCF_eel_Germany.pdf)

**Quality checks documentation:**

Quality checks are described in the "Data Quality document for eel sampling & analysis within the German DCF programme" and available from the German DCF website (https://www.dcf-germany.de/fileadmin/sites/default/downloads/DataQuality_DCF_eel_Germany.pdf).

**Data storage**

**National database:**
NA

**International database:**
NA

**Quality checks and data validation documentation:**
Data storage is described in the "Data Quality document for eel sampling & analysis within the German DCF programme" and available from the German DCF website (https://www.dcf-germany.de/fileadmin/sites/default/downloads/DataQuality_DCF_eel_Germany.pdf)

**Sample storage**

In case tissues or whole individuals are sampled, they are stored at the Thünen-Institute of Fisheries Ecology until the analysis is completed. Otoliths are stored on long-term, to allow for further analyses, if required.

Sample analysis:
Age reading is conducted according to the guidelines provided by ICES WKAREA2 (ICES 2011, Report of the Workshop on Age Reading of European and American Eel (WKAREA2), 22-24 March 2011, Bordeaux, France. ICES CM 2011/ACOM:43. 35 pp.+ Annex 5: Manual for the Ageing of Atlantic eel: Otolith preparation methodologies, age interpretation and image storage, produced by the participants of the ICES Workshop on Age Reading for European and American Eel)

**Data processing**

**Evaluation of data accuracy (bias and precision):**
Data are captured in a written protocol and double-checked when digitalized in an Excel table. Checks are performed by data visualization, e.g. length-mass relationship or length-age relationship and testing whether single datapoints are within a reasonable range (e.g. size of males <50cm). In case of discrepancies, data are reviewed and discarded if they cannot be evaluated. Additional quality checks are applied for age reading, which is conducted according to the guidelines provided by WKAREA2. Otoliths are prepared using the cut-and-burn method and blind age readings (i.e. without knowledge of other biological data) are performed by two independent readers to ensure precision of readings. In case of discrepancies, age readings are being reviewed. The accuracy of age readings cannot be confirmed without dedicated studies, but readers were trained and did comparative readings during WKAREA2

**Editing and imputation methods:**
Data processing is described in the "Data Quality document for eel sampling & analysis within the German DCF programme" and available from the German DCF website (https://www.dcf-germany.de/fileadmin/sites/default/downloads/DataQuality_DCF_eel_Germany.pdf)

**Quality document associated to a dataset:**
No

| |
|---|
| **Validation of the final dataset:**<br>See above (Evaluation of data accuracy) |

| |
|---|
| **MS : DEU** |
| **Region: Baltic Sea / North Sea and Eastern Arctic** |
| **Sampling scheme identifier: = Salm_Data** |
| **Sampling scheme type: NA** |
| **Observation type: NA** |
| **Time period of validity:** 2022-2024 |
| Salmon (*Salmo salar*) stocks in Germany are extirpated and in those rivers (exclusively North Sea rivers) with re-introduction programs (Rhine, Elbe, Ems and Weser) abundance of salmon is very low. German stocks of *Salmo salar* do currently not contribute to (nor are not further considered in) in stock assessment by WGNAS or WGBAST. For the given reasons, active data collection within the German DCF data collection is considered not feasible. For *Salmo trutta,* currently no active international stock assessment for *Salmo trutta* stocks from North Sea rivers exists. As a result, no clear end-user need for Salmo data from North Sea – draining rivers in Germany is given. In Baltic river systems, some monitoring programmes of *Salmo trutta* are currently conducted by regional authorities.<br><br>However, available data and information on ascending individuals derived from re-introduction programs and electro fishing campaigns from North and Baltic Sea rivers from regional authorities will be requested and collected on an annual base in line with a data survey and provided to relevant end-users (e.g. WGNAS, WGBAST). |
| **Description of the population** |
| **Population targeted:**<br>Available data (e.g. stocking numbers, numbers of returnees, smolt / parr abundance) of populations of *Salmo salar* and *Salmo trutta* in rivers of relevance (according to end-user needs).<br><br>**Population sampled:**<br>Populations of *Salmo salar* and *Salmo trutta* in rivers of relevance (according to end-user needs).<br><br>**Stratification:**<br>Data survey will reveal which data are available in which form. Available data will then be compiled, assessed and provided according to end-user needs. |
| **Sampling design and protocols** |
| **Sampling design description:**<br>Inland fisheries management in Germany is regulated by state law and handled by the sixteen German federal states. During the data survey, responsible federal states for the respective bodies of water of interest, following end-user needs, will be contacted to clarify which kind of data and monitoring of the respective species (*Salmo trutta* and *Salmo salar*) is available and in which form.<br>Available data will then be compiled and reported to fulfil end-user needs following the EU-MAP. Also, the data survey will be conducted to reveal whether data from electrofishing surveys conducted in line with WFD can be used to fulfil end-user needs.<br><br>**Is the sampling design compliant with the 4S principle?:** |

NA

**Regional coordination:**
No

**Link to sampling design documentation:**
NA

**Compliance with international recommendations:**
N

**Link to sampling protocol documentation:**
NA

**Compliance with international recommendations:**
N

**Sampling implementation**

**Recording of refusal rate:**
Y

**Monitoring of sampling progress within the sampling year:**
Data will be inquired and requested by local authorities and then compiled and assessed.

**Data capture**

**Means of data capture:**
Computers, Excel lists, telephone

**Data capture documentation:**
NA

**Quality checks documentation:**
NA

**Data storage**

**National database:**
NA

**International database:**
NA

**Quality checks and data validation documentation:**
NA

**Sample storage**

Storage description
NA

| Data processing |
| --- |
| **Evaluation of data accuracy (bias and precision):**<br>N (Assessment will take place adfter data suervey)<br><br>**Editing and imputation methods:**<br>NA<br><br>**Quality document associated to a dataset:**<br>No<br><br>**Validation of the final dataset:**<br>NA |

| MS : DEU |
| --- |
| **Region: Baltic Sea** |
| **Sampling scheme identifier: Trout_data** |
| **Sampling scheme type: Diadromous (scientific)** |
| **Observation type: SciObs water body** |
| **Time period of validity:** 2022-2024 |
| Short description (max 100 words): The Trout_data provides data on densities of trout parr in Baltic nursery streams collected by electrofishing following the Trout Habitat Parr Index method (THS) as recommended by the corresponding assessment group ICES WGBAST. Parr densities (number of 0+ (3-15 cm TL) / 100m²) are monitored by means of one-pass electrofishing of sites in relevant Baltic tributaries. The data are collected by the federal state authorities and will be queried, compiled and transmitted annually to the relevant end users by the Thünen Institute. |
| **Description of the population** |
| **Population targeted:** Primary sampling units (PSUs) are the individual Baltic tributaries used by sea trout for spawning, the secondary sampling unit is the electro fishing site and the tertiary sampling unit the fish (parr).<br><br>**Population sampled:** Baltic Sea tributaries with occurrence of sea trout<br><br>**Stratification:** Stratification by federal state and river |
| **Sampling design and protocols** |
| **Sampling design description:**<br>Monitoring of Baltic sea trout parr densities lies de jure in the responsibility of the individual federal states in Germany (Schleswig-Holstein and Mecklenburg-Western Pomerania). Therefore, the data are collected by the federal state authorities. Available data on parr abundances from the federal authorities will be queried, compiled and transmitted annually to the relevant end users. Densities of trout parr in German Baltic nursery streams are evaluated by electrofishing following the Trout Habitat Parr Index method (THS; Pedersen et al., 2017) as recommended by the corresponding assessment group ICES WGBAST. Parr densities (number of 0+ (3-15 cm TL) / 100m²) are monitored by means of one-pass electrofishing of sites in relevant Baltic tributaries. Electrofishing campaigns are usually scheduled in summer/autumn.<br><br>Reference: |

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|---|
| Pedersen, S., Degerman, E., Debowski, P., Petereit, C. 2017. Assessment and recruitment status of Baltic Sea Trout populations. In Harris, G. (Ed): Sea Trout Science and Management. Proceedings of the 2nd International Sea Trout Symposium. Trobadour Publishing p. 423-441.<br><br>**Is the sampling design compliant with the 4S principle?:** Y<br><br>**Regional coordination:** N<br><br>**Link to sampling design documentation:** ICES. 2020. Baltic Salmon and Trout Assessment Working Group (WGBAST). ICES Scientific Reports. 2:22. 261 pp. http://doi.org/10.17895/ices.pub.5974<br><br>Pedersen, S., Degerman, E., Debowski, P., Petereit, C. 2017. Assessment and recruitment status of Baltic Sea Trout populations. In Harris, G. (Ed): Sea Trout Science and Management. Proceedings of the 2nd International Sea Trout Symposium. Trobadour Publishing p. 423-441.<br><br>**Compliance with international recommendations:** Y, the sampling design complies with ICES standards (e.g. ICES WGBAST and SGBALANST, ICES WGTRUTTA)<br><br>**Link to sampling protocol documentation:** NA – Sampling is conducted by the federal state authorities.<br><br>**Compliance with international recommendations:** NA |
| **Sampling implementation** |
| **Recording of refusal rate:** NA<br><br>**Monitoring of sampling progress within the sampling year:** NA |
| **Data capture** |
| **Means of data capture:** Data collected during electrofishing are transferred to Excel spreadsheet templates. Available data on parr abundances from the federal authorities are queried, compiled and transmitted annually to the relevant end users.<br><br>**Data capture documentation:** NA – Sampling is conducted by the federal state authorities.<br><br>**Quality checks documentation:** Y, data quality is permanently checked internally at different levels of the processing chain (e.g. daily/monthly completeness and validity checks of the Excel spreadsheets during the data input / completeness, consistency and validity checks before data transfer to end users. |

| |
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| **Data storage** |
| **National database:** Data are stored at internal servers of the federal state authorities and the Thünen Institute of Baltic Sea Fisheries<br><br>**International database:** NA<br><br>**Quality checks and data validation documentation:** NA |
| **Sample storage** |
| NA – only parr abundance data collected |
| **Data processing** |

**Evaluation of data accuracy (bias and precision):** Y, data quality is regularly checked internally.

**Editing and imputation methods:** No editing and imputation occurs.

**Quality document associated to a dataset:** NA

**Validation of the final dataset:** The data sets are checked by the federal state authorities and the scientists working at the Thünen Institute who transfer the data to relevant end users.

| |
|---|
| **MS : DEU** |
| **Region: Baltic Sea** |
| **Sampling scheme identifier: Trout_camera** |
| **Sampling scheme type: Diadromous (scientific)** |
| **Observation type: EMA water body** |
| **Time period of validity:** 2022-2024 |
| Short description (max 100 words): The Trout_camera sampling provides data on the number of ascending adult sea trout in Baltic nursery streams collected by electronic monitoring via remote underwater cameras. The data are collected by the federal state authorities and will be queried, compiled and transmitted annually to the relevant end users by the Thünen Institute. |
| **Description of the population** |
| **Population targeted:** Primary sampling units (PSUs) are the individual Baltic tributaries used by sea trout for spawning, the secondary sampling unit is the ascending fish (spawner).<br><br>**Population sampled:** Reference set of Baltic Sea tributaries with occurrence of sea trout<br><br>**Stratification:** Stratification by federal state and river |
| **Sampling design and protocols** |
| **Sampling design description:**<br>Monitoring of ascending adult Baltic sea trout lies de jure in the responsibility of the individual federal states in Germany (Schleswig-Holstein and Mecklenburg-Western Pomerania). Therefore, the data are collected by the federal state authorities. Available data on ascending adults/river from the federal authorities will be queried, compiled and transmitted annually to the relevant end users. Currently video camera systems have been installed in 8 reference rivers with relevant sea trout populations draining in the Baltic Sea. The video cameras automatically document ascending sea trout in the individual rivers. A special AI-based software was developed for the automatic evaluation of the recorded video sequences. The software has been trained annually since 2017 using the video data of each season. The accuracy of detections is currently 98%.<br><br>**Is the sampling design compliant with the 4S principle?:** NA – fish are only counted.<br><br>**Regional coordination:** N |

**Link to sampling design documentation:** Hantke, H., Lorenz, T., Krüger, O.W., Blume, W., Gentzen, B. (2013): Entwicklung einer Methode zur Bestandsschätzung der Meerforelle (Salmo trutta trutta L.) auf Grundlage videooptischer Zählungen in ausgewählten Fließgewässern unter Einbeziehung von Gewässerstrukturdaten. Jahresbericht Verein Fisch und Umwelt Mecklenburg-Vorpommern e.V., (in German) http://www.fium.de/fileadmin/Medienpool/PDFs/Jahresheft_2011_2012.pdf

**Compliance with international recommendations:** NA – There are no international recommendations regarding the monitoring of ascending sea trout

**Link to sampling protocol documentation:** NA – Sampling is conducted by the federal state authorities.

**Compliance with international recommendations:** NA

**Sampling implementation**

**Recording of refusal rate:** NA

**Monitoring of sampling progress within the sampling year:** NA

**Data capture**

**Means of data capture:** Video sequences are stored on local servers at the federal state authorities. A AI-based software evaluates the video sequences and transfers the count data to Excel spreadsheet templates. Available data on ascending adult sea trout per river from the federal authorities are queried, compiled and transmitted annually to the relevant end users by the Thünen Institute.

**Data capture documentation:** NA – Sampling is conducted by the federal state authorities.

**Quality checks documentation:** Y, data quality is permanently checked internally at different levels of the processing chain (e.g. daily/monthly completeness and validity checks of the Excel spreadsheets during the data input / completeness, consistency and validity checks before data transfer to end users.

**Data storage**

**National database:** Data are stored at internal servers of the federal state authorities and the Thünen Institute of Baltic Sea Fisheries

**International database:** NA

**Quality checks and data validation documentation:** NA

**Sample storage**

NA – only numbers of ascending adults are collected

**Data processing**

**Evaluation of data accuracy (bias and precision):** Y, data quality is regularly checked internally.

**Editing and imputation methods:** No editing and imputation occurs.

**Quality document associated to a dataset:** NA

**Validation of the final dataset:** The data sets are checked by the federal state authorities and the scientists working at the Thünen Institute who transfer the data to relevant end users.

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| **MS : DEU** |
| **Region: Baltic Sea** |
| **Sampling scheme identifier: Multispecies off-site survey** |
| **Sampling scheme type: recreational (off site survey)** |
| **Observation type: SelfOnShore** |
| **Time period of validity:** 2022-2024 |
| Short description (max 100 words):<br>The multispecies off-site survey is a nation-wide representative computer-assisted telephone interview (CATI) screening survey targeting 150,000 German households and has been carried out from October 2020 to April 2021 followed by a one-year diary survey. The off-site CATI survey was designed to identify anglers in the German population, to collect their socio-demographic parameters and information on angler heterogeneity, and to estimate fishing effort as well as to recruit participants for a subsequent diary survey. No biological data is collected in this survey. These nation-wide surveys are conducted every 5 years. |
| **Description of the population** |
| **Population targeted:** Primary sampling units (PSUs) are German households the secondary sampling unit is the individual.<br><br>**Population sampled:** German population<br><br>**Stratification:**<br>The Population is stratified by municipality. |
| **Sampling design and protocols** |
| **Sampling design description:**<br>The CATI survey used a dual frame approach with 70% landline numbers and 30% mobile numbers. A mixture of random-digit dialling and number sampling from an official number registry (landline only) was used to derive telephone numbers and contact households, with selection probabilities being proportional to the number of households per municipality. However, a disproportional sampling approach was chosen to increase the number of marine anglers in the diary survey. Therefore, the probability of sampling telephone numbers originating from federal states that are more close to the German coasts was doubled. A total of 1,541,182 numbers were used to realize 150,232 interviews. Of these numbers, 683,135 (~44%) were mobile numbers and 858,047 (~56%) were land-line numbers. Up to ten attempts were made to contact a household. Thereafter, a telephone number was considered a quality-neutral failure. Household size and number of persons in a household being recreational anglers were determined. An angler was defined as a person who had fished at least once in Germany during the last 12 months preceding the survey. Survey participants had to be older than 14 due to the German Youth Protection Act. All persons that had been fishing in Germany in the last 12 months, or who planned to go fishing there in the next 12 months were asked to participate in a one-year diary survey. This resulted in a total of 1,891 diarists. All diary participants are asked to report every single angling day in Germany over an observation period of 12 months starting from the day they received the diary. For every angling day, the date, time, fishing location, angling platform (boat, charter boat, shore), target species, and the number of fish caught, harvested and released per species has to be reported. In order to maintain the motivation to participate, to retrieve diary data, and to reduce panel attrition bias, the participants are contacted by telephone at quarterly intervals during the entire observation period. The diary data will be collected between October 2020 and April 2022. In order to obtain representative estimates of the size of the German angler population, the corresponding fishing effort and catches, harvests and releases for all species both the data of the CATI and the diary survey will be weighted and extrapolated in various ways following the data collection.<br><br>**Is the sampling design compliant with the 4S principle?:** Y<br><br>**Regional coordination:** N |

**Link to sampling design documentation:** ICES. 2019. Benchmark Workshop on Baltic Cod Stocks (WKBALTCOD2). ICES Scientific Reports. 1:9. 310 pp. http://doi.org/10.17895/ices.pub.4984

Lewin, W.-C., Weltersbach, M. S., Haase, K., Riepe, C., Skov, C., Gundelund, C., & Strehlow, H. V. (2021). Comparing on-site and off-site survey data to investigate survey biases in recreational fisheries data. ICES Journal of Marine Science. http://doi:10.1093/icesjms/fsab131

Weltersbach, M. S., Riepe, C., Lewin, W.-C., & Strehlow, H. V. (2021). Ökologische, soziale und ökonomische Dimensionen des Meeresangelns in Deutschland. Braunschweig: Johann Heinrich von Thünen-Institut, 254 p, Thünen Rep 83, http://doi:10.3220/REP1611578297000

**Compliance with international recommendations:** Y, the sampling design complies with ICES standards (e.g. WGRFS)

**Link to sampling protocol documentation:** NA

**Compliance with international recommendations:** NA

**Sampling implementation**

**Recording of refusal rate:** Y

**Monitoring of sampling progress within the sampling year:** Sampling is continuously planned and continuously monitored

**Data capture**

**Means of data capture:** Data is collected by contracted market research company within their VOXCO system. Final data tables are transmitted as Excel spreadsheets and imported to the Thünen institutes recreational fisheries database.

**Data capture documentation:** protocols are stored on an internal server of the Thünen institute.

**Quality checks documentation:** Y, data quality is checked externally at market research company for consistency and validity. Data quality is checked internally at different levels of the processing chain (e.g. completeness, consistency and validity checks of the Excel spreadsheets during data import to database / range and cross checks of the final database entry.

**Data storage**

**National database:** Thünen Baltic Sea Fisheries php myAdmin SQL and PostgreSQL data base.

**International database:** Y – catch data submitted to assessment working group

**Quality checks and data validation documentation:** NA – only catch data is submitted to other databases

**Sample storage**

NA

**Data processing**

**Evaluation of data accuracy (bias and precision):** Y, data quality is regularly checked internally.

**Editing and imputation methods:** Y, data quality is permanently checked internally at different levels of the processing chain (e.g. completeness, consistency and validity checks of the Excel spreadsheets during data import to database / range and cross checks of the final database entry.

**Quality document associated to a dataset:**
Y, the data quality is checked internally a similar approach has been documented in:

Lewin, W.-C., Weltersbach, M. S., Haase, K., Riepe, C., Skov, C., Gundelund, C., & Strehlow, H. V. (2021). Comparing on-site and off-site survey data to investigate survey biases in recreational fisheries data. ICES Journal of Marine Science. http://doi:10.1093/icesjms/fsab131

Weltersbach, M. S., Riepe, C., Lewin, W.-C., & Strehlow, H. V. (2021). Ökologische, soziale und ökonomische Dimensionen des Meeresangelns in Deutschland. Braunschweig: Johann Heinrich von Thünen-Institut, 254 p, Thünen Rep 83, http://doi:10.3220/REP1611578297000

**Validation of the final dataset:** Before using the data to compile German recreational catch data, the data sets are checked by the IT department and the scientists working with the data at the Thünen Institute.

**MS : DEU**

**Region: Baltic Sea**

**Sampling scheme identifier: Multispecies on-site survey**

**Sampling scheme type: recreational (on site survey)**

**Observation type: SciObsOnShore**

**Time period of validity:** 2022-2024

Short description (max 100 words):
The multispecies on-site survey includes random intercepts of marine anglers (shore, boat and charter boat anglers) at access point s(harbours, beaches) along the German Baltic Sea coast. It aims to collect catch rates and fishing characteristics of marine anglers for both sea-based and land-based catches for both the harvest and release component. The sampling frame covers all access point (79) along the entire German coast in SD22 & SD24. Data is used for extrapolation of German recreational catch data using effort data from the multispecies off-site survey.

**Description of the population**

**Population targeted:** Primary sampling units (PSUs) are access points and days the secondary sampling unit is the fishing trip.

**Population sampled:** Baltic marine anglers

**Stratification:**
The Population is stratified by area.

**Sampling design and protocols**

**Sampling design description:**
The coastline is divided into five strata, with harbours and beaches as access points and days as primary sampling units. Access points and days (27 days per month) are randomly selected within the strata. The interviews are conducted by six survey agents during peak activity times in the afternoon/evening when most anglers are expected to end their fishing day. The sampling effort is increased for sea-based fishing methods and for those days when anglers most frequently go fishing (weekends and public holidays). Observation time per access point

is usually 3-5 hours. The fishing methods are grouped into shore fishing (surf angling and wading), boat fishing (including float tubes and kayaks), and charter vessel fishing. The following data are collected during the interviews: the number of caught and released fish per species, the sociodemographic factors gender, age, place of residence (postal code), avidity (measured as the reported number of fishing days in the German Baltic Sea in the past 12 months), weather conditions and the coastal state and specific location at which the interview took place.

**Is the sampling design compliant with the 4S principle?:** Y

**Regional coordination:** N

**Link to sampling design documentation:** ICES. 2019. Benchmark Workshop on Baltic Cod Stocks (WKBALTCOD2). ICES Scientific Reports. 1:9. 310 pp. http://doi.org/10.17895/ices.pub.4984

Lewin, W.-C., Weltersbach, M. S., Haase, K., Riepe, C., Skov, C., Gundelund, C., & Strehlow, H. V. (2021). Comparing on-site and off-site survey data to investigate survey biases in recreational fisheries data. ICES Journal of Marine Science. http://doi:10.1093/icesjms/fsab131

**Compliance with international recommendations:** Y, the sampling design complies with ICES standards (e.g. WGRFS)

**Link to sampling protocol documentation:** NA

**Compliance with international recommendations:** NA

**Sampling implementation**

**Recording of refusal rate:** Y

**Monitoring of sampling progress within the sampling year:** Sampling is continuously planned and continuously monitored for the year

**Data capture**

**Means of data capture:** Observers are equipped with sampling protocols for documentation. Field notes are transferred to Excel spreadsheet templates provided. Excel spreadsheets are imported annually to the Thünen institutes recreational fisheries database.

**Data capture documentation:** protocols are stored on an internal server of the Thünen institute.

**Quality checks documentation:** Y, data quality is permanently checked internally at different levels of the processing chain (e.g. daily/monthly completeness and validity checks of the Excel spreadsheets during the data input / completeness, consistency and validity checks during data import to database / range and cross checks of the final database entry.

**Data storage**

**National database:** Thünen Baltic Sea Fisheries php myAdmin SQL and PostgreSQL data base.

**International database:** Y – catch data submitted to assessment working group

**Quality checks and data validation documentation:** NA – only catch data is submitted to other databases

**Sample storage**

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| NA |
| **Data processing** |
| **Evaluation of data accuracy (bias and precision):** Y, data quality is regularly checked internally.<br><br>**Editing and imputation methods:** Y, data quality is permanently checked internally at different levels of the processing chain (e.g. daily/monthly completeness and validity checks of the Excel spreadsheets during the data input / completeness, consistency and validity checks during data import to database / range and cross checks of the final database entry.<br><br>**Quality document associated to a dataset:** *Has a publication digital object identifier (DOI) been created? Is there a document summarising the estimation process that has been followed?*<br>N, the data quality is regularly checked internally but not documented.<br><br>**Validation of the final dataset:** Before using the data to compile German recreational catch data, the data sets are checked by the IT department and the scientists working with the data at the Thünen Institute. |

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| **MS : DEU** |
| **Region: Baltic Sea** |
| **Sampling scheme identifier: Multispecies length sampling** |
| **Sampling scheme type: recreational (on site survey)** |
| **Observation type: SciObsAtSea** |
| **Time period of validity:** 2022-2024 |
| Short description (max 100 words):<br>The multispecies length sampling includes onboard sampling of recreational charter boats in the German Baltic Sea. It aims to collect recreational length distributions for sea-based catches for both the harvest and release component. The sampling frame covers the entire German charter boat fleet in SD22 & SD24. Data is used for extrapolation of German recreational catch data, as well as for scaling Danish recreational catches in SD22 & SD24 for the ICES stock assessment. Recreational length data is used together with commercial length-weight data to determine catch in numbers at age (CANUM).<br>The coastline is divided into five strata. Per month 5 assignments are carried out where a scientific observer carries out onboard length measurements. Sampling date and the individual charter vessel are randomly selected for each sampling day. Information on the overall recreational catch composition and sociodemographic data of the individual angler are also collected by the scientific observers. |
| **Description of the population** |
| **Population targeted:** Primary sampling units (PSUs) are recreational charter vessel fishing trips the secondary sampling unit is the fish.<br><br>**Population sampled:**<br><br>**Stratification:**<br>The Population is stratified by area. |
| **Sampling design and protocols** |
| **Sampling design description:** |

Biological data collection is conducted via random onboard sampling based on a recreational charter vessel registry (for details see Strehlow et al., 2012 and Weltersbach et al., 2019). Sampling date and the individual charter vessel are randomly selected for each sampling day. However, random selection can be affected by weather conditions (i.e., weather-related cancellations) and the availability of the selected charter vessel (e.g., level of bookings, dry dock phase, approval of the crew) and sometimes sampling dates or charter vessels have to be changed. During some trips, not all fish can be measured because of very high catch rates. In such cases, all fish are separately counted and representative subsamples are measured. This approach ensures that all fish caught on the charter vessel fishing trip are registered by the observers minimizing the risk of under- and non-reporting. Commercial/BITS length-weight relationships and age-length keys are then used for conversion of recreational catch numbers to biomass and length at age if needed by end users.

**Is the sampling design compliant with the 4S principle?:** Y

**Regional coordination:** Marginal regional coordination as German length distributions are used to age Danish recreational catch data (only weight) and determine CANUM data.

**Link to sampling design documentation:** ICES. 2019. Benchmark Workshop on Baltic Cod Stocks (WKBALTCOD2). ICES Scientific Reports. 1:9. 310 pp. http://doi.org/10.17895/ices.pub.4984

**Compliance with international recommendations:** Y, the sampling design complies with ICES standards (e.g. WGRFS)

**Link to sampling protocol documentation:** NA – simple length distributions mostly census data

**Compliance with international recommendations:** NA

**Sampling implementation**

**Recording of refusal rate:** N

**Monitoring of sampling progress within the sampling year:** Recreational charter boat activities are continuously monitored and sampling is adjusted accordingly.

**Data capture**

**Means of data capture:** Observers are equipped with measuring boards, Measurements are transferred to Excel spreadsheet templates provided. Excel spreadsheets are imported annually to the Thünen institutes recreational fisheries database.

**Data capture documentation:** protocols are stored on an internal server of the Thünen institute.

**Quality checks documentation:** Y, data quality is permanently checked internally at different levels of the processing chain (e.g. daily/monthly completeness and validity checks of the Excel spreadsheets during the data input / completeness, consistency and validity checks during data import to database / range and cross checks of the final database entry.

**Data storage**

**National database:** Thünen Baltic Sea Fisheries php myAdmin SQL and PostgreSQL data base.

**International database:** NA – only catch data is submitted to other databases

**Quality checks and data validation documentation:** NA – only catch data is submitted to other databases

**Sample storage**

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| NA – only length data collected |
| **Data processing** |
| **Evaluation of data accuracy (bias and precision):** Y, data quality is regularly checked internally.<br><br>**Editing and imputation methods:** Y, data quality is permanently checked internally at different levels of the processing chain (e.g. daily/monthly completeness and validity checks of the Excel spreadsheets during the data input / completeness, consistency and validity checks during data import to database / range and cross checks of the final database entry.<br><br>**Quality document associated to a dataset:** *Has a publication digital object identifier (DOI) been created? Is there a document summarising the estimation process that has been followed?*<br>N, the data quality is regularly checked internally but not documented.<br><br>**Validation of the final dataset:** Before using the data to compile German recreational catch data, the data sets are checked by the IT department and the scientists working with the data at the Thünen Institute. |

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| **MS : DEU** |
| **Region: Baltic Sea** |
| **Sampling scheme identifier: Salmon survey** |
| **Sampling scheme type: recreational (on site survey)** |
| **Observation type: SelfAtSea** |
| **Time period of validity:** 2022-2024 |
| The salmon survey includes on-site intercepts of salmon trolling boat anglers in the German Baltic Sea. It aims to collect recreational length frequency distributions for sea-based catches for both the harvest and release component of salmon. The sampling frame covers the entire German trolling boat fleet in SD24. Data is collected for information purposes as there is no direct end user. Length data is collected by interviewing salmon trolling anglers about their catches at sea. Information on the overall recreational catch composition and sociodemographic data of the individual angler are also collected by the survey agents. |
| **Description of the population** |
| **Population targeted:** Primary sampling units (PSUs) are recreational trolling boat trips the secondary sampling unit is the fish.<br><br>**Population sampled:**<br>Trolling boat trips<br><br>**Stratification:**<br>Spatial (harbour) and temporal (weekday vs. weekend) stratification |
| **Sampling design and protocols** |
| **Sampling design description:**<br>Biological data collection is conducted via random intercept sampling of trolling boats in four relevant salmon trolling boat harbors responsible for 85% of the total recreational salmon trolling fishing effort in Germany (see Hartill et al., 2020). During the salmon trolling season from December until May each year, 10 assignments are carried out per month (5 on weekdays and 5 on weekends or public holidays). Sampling date and the individual harbor are randomly selected for each sampling day. However, random selection can be affected by weather conditions (i.e., strong winds > 6bft) and sometimes sampling dates have to be changed. Sampling takes place in the afternoon evening when most trolling boats are expected to return to their harbor. Respondents are asked to provide length data for both harvested and released salmon. Therefore, length data relies on self-measurements and the reliability of the respondents. A relationship of mutual trust minimizes the risk of under- and non-reporting.<br><br>**Is the sampling design compliant with the 4S principle?:** Y<br><br>**Regional coordination:** N<br><br>**Link to sampling design documentation:** ICES. 2020. Baltic Salmon and Trout Assessment Working Group (WGBAST). ICES Scientific Reports. 2:22. 261 pp. http://doi.org/10.17895/ices.pub.5974<br><br>**Compliance with international recommendations:** Y, the sampling design complies with ICES standards (e.g. WGRFS)<br><br>**Link to sampling protocol documentation:** NA – simple length distributions mostly census data<br><br>**Compliance with international recommendations:** NA |
| **Sampling implementation** |
| **Recording of refusal rate:** Y |

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| **Monitoring of sampling progress within the sampling year:** The sampling covers the entire recreational salmon season from December to May. |
| **Data capture** |
| **Means of data capture:** Observers transfer length data obtained by interviews to Excel spreadsheet templates provided. Excel spreadsheets are imported annually to the Thünen Institutes recreational fisheries database.<br><br>**Data capture documentation:** Protocols are stored on an internal server of the Thünen Institute.<br><br>**Quality checks documentation:** Y, data quality is permanently checked internally at different levels of the processing chain (e.g. daily/monthly completeness and validity checks of the Excel spreadsheets during the data input / completeness, consistency and validity checks during data import to database / range and cross checks of the final database entry. |

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| **Data storage** |
| **National database:** Thünen Baltic Sea Fisheries php myAdmin SQL and PostgreSQL data base.<br><br>**International database:** NA – only catch data is submitted to other databases<br><br>**Quality checks and data validation documentation:** NA – only catch data is submitted to other databases |
| **Sample storage** |
| NA – only length data collected |
| **Data processing** |
| **Evaluation of data accuracy (bias and precision):** Y, data quality is regularly checked internally.<br><br>**Editing and imputation methods:** No imputation and editing is conducted.<br><br>**Quality document associated to a dataset:** N, the data quality is regularly checked internally but not documented.<br><br>**Validation of the final dataset:** The data sets are checked by the IT department and the scientists working with the data at the Thünen Institute. |

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| **MS : DEU** |
| **Region: Baltic Sea** |
| **Sampling scheme identifier: OF Observer** |
| **Sampling scheme type: Commercial fishing trip** |
| **Observation type: SciObsAtSea** |
| **Time period of validity:** 2022-2024 |
| The German sampling scheme for the Baltic Sea comprises 6 sampling frames: 1) Baltic active 2224, 2) Baltic passive 2224, 3) Baltic active 2532, 4) Baltic herring passive 2224, 5) Baltic herring active 2224, 6) Baltic sprat active SD2232. Only the demersal fleets are currently sampled by observers at sea. It is aiming to collect biological samples (length/weight/age/sex/maturity depending on species) from target species of the German fisheries in the Baltic Sea to fulfil the national sampling obligations and secure the data delivery for the ICES stock assessments. Furthermore, information on the overall catch composition and incidental catches of sensitive species are collected by scientific observers. |
| **Description of the population** |
| **Population targeted:** Primary sampling units (PSUs) are fishing trips in the different sampling frames.<br><br>**Population sampled:**<br>1) Baltic active 2224: Trawlers targeting demersal species, mainly cod and flatfish species (plaice, flounder, dab) with active gear types. Peak season: 1st and 4th quarter. Area: Western Baltic Sea. Duration of trips: 1 to 5 days. Number of vessels operating: 57 (2020).<br><br>2) Baltic passive 2224: Small-scale vessels targeting demersal species like cod and flatfish species (plaice, flounder, dab) with passive gear types. Peak season: 1st and 4th quarter. Area: Western Baltic Sea. Duration of trips: 1-2 days. Number of vessels operating: 397 (2020).<br><br>3) Baltic active 2532: Trawlers targeting demersal species like cod and flatfish species (plaice, flounder) with demersal gears. Peak season: 1st and 2nd quarter. Area: Eastern Baltic Sea. Duration of trips: 5-8 days. Number of vessels operating: 4 (2020).<br><br>The following pelagic populations are currently covered by a self-sampling program, conducted at sea or at shore and is covered by the respective Text Box. At-sea sampling might take place if necessary.<br><br>4) Baltic herring passive 2224: Small-scale vessels targeting herring with passive gear types. Peak season: 1st and 2nd quarter. Area: Western Baltic Sea. Duration of trips: 1 day. Number of vessels operating: 240 (2020).<br><br>5) Baltic  erring active 2224: Trawlers targeting herring with pelagic trawl gears. Peak season: 1st and 2nd quarter. Area: Western Baltic Sea. Duration of trips: 1 day. Number of vessels operating: 17 (2020).<br><br>6) Baltic sprat: Trawlers targeting sprat with pelagic trawl gears. Peak season: 1st and 2nd quarter. Area: Baltic Sea. Duration of trips: 1-2 weeks. Number of vessels operating: 6 (2020).<br><br>**Stratification:**<br>Populations are stratified by target species, area and gear type (active, passive) |
| **Sampling design and protocols** |
| **Sampling design description:** The designs differ between the populations sampled.<br>*Demersal populations*: Each year, for each sampled population a list of vessels is produced using the landings data from the previous year (e.g. the lists for 2021 are compiled at the end of 2020 with data from 2019). The lists are sorted by total landings per vessel. The vessel lists of the sampled populations Baltic active 2224, Baltic passive 2224 and Baltic active 2532 include all vessels that contributed ~60%, ~90 and ~90% of the total landings, |

respectively. The list of vessels is then randomised by assigning a random number to each vessel on a list. The sequence of the random number determines the sequence of contacting the vessel. Flounder, plaice and other (flat-)fish species are sampled as part of the demersal sampling programme mainly targeting cod. However, if a vessel is selected, any fishing trip is sampled, except for trips targeting freshwater species, herring or sprat (see below). There is only one list for the entire year. If all vessels from a list have been contacted before the year ends, the same list is used again. Sampling is conducted all year-round and the effort is distributed according to fishing seasons. Each phone call with fishers is documented since 2010. This document is used to calculate the success/non-response/rejection/refusal rates. In addition, we record if the sample is selected randomly or based on expert judgement. Expert knowledge partly is used to ensure efficient sampling coverage of periods/strata with very low landings, e.g. demersal species in quarter 3.
An at-sea observer catch sampling programme (including concurrent sampling of landings, discards and unwanted by-catches) is conducted for the demersal fleet segments. In addition, a self-sampling programme with fishers is used to collect biological and catch data; unsorted commercial catch samples of usually 200-300 kg from the last or last but one haul are purchased (see following textbox on OF Self-Sampling). Diagnostics show that sampled trips are representative of the overall national population of vessels and their spatio-temporal dynamics. In addition, opportunistic sampling of landed discards (BMS cod under the landing obligation) may take place.

*Herring*: For the sampled population Herring passive SD2224, five major ports around the Greifswald Bay - the major fishing ground - are sampled using unsorted catch samples from a vessel per port. For the sampled population Herring active SD2224, unsorted catch samples are taken from an arbitrary (pair) trawler. In addition, to estimate the by-catches of cod (and other species) of the herring trawlers, the by-catch of the population Herring active SD2224 landed in the herring processing plant in Neu-Mukran, Rügen island is sampled once bi-weekly since 2014.

*Sprat SD2232*: The German sprat catches in the Baltic Sea mainly originate from two pelagic trawlers. Since 2013, a self-sampling programme is conducted (see next textbox for sampling details).

The métier of a sample is assigned *ex-post*. Each sample is raised from the haul to trip level. Replicate samples from the same métier are averaged and raised to all trips of the métier within a stratum (e.g. all landings of quarter 1-SD22-gillnets).

The primary sampling unit is the vessel x trip, the secondary sampling unit is the haul, the tertiary sampling unit is the fish in the haul.

**Is the sampling design compliant with the 4S principle?:** Y

**Regional coordination:** No regional coordination yet in place. Thünen-OF will engage in the final testing phase of a regional sampling plan (RSP) on pelagic trawlers in 2022. The RSP was developed by the RCG Baltic (RCG NA NS&EA RCG Baltic 2021) and, if successfully conducted in 2022, will be adapted into the Regional and National work plan. Data are collected using standardized sampling protocols and sampling methods that were developed and agreed on in the respective RCG Baltic subgroup and adopted by the member states. Refusal and rejection rates are additionally collected. Data will be submitted to the RDBES as a case study (Design "Baltic SPF Regional").

**Link to sampling design documentation:** https://www.dcf-germany.de/sampling/

**Compliance with international recommendations:** Y, the sampling design complies with ICES standards (e.g. WGCATCH)
The sampling program was externally evaluated (Christman, M. 2020: Evaluation and Optimization of the National German Catch Sampling Programme for the Baltic Sea Fisheries of cod, plaice and herring)

**Link to sampling protocol documentation:** https://www.dcf-germany.de/sampling/ and

RCG NA NS&EA RCG Baltic 2021. Regional Coordination Group North Atlantic, North Sea & Eastern Arctic and Regional Coordination Group Baltic. 2021. Part I, Report, 78 p. Part II, Decisions and Recommendations, 16 p. **Part III, Intersessional Subgroup (ISSG) 2020-2021** Reports, 331 p. (https://datacollection.jrc.ec.europa.eu/docs/rcg), Report of the Intersessional Study Group (ISSG):case study on RSP of small pelagic fishery trawler in the Baltic, Report Part III, page 126pp.

**Compliance with international recommendations:** Y, the sampling design complies with ICES standards (e.g. WGCATCH)
The sampling program was externally evaluated (Christman, M. 2020: Evaluation and Optimization of the National German Catch Sampling Programme for the Baltic Sea Fisheries of cod, plaice and herring)

**Sampling implementation**

**Recording of refusal rate:** Y, refusal rates are available at the end of the sampling year

**Monitoring of sampling progress within the sampling year:** There is a constant flow of information between us and the fisheries on different channels. Thus, the fishing activities are continuously monitored and sampling is adjusted accordingly.

**Data capture**

**Means of data capture:** Observers are equipped with measuring boards, marine scales plus additional equipment, e.g. boxes, knifes, forceps etc. Measurements are written on paper before the data are typed into a special input programme.
Self-samples are processed in our laboratory according to standard procedure in fisheries biology.

**Data capture documentation:** https://www.dcf-germany.de/sampling/, protocols are stored on an internal server of the Thünen institute.

**Quality checks documentation:** Y, data quality is permanently checked internally at different levels of the processing chain (e.g. cross checks during the data input, database checks for completeness, logic and consistency, range checks and cross checks with official census data.

**Data storage**

**National database:** Thünen Baltic Sea Fisheries php myAdmin SQL and PostgreSQL data base.

**International database:** Data are submitted to the RDB, RDBES and InterCatch which are all hosted by ICES and provided to ICES working groups with internal data bases (e.g. WGBYC) as well as to EU institutions (e.g. JRC). See for details:
https://www.ices.dk/data/data-portals/Pages/RDB-FishFrame.aspx,
https://www.ices.dk/data/data-portals/Pages/InterCatch.aspx , https://datacollection.jrc.ec.europa.eu/data-calls

**Quality checks and data validation documentation:** No link for national data base. Data quality is permanently checked internally at different levels of the processing chain (e.g. cross checks during the data input, database checks for completeness, logic and consistency, range checks and cross checks with official census data. After upload to the international data bases ICES / EU institutions are responsible for further quality checks. See for details:
https://www.ices.dk/data/data-portals/Pages/RDB-FishFrame.aspx,
https://www.ices.dk/data/data-portals/Pages/InterCatch.aspx , https://datacollection.jrc.ec.europa.eu/data-calls

**Sample storage**

Storage description: With regard to sampling of the commercial fishery, mostly only otoliths are stored dark and dry in the Thünen Institute of Baltic Sea Fisheries. Sample storage is perpetual. The internal server of the Thünen institute contains the single fish data that can be linked to the stored otoliths.

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| Sample analysis: The Thünen Institute of Baltic Sea Fisheries is participating in all relevant methodology workshops and following the international agreed methods and manuals, see also https://www.ices.dk/community/Pages/PGCCDBS-doc-repository.aspx |
| **Data processing** |
| **Evaluation of data accuracy (bias and precision):**<br><br>Y, data quality is regularly checked internally.<br><br>**Editing and imputation methods:**<br><br>Y, data quality is permanently checked internally at different levels of the processing chain (e.g. cross checks during the data input, database checks for completeness, logic and consistency, range checks and cross checks with official census data. Data checks and processes are stepwise adapted to the new PostgreSQL database and uploaded to a Thünen github and later to an ICES repository (https://github.com/ices-eg/Thuenen ).<br><br>**Quality document associated to a dataset:**<br>Y, the estimation process is documented internally and the data quality is regularly checked internally.<br><br>**Validation of the final dataset:** Before upload, the data sets are checked by the IT department and the scientists working with the data at the Thünen Institute. |

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| **MS : DEU** |
| **Region: Baltic Sea** |
| **Sampling scheme identifier: OF Self-Sampling** |
| **Sampling scheme type: Commercial fishing trip** |
| **Observation type: SelfAtSea, SelfAtShore** |
| **Time period of validity:** 2022-2024 |
| Short description (max 100 words):<br>The German self-sampling scheme for the Baltic Sea comprises of the same 6 sampling frames covered by the OF Observer scheme (previous textbox). It is aiming to compliment the at-Sea sampling and enables further biological samples (length/weight/age/sex/maturity depending on species) from target species of the German fisheries in the Baltic Sea to fulfil the national sampling obligations and secure the data delivery for the ICES stock assessments. Self-Samples comprise of an unsorted catch sample, additional information on landings and sales as well as incidental catches of sensitive species are asked from the fishermen directly and taken from official data. |
| **Description of the population** |
| **Population targeted:** Primary sampling units (PSUs) are fishing trips in the different sampling frames.<br><br>**Population sampled:**<br>1) Active SD2224: Trawlers targeting demersal species, mainly cod and flatfish species (plaice, flounder, dab) with active gear types. Peak season: 1st and 4th quarter. Area: Western Baltic Sea. Duration of trips: 1 to 5 days. Number of vessels operating: 57 (2020).<br><br>2) Passive SD2224: Small-scale vessels targeting demersal species like cod and flatfish species (plaice, flounder, dab) with passive gear types. Peak season: 1st and 4th quarter. Area: Western Baltic Sea. Duration of trips: 1-2 days. Number of vessels operating: 397 (2020). |

3) Active SD2532: Trawlers targeting demersal species like cod and flatfish species (plaice, flounder) with demersal gears. Peak season: 1st and 2nd quarter. Area: Eastern Baltic Sea. Duration of trips: 5-8 days. Number of vessels operating: 4 (2020).

4) Herring passive SD2224: Small-scale vessels targeting herring with passive gear types. Peak season: 1st and 2nd quarter. Area: Western Baltic Sea. Duration of trips: 1 day. Number of vessels operating: 240 (2020).

5) Herring active SD2224: Trawlers targeting herring with pelagic trawl gears. Peak season: 1st and 2nd quarter. Area: Western Baltic Sea. Duration of trips: 1 day. Number of vessels operating: 17 (2020).

6) Sprat active SD2232: Trawlers targeting sprat with pelagic trawl gears. Peak season: 1st and 2nd quarter. Area: Baltic Sea. Duration of trips: 1-2 weeks. Number of vessels operating: 6 (2020).

**Stratification:**
Populations are stratified by target species, area and gear type (active, passive)

**Sampling design and protocols**

**Sampling design description:** The designs differ between the populations sampled.
*Demersal populations*: Each year, for each sampled population a list of vessels is produced using the landings data from the previous year (e.g. the lists for 2021 are compiled at the end of 2020 with data from 2019). The lists are sorted by total landings per vessel. The vessel lists of the sampled populations Active SD2224, Passive SD2224 and Active SD2532 include all vessels that contributed ~60%, ~90 and ~90% of the total landings, respectively. The list of vessels is then randomised by assigning a random number to each vessel on a list. The sequence of the random number determines the sequence of contacting the vessel. Flounder, plaice and other (flat-)fish species are sampled as part of the demersal sampling programme mainly targeting cod. However, if a vessel is selected, any fishing trip is sampled, except for trips targeting freshwater species, herring or sprat (see below). There is only one list for the entire year. If all vessels from a list have been contacted before the year ends, the same list is used again. Sampling is conducted all year-round and the effort is distributed according to fishing seasons. Each phone call with fishers is documented since 2010. This document is used to calculate the success/non-response/rejection/refusal rates. In addition, we record if the sample is selected randomly or based on expert judgement. Expert knowledge partly is used to ensure efficient sampling coverage of periods/strata with very low landings, e.g. demersal species in quarter 3.
The self-sampling programme with fishers is used to collect biological and catch data; unsorted commercial catch samples of usually 200-300 kg from the last or last but one haul are purchased. Diagnostics show that self-sampled trips are representative of the overall national population of vessels and their spatio-temporal dynamics. In addition, opportunistic sampling of landed discards (BMS cod and plaice under the landing obligation) may take place.

*Herring*: For the sampled population Herring passive SD2224, five major ports around the Greifswald Bay - the major fishing ground - are sampled using 50 kg unsorted catch samples from a vessel per port. Samples from the ports are taken from a known group of fishers, which are considered representative for the respective fleet given that similar mesh sizes are used. This population is subdivided into “gillnets” and “traps”. For the sampled population Herring active SD2224, a 50 kg unsorted catch sample is taken from an arbitrary (pair) trawler landing in the only German herring processing plant in Neu-Mukran, Rügen island. During the herring season (Nov-Apr), each week either Herring passive SD2224 or Herring active SD2224 is sampled. The day of the week is selected according to wind and logistic considerations. In addition, to estimate the by-catches of cod (and other species) of the herring trawlers, the by-catch of the population Herring active SD2224 landed in Neu-Mukran is sampled once bi-weekly since 2014.

*Sprat SD2232*: The German sprat catches in the Baltic Sea mainly originate from two pelagic trawlers. Since 2013, a self-sampling programme is conducted where each vessel provides one frozen catch sample (5 kg) per trip. This covers the ICES subdivisions 25-29. In addition, minor sprat catches in SD22 and SD24 are sampled

opportunistically upon expert judgement and notification from the few fishers that are temporarily targeting sprat.

The métier of a sample is assigned *ex-post*. Each sample is raised from the haul to trip level. Replicate samples from the same métier are averaged and raised to all trips of the métier within a stratum (e.g. all landings of quarter 1-SD22-gillnets).

The primary sampling unit is the vessel x trip, the secondary sampling unit is the haul, the tertiary sampling unit is the fish in the haul.

**Is the sampling design compliant with the 4S principle?:** Y

**Regional coordination:** No regional coordination yet in place. Thünen-OF will engage in the final testing phase of a regional sampling plan (RSP) on pelagic trawlers in 2022. The RSP was developed by the RCG Baltic (RCG NA NS&EA RCG Baltic 2021) and, if successfully conducted in 2022, will be adapted into the Regional and National work plan. Data are collected using standardized sampling protocols and sampling methods that were developed and agreed on in the respective RCG Baltic subgroup and adopted by the member states. Refusal and rejection rates are additionally collected. Data will be submitted to the RDBES as a case study (Design "Baltic SPF Regional").

**Link to sampling design documentation:** https://www.dcf-germany.de/sampling/

**Compliance with international recommendations:** Y, the sampling design complies with ICES standards (e.g. WGCATCH)
The sampling program was externally evaluated (Christman, M. 2020: Evaluation and Optimization of the National German Catch Sampling Programme for the Baltic Sea Fisheries of cod, plaice and herring)

**Link to sampling protocol documentation:** https://www.dcf-germany.de/sampling/ and
RCG NA NS&EA RCG Baltic 2021. Regional Coordination Group North Atlantic, North Sea & Eastern Arctic and Regional Coordination Group Baltic. 2021. Part I, Report, 78 p. Part II, Decisions and Recommendations, 16 p. **Part III, Intersessional Subgroup (ISSG) 2020-2021** Reports, 331 p. (https://datacollection.jrc.ec.europa.eu/docs/rcg), Report of the Intersessional Study Group (ISSG):case study on RSP of small pelagic fishery trawler in the Baltic, Report Part III, page 126pp.

**Compliance with international recommendations:** Y, the sampling design complies with ICES standards (e.g. WGCATCH)
The sampling program was externally evaluated (Christman, M. 2020: Evaluation and Optimization of the National German Catch Sampling Programme for the Baltic Sea Fisheries of cod, plaice and herring)

**Sampling implementation**

**Recording of refusal rate:** Y, refusal rates are available at the end of the sampling year

**Monitoring of sampling progress within the sampling year:** There is a constant flow of information between us and the fisheries on different channels. Thus, the fishing activities are continuously monitored and sampling is adjusted accordingly.

**Data capture**

**Means of data capture:**
Self-samples are processed in our laboratory according to standard procedure in fisheries biology.

**Data capture documentation:** https://www.dcf-germany.de/sampling/, protocols are stored on an internal server of the Thünen institute.

**Quality checks documentation:** *Indicate with 'Y' (yes) or 'N' (no). If 'N' (no), indicate when (year) documentation will be available. Provide a link to a webpage where the documentation can be found. If no link is available, but documentation exists, provide a literature reference (author(s), year and type of publication - e.g. internal report). If no documentation on the quality checks exists, provide some details in the text box.*
Y, data quality is permanently checked internally at different levels of the processing chain (e.g. cross checks during the data input, database checks for completeness, logic and consistency, range checks and cross checks with official census data.

**Data storage**

**National database:** Thünen Baltic Sea Fisheries php myAdmin SQL and PostgreSQL data base.

**International database:** Data are submitted to the RDB, RDBES and InterCatch which are all hosted by ICES and provided to ICES working groups with internal data bases (e.g. WGBYC) as well as to EU institutions (e.g. JRC). See for details:
https://www.ices.dk/data/data-portals/Pages/RDB-FishFrame.aspx,
https://www.ices.dk/data/data-portals/Pages/InterCatch.aspx , https://datacollection.jrc.ec.europa.eu/data-calls

**Quality checks and data validation documentation:** See for details:
https://www.ices.dk/data/data-portals/Pages/RDB-FishFrame.aspx,
https://www.ices.dk/data/data-portals/Pages/InterCatch.aspx , https://datacollection.jrc.ec.europa.eu/data-calls

**Sample storage**

Storage description: With regard to sampling of the commercial fishery, mostly only otoliths are stored dark and dry in the Thünen Institute of Baltic Sea Fisheries. Sample storage is perpetual. The internal server of the Thünen institute contains the single fish data that can be linked to the stored otoliths.

Sample analysis: The Thünen Institute of Baltic Sea Fisheries is participating in all relevant methodology workshops and following the international agreed methods and manuals, see also https://www.ices.dk/community/Pages/PGCCDBS-doc-repository.aspx

**Data processing**

**Evaluation of data accuracy (bias and precision):** *Indicate with 'Y' (yes) or 'N' (no). If 'N' (no), indicate when (year) documentation will be available. Provide a link to a webpage where the documentation can be found. If no link is available, but documentation exists, provide a literature reference (author(s), year and type of publication - e.g. internal report). If no documentation on the evaluation of data accuracy exists, provide some details in the textbox.*
Y, data quality is regularly checked internally.

**Editing and imputation methods:** *Indicate 'Y' (yes) or 'N' (no). If 'N' (no), indicate when (year) documentation will be available. Provide a link to a webpage where the documentation can be found. If no link is available, but documentation exists, provide a literature reference (author(s), year and type of publication - e.g. internal report). If no documentation on the editing and imputation methods exists, provide some details in the textbox.*
Y, data quality is permanently checked internally at different levels of the processing chain (e.g. cross checks during the data input, database checks for completeness, logic and consistency, range checks and cross checks with official census data. Data checks and processes are stepwise adapted to the new PostgreSQL database and uploaded to a Thünen github and later to an ICES repository (https://github.com/ices-eg/Thuenen).

**Quality document associated to a dataset:** *Has a publication digital object identifier (DOI) been created? Is there a document summarising the estimation process that has been followed?*
Y, the estimation process is documented internally and the data quality is regularly checked internally.

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| **Validation of the final dataset:** Before upload, the data sets are checked by the IT department and the scientists working with the data at the Thünen Institute. |

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| **MS : DEU** |
| **Region: North Sea and Eastern Arctic, North Atlantic** |
| **Sampling scheme identifier: SF Observer** |
| **Sampling scheme type: Commercial fishing trip** |
| **Observation type: SciObsAtSea** |
| **Time period of validity:** 2022-2024 |
| This sampling scheme comprises 11 sampling frames: Arctic 1 and 2, North Sea 1-5, and North Atlantic 1-4. It is aiming to collect biological samples (length/weight/age/sex/maturity depending on species) from target species of the German fisheries in the North Sea and Eastern Arctic and the North Atlantic to fulfil the national sampling obligations and secure the data delivery for the assessment. Furthermore, information on the overall catch composition and incidental catches of sensitive species are collected by scientific observers. See general remark in Text Box 2.5 for the overall rationale to collect the data with scientific observers only. |
| **Description of the population** |
| **Population targeted:** Primary sampling units (PSUs) are fishing trips in the different sampling frames.<br><br>**Population sampled:**<br>Arctic 1: Factory trawlers targeting gadoid species (cod, saithe, haddock) with demersal gears. Peak season: 1st and 3rd quarter. Area: Northeast Arctic waters. Duration of trips: 4 weeks to 3 months. Number of vessels operating: 2 (2020).<br>Arctic 2: Pelagic freezer trawlers targeting Atlanto-Scandian herring with pelagic gears. Peak season: August to November. Area: Norwegian Sea. Duration of trips: 3 to 4 weeks. Number of vessels operating: 2 (2020).<br>North Sea 1: Beam trawlers targeting brown shrimp in the German coastal area. Peak season: March to October with peaks in the 2nd and 3rd quarter. Area: German North Sea coastal waters. Duration of trips: 1 to 3 days. Number of vessels operating: 162 (2020).<br>North Sea 2: Pelagic freezer trawler targeting North Sea and channel herring with pelagic gears. Peak season: 3rd quarter/December. Area: North Sea and English Channel. Duration of trips: 3 to 4 weeks. Number of vessels operating: 5 (2020).<br>North Sea 3: Otter trawlers, pair trawlers and seine trawlers targeting gadoid species (cod, saithe, haddock). Peak season: All year round. Area: Northern North Sea and Skagerrak. Duration of trips: 1 to 2 weeks. Number of vessels operating: 8 (2020).<br>North Sea 4: Beam trawlers targeting flatfish (sole and plaice). Peak season: All year round. Area: Central and southern North Sea. Duration of trips: 5 to 8 days. Number of vessels operating: 9 (2020).<br>North Sea 5: Otter trawlers targeting flatfish. Peak season: All year round. Area: Central and southern North Sea. Duration of trips: 5 to 8 days. Number of vessels operating: 9 (2020).<br>North Atlantic 1: OTB factory trawlers targeting Greenland halibut / redfish in ICES 12, 14, 5a and NAFO SA1-2. Peak season: 2nd/3rd/4th quarter. Area: East and West Greenland. Duration of trips: 6 weeks to 3 months. Number of vessels operating: 3 (2020).<br>North Atlantic 2: Pelagic freezer trawlers targeting mainly mackerel, horse mackerel, blue whiting in 6, 7bcjk, 7e, 7fgh, 8, 5-14, (4a). Peak season: seasonal depending on main target species (e.g. mackerel: Jan/Feb and Oct/Nov, blue whiting: Mar/April). Area: Northern North Sea, West British waters and Bay of Biscay. Duration of trips: 3 to 4 weeks. Number of vessels operating: 4 (2020).<br>North Atlantic 3: OTM targeting redfish in 12, 14, 5a. Peak season: 2nd/3rd quarter. Duration of trips: 4 weeks to 3 months. Sporadic fishery which is not carried out every year.<br>North Atlantic 4: OTB targeting cod in 14, NAFO 1F. Peak season: 2nd/3rd quarter. Duration of trips: 4 weeks to 3 months but landings in between into Iceland. Number of vessels operating: 2 (2020). |

**Stratification:**
Populations are stratified by regions and fleet characteristics (gear, target species).

**Sampling design and protocols**

**Sampling design description:** Vessels to sample are selected from a telephone list. However, the approach is an opportunistic randomised PSU selection and not fully probability-based due to the low number of vessels within the segments. The primary sampling unit is the vessel x trip, the secondary sampling unit is the haul, the tertiary sampling unit is the fish in the haul.

**Is the sampling design compliant with the 4S principle?:** N, not fully implementable due to the low numbers of vessels within the fleet segments

**Regional coordination:** No regional coordination yet in place. However, within the sampling of the pelagic freezer trawler fleet, joint reports of the Dutch and German sampling programs are produced (e.g. Overzee HMJ van, Ulleweit J, Helmond ATM van, Bangma T (2020) Catch sampling of the pelagic freezer trawler fishery operating in European waters in 2017-2018 - joint report of the Dutch and German national sampling programmes. IJmuiden: Stichting Wageningen Research, Centre for Fisheries Research (CVO), 53 p, CVO Rep 20.004, DOI:10.18174/512809 )

**Link to sampling design documentation:** https://www.dcf-germany.de/sampling/

**Compliance with international recommendations:** Y, the sampling design complies with ICES standards (e.g. WGCATCH).
The sampling program was externally evaluated (Christman, M. 2020: Evaluation and Optimization of the National German Catch Sampling Programme for North Sea and North Atlantic Fisheries)

**Link to sampling protocol documentation:** https://www.dcf-germany.de/sampling/ and Overzee HMJ van, Ulleweit J, Helmond ATM van, Bangma T (2020) Catch sampling of the pelagic freezer trawler fishery operating in European waters in 2017-2018 - joint report of the Dutch and German national sampling programmes. IJmuiden: Stichting Wageningen Research, Centre for Fisheries Research (CVO), 53 p, CVO Rep 20.004, DOI:10.18174/512809

**Compliance with international recommendations:** Y, the sampling design complies with ICES standards (e.g. WGCATCH).
The sampling program was externally evaluated (Christman, M. 2020: Evaluation and Optimization of the National German Catch Sampling Programme for North Sea and North Atlantic Fisheries)

**Sampling implementation**

**Recording of refusal rate:** Y, refusal rates are available at the end of the sampling year.

**Monitoring of sampling progress within the sampling year:** Sampling progress is discussed quarterly and adjusted if needed and followed-up. No specific mechanisms are in place to resolve issues and adopt mitigation measures during the sampling year.

**Data capture**

**Means of data capture:** Observers are equipped with measuring boards, marine scales plus additional equipment, e.g. boxes, knifes, forceps etc. Measurements are mainly first written on paper or sound-recorded before typed into a special input programme. This programme is based on MS Access.

**Data capture documentation:** https://www.dcf-germany.de/sampling/, protocols are stored as hard copies and electronically on an internal server of the Thünen institute.

**Quality checks documentation:**
Y, data quality is regularly checked internally. Input values are checked within the input programme based on MS Access routines. Currently, a new input programme is developed.

**Data storage**

**National database:** Access data files, Thünen Sea Fisheries SQL data base.

**International database:** Data are uploaded into the RDB, RDBES trials and InterCatch which are all hosted by ICES and provided to ICES working groups with internal data bases (e.g. WGBYC) as well as to EU institutions. See for details: https://www.ices.dk/data/data-portals/Pages/RDB-FishFrame.aspx, https://www.ices.dk/data/data-portals/Pages/InterCatch.aspx , https://datacollection.jrc.ec.europa.eu/data-calls

**Quality checks and data validation documentation:** No link for national data base. Data quality is permanently checked internally at different levels of the processing chain (e.g. cross checks during the data input, database checks for completeness, logic and consistency, range checks and cross checks with official census data. After upload to the international data bases ICES / EU institutions are responsible for further quality checks. See for details: https://www.ices.dk/data/data-portals/Pages/RDB-FishFrame.aspx, https://www.ices.dk/data/data-portals/Pages/InterCatch.aspx , https://datacollection.jrc.ec.europa.eu/data-calls

**Sample storage**

Storage description: With regard to sampling of the commercial fishery, mostly only otoliths are stored dark and dry in the Thünen institute of Sea Fisheries. Sample storage is perpetual. The internal server of the Thünen institute contains the single fish data that can be linked to the stored otoliths.

Sample analysis: The Thünen Institute of Sea Fisheries is participating in all relevant methodology workshops and following the international agreed methods and manuals, see also https://www.ices.dk/community/Pages/PGCCDBS-doc-repository.aspx

**Data processing**

**Evaluation of data accuracy (bias and precision):**
Evaluation of data accuracy is based on the developed R-codes. The aim of the codes is to identify a potential source of bias and high variance (e.g. refusals, incomplete coverage, noisy data etc.). The codes are stored internally and permanently improved.

**Editing and imputation methods:**
Data cleaning/editing process is based on the developed R-codes and involves: outliers detecting, detection and correction of individual input errors, range checks etc.).
To avoid the problems related to missing data, imputation approaches are used, in particular to handle: (1) missing age data to produce ALKs (imputing based on annual values/larger length bin/non-commercial survey data), (2) missing weight data (imputing based on regression).

**Quality document associated to a dataset:**
Y, the estimation process is documented internally and the data quality is regularly checked internally.

**Validation of the final dataset:** Before upload, the data sets are checked by the IT department and the scientists working with the data at the Thünen Institute.

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| **MS : DEU** |
| **Region: Other regions** |
| **Sampling scheme identifier: SF Other** |
| **Sampling scheme type: Commercial fishing trip** |
| **Observation type: SciObsAtSea** |
| **Time period of validity:** 2022-2024 |
| This sampling scheme comprises two sampling frames: CECAF1 and SE Pacific 1. It is aiming to collect biological samples (length/weight/age/sex/maturity depending on species) from target species of the German fisheries in the CECAF area and the South Pacific to fulfil the national sampling obligations and secure the data delivery for the assessment. Furthermore, information on the overall catch composition and incidental catches of sensitive species are collected by scientific observers. See general remark in Text Box 2.5 for the overall rationale to collect the data with scientific observers only.<br>For this scheme, two multilateral agreements exist which secure the sampling of these fleet segments. |
| **Description of the population** |
| **Population targeted:** Primary sampling units (PSUs) are fishing trips in the different sampling frames.<br><br>**Population sampled:**<br>CECAF1: Pelagic freezer trawler targeting mainly *Sardinella* with pelagic gears. Number of vessels operating: 1 (2020).<br>SE Pacific 1: Pelagic freezer trawler targeting mainly Pacific horse mackerel with pelagic gears. Sporadic fishery which is not carried out every year.<br><br>**Stratification:**<br>Populations are stratified by regions and fleet characteristics (gear, target species) |
| **Sampling design and protocols** |
| **Sampling design description**: see https://www.dcf-germany.de/sampling/<br><br>**Is the sampling design compliant with the 4S principle?:** N, not fully implementable due to the low numbers of vessels within the fleet segments<br><br>**Regional coordination:** Y, Germany, Latvia, Lithuania, the Netherlands and Poland are involved, see Table 1.3. Poland is responsible for placement of observers onboard, in coordination with the Netherlands in respect of the expected vessels' movements.<br><br>**Link to sampling design documentation:** https://www.dcf-germany.de/sampling/<br><br>**Compliance with international recommendations:** Y<br><br>**Link to sampling protocol documentation:** https://www.dcf-germany.de/sampling/<br><br>**Compliance with international recommendations:** Y |
| **Sampling implementation** |
| **Recording of refusal rate:** NA<br><br>**Monitoring of sampling progress within the sampling year:** NA |

| Data capture |
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| **Means of data capture:** https://www.dcf-germany.de/sampling/<br><br>**Data capture documentation:** https://www.dcf-germany.de/sampling/<br><br>**Quality checks documentation:** https://www.dcf-germany.de/sampling/ |

| Data storage |
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| **National database:** NA<br><br>**International database:** https://www.dcf-germany.de/sampling/<br><br>**Quality checks and data validation documentation:** https://www.dcf-germany.de/sampling/ |
| **Sample storage** |
| Storage description: https://www.dcf-germany.de/sampling/<br><br>Sample analysis: https://www.dcf-germany.de/sampling/ |
| **Data processing** |
| **Evaluation of data accuracy (bias and precision):** https://www.dcf-germany.de/sampling/<br><br>**Editing and imputation methods:** https://www.dcf-germany.de/sampling/<br><br>**Quality document associated to a dataset:** https://www.dcf-germany.de/sampling/<br><br>**Validation of the final dataset:** https://www.dcf-germany.de/sampling/ |

**MS : DEU**

**Region: Baltic Sea**

**Sampling scheme identifier: SURVEY BITS Q1 and Q4**

**Sampling scheme type: Survey**

**Observation type: NA**

**Time period of validity:** 2022-2024

The main aim of the Baltic International Trawl Survey (BITS) is to determine the year-class strength of the commercially important fish species in the Baltic Sea. The target data are abundances, weight and length distributions of all fishes and length-weight-age-sex-maturity data of target species as well as hydrographic data (temperature, salinity and oxygen). In addition, marine litter and various biological samples (e.g. stomachs, livers, DNA, etc. from target species) are sampled for national and international studies.

**Description of the population**

**Population targeted:**
The target species are mainly Baltic cod *(Gadus morhua*) and the flatfish species flounder (*Platichthys flesus*), plaice (*Pleuronectes platessa*), dab (*Limanda limanda*), turbot (*Scophthalmus maximus*) and brill (*Scophthalmus rhombus*) in the ICES subdivisions 21 to 28. Germany is responsible for sampling from SD22 and SD24 in the western Baltic region.

**Population sampled**
The target species are demersal fish species.

**Stratification:**
The international trawl surveys are carried out in form of a stratified random survey. The ICES subdivisions and depth layers within eight ICES subdivisions (SD21-SD28) are used as strata. Six layers between 10 to 120 m (10 – 39 m, 20 – 39 m, 40 – 59 m, 60 – 79 m, 80 – 99 m and 100 – 120 m) depending on ICES subdivision are covered by the surveys in aggregated areas in nm² by 10-m depth layers and ICES rectangles.

**Sampling design and protocols**

**Sampling design description:**
The numbers of planned stations of all participating countries are summarized for the western Baltic area (ICES Subdivisions 22–24) and for the eastern Baltic area (ICES Subdivisions 25–28). Then the total number of planned trawl stations is allocated to subdivisions according to the area and the 5 years running mean of the cpue derived from the BITS survey in spring for each region. The number of planned stations of each the ICES Subdivision is then allocated to the depth layers.

**Is the sampling design compliant with the 4S principle?:**
NA

**Regional coordination:**
The BITS Survey sampling design is a regional agreement developed by the ICES Working Group on Baltic International Fish Survey (WGBIFS) with the participation of Denmark, Germany, Latvia, Poland, Sweden (all from 1991), Russia (from 1995), Estonia (from 1996) and Lithuania (from 2005).

**Link to sampling design documentation:**
https://www.ices.dk/sites/pub/Publication%20Reports/Forms/DispForm.aspx?ID=37133

**Compliance with international recommendations:**
Y

**Link to sampling protocol documentation:**
National sampling protocols are in line with the international agreed fishing method, Sampling of trawl catches and collect Environmental data in the Manual for the Baltic International Trawl Surveys (BITS),

https://www.ices.dk/sites/pub/Publication%20Reports/Forms/DispForm.aspx?ID=37133

**Compliance with international recommendations:**
Y

**Sampling implementation**

**Recording of refusal rate:**
NA

**Monitoring of sampling progress within the sampling year:**
NA

**Data capture**

**Means of data capture:**
Measuring boards, scales, dissection equipment, tubs & buckets, different sampling protocols, national fish data input software (FishInput), CTD probe with data processing software.

**Data capture documentation:**
https://www.ices.dk/sites/pub/Publication%20Reports/Forms/DispForm.aspx?ID=37133

**Quality checks documentation:**
Digitized and checked target data at sea by means of national software 'FishInput' is at land reviewed using different views and upload to national server (MySQL/ PostGre SQL).

**Data storage**

**National database:**
Database for Monitoring Aquatic Resources (DMAR).

**International database:**
ICES trawl surveys database DATRAS,
https://www.ices.dk/data/data-portals/Pages/DATRAS.aspx

**Quality checks and data validation documentation:**
Quality checks for data validation run when the data is uploaded from the national server to ICES-DATRAS.

**Sample storage**

Storage description:

Otoliths from cod and flatfish (plaice, flounder, dab, turbot and brill) are collected by German BITS every year in spring and autumn in the ICES subdivisions 22 and 24 since 1991. Most of the otoliths are dry stored in archive of the Thünen Institute of Baltic Sea Fisheries in Rostock. Otoliths of stored cod otoliths are approx. 60500

(SD22/SD24: 17500/43000) and a total of approx. 89000 for flatfish (plaice, SD22/SD24: 7000/27000), flounder, SD22/SD24: 8500/19000, dab, SD22/SD24:11500/9000, turbot, SD22/SD24: 1200/5500 and brill, SD22/SD24: 100/200).

Sample analysis:
https://www.ices.dk/sites/pub/Publication%20Reports/Forms/DispForm.aspx?ID=37133

**Data processing**

**Evaluation of data accuracy (bias and precision**
Y

Data capture occurs according to BITS standards in its manual,
https://www.ices.dk/sites/pub/Publication%20Reports/Forms/DispForm.aspx?ID=37133

Target data is collected strictly according to ICES-DATRAS requirements,
*https://datras.ices.dk/Data_products/ReportingFormat.aspx*

**Editing and imputation methods:**
Y

ICES Data validation performed upon data submissions is mostly automated, and produces data quality reports with quality flagged data for the submitter to verify if the data need any correction.
https://www.ices.dk/data/tools/Pages/data-validation.aspx

**Quality document associated to a dataset:**
All data quality control checks performed by the online screening programmes, or by ICES data officers before data are uploaded to the thematic portals are documented in the Quality Control Database (QC DB).

**Validation of the final dataset:**
When the data are used in the assessment, the assessment report and the associated management advice provide comments on the quality of the data, which is fed back to the data submitter and the ICES Data Centre.

| |
|---|
| **MS : DEU** |
| **Region: Baltic Sea / North Sea and Eastern Arctic / North East Atlantic** |
| **Sampling scheme identifier: SURVEY BIAS** |
| **Sampling scheme type: NA** |
| **Observation type: NA** |
| **Time period of validity:** 2022-2024 |
| The Baltic International Acoustic Survey (BIAS) are carried out annually in May and September- October, respectively. It is assumed that during autumn survey there is little or no emigration or immigration of pelagic stocks in the main part of the Baltic Sea so that the estimates are representing a good 'snapshot' of the herring, sprat and cod resources.<br>The survey is undertaken by Germany and Denmark in the western Baltic, while Finland, Estonia, Latvia, Poland and Sweden cover the reaming parts of the Baltic sea in the BIAS surveys.<br>Coordination and planning is undertaken during the annual WGIPS meeting. |
| **Description of the population** |
| **Population targeted:**<br>The survey aims to provide an annual estimate of the distribution, abundance and population structure to inform the assessment of the following herring and sprat stocks: Western Baltic Spring-spawning herring and sprat in ICES Subdivisions 21-24.<br><br>**Population sampled:**<br>The main target species in the surveys are pelagic clupeids (herring, sprat, sardine, anchovies).<br><br>**Stratification:**<br>A stratified systematic (parallel where possible) transect design. Start point not randomized. ICES statistical rectangles used as strata for all ICES subdivisions. |
| **Sampling design and protocols** |
| **Sampling design description:**<br><br>All acoustic investigations were performed during night time to account for the more pelagic distribution of clupeids during that time. The acoustic data are collected using a Simrad EK80 scientific echosounder with 38, 70, 120 and 200 kHz transducers. The general rule is to make as many trawl hauls as time permits; at least two per ICES rectangle. The principal objective is to obtain a sample from the school or the layer that appears as an echotrace on the sounder.<br><br>**Is the sampling design compliant with the 4S principle?:** NA<br><br>**Regional coordination:**<br>The German Autumn Acoustic Survey (GERAS) is coordinated by ICES WGIPS and the ICES Baltic International Fish Survey Working Group (WGBIFS). During the current reporting cycle, the survey provided the Herring Assessment Working Group (HAWG) and the Baltic Fisheries Assessment Working Group (WGBFAS) with index values for stock sizes of herring and sprat in the Western Baltic area (ICES Subdivisions 21-24).<br><br>**Link to sampling design documentation:**<br>Details on survey specific methods are reported annually in the cruise reports that appear in the WGIPS report: WGIPS: http://www.ices.dk/community/groups/Pages/WGIPS.aspx<br><br>**Compliance with international recommendations:** |

Y

**Link to sampling protocol documentation:**
ICES. 2015. Manual for International Pelagic Surveys (IPS). Series of ICES Survey Protocols SISP 9 – IPS. 92 pp.
ICES. 2017. Manual for the International Baltic Acoustic Surveys (IBAS). Series of ICES Survey Protocols SISP 8 - IBAS. 47 pp. http://doi.org/10.17895/ices.pub.3368

**Compliance with international recommendations:**
Y

**Sampling implementation**

**Recording of refusal rate:** NA

**Monitoring of sampling progress within the sampling year:** Survey results of the most recent surveys are summarized and uploaded into a Share point data folder, including a map showing the echo integration tracks and the location of trawling activities.

**Data capture**

**Means of data capture:**
Echo integration and further data analyses are carried out using GERIBAS II software and Microsoft Office. The total number of fish (total N) in one rectangle was estimated as the product of the mean Nautical Area Scattering Coefficient (NASC; SA) and the rectangle area, divided by the corresponding mean cross section σ. The total number was separated into the categories mentioned above and further into herring and sprat according to the mean catch composition. For herring and sprat either representative or length stratified samples are taken for maturity, age (otolith extraction) and weight.

**Data capture documentation:**
ICES. 2015. Manual for International Pelagic Surveys (IPS). Series of ICES Survey Protocols SISP 9 – IPS. 92 pp.
ICES. 2017. Manual for the International Baltic Acoustic Surveys (IBAS). Series of ICES Survey Protocols SISP 8 - IBAS. 47 pp. http://doi.org/10.17895/ices.pub.3368

**Quality checks documentation:** Y. ICES. 2015. Manual for International Pelagic Surveys (IPS). Series of ICES Survey Protocols SISP 9 – IPS. 92 pp.
ICES. 2017. Manual for the International Baltic Acoustic Surveys (IBAS). Series of ICES Survey Protocols SISP 8 - IBAS. 47 pp. http://doi.org/10.17895/ices.pub.3368

| |
|---|
| **MS : DEU** |
| **Region: Baltic Sea** |
| **Sampling scheme identifier: SURVEY SPRAS** |
| **Sampling scheme type: Survey** |
| **Observation type: NA** |
| **Time period of validity:** 2022-2024 |
| The main objective of this hydroacoustic survey is the annual assessment of small pelagic fish stocks, especially sprat, in the Baltic proper (SD 24-29). SPRAS is internationally co-ordinated by the ICES Baltic International Fish Survey Working Group (WGBIFS) where timing, surveyed area and the principal methods of investigation are discussed and agreed. The investigation area surveyed by Germany covers ICES SD 24-29, and thus most of the total area. The SPRAS combines hydroacoustic measurements and fishing hauls to estimate the biomass, weight and length distributions, and length-weight-age-sex-maturity data. Further, hydrographic data (temperature, salinity and oxygen) are collected. |
| **Description of the population** |
| **Population targeted:**<br>Target species is sprat (*Sprattus sprattus*) in the Baltic proper in ICES Subdivisions 24-29<br><br>**Population sampled:** pelagic survey<br><br>**Stratification:** - |
| **Sampling design and protocols** |
| **Sampling design description:**<br>The acoustic and ichthyological sampling stratification is based on ICES statistical rectangles (0.5 degree in latitude and 1 degree in longitude). The daily surveyed distance amounts to approximately 70-90 nautical miles with an objective of 60 nautical miles per statistical rectangle. In general, each ICES-rectangle is covered with two parallel transects spaced by a maximum of 15-18 nm whenever possible.<br>Fishing is conducted with a pelagic trawl according to hydroacoustic indications and subsequent biological measurement of catches (species, length composition, sex, maturity and age) are taken. Hydrographic measurements are recorded with a CTD probe on predetermined stations and after each fishing station when distant from the planned CTD station (circa 10nmi).<br><br>**Is the sampling design compliant with the 4S principle?:** NA<br><br>**Regional coordination:**<br>SPRAS is internationally co-ordinated by the ICES Baltic International Fish Survey Working Group (WGBIFS) where timing, surveyed area and the principal methods of investigation are discussed and agreed. In addition to Germany, other parts of the Baltic Sea are covered by Sweden, Lithuania, Latvia, Estonia, Russia and Poland<br><br>**Link to sampling design documentation:**<br><br>see survey manual: http://www.ices.dk/community/groups/Pages/WGBIFS.aspx<br><br>**Compliance with international recommendations:** Y<br><br>**Link to sampling protocol documentation:**<br><br>see survey manual: http://www.ices.dk/community/groups/Pages/WGBIFS.aspx |

**Compliance with international recommendations:** Y

**Sampling implementation**

**Recording of refusal rate:** NA

**Monitoring of sampling progress within the sampling year:** NA

**Data capture**

**Means of data capture:**
hydroacoustic measurements with an echosounder (38 kHz), measurement boards, scales, for further details see survey manual below

**Data capture documentation:**
see survey manual: http://www.ices.dk/community/groups/Pages/WGBIFS.aspx

**Quality checks documentation:** Y

**Data storage**

**National database:** NA

**International database:**
ICES Acoustic trawl database
https://www.ices.dk/data/data-portals/Pages/acoustic.aspx

**Quality checks and data validation documentation:**
https://acoustic.ices.dk/validationrules

**Sample storage**

Storage description:

otoliths for age readings are stored dry and dark in the archives of the Thünen Institute of Baltic Sea Fisheries

Sample analysis: see survey manual: http://www.ices.dk/community/groups/Pages/WGBIFS.aspx

**Data processing**

**Evaluation of data accuracy (bias and precision):**

Y for acoustic measurements through calibration, see survey manual:
http://www.ices.dk/community/groups/Pages/WGBIFS.aspx

**Editing and imputation methods:** NA

**Quality document associated to a dataset:** http://doi.org/10.17895/ices.pub/7581

**Validation of the final dataset:**
Quality check by scientist before upload and validated by ICES after uploading to database

| |
|---|
| **MS : DEU** |
| **Region: Baltic Sea** |
| **Sampling scheme identifier: SURVEY RHLS** |
| **Sampling scheme type: Survey** |
| **Observation type: NA** |
| **Time period of validity:** 2022-2024 |
| The target species is the western Baltic spring-spawning herring. The main aim is to monitor spawning activity and reproductive success of the spring-spawning herring of the Western Baltic Sea in its main spawning area, the Greifswald Bay. The target data are high-resolution spatial and temporal records of the larval abundance during the entire spawning period as well as hydrographic data (temperature, salinity and oxygen). The survey contains weekly sampling of larval herring on 35 stations using a 335µm Bongo net. The collected data are stored nationally and in the ICES Fish Eggs and Larvae data base. |
| **Description of the population** |
| **Population targeted:**<br>Larval herring (*Clupea harengus*) in Greifswald Bay<br><br>**Population sampled:**<br>Western Baltic spring-spawning herring. Larvae are sampled up to 20 mm total length as proxy for recruitment strength<br><br>**Stratification:**.<br>NA |
| **Sampling design and protocols** |
| **Sampling design description:**<br><br>**Is the sampling design compliant with the 4S principle?:**<br>NA<br><br>**Regional coordination:**<br>NA<br><br>**Link to sampling design documentation:**<br>https://www.ices.dk/community/groups/Pages/WGSINS.aspx<br><br>Oeberst R, Dickey-Collas M, Nash RDM (2009) Mean daily growth of herring larvae in relation to temperature over a range of 5-20°C, based on weekly repeated cruises in the Greifswalder Bodden. ICES J Mar Sci 66(8):1696-1701, DOI:10.1093/icesjms/fsp193<br>https://academic.oup.com/icesjms/article/66/8/1696/677425?login=true<br><br>Oeberst R, Klenz B, Gröhsler T, Dickey-Collas M, Nash RDM, Zimmermann C (2009) When is year-class strength determined in western Baltic herring? ICES J Mar Sci 66(8):1667-1672, DOI:10.1093/icesjms/fsp143<br>https://academic.oup.com/icesjms/article/66/8/1667/675141?login=true<br><br>Polte P (2013) Ruegen herring larvae survey and N20 larval index. Working Document WKPELA. Benchmark Workshop on on Pelagic Stocks (WKPELA): 4-8 February 2013. Copenhagen: ICES, 10 p<br><br>**Compliance with international recommendations:** |

Y

**Link to sampling protocol documentation:**

https://www.ices.dk/community/groups/Pages/WGSINS.aspx

Oeberst R, Dickey-Collas M, Nash RDM (2009) Mean daily growth of herring larvae in relation to temperature over a range of 5-20°C, based on weekly repeated cruises in the Greifswalder Bodden. ICES J Mar Sci 66(8):1696-1701, DOI:10.1093/icesjms/fsp193
https://academic.oup.com/icesjms/article/66/8/1696/677425?login=true

Oeberst R, Klenz B, Gröhsler T, Dickey-Collas M, Nash RDM, Zimmermann C (2009) When is year-class strength determined in western Baltic herring? ICES J Mar Sci 66(8):1667-1672, DOI:10.1093/icesjms/fsp143
https://academic.oup.com/icesjms/article/66/8/1667/675141?login=true

Polte P (2013) Ruegen herring larvae survey and N20 larval index. Working Document WKPELA. Benchmark Workshop on on Pelagic Stocks (WKPELA): 4-8 February 2013. Copenhagen: ICES, 10 p

**Compliance with international recommendations:**

Y

**Sampling implementation**

**Recording of refusal rate:**

NA

**Monitoring of sampling progress within the sampling year:**

Sampling progress is *inter alia* presented and adjusted by ICES expert groups
https://www.ices.dk/community/groups/Pages/WGALES.aspx

**Data capture**

**Means of data capture**

**Data capture documentation:**

https://www.thuenen.de/en/of/fields-of-activity/research/reproduction-biology/reproduktionsbiologie-des-herings/n20-rekrutierungsindex-aus-dem-heringslarvensurvey/
(in German language)

Oeberst R, Klenz B, Gröhsler T, Dickey-Collas M, Nash RDM, Zimmermann C (2009) When is year-class strength determined in western Baltic herring? ICES J Mar Sci 66(8):1667-1672, DOI:10.1093/icesjms/fsp143
https://academic.oup.com/icesjms/article/66/8/1667/675141?login=true

Polte P (2013) Ruegen herring larvae survey and N20 larval index. Working Document WKPELA. Benchmark Workshop on on Pelagic Stocks (WKPELA): 4-8 February 2013. Copenhagen: ICES, 10 p (ICES Report)

**Quality checks documentation:**

Internal report of ICES WGSINS, annually Dec/Jan

**Data storage**

**National database:**

NA

**International database:**

ICES eggs & larvae database
https://www.ices.dk/data/data-portals/Pages/Eggs-and-larvae.aspx

**Quality checks and data validation documentation:**

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| Quality check & data validation is conducted on the level of institutional expertise. |
| **Sample storage** |
| Ichthyoplankton samples of the target species and remaining content are stored at the national sampling institute fixated in buffered formalin for a duration of at least a decade (most samples > 2 decades). Sample quantities include 35 (+1) samples/week over an annual period of 15-17 weeks. As a consequence, an average of 560 samples /year is stored for future reference.<br>Sample analysis:<br>See https://www.ices.dk/sites/pub/Publication%20Reports/Forms/DispForm.aspx?ID=35921<br><br>Polte P, Kotterba P, Hammer C, Gröhsler T (2014) Survival bottlenecks in the early ontogenesis of Atlantic herring (*Clupea harengus*, L.) in coastal lagoon spawning areas of the western Baltic Sea. ICES J Mar Sci 71(4):982-990, doi:10.1093/icesjms/fst050<br><br>Polte P, Kotterba P, Moll D, Nordheim L von (2017) Ontogenetic loops in habitat use highlight the importance of littoral habitats for early life-stages of oceanic fishes in temperate waters. Sci Rep 7:42709, DOI:10.1038/srep42709 |
| **Data processing** |
| **Evaluation of data accuracy (bias and precision):**<br>N<br>The RHLS is conducted by a single, national research team. Raw data are evaluated by the responsible scientist according to larval herring abundance/m³. Malfunctions of flowmeter devices are the most abundant source of biased data. Erroneous flowmeter reading can be fully recognized and corrected by time series means of m³/depth data. This can only be conducted on the level of the sampling institute.<br><br>**Editing and imputation methods:**<br>Oeberst R, Klenz B, Gröhsler T, Dickey-Collas M, Nash RDM, Zimmermann C (2009) When is year-class strength determined in western Baltic herring? ICES J Mar Sci 66(8):1667-1672, DOI:10.1093/icesjms/fsp143<br><br>**Quality document associated to a dataset:**<br>N<br><br>**Validation of the final dataset:**<br>Validation of the raw data is conducted by the responsible national survey scientist. Validation of survey methods, computation of indices etc. is validated by the respective ICES expert groups (WGSINS; WGALES; HAWG). |

| |
|---|
| **MS : DEU** |
| **Region: Baltic Sea** |
| **Sampling scheme identifier: SURVEY FEJUCS (Fehmarn Juvenile Cod Survey)** |
| **Sampling scheme type: Survey** |
| **Observation type: NA** |
| **Time period of validity:** 2022-2024 |
| The objective of FEJUCS is to provide an independent estimate of the strength of the young-of-year cohort of Western Baltic cod, i.e. age-0 cod, using standardised length frequency samples of juvenile cod collected from commercial pound nets set in shallow waters around Fehmarn. The FEJUCS time series is used as a tuning fleet in the assessment of the Western Baltic cod stock by the ICES Baltic Fisheries Assessment Working Group (WGBFAS) as fishery-independent abundance index since 2019. |
| **Description of the population** |
| **Population targeted:**<br>Western Baltic Cod (*Gadus morhua*) – cod2224.<br><br>**Population sampled:**<br>Juvenile cod in shallow waters (<5 m depth) in ICES Subdivision 22.<br><br>**Stratification:**<br>NA |
| **Sampling design and protocols** |
| **Sampling design description:**<br>From September to December, cod samples are provided by two full-time, commercial pound net fishers who operate from the island of Fehmarn in Germany (Baltic Sea). The pound net fishers each maintain 3-5 stationary, uncovered pound nets in shallow waters (<5m) close to the coast (see figure below). The nets are set perpendicularly to the coast in a seagrass-dominated substrate and span over the entire water column. The pound net fishers target eel, but undersized cod are also retained in the catch chamber, when they migrate between daytime resting sites in deeper waters and night-time feeding sites in structured shallow water habitats.<br><br>The catch chambers are emptied by the fishers every 1-17 days (mean = 2.3 days) depending on the weather conditions. On each trip, samples (average sample weight: 3kg) of small cod (<38cm in length) are collected and weighed, and the weight of the entire catch of small cod including the sub-sample is estimated by the fisher and recorded in a protocol.<br>The undersized cod are frozen (-20°C) after landing at the port (Burgstaaken, Fehmarn). Cod from the frozen samples are later defrosted, measured and processed at the Thünen Institute of Baltic Sea Fisheries.<br><br>A detailed description is available on pages 293-310 of<br><br>ICES. 2019. Benchmark Workshop on Baltic Cod Stocks (WKBALTCOD2). ICES Scientific Reports. 1:9. 310 pp. http://doi.org/10.17895/ices.pub.4984<br><br>**Is the sampling design compliant with the 4S principle?:**<br>NA<br><br>**Regional coordination:**<br>No, FEJUCS is a national survey.<br><br>**Link to sampling design documentation:** |

A detailed description is available on pages 293-310 ofICES. 2019. Benchmark Workshop on Baltic Cod Stocks (WKBALTCOD2). ICES Scientific Reports. 1:9. 310 pp. http://doi.org/10.17895/ices.pub.4984

**Compliance with international recommendations:**
NA

**Link to sampling protocol documentation:**
A detailed description is available on pages 293-310 of

ICES. 2019. Benchmark Workshop on Baltic Cod Stocks (WKBALTCOD2). ICES Scientific Reports. 1:9. 310 pp. http://doi.org/10.17895/ices.pub.4984

**Compliance with international recommendations:**
No, but the approach was accepted by ICES during the benchmark of Baltic cod in 2019.
A detailed description is available on pages 293-310 of

ICES. 2019. Benchmark Workshop on Baltic Cod Stocks (WKBALTCOD2). ICES Scientific Reports. 1:9. 310 pp. http://doi.org/10.17895/ices.pub.4984

**Sampling implementation**

**Recording of refusal rate:**
NA

**Monitoring of sampling progress within the sampling year:**
NA

**Data capture**

**Means of data capture:**

Figure above: A commercial pound net near the mouth of Burgstaaken harbour, Fehmarn, Germany (Baltic Sea); from front to back: first chamber, wings and guiding net or leader (with white buoys), beach (photo: U. Krumme).

Buoys at the head line and weights at the lead line force fish to enter the catch chamber (mesh size 12mm) at the seaward end. The catch chamber is stretched by ropes attached to fixed pillars (see figure above).

For more details, please refer to pages 293-310 of

ICES. 2019. Benchmark Workshop on Baltic Cod Stocks (WKBALTCOD2). ICES Scientific Reports. 1:9. 310 pp. http://doi.org/10.17895/ices.pub.4984

**Data capture documentation:**
For more details, please refer to the pages 293-310 of

ICES. 2019. Benchmark Workshop on Baltic Cod Stocks (WKBALTCOD2). ICES Scientific Reports. 1:9. 310 pp. http://doi.org/10.17895/ices.pub.4984

**Quality checks documentation:**
Y. The age of juvenile Western Baltic cod has been validated using multi-year length-frequency distributions and otoliths of chemically-marked recaptures.

For details, please refer to:

McQueen K, Hrabowski J, Krumme U (2019) Age validation of juvenile cod in the western Baltic Sea. ICES J Mar Sci 76(2):430-441, DOI:10.1093/icesjms/fsy175

Krumme U, Stötera S, McQueen K, Pahlke E (2020) Age validation of age 0-3 wild cod *Gadus morhua* in the western Baltic Sea through mark-recapture and tetracycline marking of otoliths. Mar Ecol Progr Ser 645:141-158, DOI:10.3354/meps13380

Plonus R, McQueen K, Günther C, Funk S, Temming A, Krumme U (2021) Is analysis of otolith microstructure a valid method for investigating early life history of Western Baltic cod? Mar Biol 168:30, DOI:10.1007/s00227-021-03834-x

**Data storage**

**National database:**
National database (without a special name)

**International database:**
NA

**Quality checks and data validation documentation:**
Routine quality checks during and after data input

**Sample storage**

The otoliths are stored (in envelopes, dry, dark) in the otolith archive of the Thünen Institute of Baltic Sea Fisheries in Rostock, Germany. Otoliths are stored indefinitely.

For age reading:
Haase S, Krumme U (2020) Report of the autumn 2019 Western Baltic cod (*Gadus morhua*) age reading exchange – SD 22. SmartDots event ID: 201. *It includes an age reading guide for Western Baltic cod (cod2224)*
For processing of samples and data, refer to the pages 293-310 of:
ICES. 2019. Benchmark Workshop on Baltic Cod Stocks (WKBALTCOD2). ICES Scientific Reports. 1:9. 310 pp. http://doi.org/10.17895/ices.pub.4984

**Data processing**

**Evaluation of data accuracy (bias and precision):**

Y. For age reading, please refer to McQueen *et al.* (2019), Krumme *et al.* (2020) and Plonus *et al*. (2021).
For details on the index calculation, please refer to the pages 293-310 of:
ICES. 2019. Benchmark Workshop on Baltic Cod Stocks (WKBALTCOD2). ICES Scientific Reports. 1:9. 310 pp. http://doi.org/10.17895/ices.pub.4984

**Editing and imputation methods:**
Y. The data are put in Excel; calculations are performed using R. For details, please refer to the pages 293-310 of:
ICES. 2019. Benchmark Workshop on Baltic Cod Stocks (WKBALTCOD2). ICES Scientific Reports. 1:9. 310 pp. http://doi.org/10.17895/ices.pub.4984

**Quality document associated to a dataset:**
Index calculation:

ICES. 2019. Benchmark Workshop on Baltic Cod Stocks (WKBALTCOD2). ICES Scientific Reports. 1:9. 310 pp. http://doi.org/10.17895/ices.pub.4984

Age reading:

Haase S, Krumme U (2020) Report of the autumn 2019 Western Baltic cod (*Gadus morhua*) age reading exchange – SD 22. SmartDots event ID: 201. *It includes an age reading guide for Western Baltic cod (cod2224)*

Krumme U, Stötera S, McQueen K, Pahlke E (2020) Age validation of age 0-3 wild cod *Gadus morhua* in the western Baltic Sea through mark-recapture and tetracycline marking of otoliths. Mar Ecol Progr Ser 645:141-158, DOI:10.3354/meps13380

McQueen K, Hrabowski J, Krumme U (2019) Age validation of juvenile cod in the western Baltic Sea. ICES J Mar Sci 76(2):430-441, DOI:10.1093/icesjms/fsy175

Plonus R, McQueen K, Günther C, Funk S, Temming A, Krumme U (2021) Is analysis of otolith microstructure a valid method for investigating early life history of Western Baltic cod? Mar Biol 168:30, DOI:10.1007/s00227-021-03834-x

**Validation of the final dataset:**
Routine checks in the Thünen Institute of Baltic Sea Fisheries with every new data year

| |
|---|
| **MS : DEU** |
| **Region: North Sea** |
| **Sampling scheme identifier: SURVEY International Bottom Trawl Survey of the 1st quarter (IBTS-Q1)** |
| **Sampling scheme type: Survey** |
| **Observation type: NA** |
| **Time period of validity:** 2022-2024 |
| Sampling scheme aiming<br>• To determine the distribution and relative abundance of pre-recruits of the main commercial species with a view of deriving recruitment indices;<br>• To monitor changes in the stocks of commercial fish species independently of commercial fisheries data;<br>• To monitor the distribution and relative abundance of all fish species and selected invertebrates;<br>• To collect data for the determination of biological parameters for selected species;<br>• To collect hydrographical and environmental information;<br>• To determine the abundance and distribution of late herring larvae |
| **Description of the population** |
| **Population targeted:**<br>herring, sprat, cod, haddock, whiting, saithe, Norway pout, mackerel, plaice in the North Sea<br><br>**Population sampled:**<br>larvae, juveniles and adults of herring; juveniles and adults of sprat, cod, haddock, whiting, saithe, Norway pout, mackerel, plaice<br><br>**Stratification:**<br>Random hauls by statistical ICES rectangle |
| **Sampling design and protocols** |
| **Sampling design description:**<br>See sampling manual for details<br><br>**Is the sampling design compliant with the 4S principle?:**<br>NA<br><br>**Regional coordination:**<br>Coordinated by ICES working group - IBTSWG<br><br>**Link to sampling design documentation:**<br>The most recent version of the IBTS Manual is SISP 10 revision nr 11<br><br>The most recent version of the MIK-manual is SISP 13-MIK 3.0.<br><br>**Compliance with international recommendations:**<br>Y<br><br>**Link to sampling protocol documentation:**<br>See above<br><br>**Compliance with international recommendations:**<br>Y |

| Sampling implementation |
| --- |
| **Recording of refusal rate:**<br>NA<br>**Monitoring of sampling progress within the sampling year:**<br>Y – through IBTS Q1 survey coordinator |
| **Data capture** |
| **Means of data capture:**<br>Scales, measuring boards, staff, microscopes, computers<br><br>**Data capture documentation:**<br>https://www.ices.dk/data/data-portals/Pages/DATRAS.aspx<br>https://www.ices.dk/data/data-portals/Pages/Eggs-and-larvae.aspx<br><br>**Quality checks documentation:**<br>https://doi.org/10.17895/ices.pub.8219 |

| Data storage |
| --- |
| **National database:**.<br>NA<br>**International database:**<br>ICES - DATRAS and fish eggs and larvae database – see above for links<br><br>**Quality checks and data validation documentation:**<br>https://www.ices.dk/data/data-portals/Pages/default.aspx |
| **Sample storage** |
| Storage description:<br><br>Otoliths are stored as well as plankton samples<br><br>Sample analysis:<br>**https://www.ices.dk/community/groups/Pages/IBTSWG.aspx**<br>https://www.ices.dk/community/groups/Pages/WGSINS.aspx |
| **Data processing** |
| **Evaluation of data accuracy (bias and precision):**<br>No comprehensive analysis available, but several aspects analysed and documented in reports of the ICES IBTSWG (https://www.ices.dk/community/groups/pages/ibtswg.aspx), and the ICES Working Group on Improving use of Survey Data for Assessment and Advice (WGISDAA, https://www.ices.dk/community/groups/Pages/WGISDAA.aspx). Additional analyses regarding integration for the ecosystem approach: https://www.ices.dk/community/groups/Pages/WGISUR.aspx<br><br>**Editing and imputation methods:**<br>Information on data uploading process and option for data screening:<br>https://datras.ices.dk/Data%20submission/Default.aspx<br><br>**Quality document associated to a dataset:**<br>unknown, see ICES datacentre |

**Validation of the final dataset:**
unknown, see ICES datacentre

**MS : DEU**

**Region: North Sea**

**Sampling scheme identifier: SURVEY International Bottom Trawl Survey (IBTS Q3)**

**Sampling scheme type: Survey**

**Observation type: NA**

**Time period of validity:** 2022-2024

Internationally coordinated otter board survey to obtain biological data for several commercially targeted groundfish species and invertebrates, as well as the entire demersal fish communities in the North Sea. The IBTS Q3 is conducted annually since 1991; its main objectives are to determine and monitor:
1 ) Distribution, relative abundance and population age structure for the main commercial species;
2 ) Changes in their stocks, observed independently of commercial fisheries data;
3 ) Distribution and relative abundance of all fish species and selected invertebrates;
4 ) Biological parameters for selected species;
5 ) Accompanying hydrographical and environmental conditions, marine litter.

**Description of the population**

**Population targeted:**
Main target species, for which detailed biological data are obtained: herring, sprat, mackerel, cod, haddock, whiting, Norway out, saithe, plaice.
Survey area: North Sea incl. Skagerrak.

**Population sampled:**
Demersal fish communities including non-commercial species, plus commercially targeted invertebrates and cephalopods.

**Stratification:**
Systematic division of survey area into ICES rectangles; random distribution of hauls within trawlable area of each rectangle; if possible, sampling of each rectangle by two different ships/nations.

**Sampling design and protocols**

**Sampling design description:**
All fish species, cephalopods and larger (commercially used) invertebrates are recorded, either from the entire catch or from a representative subsample.

**Is the sampling design compliant with the 4S principle?:**
NA

**Regional coordination:**
International coordination through ICES, participating nations: Denmark, England, Germany, Norway, Scotland, Sweden.

**Link to sampling design documentation:**
https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%2010%20%E2%80%93%20Revision%2011_Manual%20for%20the%20North%20Sea%20International%20Bottom%20Trawl%20Surveys.pdf

**Compliance with international recommendations:**

Y, coordination through ICES International Bottom Trawl Survey Working Group (IBTSWG); https://www.ices.dk/community/groups/pages/ibtswg.aspx

**Link to sampling protocol documentation:**
https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%2010%20%E2%80%93%20Revision%2011_Manual%20for%20the%20North%20Sea%20International%20Bottom%20Trawl%20Surveys.pdf

**Compliance with international recommendations:**
Y, coordination through ICES International Bottom Trawl Survey Working Group (IBTSWG); https://www.ices.dk/community/groups/pages/ibtswg.aspx

**Sampling implementation**

**Recording of refusal rate:**
NA

**Monitoring of sampling progress within the sampling year:**
Survey coordination during the ongoing operation trough the Q3 survey coordinator of the IBTSWG

**Data capture**

**Means of data capture:**
Traditional catches (otter board trawl); working-up in laboratory: sorting at conveyor belt, length measurements on measuring board (partly with electronic boards); determination of individual weights for selected species; dissection to obtain biological data, tissue samples for genetic analyses or stomach contents.

**Data capture documentation:**
https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%2010%20%E2%80%93%20Revision%2011_Manual%20for%20the%20North%20Sea%20International%20Bottom%20Trawl%20Surveys.pdf

**Quality checks documentation:**
ICES Data Centre performing quality checks on uploaded survey data

**Data storage**

**National database:**
NA
**International database:**
ICES DATRAS website:
https://datras.ices.dk/Data_products/Download/Download_Data_public.aspx

**Quality checks and data validation documentation:**
Data are quality checked during the upload of data to the international data base. The filters and algorithms for data checking are being updated regularly, and communication between the ICES Data Centre and the survey coordination group (IBTSWG) takes place during the annual WG meeting. Upon request for the IBTSWG, new quality checks are included in the uploading routine.

**Sample storage**

Storage description:

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| Storage of otoliths at the national institutes involved in the survey. Storage of other samples at the participating institutes' and based on their own decision.<br><br>Sample analysis:<br>https://www.ices.dk/community/groups/pages/ibtswg.aspx |
| **Data processing** |
| **Evaluation of data accuracy (bias and precision):**<br>No comprehensive analysis available, but several aspects analysed and documented in reports of the ICES IBTSWG (https://www.ices.dk/community/groups/pages/ibtswg.aspx), and the ICES Working Group on Improving use of Survey Data for Assessment and Advice (WGISDAA, https://www.ices.dk/community/groups/Pages/WGISDAA.aspx). Additional analyses regarding integration for the ecosystem approach: https://www.ices.dk/community/groups/Pages/WGISUR.aspx<br><br>**Editing and imputation methods:**<br>Information on data uploading process and option for data screening:<br>https://datras.ices.dk/Data%20submission/Default.aspx<br><br>**Quality document associated to a dataset:**<br>Unknown, see ICES data centre<br><br>**Validation of the final dataset:**<br>Unknown, see ICES data centre |

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| **MS : DEU** |
| **Region: North Sea and Eastern Arctic** |
| **Sampling scheme identifier: SURVEY BTS** |
| **Sampling scheme type: Survey** |
| **Observation type: NA** |
| **Time period of validity:** 2022-2024 |
| The cruise is part of the German contribution to the International Beam Trawl Survey (BTS) in the North Sea. The ICES coordinated survey aims to provide assessment and science groups with consistent and standardized data for examining spatial and temporal changes in (a) the distribution and relative abundance of fish and fish assemblages; and (b) of the biological parameters of commercial fish species for stock assessment purposes, especially dab, plaice and sole. |
| **Description of the population** |
| **Population targeted:**<br>Target species are mainly dab, plaice and sole but also associated species and larger invertebrates.<br><br>**Population sampled:**<br>All size and age classes of target species are sampled.<br><br>**Stratification:**<br>Germany samples about 63 fishing stations in a grid of ICES statistical rectangles which is tried to be kept fixed. Generally, the same stations are fished every year. The study area extends from 55° N to 55° 30' N and from 4° E to the Danish coast. |
| **Sampling design and protocols** |
| **Sampling design description:**<br>Four stations are placed in the most inshore rec-tangles, three in the next seaward ones, and two otherwise. Each fishing haul is limited to a duration of 30 minutes.<br><br>**Is the sampling design compliant with the 4S principle?:** NA<br><br>**Regional coordination:**<br>internationally coordinated survey by ICES WGBEAM<br><br>**Link to sampling design documentation:**<br>SISP 14 - Manual for the Offshore Beam Trawl Surveys (WGBEAM), Version 3.4<br>https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%2014%20-%20Manual%20for%20the%20Offshore%20Beam%20Trawl%20Surveys%20(WGBEAM).pdf<br>**Compliance with international recommendations:** Y<br><br>**Link to sampling protocol documentation:**<br>https://www.ices.dk/community/groups/Pages/WGBEAM.aspx.<br><br>**Compliance with international recommendations:** Y |
| **Sampling implementation** |
| **Recording of refusal rate:** NA<br><br>**Monitoring of sampling progress within the sampling year:** NA |
| **Data capture** |

**Means of data capture:**
7.2 m beam trawl with five tickler chains attached, cod-end mesh size 40 mm, measurement boards, scales, knives, forceps

**Data capture documentation:**
see survey manual for details (SISP 14 - Manual for the Offshore Beam Trawl Surveys (WGBEAM), Version 3.4),
https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%2014%20-%20Manual%20for%20the%20Offshore%20Beam%20Trawl%20Surveys%20(WGBEAM).pdf

**Quality checks documentation:**
see survey manual for details (SISP 14 - Manual for the Offshore Beam Trawl Surveys (WGBEAM), Version 3.4),
https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%2014%20-%20Manual%20for%20the%20Offshore%20Beam%20Trawl%20Surveys%20(WGBEAM).pdf

**Data storage**

**National database:** Thünen SQL data base.

**International database:** held by ICES Database of Trawl Surveys (DATRAS)
https://www.ices.dk/data/data-portals/Pages/DATRAS.aspx

**Quality checks and data validation documentation:**
Germany has numerous quality checks in its self-developed data entry software. Further checks are carried out before uploading to the database. The age determination is confirmed by a second age reader.
https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%2014%20-%20Manual%20for%20the%20Offshore%20Beam%20Trawl%20Surveys%20(WGBEAM).pdf

**Sample storage**

Storage description: otoliths for age readings are stored dry and dark in the archives of the Thünen Institute of Sea Fisheries for an indefinite period of time.

Sample analysis: see survey manual for details (SISP 14 - Manual for the Offshore Beam Trawl Surveys (WGBEAM), Version 3.4)
https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%2014%20-%20Manual%20for%20the%20Offshore%20Beam%20Trawl%20Surveys%20(WGBEAM).pdf

**Data processing**

**Evaluation of data accuracy (bias and precision):** Y

**Editing and imputation methods:** Y, see survey manual for details (SISP 14 - Manual for the Offshore Beam Trawl Surveys (WGBEAM), Version 3.4)
https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%2014%20-%20Manual%20for%20the%20Offshore%20Beam%20Trawl%20Surveys%20(WGBEAM).pdf

**Quality document associated to a dataset:** NA

**Validation of the final dataset:**
Quality check by scientist before upload and validated by ICES after uploading to database

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| **MS : DEU** |
| **Region: North Sea and Eastern Arctic** |
| **Sampling scheme identifier: SURVEY Demersal Young Fish Survey DYFS** |
| **Sampling scheme type: Survey** |
| **Observation type:** |
| **Time period of validity:** 2022-2024 |
| The Demersal Young Fish Survey aims to collect data on abundance, distribution and biological data for demersal young fish and brown shrimp. 0-group plaice and 0-group sole indices are calculated and used for stock assessment purposes. The survey is coordinated by the ICES WGBEAM. The German part of the survey covers the German North Sea coast and the German Wadden Sea areas. |
| **Description of the population** |
| **Population targeted:**<br>The main target species are plaice, sole and brown shrimp. The main survey area is the German North Sea coast (within 12nm) and the German Wadden Sea areas<br><br>**Population sampled:**<br><br>0-group plaice, 0-group sole, whole population of brown shrimp. The older age groups of plaice and sole are mainly distributed further off shore and are targeted by the offshore beam trawl surveys.<br><br>**Stratification:**<br>Statistical areas are defined along the coast. |
| **Sampling design and protocols** |
| **Sampling design description:**<br>Otolith sampling is based on statistical areas and on length classes.<br><br>**Is the sampling design compliant with the 4S principle?:** NA<br><br>**Regional coordination:**<br>The DYFS is coordinated by the ICES WGBEAM. The Netherlands, Belgium and Germany participate.<br><br>**Link to sampling design documentation:**<br>ICES WGBEAM report:<br>https://doi.org/10.17895/ices.pub.8114<br><br>A manual for the inshore beam trawl surveys is not available yet but in progress. The finalization of a survey manual is one current ToR of the ICES WGBEAM.<br>**Compliance with international recommendations:** Y<br><br>**Link to sampling protocol documentation:**<br>ICES WGBEAM report:<br>https://doi.org/10.17895/ices.pub.8114<br><br>A manual for the inshore beam trawl surveys is not available yet but in progress. The finalization of a survey manual is one current ToR of the ICES WGBEAM.<br><br>**Compliance with international recommendations: Y** |

| Sampling implementation |
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| **Recording of refusal rate:** NA<br><br>**Monitoring of sampling progress within the sampling year:** NA |
| **Data capture** |
| **Means of data capture:**<br>Scales, measuring boards<br><br>**Data capture documentation:**<br>See link to sampling protocol documentation<br>**Quality checks documentation:**<br>See link to sampling protocol documentation |

| Data storage |
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| **National database:** Thünen SQL data base<br><br>**International database:**<br>ICES DATRAS<br><br>https://www.ices.dk/data/data-portals/Pages/DATRAS.aspx<br><br>**Quality checks and data validation documentation:**<br><br>https://www.ices.dk/data/data-portals/Pages/DATRAS.aspx |
| **Sample storage** |
| Otoliths are stored in the national institute. No special conservation needed.<br><br>Sample analysis:<br>See link to sampling protocol documentation |
| **Data processing** |
| **Evaluation of data accuracy (bias and precision):**<br>See link to sampling protocol documentation<br><br>**Editing and imputation methods:**<br>See link to sampling protocol documentation<br><br>**Quality document associated to a dataset:**<br>See link to sampling protocol documentation<br><br>**Validation of the final dataset:**<br>See link to sampling protocol documentation |

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| **MS : DEU** |
| **Region: North Sea and Eastern Arctic** |
| **Sampling scheme identifier: SURVEY (IHLS I and IHLS II)** |
| **Sampling scheme type: Survey** |
| **Observation type: NA** |
| **Time period of validity:** 2022-2024 |
| The main objective of the survey is helping to assess the herring stocks in the North Sea. The results of the herring larvae surveys are used to calculate an overall biomass index of the SSB of North Sea autumn-spawning herring as well as the relative contribution of different stock components on the total herring reproduction. The surveys monitor the annual distribution and abundance of herring larvae at the main spawning locations, the length frequency of herring larvae, as well as ambient water temperature and salinity. All relevant herring larvae data are stored together with basic hydrographic information in the ICES eggs and larvae database. The surveys are conducted annually during autumn (September) and winter (January). |
| **Description of the population** |
| **Population targeted:**<br>The IHLS covers the major herring spawning grounds in the North Sea, e.g. in the Orkney/Shetland area, the Buchan region, the Central North Sea and the Southern North Sea. Target species are newly hatched larvae of North Sea autumn spawning herring.<br><br>**Population sampled:**<br>The IHLS covers the major herring spawning grounds at spawning time in the North Sea.<br><br>**Stratification:** The stratification follows the spawning areas of the four major spawning components of North Sea herring. Standard gears are high-speed GULF samplers, deployed in a double oblique manner to near the sea bed and back to surface. Stations are located on a 10 by 10 nautical miles grid. This grid includes every square that is known to contain herring larvae less than 10 mm. Herring larvae are sorted from the samples and length-measured. The number of larvae per $m^2$ at each station is used to calculate mean numbers of larvae per $m^2$ for each ICES rectangle (consist of nine IHLS stations in total). These values are raised by the sea surface corresponding to the relevant rectangle and summed over the total area to obtain larvae abundance indices. |
| **Sampling design and protocols**<br>Standard gears are high-speed GULF samplers, deployed in a double oblique manner to near the sea bed and back to surface. Stations are located on a 10 by 10 nautical miles grid. This grid includes every square that is known to contain herring larvae less than 10 mm. Herring larvae are sorted from the samples and length-measured. The number of larvae per $m^2$ at each station is used to calculate mean numbers of larvae per $m^2$ for each ICES rectangle (consist of nine IHLS stations in total). These values are raised by the sea surface corresponding to the relevant rectangle and summed over the total area to obtain larvae abundance indices. |
| **Sampling design description:** The sampling allocation is defined by the spawning area of herring.<br><br>**Is the sampling design compliant with the 4S principle?:** NA<br><br>**Regional coordination:** Germany and The Netherlands participate in the IHLS sampling. The parental committee for the IHLS is the ICES Working Group on Surveys on Ichthyoplankton in the North Sea (WGSINS).<br><br>**Link to sampling design documentation:** The manual of the IHLS is available as Annex 7 to the ICES WGIPS Report 2010.<br><br>**Compliance with international recommendations:** Y |

**Link to sampling protocol documentation:** The manual of the IHLS is available as Annex 7 to the ICES WGIPS Report 2010.

**Compliance with international recommendations:** Y

**Sampling implementation**

**Recording of refusal rate:** NA

**Monitoring of sampling progress within the sampling year:** Individual tasks to the survey participants (e.g. coverage of certain areas in a certain time frame) are allocated by WGSINS. Each participating country is responsible for the activities conducted on its national part of the international survey. Sampling results are presented at the herring assessment working group each year.

**Data capture**

**Means of data capture:** Standard gears are high-speed plankton samplers, deployed in a double oblique manner to near the sea bed and back to surface. Stations are located on a 10 by 10 nautical miles grid. Herring larvae are sorted from the samples and length-measured. The number of larvae per $m^2$ at each station is used to calculate mean numbers of larvae per $m^2$ for each ICES rectangle (consist of nine IHLS stations in total). These values are raised by the sea surface corresponding to the relevant rectangle and summed over the total area to obtain larvae abundance

**Data capture documentation:** The manual of the IHLS is available as Annex 7 to the ICES WGIPS Report 2010.

**Quality checks documentation:** Y. Quality checks are included before uploading data into the ICES eggs and larvae database.

**Data storage**

**National database:** NA.

**International database:** ICES eggs and larvae database.

**Quality checks and data validation documentation:**
https://www.ices.dk/data/data-portals/Pages/Eggs-and-larvae.aspx

**Sample storage**

Storage description: The samples are stored by national institutes. This includes fish larvae, eggs and the remaining plankton. Samples are usually stored for decades and available for additional studies on request.

Sample analysis: Sampling and sample processing is described in the manual of the IHLS (Annex 7 to the ICES WGIPS Report 2010).

**Data processing**

**Evaluation of data accuracy (bias and precision):** Survey aspects are described each year in the WGSINS report (ICES. 2020. ICES Working Group on Surveys on Ichthyoplankton in the North Sea and adjacent Seas (WGSINS; outputs from 2019 meeting). ICES Scientific Reports. 2: 17. 33 pp. http://doi.org/10.17895/ices.pub.5969) and survey results given in the HAWG report. (ICES. 2020. Herring Assessment Working Group for the Area South of 62° N (HAWG). ICES Scientific Reports. 2:60. 1054 pp. http://doi.org/10.17895/ices.pub.6105).

**Editing and imputation methods:** Y. Survey results are uploaded by the national participants into the ICES eggs and larvae database.

**Quality document associated to a dataset:** Survey aspects are described each year in the WGSINS report (ICES. 2020. ICES Working Group on Surveys on Ichthyoplankton in the North Sea and adjacent Seas (WGSINS; outputs from 2019 meeting). ICES Scientific Reports. 2: 17. 33 pp. http://doi.org/10.17895/ices.pub.5969) and survey results given in the HAWG report. (ICES. 2020. Herring Assessment Working Group for the Area South of 62° N (HAWG). ICES Scientific Reports. 2:60. 1054 pp. http://doi.org/10.17895/ices.pub.6105) .

**Validation of the final dataset**: Quality checks should be implemented by each contributor prior to data upload. However, there is already some code implemented checking for spatial and temporal integrity of the data (e.g., points on land, consistency in date and time) and logic in the data sets (e.g., water and sampler depth, volume filtered, haul duration and distance etc.). These checks will be run before the data are integrated into the eggs and larvae database. The data portal provides a file template as well as specifications of the file format of the haul meta-information and the eggs and larvae measurements.

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| **MS : DEU** |
| **Region: North Sea and Eastern Arctic** |
| **Sampling scheme identifier: SURVEY NHAS** |
| **Sampling scheme type: Survey** |
| **Observation type: NA** |
| **Time period of validity:** 2022-2024 |
| The NHAS surveys are carried out annually in June/July to determine the distribution and abundance of herring and sprat in the North Sea region and to the west of Ireland and Scotland. Acoustic estimates are used as a tuning index by ICES to determine the size of the populations of herring and sprat and the results are submitted annually to HAWG. The survey is carried out by vessels from Denmark, Germany, Netherlands, Ireland, Norway and Scotland. Coordination and<br>planning of the surveys are undertaken during the annual WGIPS meeting. |
| **Description of the population** |
| **Population targeted:**<br>The survey aims to provide an annual estimate of the distribution, abundance and population structure to inform the assessment of the following herring and sprat stocks: Western Baltic Spring-spawning herring (in ICES Divisions 4 and 3a), North Sea Autumn Spawning herring (in 4 and 3a), West of Scotland herring (in 6aN), Malin Shelf herring (west of Scotland/Ireland in 6aN-S and 7b,c), North Sea sprat (in 4) and sprat in 3a (western Baltic).<br><br>**Population sampled:**<br>The main target species in the surveys are pelagic clupeids (herring, sprat, sardine, anchovies).<br><br>**Stratification:**<br>A stratified, systematic, parallel transect design with random starting points is used in this survey. Survey stratification is based on ICES statistical rectangles with a range of 1 degree in latitude and 2 degrees in longitude. Each ICES rectangle should be covered with a minimum of one transect and with higher intensity where historically a high abundance or variability of abundance has been detected. |
| **Sampling design and protocols** |
| **Sampling design description:**<br>The acoustic data are collected using a Simrad EK60 scientific echosounder with 38 kHz transducers. The general rule is to make as many trawl hauls as time permits, especially if echotraces are visible on the echosounder after a blank period. The principal objective is to obtain a sample from the school or the layer that appears as an echotrace on the sounder. The trawling gear used is of little importance as long as it is suitable for catching a sample of the target-school or layer. During trawling it is important to take note of the traces on the echosounder and the netsonde in order to judge if the target-school entered the net or if some other traces “spoil” the sample. It is recommended that notes be made on the appearance and behaviour of fish in the net during every haul.<br><br>**Is the sampling design compliant with the 4S principle?:** NA<br><br>**Regional coordination:**<br>The surveys are coordinated through the ICES Working Group of International Pelagic Surveys (WGIPS) as a guide to the methodologies adhered to during the planning, execution and analysis phases of WGIPS coordinated surveys. The group coordinates 29 individual surveys undertaken in the Northeast Atlantic by nine countries (Ireland, Germany, Scotland, UK (England, Scotland, Northern Ireland), Russian Federation, Norway, Netherlands, Faroe Islands, Denmark and Iceland).<br><br>**Link to sampling design documentation:**<br>Details on survey specific methods are reported annually in the cruise reports that appear in the WGIPS report: WGIPS: http://www.ices.dk/community/groups/Pages/WGIPS.aspx |

**Compliance with international recommendations:** Y

**Link to sampling protocol documentation:**
ICES. 2015. Manual for International Pelagic Surveys (IPS). Series of ICES Survey Protocols SISP 9 – IPS. 92 pp.

**Compliance with international recommendations:** Y

**Sampling implementation**

**Recording of refusal rate:** NA

**Monitoring of sampling progress within the sampling year:** Survey participants exchange emails about survey progress while at sea. A survey coordinator is available in case transects must be swapped between participants.

**Data capture**

**Means of data capture:**
Echo integration and further data analyses are carried out in national laboratories for the area they cover using either MAREC LSSS (Large Scale Survey System), Myriax Echoview or EchoAnn software as well as other nationally developed analysis programmes.
The fish sample obtained from the trawl catch is divided into species by weight and by number. Length measurements are taken to the nearest 0.5 cm below for sprat and herring (and to the whole cm below for other species). For herring and sprat either representative or length stratified samples are taken for maturity, age (otolith extraction) and weight.

**Data capture documentation:**
ICES. 2015. Manual for International Pelagic Surveys (IPS). Series of ICES Survey Protocols SISP 9 – IPS. 92 pp.

**Quality checks documentation:** Y. ICES. 2015. Manual for International Pelagic Surveys (IPS). Series of ICES Survey Protocols SISP 9 – IPS. 92 pp.

**Data storage**

**National database:** NA

**International database:** ICES database on acoustic trawl surveys.
https://www.ices.dk/data/data-portals/Pages/acoustic.aspx

**Quality checks and data validation documentation:**
ICES. 2015. Manual for International Pelagic Surveys (IPS). Series of ICES Survey Protocols SISP 9 – IPS. 92 pp.
and annual survey reports
WGIPS: http://www.ices.dk/community/groups/Pages/WGIPS.aspx

**Sample storage**

Storage description:

Otoliths used for age determination are stored by the national labs.

Sample analysis: ICES. 2015. Manual for International Pelagic Surveys (IPS). Series of ICES Survey Protocols SISP 9 – IPS. 92 pp. and annual survey reports
WGIPS: http://www.ices.dk/community/groups/Pages/WGIPS.aspx

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| **Data processing** |
| **Evaluation of data accuracy (bias and precision):** Y<br>Sample analysis: ICES. 2015. Manual for International Pelagic Surveys (IPS). Series of ICES Survey and dedicated scrutinization workshops and working group meetings.<br>ICES. 2021. Working Group of International Pelagic Surveys (WGIPS).<br>ICES Scientific Reports. 3:40. 481pp. https://doi.org/10.17895/ices.pub.8055<br><br>**Editing and imputation methods:** Y.<br>ICES. 2015. Manual for International Pelagic Surveys (IPS). Series of ICES Survey and dedicated scrutinization workshops and working group meetings<br><br>**Quality document associated to a dataset:**<br>ICES. 2021. Working Group of International Pelagic Surveys (WGIPS). ICES Scientific Reports. 3:40. 481pp. https://doi.org/10.17895/ices.pub.8055<br><br>**Validation of the final dataset:** Data analyses and combination is object of an annual post cruise meeting of NHAS participants. |

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| **MS: DEU** |
| **Region: North East Atlantic** |
| **Sampling scheme identifier: SURVEY REDTAS (IDEEPS)** |
| **Sampling scheme type: Survey** |
| **Observation type: NA** |
| **Time period of validity: 2022-2024** |
| This cruise is part of a co-ordinated effort of ICES to undertake an International Deep Pelagic Ecosystem Survey in the Irminger Sea and adjacent waters in June/July, estimating the abundance and biomass of the pelagic beaked redfish (Sebastes mentella) stocks and conducting additional observations relevant to integrated ecosystem assessment in the area. |
| **Description of the population** |
| **Population targeted:** The targeted stocks are the deep pelagic beaked redfish (*Sebastes mentella*) and the shallow pelagic beaked redfish (*S. mentella*). The survey covers the open waters of the Irminger Sea and adjacent waters down to 1000 m from 52°30'N to 65°30´N and from 24°W to 58°W<br><br>**Population sampled:** REDTAS is pelagic single-species survey, targeting two different stocks of *Sebastes mentella.* The survey covers almost entirely the adult population, juvenile S. mentella dwell in different regions (i.e. shelf areas).<br><br>**Stratification:** The survey is stratified in depth zones. In the depth zone that can be surveyed by hydroacoustic measurements, i.e. shallower than the deep-scattering layer (DSL; down to about 350 m), hydroacoustic measurements and identification trawls are carried out. Within and below the DSL (down to about 950 m), redfish abundance is estimated by trawls. |
| **Sampling design and protocols** |
| **Sampling design description:** Primary sampling Units:<br>• Hydroacoustics – Elementary sampling distance units (ESDU) is 1 square nautical miles.<br>• Trawling – Single haul or codend when using multi-sampler standardized to kg per square nautical miles.<br>• Hydrography – Vertical CTD profile to measure water temperature, salinity and pressure.<br>The distribution of survey tracks within the distribution area of pelagic beaked redfish and the distance between them is based on experience from the past surveys, fisheries information, number of vessels participating in the survey and available vessel time. Parallel transects are spaced evenly in the research area with the distance between the planned cruise tracks of 30, 45 or 60 square nautical miles.<br>Transects can be shortened in case of continuous registrations with no redfish combined with very low catch rates and particular hydrographical conditions (low water temperature).<br>Sampling strategy by trawling is adaptive, i.e. trawling is conducted on redfish registration down to ca. 350 m. In addition, it is geographically stratified by statistical rectangles (one degree latitude by 2 degrees longitude) and vertically stratified by trawl type.<br>For the aggregation of biological data, these subareas were grouped into three larger geographical units since the 2005–2007 surveys, namely a northeastern (subarea A), southwestern (subareas D-F) and southeastern area (subareas B and C).<br>Hydrographical observations using CTD probes down to 1000 m depth are taken at the end of each transect and at each trawl station location.<br><br>**Is the sampling design compliant with the 4S principle?:** NA |

**Regional coordination:** The sampling design was developed within the framework of the International Council for the Exploration of the Sea (ICES). The survey is coordinated by the ICES Working Group on International Deep Pelagic Ecosystem Surveys (WGIDEEPS).
https://www.ices.dk/community/groups/Pages/WGIDEEPS.aspx

**Link to sampling design documentation:**
https://www.ices.dk/sites/pub/publication%20reports/forms/defaultone.aspx?rootfolder=/sites/pub/publication+reports/ices+survey+protocols+(sisp)

**Compliance with international recommendations:** 'Y'

**Link to sampling protocol documentation:**
https://www.ices.dk/sites/pub/publication%20reports/forms/defaultone.aspx?rootfolder=/sites/pub/publication+reports/ices+survey+protocols+(sisp)

**Compliance with international recommendations:** 'Y'

**Sampling implementation**

**Recording of refusal rate:** 'NA'

**Monitoring of sampling progress within the sampling year:** 'NA'

**Data capture**

**Means of data capture:** scales, measuring board, Simrad EK60 split-beam echosounder and the standard frequency is 38 kHz with hull-mounted transducers. For post-processing EchoView or FAMAS can be used for echo integration. For details:
https://www.ices.dk/sites/pub/publication%20reports/forms/defaultone.aspx?rootfolder=/sites/pub/publication+reports/ices+survey+protocols+(sisp)

**Data capture documentation:**
https://www.ices.dk/sites/pub/publication%20reports/forms/defaultone.aspx?rootfolder=/sites/pub/publication+reports/ices+survey+protocols+(sisp)

**Quality checks documentation:**
https://www.ices.dk/sites/pub/publication%20reports/forms/defaultone.aspx?rootfolder=/sites/pub/publication+reports/ices+survey+protocols+(sisp)

**Data storage**

**National database:** Data are stored on the computers of the participating scientists and are exchanged after the survey. The data are then uploaded to the relevant data base of the International Council for the Exploration of the Sea (ICES), see below.

**International database:** DATRAS of the International Council for the Exploration of the Sea (ICES):
https://www.ices.dk/data/data-portals/Pages/DATRAS.aspx

**Quality checks and data validation documentation:**
International Council for the Exploration of the Sea (ICES):
https://www.ices.dk/data/data-portals/Pages/DATRAS.aspx

**Sample storage**

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| Otoliths for age reading are stored at national labs of the participating countries.<br><br>Results of age reading exercises regarding the samples from REDTAS are discussed at the ICES Northwestern Working Group (NWWG), which is the relevant assessment working group:<br>https://www.ices.dk/community/groups/Pages/NWWG.aspx |
| **Data processing** |
| **Evaluation of data accuracy (bias and precision):** 'Y':<br>https://www.ices.dk/sites/pub/publication%20reports/forms/defaultone.aspx?rootfolder=/sites/pub/publication+reports/ices+survey+protocols+(sisp)<br><br>**Editing and imputation methods:** 'Y':<br>https://www.ices.dk/sites/pub/publication%20reports/forms/defaultone.aspx?rootfolder=/sites/pub/publication+reports/ices+survey+protocols+(sisp)<br><br>**Quality document associated to a dataset:** The results of the survey are published as a working group report. The latest report can be found here:<br>https://www.ices.dk/community/groups/Pages/WGIDEEPS.aspx<br><br>**Validation of the final dataset:** During the upload process to the DATRAS quality checks are being conducted. |

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| **MS : DEU** |
| **Region: North East Atlantic** |
| **Sampling scheme identifier: SURVEY GGS (Greenland Groundfish Survey)** |
| **Sampling scheme type: Survey** |
| **Observation type: NA** |
| **Time period of validity:** 2022-2024 |
| Sampling scheme aiming to collect biological samples (length/weight/age/sex) from the annual fishery-independent groundfish survey for Atlantic cod and redfish (*Sebastes mentella* & *Sebastes norvegicus*). Species of the whole groundfish assemblage present in the area are recorded. The scheme covers slope and continental shelf regions in East, South and Southwest Greenland waters. |
| **Description of the population** |
| **Population targeted:** East Greenland offshore cod (*Gadus morhua*) in ICES 14b & NAFO 1F and demersal redfish (*Sebastes mentella* and *Sebastes norvegicus*) off East Greenland.<br><br>**Population sampled:** For both species, mainly the adult stock is sampled. Nursery areas for redfish are still largely unknown and nursery areas for Atlantic cod are in more northern areas in West Greenland, which the survey does not cover. For deep-sea redfish (*Sebastes mentella*), only a part of the depth distribution is covered.<br><br>**Stratification:** The whole survey area is density-stratified and hauls are carried out proportionally to the size of the area and the expected density of the fish populations. |
| **Sampling design and protocols** |
| **Sampling design description:** The sampling area is divided into 14 strata in 7 regions. Each region is divided in a shallow and a deep stratum. 50 % of the hauls are made proportionally to the size of the stratum and 50 % according to the expected density of the target populations.<br><br>**Is the sampling design compliant with the 4S principle?:**<br>NA<br><br>**Regional coordination:** The sampling design and protocols were not developed as part of a regional coordination, but in long-term international cooperation within the ICES North-Western Working Group (NWWG).<br><br>**Link to sampling design documentation:**<br>Fock, H.O. 2007. Driving-forces for Greenland offshore groundfish assemblages: Interplay of climate, ocean productivity and fisheries. J. Northwest Atl. Fish. Sci. **39**: 103–118. doi:10.2960/J.v39.m588.<br>Rätz, H.J. 1996. Efficiency of geographical and depth stratification in error reduction of groundfish survey results: Case study Atlantic cod off Greenland. NAFO Sci. Counc. Stud. (28): 65–71.<br><br>**Compliance with international recommendations:** Y, the sampling design is in line with international recommendations (ICES NWWG).<br><br>**Link to sampling protocol documentation:** Detailed sampling information for the biological protocol for Atlantic cod can be found here:<br>Werner, K., Taylor, M., Diekmann, R., Lloret, J., Möllmann, C., Primicerio, R., and Fock, H. 2019. Evidence for limited adaptive responsiveness to large-scale spatial variation of habitat quality. Mar. Ecol. Prog. Ser. 629: 179–191. doi:10.3354/meps13120.<br>Measurements for other, albeit rarer gadoid species, such as saithe (*Pollachius virens*) or haddock (*Melanogrammus aeglefinus*) are taken the same way. For redfish, age is not determined. |

**Compliance with international recommendations:** Y

**Sampling implementation**

**Recording of refusal rate:** NA

**Monitoring of sampling progress within the sampling year:**
Because this is a research survey, which only takes place once a year, issues are only resolved in the period between surveys. Mitigation measures are adopted between surveys.

**Data capture**

**Means of data capture:** Scales, measuring boards, knives, forceps

**Data capture documentation:**
Werner, K., Taylor, M., Diekmann, R., Lloret, J., Möllmann, C., Primicerio, R., and Fock, H. 2019. Evidence for limited adaptive responsiveness to large-scale spatial variation of habitat quality. Mar. Ecol. Prog. Ser. 629: 179–191. doi:10.3354/meps13120.

**Quality checks documentation:** Data quality is regularly checked internally and in collaboration with the Greenland Institute of Natural Resources.

**Data storage**

**National database:** Thünen SQL data base.

**International database:** NA

**Quality checks and data validation documentation:** The storage quality is regularly checked by the IT department at the Thünen Institute.

**Sample storage**

Otoliths, stomachs, plankton, genetic samples, stable isotope samples. Otoliths are stored in the archive of the Thünen Institute. Biological samples, such as plankton, fin clips are stored in ethanol or formaldehyde in safe places and analysed as soon as possible after the survey. International protocols for sample analysis are followed, see https://www.ices.dk/community/Pages/PGCCDBS-doc-repository.aspx.

**Data processing**

**Evaluation of data accuracy (bias and precision):** Data accuracy is checked internally and in collaboration with the Greenland Institute of Natural Resources.

**Editing and imputation methods:** Within the ICES NWWG editing and imputation metods were covered (see ICES NWWG reports and stock annexes).

**Quality document associated to a dataset:** DOI publication: No. Estimation procedures are documented in the ICES NWWG reports.

**Validation of the final dataset:** Data sets are checked by the IT department and the scientists working with the data at the Thünen Institute.

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| **MS : DEU** |
| **Region: North East Atlantic** |
| **Sampling scheme identifier: SURVEY MEGS** |
| **Sampling scheme type: Survey** |
| **Observation type: NA** |
| **Time period of validity:** 2022-2024 |
| Data collected provide an estimate of the total annual egg production that in turn provides an estimate of spawning-stock biomass for both the western and North Sea Atlantic mackerel stocks. It also provides a relative abundance index of spawning for horse mackerel in the Northeast Atlantic.<br><br>The mackerel egg survey has been running continuously on a triennial basis since 1977. It typically takes place between February and July and aims to cover the entire spawning area from Cadiz in the south to Northwest Scotland and since 2010, up to the waters around the Faroe Islands and southeast of Iceland. There are currently nine nations and ten institutes participating in the survey. |
| **Description of the population** |
| **Population targeted:** NEA mackerel and horse mackerel. The German part of the survey covers typically mainly parts of ICES area 7 west of the British isles and Celtic Sea<br><br>**Population sampled:** Spawning mackerel and freshly spawned mackerel eggs, adult horse mackerel and horse mackerel eggs<br><br>**Stratification:** see survey manual for details (SISP 6 - Manual for the mackerel and horse mackerel egg surveys (MEGS): sampling at sea. Version 1.3, http://doi.org/10.17895/ices.pub.7579 ) |
| **Sampling design and protocols** |
| **Sampling design description:** The general method is to quantify the freshly spawned eggs in the water column on the spawning grounds and to determine the fecundity of the females. This is done by sampling sufficient numbers of gonads before during and after the spawning. These are then histologically analysed. In combination, the realised fecundity (potential fecundity minus atresia) of the females and the actual number of freshly spawned eggs in the water render an estimate of the spawning stock biomass. See survey manuals for details (SISP 6 - Manual for the mackerel and horse mackerel egg surveys (MEGS): sampling at sea. Version 1.3, http://doi.org/10.17895/ices.pub.7579 and WGMEGS Manual for the AEPM and DEPM estimation of fecundity in mackerel and horse mackerel Version 11.0, http://doi.org/10.17895/ices.pub/7585 )<br><br>**Is the sampling design compliant with the 4S principle?:** NA<br><br>**Regional coordination:** internationally coordinated survey by ICES WGMEGS. Participating countries are Portugal, Spain, the Netherlands, Germany, Ireland, Faroe Islands, UK, Norway, Denmark<br><br>**Link to sampling design documentation:** SISP 6 - Manual for the mackerel and horse mackerel egg surveys (MEGS): sampling at sea. Version 1.3, http://doi.org/10.17895/ices.pub.7579 ) and WGMEGS Manual for the AEPM and DEPM estimation of fecundity in mackerel and horse mackerel Version 11.0, http://doi.org/10.17895/ices.pub/7585<br><br>**Compliance with international recommendations:** Y<br><br>**Link to sampling protocol documentation:** https://www.ices.dk/community/groups/Pages/WGMEGS.aspx<br><br>**Compliance with international recommendations:** Y |
| **Sampling implementation** |

**Recording of refusal rate:** NA

**Monitoring of sampling progress within the sampling year:**
Survey coordination during the ongoing operation through the survey coordinator of the WGMEGS

**Data capture**

**Means of data capture:** see survey manual for details (SISP 6 - Manual for the mackerel and horse mackerel egg surveys (MEGS): sampling at sea. Version 1.3, http://doi.org/10.17895/ices.pub.7579 ) and WGMEGS Manual for the AEPM and DEPM estimation of fecundity in mackerel and horse mackerel Version 11.0, http://doi.org/10.17895/ices.pub/7585

**Data capture documentation:** see survey manual for details (SISP 6 - Manual for the mackerel and horse mackerel egg surveys (MEGS): sampling at sea. Version 1.3, http://doi.org/10.17895/ices.pub.7579 ) and WGMEGS Manual for the AEPM and DEPM estimation of fecundity in mackerel and horse mackerel Version 11.0, http://doi.org/10.17895/ices.pub/7585 and

**Quality checks documentation:** see survey manual for details (SISP 6 - Manual for the mackerel and horse mackerel egg surveys (MEGS): sampling at sea. Version 1.3, http://doi.org/10.17895/ices.pub.7579 ) and WGMEGS Manual for the AEPM and DEPM estimation of fecundity in mackerel and horse mackerel Version 11.0, http://doi.org/10.17895/ices.pub/7585

**Data storage**

**National database:** NA

**International database:** hold by the international survey coordinator (Brendan o´Hea, MI) and https://data.ices.dk/view-map?dataset=194734 ICES Eggs and larvae data sets

**Quality checks and data validation documentation:** see survey manual for details (SISP 6 - Manual for the mackerel and horse mackerel egg surveys (MEGS): sampling at sea. Version 1.3, http://doi.org/10.17895/ices.pub.7579 ) and WGMEGS Manual for the AEPM and DEPM estimation of fecundity in mackerel and horse mackerel Version 11.0, http://doi.org/10.17895/ices.pub/7585 and latest WG report https://doi.org/10.17895/ices.pub.8249

**Sample storage**

Plankton samples from the German part of the survey are stored in formaldehyde locally in the home institute. In average 200 plankton samples plus the fish eggs fractions and up to 800 fecundity samples are taken during the survey. Fecundity samples are sent to other institutes for further investigations. Otoliths from adult mackerel catches are stored dry and dark in the archives of the Thünen Institute of Sea Fisheries

Sample analysis: see survey manual for details (SISP 6 - Manual for the mackerel and horse mackerel egg surveys (MEGS): sampling at sea. Version 1.3, http://doi.org/10.17895/ices.pub.7579 ) and WGMEGS Manual for the AEPM and DEPM estimation of fecundity in mackerel and horse mackerel Version 11.0, http://doi.org/10.17895/ices.pub/7585

**Data processing**

**Evaluation of data accuracy (bias and precision):** Y, see survey manual for details (SISP 6 - Manual for the mackerel and horse mackerel egg surveys (MEGS): sampling at sea. Version 1.3, http://doi.org/10.17895/ices.pub.7579 ) and WGMEGS Manual for the AEPM and DEPM estimation of fecundity in mackerel and horse mackerel Version 11.0, http://doi.org/10.17895/ices.pub/7585 and https://www.ices.dk/community/groups/Pages/WGMEGS.aspx

**Editing and imputation methods:** see survey manual for details (SISP 6 - Manual for the mackerel and horse mackerel egg surveys (MEGS): sampling at sea. Version 1.3, http://doi.org/10.17895/ices.pub.7579 ) and

https://www.ices.dk/community/groups/Pages/WGMEGS.aspx and latest WG report https://doi.org/10.17895/ices.pub.8249

**Quality document associated to a dataset:** NA

**Validation of the final dataset:** plankton data are first checked by the scientists working with the data at the Thünen Institute and then validated by the survey coordinator and ICES WGMEGS

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| **MS : DEU** |
| **Region: North East Atlantic** |
| **Sampling scheme identifier: SURVEY EELS** |
| **Sampling scheme type: Survey** |
| **Observation type: SelfAtSea** |
| **Time period of validity:** 2022-2024 |
| Current stock assessment of the European eel (*Anguilla anguilla*) is solely based on glass eel arrival time series. In addition, all EU member states are obliged to report silver eel escapement (EC No 1100/2007). However, little information is available to show either a stock-recruitment relationship as an implicit basis for the intended increase in spawning biomass or a direct correlation between silver eel escapement and subsequent glass eel arrival. The EELS survey fulfils the urgent need of an eel larvae time series investigation in the Sargasso Sea by assessing spatially resolved larval abundances and length distributions. |
| **Description of the population** |
| **Population targeted:**<br>The main target species of this research larval survey (EELS) is the European Eel (*Anguilla anguilla*) and the main survey area is the Sargasso Sea (22°N-31°N and 54°W-70°W).<br>The European eel is a facultatively catadromous species with a complex life history as a long-lived semelparous and widely dispersed species. During its continental phase, the European eel is unevenly distributed across most coastal countries in Europe and North Africa, with its southern limit in Morocco (30°N), its northern limit situated in the Barents Sea (72°N) and spanning the entire Mediterranean basin. The shared single stock is considered genetically panmictic and data indicate that the spawning area is in the southwestern part of the Sargasso Sea. The newly hatched leptocephalus larvae drift with the ocean currents to the continental shelf of Europe and North Africa, where they metamorphose into glass eels and enter continental waters. Glass eel densities are greatest in the centre of their distribution around the Bay of Biscay, with high densities also occurring in the eastern Mediterranean and in the Bristol Channel. The growth stage, known as yellow eel, may take place in marine, brackish (transitional), or freshwaters. This stage may last typically from two to 25 years (and can exceed 50 years) prior to metamorphosis to the "silver eel" stage, maturation and spawning migration.<br>The European eel is classified as a category 3 stock: "stocks for which survey-based assessments indicate trends. Includes stocks for which survey or other indices are available that provide reliable indications of trends in stock metrics, such as total mortality, recruitment, and biomass" (ICES, 2019). The reason for this is that there are not enough data available for a quantitative assessment (category 1 and 2 stocks), but there is an index available which functions to indicate a trend in eel recruitment. For those stocks in category 3, without reference points, and with extremely low biomass relative to previous estimates, the provision of a precautionary Advice includes a zero-catch Advice (ICES, 2021). The recurrent ICES advice on fishing opportunities for eel is based on a statistical analysis of several time-series on recruitment (here defined as glass eel and or a mixture of glass + yellow eels, and of young yellow eel time-series). However, glass and young yellow eel time-series reflect spawning plus impacts during the oceanic migration to continental waters. Reference points such as $B_{lim}$ used in traditional stock assessments are not available since spawning in the wild has not been observed or quantified and escapement (i.e. the biomass of silver eels that yearly leaves continental waters towards the spawning ground) as the best possible proxy of escapement at the population scale is difficult to quantify. While time-series for escapement are collected at a few sites over the distribution area, their use to infer a trend at the population scale is a challenge because of the complex ecology of eels compounded by the absence of data in some areas.<br>Therefore, to prove a traditional stock–recruitment (SSB–R) relationship for the European eel based on silver eel escapement and subsequent glass and young yellow eel arrival, the impacts during the oceanic migration from continental waters to the Sargasso Sea for silver eels and from the Sargasso Sea to continental waters for leptocephalus larvae need to be understood and at best quantified. Since this is practically impossible to reach, a time series investigation on the abundance of young-of-the-year early life stages in the Sargasso Sea, the spawning ground of the European eel, is urgently needed to evaluate the success of management measures implemented as a consequence of the European Eel Regulation. |

**Population sampled:**
The European eel is considered to be a panmictic species without population structure. Its presumed spawning time is in early spring. The EELS survey is conducted between mid-March and mid-April in an area between 22°N and 31°N and 54°W and 70°W. For practical reasons (limitations in ship-time and funding), the survey is currently only conducted on a triennial basis. The sampling scheme is assumed to cover the main spawning area shortly after and/or during peak spawning. However, annual variations in the spatial distribution of distinct areas of increased spawning activity and therefore larval distribution cannot be excluded.

**Stratification:**
Since the survey is intended to cover the main spawning area after peak spawning, a further regional and seasonal stratification is not envisaged. However, annual surveys would improve coverage.

**Sampling design and protocols**

**Sampling design description:**
The main sampling area is allocated between 22°N and 31°N and 54°W and 70°W. Location and timing are defined based on previous findings on European eel larval abundance and individual larval size. The survey takes place in the region and season where smallest larvae were ever collected. The survey covers the main spawning area in a North-South transect sampling scheme. Transects are each 3 degrees longitude apart. Single sampling stations are located every 1 degree latitude. The number of transects and their northern and southern extent may vary between surveys, depending on local larval abundance/distribution and hydrographic conditions. A 500 µm meshsize Isaacs-Kidd Midwater Trawl (IKMT) is the main sampling gear.

**Is the sampling design compliant with the 4S principle?:**
NA

**Regional coordination**
No

**Link to sampling design documentation:**
The data are stored on local servers and will be publicly available after publication in scientific journals. Collected data include larval densities per haul and per area, individual body lengths and genetic species identity. All eel larvae are stored for further analyses (e.g. body composition, otolith analyses, gut content analyses).

**Compliance with international recommendations:**
'Y' The ICES Working Group on Eels (WGEEL) repeatedly highlighted the need of an international eel larval survey in the spawning area in the Sargasso Sea. The Workshop on Eel and Salmon DCF Data (WKESDCF) supported this recommendation and RCG agreed that the opportunity should be provided to assess these data, because of their importance for eel stock management. However, the sampling design itself was not yet evaluated by a relevant expert or coordination group.

**Link to sampling protocol documentation:**
The sampling protocol contains the following information:
Individual ID, Survey number, Station number, Time (UTC), Lat (°N), Long (°W), Net-type, Total length (mm), Pre-anal length (mm), Pre-dorsal length (mm), Total myomeres (N), Pre-anal myomeres (N), Pre-dorsal myomeres (N), Head length (mm), Body height (mm).

**Compliance with international recommendations:**
'Y' The ICES Working Group on Eels (WGEEL) repeatedly highlighted the need of an international eel larval survey in the spawning area in the Sargasso Sea. The Workshop on Eel and Salmon DCF Data (WKESDCF) supported this recommendation and RCG agreed that the opportunity should be provided to assess these data, because of their importance for eel stock management. However, the sampling protocol itself was not yet evaluated by a relevant expert or coordination group.

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Individual ID, Survey number, Station number, Time (UTC), Lat (°N), Long (°W), Net-type, Total length (mm), Pre-anal length (mm), Pre-dorsal length (mm), Total myomeres (N), Pre-anal myomeres (N), Pre-dorsal myomeres (N), Head length (mm), Body height (mm).

**Sampling implementation**

**Recording of refusal rate:**
NA

**Monitoring of sampling progress within the sampling year:**
The number of transects and their northern and southern extent may vary between surveys. The hydrographic conditions in the area are dominated by a temperature front system, which is assumed to play a key role in the allocation of spawning places of eels. The position of these fronts varies between years and even between weeks and the northern and southern extension of the survey transects is modified accordingly. In addition and in order to further narrow down the location of potential spawning sites, main catch effort is directed towards areas of high larval abundance and the presence of very small larvae.

**Data capture**

**Means of data capture:**
Standardized sampling is conducted at each station with an Isaac-Kidd Midwater Trawl (IKMT) in the form of double oblique tows from the surface to 300 m depth. At selected stations, additional modified hauls (e.g. triple oblique to 150 m) are carried out in order to further study the occurrence of early development stages of eels. Additionally, at all stations a hydrographic profile is generated (CTD also including oxygen, turbidity and Chlorophyll-a measurements) down to a depth of 500 m. Further CTD profiles to a depth of 300 m are conducted in between stations to increase the resolution of the hydrographic data.
All preleptocephalus and leptocephalus larvae, as well as potential Anguilla eggs, are sorted out of the catches and identified (if possible) to the species level by morphological features. In individual cases, a RT-PCR can be conducted onboard for genetical species identification of possible Anguilla specimens. All larvae are measured for at least total length and, depending on the species, additional morphometric parameters (e.g. preanal length) are recorded.
All data are documented in handwritten protocols and digitalized on board.

**Data capture documentation:**
Documentation on data capture is provided in cruise reports for past cruises:
Hanel, R. (2011), Cruise report WH 342
Hanel, R. (2014), Cruise report WH373
Hanel, R. (2017), Cruise report WH 404
A popular science format with photographic documentation can be found under:
https://www.thuenen.de/en/topics/seas/no-fisheries-research-without-research-vessels/sea-blogs/whiii-404-reise/
and
https://www.thuenen.de/de/thema/meere/keine-fischereiforschung-ohne-schiffe/see-tagebuecher/whiii-373-reise/

**Quality checks documentation:**.
Y, see above (means of data capture/data capture documentation)

**Data storage**

**National database:**
NA, data are stored locally

**International database:**

NA, data are stored locally. It is intended to provide the data to the ICES Eggs and Larvae database, though no timeframe has been established to do this.

**Quality checks and data validation documentation:**
In addition to the ships data storage system (DataDis), station data as well as data captured alongside IKMT hauls and CTD Profiles (e.g. time, location, sampling depth etc.) are documented in handwritten protocols onboard, which are stored for subsequent evaluation.

**Sample storage**

Storage description:
*Anguilla anguilla* leptocephali larvae collected during the survey are stored at the Thünen Institute either frozen (-20°C / -80°C) or in ethanol, depending on the requirements for planned analyses.

Sample analysis:
Leptocephali are sorted out of the plankton samples directly after hauls and kept in chilled seawater until they morphological identification according to Böhlke (1989). Collected leptocephali are identified using DNA-analyses (mitochondrial 16sS rRNA gene for species identification and 18S rDNA and restriction fragment length polymorphisms (RFLPs) for detecting hybrids following established protocols (Frankowski & Bastrop 2010) (along with some restriction enzyme modifications (Prigge et al. 2013)).

Böhlke, E.B., (Ed.), 1989a. Leptocephali. Fishes of the western North Atlantic. Mem. Sears Found. Mar. Res. 2 (9), 657e1055.
Frankowski J, Bastrop R (2010) Identification of *Anguilla anguilla* (L.) and *Anguilla rostrata* (Le Sueur) and their hybrids based on a diagnostic single nucleotide polymorphism in nuclear 18S rDNA. Mol Ecol 10:173–176.
Prigge E, Marohn L, Oeberst R, Hanel R (2013) Model prediction vs. reality—testing the predictions of a European eel (*Anguilla anguilla*) stock dynamics model against the in situ observation of silver eel escapement in compliance with the European eel regulation. ICES J Mar Sci 70:309–318.

**Data processing**

**Evaluation of data accuracy (bias and precision):**
Data accuracy is not assessed on a regular basis but in relation to certain scientific publications. However, the data basically consist of species identification (morphologic and genetic), length measurements and the determination of filtered water volume during sampling.

**Editing and imputation methods:**
See above. There is no regular assessment of data accuracy. Data quality issues are described case by case in the respective scientific publications.

**Quality document associated to a dataset:**
No

**Validation of the final dataset:**
N/NA. So far, data have not been included in an end user data base (e.g. ICES database) and have hence not been finally validated.

**MS : DEU**

**Region: North East Atlantic**

**Sampling scheme identifier: EELS_Cont**

**Sampling scheme type: Survey**

**Observation type: SelfAtSea**

**Time period of validity:** 2022-2024

Current stock assessment of the European eel (*Anguilla anguilla*) is solely based on glass eel arrival time series. In addition, all EU member states are obliged to report silver eel escapement (EC No 1100/2007). However, little information is available to show either a stock-recruitment relationship as an implicit basis for the intended increase in spawning biomass or a direct correlation between silver eel escapement and subsequent glass eel arrival. The EELS_Cont survey fulfils the urgent need of assessing possible oceanic influences on the discrepancy between larval decline in the Sargasso Sea and the late stage leptocephalus larvae at the continental shelves of the species natural distribution range.

**Description of the population**

**Population targeted:**
The main target species of this research larval survey (EELS_Cont) is the European Eel (*Anguilla anguilla*) and the main survey area is at and beyond the continental slope in the Bay of Biscay and west of the Iberian Peninsula. In addition, some stations are planned at the entrance of the Strait of Gibraltar.

**Population sampled:**
The European eel is considered to be a panmictic species without population structure. The EELS_cont survey is planned to be conducted between October/November at and beyond the continental slope in the Bay of Biscay, West of the Iberian Peninsula and around the entrance of the Strait of Gibraltar in order to catch late-stage leptocephalus larvae on their larval migration to the continental shelves of their distribution range.

**Stratification:**
NA

**Sampling design and protocols**

**Sampling design description:**
Abundance and distribution of anguilliform leptocephalus larvae will be determined using an Isaac-Kidd Midwater Trawl (IKMT, mesh-size 500 µm) in the upper 300 m according to the planned station grid. All leptocephalus larvae will be sorted from the samples directly after the catch. Species will be identified morphologically and length measurements will be made prior to preservation. To doubtlessly identify *A. anguilla* larvae, species identification will be confirmed genetically.

**Is the sampling design compliant with the 4S principle?:**
NA

**Regional coordination**
No

**Link to sampling design documentation:**
NA

**Compliance with international recommendations:**
The decline of larval abundance was not as severe as the decline in glass eel abundance, indicating the potential importance of oceanic factors on larval mortality during migration from the spawning to the settlement areas for the decline of the European eel stock (Westerberg et al., 2018). To what extent the effect of potential detrimental oceanic factors is reflected in larval abundance and condition at later stages of the migration is still unknown. Nonetheless, information from the first major research phase from near coastal areas is available and provides the basis for a very informative comparative study, 25 years after the effort on catching leptocephali in waters of the European shelf and the continental slope ceased. The sampling design itself was not yet evaluated by a relevant expert or coordination group.

Westerberg et al (2018) Larval abundance across the European eel spawning area: An analysis of recent and historic data. Fish Fisheries 19(5):890-902, DOI:10.1111/faf.12298

**Link to sampling protocol documentation:**

The sampling protocol contains the following information:
Individual ID, Survey number, Station number, Time (UTC), Lat (°N), Long (°W), Net-type, Total length (mm), Pre-anal length (mm), Pre-dorsal length (mm), Total myomeres (N), Pre-anal myomeres (N), Pre-dorsal myomeres (N), Head length (mm), Body height (mm).

**Compliance with international recommendations:**
NA

**Sampling implementation**

**Recording of refusal rate:**
NA

**Monitoring of sampling progress within the sampling year:**
NA

**Data capture**

**Means of data capture:**
Standardized sampling is conducted at each station with an Isaac-Kidd Midwater Trawl (IKMT) in the form of double oblique tows from the surface to a maximum depth of 500 m. At all stations a hydrographic profile is generated (CTD also including oxygen, turbidity and Chlorophyll-a measurements) down to a depth of 500 m. All data are documented in handwritten protocols and digitalized on board.

**Data capture documentation:**
Documentation on data capture is provided in cruise reports for past cruises into the Sargasso Sea:
Hanel, R. (2011), Cruise report WH 342
Hanel, R. (2014), Cruise report WH373
Hanel, R. (2017), Cruise report WH 404

A popular science format with photographic documentation can be found under:
https://www.thuenen.de/en/topics/seas/no-fisheries-research-without-research-vessels/sea-blogs/whiii-404-reise/
and
https://www.thuenen.de/de/thema/meere/keine-fischereiforschung-ohne-schiffe/see-tagebuecher/whiii-373-reise/

**Quality checks documentation:**.
Y, see above (means of data capture/data capture documentation)

**Data storage**

**National database:**
NA, data are stored locally

**International database:**
NA

**Quality checks and data validation documentation:**
Station data as well as data captured alongside IKMT hauls and CTD Profiles (e.g. time, location, sampling depth etc.) are documented in handwritten protocols onboard, which are stored for subsequent evaluation.

**Sample storage**

Storage description:
*Anguilla anguilla* leptocephali larvae collected during the survey are stored at the Thünen Institute either frozen (-20°C / -80°C) or in ethanol, depending on the requirements for planned analyses.

Sample analysis:
Leptocephali are sorted out of the plankton samples directly after hauls and kept in chilled seawater until they morphological identification according to Böhlke (1989).

Böhlke, E.B., (Ed.), 1989a. Leptocephali. Fishes of the western North Atlantic. Mem. Sears Found. Mar. Res. 2 (9), 657e1055.

**Data processing**

**Evaluation of data accuracy (bias and precision):**
Data accuracy is not assessed on a regular basis but in relation to certain scientific publications. However, the data basically consist of species identification (morphologic and genetic), length measurements and the determination of filtered water volume during sampling.

**Editing and imputation methods:**
See above. There is no regular assessment of data accuracy. Data quality issues are described case by case in the respective scientific publications.

**Quality document associated to a dataset:**
No

**Validation of the final dataset:**
NA

ANNEX 1.2 - QUALITY REPORT FOR SOCIOECONOMIC DATA SAMPLING SCHEME

*The quality report fulfils Article 6 (3) (d) of the Regulation (EU) 2017/1004. This document is intended to specify data to be collected under chapter II, points 3, 5, 6, and 7 of the Delegated Decision annex: Socioeconomic data on fisheries, aquaculture and any complementary data collection of fishing activity and fish processing. Use this document to describe quality aspects of the data collection process (design, sampling implementation, data capture, data storage and data processing etc.). The annex should be filled for each sampling scheme. Where applicable, use the handbook on sampling design (Deliverable 2.1 from MARE/2016/22 SECFISH study), available on the DCF website.*

The following scheme gives an overview of the data sources:

| **Source** | **Variable groups** | **Segments** | **Type** |
|---|---|---|---|
| Fleet register | Capacity | All | Census |
| Logbooks | Effort, gear | All > 8m | Census |
| Sales notes | Landings, income, price | All active vessels | Census |
| Questionnaire random sampling | Most economic variables; (effort for vessels < 8m) | Passive gear < 12m (proportional to size (value of landings)), beam trawlers <12m and >24m, | Probability sampling |
| Questionnaire census | Most economic variables | Pelagic trawlers, demersal trawlers > 40m, drift and fixed netters >24m | Census |
| Accountancy network (FADN) | Most economic variables | Beam trawlers 12-24m, Demersal trawlers 10-40m, some fixed netters between 8 and 18m (being completed with PSS survey, see above) | Probability sampling |

| **Survey Specifications** |
|---|
| *'Sector name' refers to socio economic data on fisheries, aquaculture and any complementary data collection for fishing activities and processing, as in the EU MAP Delegated Decision annex.*<br>*'Sampling scheme' refers to the survey technique: by census, by sampling, random or non-random, other (with explanation). If sampling, then outline sampling design.*<br>*'Variables' refer to Tables 7, 9 and 10 of the EU MAP Delegated Decision annex.*<br>*'Supra region' refers to Table 2 of the EU MAP Implementing Decision annex. If the sampling scheme is the same in all supra regions, put 'All supra regions'.* |
| **Sector name(s): Fisheries** ; FADN accountancy network |
| **Sampling scheme: PSS** (According to SGECA 10-03 (harmonisation of sampling strategies), data derived from FADN are to be regarded as random (=probability) sampling) |
| **Variables:** Energy consumption, Energy costs, Full-time Equivalent (FTE), Gross debt, Investments in tangible assets (net purchase of assets), Operating subsidies, Other income, Other non-variable costs, Other variable costs, Paid labour, Personnel costs, Repair and maintenance costs, Subsidies on investments, Total value of assets, Unpaid labour, Value of unpaid labour |
| **Supra region(s): All supra regions** |

**Survey planning**

Beam trawlers 12-24 m, demersal trawlers 10-40 m, and fixed netters between 8 and 18 m.

**Survey design and strategy**

The data source is the accountants' network for fisheries (FADN, on the basis of Council Regulation (EC) No 1217/2009). Fishermen are regularly invited to participate in the network, and the coverage per segment has been around 30-40%. Over a long period, these rates have proven to be highly sufficient to provide robust data. The rates are not mathematically derived as there is neither a defined target probability error nor a robust estimate for variance.
Participation in the FADN is voluntary, and a certain fluctuation can be observed. Data are in most cases compiled and submitted electronically by tax consultants.
There is an automatic plausibility check prior to data submission: https://www.bmel-statistik.de/landwirtschaft/testbetriebsnetz/testbetriebsnetz-fischerei-buchfuehrungsergebnisse/plausibilitaetspruefung-fischwirtschaft
In addition, the data is checked on the basis of comprehensive information on landings and effort (=auxiliary information), i.e. ratios of cost per day of per catch unit or per revenue are calculated and any observed outliers are further scrutinised.

**Estimation design**

In general, sample data are raised on the basis of auxiliary information, according to the following scheme which is the result of an investigation on highest correlations:

| | ***Basis for estimation*** | | | | |
|---|---|---|---|---|---|
| ***Variable type to be estimated*** | GT | kW | fishing days | days at sea | value of landings |
| Direct subsidies | | X | | | |
| Other income | | X | | | |
| Wages and salaries of crew | X | | X | | X |
| Value of unpaid labour | X | | X | | X |
| Energy costs | X | | X | | |
| Repair and maintenance costs | X | | | | X |
| Variable costs | X | | X | | |
| Non-variable costs | X | X | | | |
| Investments in physical capital | | | | | X |
| Debt, assets | | | | | X |
| Engaged crew | | | | X | |

It has turned out that the fractions, which the sample represents within the considered segment, are in most cases quite similar, e.g. in TBB1218 the sample represents about 41% of the number of vessels, 41% of LoA, 44% of GT, 41% of kW, 52% of weight of landings, 49% of revenues and 45% of days at sea (example from 2008). Thus, estimations are in most cases quite robust, no matter which factor is used for estimation.

On data estimated via PIM: degressive depreciation is applied. Several experts have been interviewed to receive specific life time and share information, but it transpired that there is no uniform pattern. Therefore, the figures as used in the Study on Capital Value ("FISH/2005/03") have been applied:
Hull share = 0.6, Engine share = 0.2, Electronics share = 0.1, "Others" share = 0.1
Useful lifetime hull = 25, Useful lifetime engine = 10, Useful lifetime electronics = 5, Useful lifetime "Others" = 7;
Degression rate hull = .07, Degression rate engine = .25, Degression rate electronics = .5, Degression rate "Others" = .35;
The price per GT unit (= €10312 (2019) is being determined as gross value from net prices of new built vessels during the period 2005-2015 with price adjustment based on the index for "producer price for commercial

products, investment goods". Due to the low number of newly built vessels and hence available price information, the same price per GT unit has to be applied to all fleet segments.

On the "Value of unpaid labour": The basis number for an average annual salary is derived from figures published by the Federal Statistical Office (e.g. 39.100 € for 2019).

On "Energy costs": A distinction between types of fuel is being applied. Based on experts' interviews and evidence from collected data, three different average fuel prices per liter have been calculated: one for vessels < 30kW (often fuelled with petrol), one for vessels between 30 and 3000 kW (gasoil, tax reduced) and one for larger vessels > 3000 kW (crude oil).

The issue of unit non-response does usually not apply to the FADN concept. Item non-response is usually identified through the plausibility check and leads to a correction loop.

**Error checks**

Potential errors are identified through the abovementioned plausibility routine. Where applicable, respondents correct potential wrong entries. Duplication of data is addressed by using the vessel ID as a link: thus, a double data set can be identified and processed. Processing errors are, as much as possible, addressed through comparison with related data sets (e.g. time series, segment average, ratio between variable and effort/landings/income).

**Data storage and documentation**

Data are stored in two ways, as physical files (paper questionnaires) and as digital data files. The paper questionnaires are stored in an archive and include no personal information, but an ID. The link between the sender information and the ID is stored in a separate place. Digital data are stored on an institutional fileserver with access limited to persons who are in charge of the data collection and processing. Backups are created daily.
*https://www.bmel-statistik.de/fileadmin/daten/BFB-0114001-2018.pdf*
*https://www.bmel-statistik.de/fileadmin/daten/BFB-0110001-2019.pdf*

**Revision**

The segmentation is created annually, based upon logbooks and sales notes, where applicable. A major concern will be the potential need for further clustering as there are several segments with few vessels only, and there is a tendency of further decrease in numbers.
The sampling rates and survey methods follow the FADN guidelines and are updated, where applicable.

**Confidentiality**

*Are procedures for confidential data handling in place and documented?*
Yes, following Directive 2016/680 of the EU Parliament and Council.

*Are protocols to enforce confidentiality between DCF partners in place and documented?*
Yes, following Directive 2016/680 of the EU Parliament and Council.

*Are protocols to enforce confidentiality with external users in place and documented?*
There are no external end users of confidential data.

*Are there any issues with publication of data due to confidentiality reasons? Provide an explanation.*
No.

**Survey Specifications**

*'Sector name' refers to socio economic data on fisheries, aquaculture and any complementary data collection for fishing activities and processing, as in the EU MAP Delegated Decision annex.*
*'Sampling scheme' refers to the survey technique: by census, by sampling, random or non-random, other (with explanation). If sampling, then outline sampling design.*
*'Variables' refer to Tables 7, 9 and 10 of the EU MAP Delegated Decision annex.*
*'Supra region' refers to Table 2 of the EU MAP Implementing Decision annex. If the sampling scheme is the same in all supra regions, put 'All supra regions'.*

**Sector name(s): Fisheries**

**Sampling scheme: PSS**

**Variables:** Energy consumption, Energy costs, Full-time Equivalent (FTE), Gross debt, Investments in tangible assets (net purchase of assets), Operating subsidies, Other income, Other non-variable costs, Other variable costs, Paid labour, Personnel costs, Repair and maintenance costs, Subsidies on investments, Total value of assets, Unpaid labour, , Value of unpaid labour
For vessels without logbooks: Days at sea, Number of nets / Length, Number of hooks, Number of lines, Numbers of pots, traps.

**Supra region(s): All supra regions**

**Survey planning**

Small-scale vessels below 10m using passive gear, beam trawlers below 12m, fixed netters 12-18m, when not sufficiently covered by FADN; questionnaire on enterprise level

**Survey design and strategy**

The survey is based on questionnaires, distributed by mail.
For small scale vessels using passive gear, the sample is drawn randomly, proportional to size, where "size" is determined by the value of landings, which is exhaustively available. The sample size is set following the principles as laid down in EWG 17-11 ("the more important, the higher the requirements"). All segments covered by this survey are economically less important for the German fleet. The rates are not mathematically derived as there is neither a defined target probability error nor a robust estimate for variance, both of which would be necessary to calculate a proper sample rate. For the large segments of small scale vessels using passive gear a sample rate of 10% was regarded sufficient. This approach also takes into account fishermen's willingness to respond. If they are sampled too frequent, the experience shows that the response rate decreases rapidly. The segment is separated by activity levels (A and L).
The data is checked on the basis of comprehensive information on landings and effort (=auxiliary information), i.e. ratios of cost per day of per catch unit or per revenue are calculated and any observed outliers are further scrutinised.

**Estimation design**

In general, sample data are raised on the basis of auxiliary information, according to the following scheme which is the result of an investigation on highest correlations:

| | ***Basis for estimation*** | | | | |
|---|---|---|---|---|---|
| ***Variable type to be estimated*** | GT | kW | fishing days | days at sea | value of landings |
| Direct subsidies | | X | | | |
| Other income | | X | | | |
| Wages and salaries of crew | X | | X | | X |
| Value of unpaid labour | X | | X | | X |

| | | | | | |
|---|---|---|---|---|---|
| Energy costs | X | | X | | |
| Repair and maintenance costs | X | | | | X |
| Variable costs | X | | X | | |
| Non-variable costs | X | X | | | |
| Investments in physical capital | | | | | X |
| Debt, assets | | | | | X |
| Engaged crew | | | | X | |

It has turned out that the fractions, which the sample represents within the considered segment, are in most cases quite similar, e.g. in TBB1218 the sample represents about 41% of the number of vessels, 41% of LoA, 44% of GT, 41% of kW, 52% of weight of landings, 49% of revenues and 45% of days at sea (example from 2008). Thus, estimations are in most cases quite robust, no matter which factor is used for estimation.

On data estimated via PIM: degressive depreciation is applied. Several experts have been interviewed to receive specific life time and share information, but it transpired that there is no uniform pattern. Therefore, the figures as used in the Study on Capital Value ("FISH/2005/03") have been applied:
Hull share = 0.6, Engine share = 0.2, Electronics share = 0.1, "Others" share = 0.1
Useful lifetime hull = 25, Useful lifetime engine = 10, Useful lifetime electronics = 5, Useful lifetime "Others" = 7;
Degression rate hull = .07, Degression rate engine = .25, Degression rate electronics = .5, Degression rate "Others" = .35;
The price per GT unit (= €10312 (2019) is being determined as gross value from net prices of new built vessels during the period 2005-2015 with price adjustment based on the index for "producer price for commercial products, investment goods". Due to the low number of newly built vessels and hence available price information, the same price per GT unit has to be applied to all fleet segments.

On the "Value of unpaid labour": The basis number for an average annual salary is derived from figures published by the Federal Statistical Office (e.g. 39.100 € for 2019).

On "Energy costs": A distinction between types of fuel is being applied. Based on experts' interviews and evidence from collected data, three different average fuel prices per liter have been calculated: one for vessels < 30kW (often fuelled with petrol), one for vessels between 30 and 3000 kW (gasoil, tax reduced) and one for larger vessels > 3000 kW (crude oil). However, for the segments under consideration, petrol and gasoil are the only relevant fuel types.

In case of non-response, estimation procedures are applied, based on the abovementioned correlations. Due to the use of auxiliary information the effect of bias is counteracted. Missing entries are interpreted as item non-response, while "slash" entries are treated as zero.

**Error checks**

Data collected through questionnaires are scanned for potential outliers that will be further scrutinised and checked with the suppliers. However, due to the large actual variability of these data, these checks have to be restricted to extreme data. Duplication of data is addressed by using the vessel ID as a link: thus, a double data set can be identified and processed. Processing errors are, as much as possible, addressed through comparison with related data sets (e.g. time series, segment average, ratio between variable and effort/landings/income).

**Data storage and documentation**

Data are stored in two ways, as physical files (paper questionnaires) and as digital data files. The paper questionnaires are stored in an archive and include no personal information, but an ID. The link between the sender information and the ID is stored in a separate place.

Digital data are stored on an institutional fileserver with access limited to persons who are in charge of the data collection and processing. Backups are created daily.

| **Revision** |
| --- |
| The segmentation is created annually, based upon logbooks and sales notes, where applicable. A major concern will be the potential need for further clustering as there are several segments with few vessels only, and there is a tendency of further decrease in numbers.<br>The sampling rates and survey methods are scrutinised ahead of any survey (= annually). |
| **Confidentiality** |
| *Are procedures for confidential data handling in place and documented?*<br>Yes, following Directive 2016/680 of the EU Parliament and Council.<br><br>*Are protocols to enforce confidentiality between DCF partners in place and documented?*<br>Yes, following Directive 2016/680 of the EU Parliament and Council.<br><br>*Are protocols to enforce confidentiality with external users in place and documented?*<br>There are no external end users of confidential data.<br><br>*Are there any issues with publication of data due to confidentiality reasons? Provide an explanation.*<br>No. |

| **Survey Specifications** |
| --- |
| *'Sector name' refers to socio economic data on fisheries, aquaculture and any complementary data collection for fishing activities and processing, as in the EU MAP Delegated Decision annex.*<br>*'Sampling scheme' refers to the survey technique: by census, by sampling, random or non-random, other (with explanation). If sampling, then outline sampling design.*<br>*'Variables' refer to Tables 7, 9 and 10 of the EU MAP Delegated Decision annex.*<br>*'Supra region' refers to Table 2 of the EU MAP Implementing Decision annex. If the sampling scheme is the same in all supra regions, put 'All supra regions'.* |
| **Sector name(s): Fisheries** |
| **Sampling scheme: IND** |
| **Variables:** Consumption of fixed capital, Value of physical capital |
| **Supra region(s): All supra regions** |
| **Survey planning** |
| All vessels |
| **Survey design and strategy** |
| Indirect survey, following the Perpetual Inventory Method following the "EUMAP guidance document for the Fishing Fleet". |
| **Estimation design** |
| On data estimated via PIM: degressive depreciation is applied. Several experts have been interviewed to receive specific life time and share information, but it transpired that there is no uniform pattern. Therefore, the figures |

| |
|---|
| as used in the Study on Capital Value ("FISH/2005/03") have been applied:<br>Hull share = 0.6, Engine share = 0.2, Electronics share = 0.1, "Others" share = 0.1<br>Useful lifetime hull = 25, Useful lifetime engine = 10, Useful lifetime electronics = 5, Useful lifetime "Others" = 7;<br>Degression rate hull = .07, Degression rate engine = .25, Degression rate electronics = .5, Degression rate "Others" = .35;<br>The price per GT unit (= €10312 (2019) is being determined as gross value from net prices of new built vessels during the period 2005-2015 with price adjustment based on the index for "producer price for commercial products, investment goods". Due to the low number of newly built vessels and hence available price information, the same price per GT unit has to be applied to all fleet segments. |
| **Error checks** |
| Processing errors are, as much as possible, addressed through comparison with related data sets (e.g. time series, segment average, ratio between variable and effort/landings/income). |
| **Data storage and documentation** |
| Data are stored as digital data files. Digital data are stored on an institutional fileserver with access limited to persons who are in charge of the data collection and processing. Backups are created daily. |
| **Revision** |
| The segmentation is created annually, based upon logbooks and sales notes, where applicable. A major concern will be the potential need for further clustering as there are several segments with few vessels only, and there is a tendency of further decrease in numbers. |
| **Confidentiality** |
| *Are procedures for confidential data handling in place and documented?*<br>Yes, following Directive 2016/680 of the EU Parliament and Council.<br><br>*Are protocols to enforce confidentiality between DCF partners in place and documented?*<br>Yes, following Directive 2016/680 of the EU Parliament and Council.<br><br>*Are protocols to enforce confidentiality with external users in place and documented?*<br>There are no external end users of confidential data.<br><br>*Are there any issues with publication of data due to confidentiality reasons? Provide an explanation.*<br>No. |

| **Survey Specifications** |
|---|
| *'Sector name' refers to socio economic data on fisheries, aquaculture and any complementary data collection for fishing activities and processing, as in the EU MAP Delegated Decision annex.*<br>*'Sampling scheme' refers to the survey technique: by census, by sampling, random or non-random, other (with explanation). If sampling, then outline sampling design.*<br>*'Variables' refer to Tables 7, 9 and 10 of the EU MAP Delegated Decision annex.*<br>*'Supra region' refers to Table 2 of the EU MAP Implementing Decision annex. If the sampling scheme is the same in all supra regions, put 'All supra regions'.* |

| |
|---|
| **Sector name(s): Fisheries** |
| **Sampling scheme: C** |
| **Variables:** Energy consumption, Energy costs, Full-time Equivalent (FTE), Gross debt, Investments in tangible assets (net purchase of assets), Operating subsidies, Other income, Other non-variable costs, Other variable costs, Paid labour, Personnel costs, Repair and maintenance costs, Subsidies on investments, Total value of assets, Unpaid labour |
| **Supra region(s): All supra regions** |
| **Survey planning** |
| Fixed netters 24-40m*, Beam trawlers: 24-40 m*; Demersal trawlers >40m" and "Pelagic trawlers > 40m*" referring to individual vessels. |
| **Survey design and strategy** |
| Questionnaires are sent by mail or as tables by e-mail.<br>Data from the high seas fleet (>40m) is usually provided exhaustively.<br><br>For the cluster of larger fixed netters and potter (over 12m, seven vessels) and large beam trawlers (8 vessels) there is a certain amount of non-response. However, overage is usually sufficient to raise the sample and correct for missing values following the principles as laid down for the two other sampling schemes for fisheries. |
| **Estimation design** |
| For the large fixed netters (4 vessels) and large beam trawlers (8 vessels) there is a certain amount of non-response. However, overage is usually sufficient to raise the sample and correct for missing values following the principles as laid down for the two other sampling schemes for fisheries. |
| **Error checks** |
| Data collected through questionnaires are scanned for potential outliers that will be further scrutinised and checked with the suppliers. The number of vessels addressed through this sampling scheme is rather low, so errors due to double counting or processing are very unlikely. Outliers are identified through comparison with mean values and time series, and are checked with the fishing companies, if deemed necessary. |
| **Data storage and documentation** |
| Data are stored in two ways, as physical files (paper questionnaires) and as digital data files. The paper questionnaires are stored in an archive and include no personal information, but an ID. The link between the sender information and the ID is stored in a separate place.<br><br>Digital data are stored on an institutional fileserver with access limited to persons who are in charge of the data collection and processing. Backups are created daily. |
| **Revision** |
| The segmentation is created annually, based upon logbooks and sales notes, where applicable. A major concern will be the potential need for further clustering as there are several segments with few vessels only, and there is a tendency of further decrease in numbers.<br>The sampling rates and survey methods are scrutinised ahead of any survey. |
| **Confidentiality** |

*Are procedures for confidential data handling in place and documented?*
Yes, following Directive 2016/680 of the EU Parliament and Council.

*Are protocols to enforce confidentiality between DCF partners in place and documented?*
Yes, following Directive 2016/680 of the EU Parliament and Council.

*Are protocols to enforce confidentiality with external users in place and documented?*
There are no external end users of confidential data.

*Are there any issues with publication of data due to confidentiality reasons? Provide an explanation.*
The data for the pelagic trawlers cannot be published for confidentiality reasons as the segment is dominated by one company. Clustering with the large demersal trawlers would not solve the problem as the company owns vessels in that segment as well, and the dominance criterion would still apply.

| **Survey Specifications** |
|---|
| *'Sector name' refers to socio economic data on fisheries, aquaculture and any complementary data collection for fishing activities and processing, as in the EU MAP Delegated Decision annex.*<br>*'Sampling scheme' refers to the survey technique: by census, by sampling, random or non-random, other (with explanation). If sampling, then outline sampling design.*<br>*'Variables' refer to Tables 7, 9 and 10 of the EU MAP Delegated Decision annex.*<br>*'Supra region' refers to Table 2 of the EU MAP Implementing Decision annex. If the sampling scheme is the same in all supra regions, put 'All supra regions'.* |
| **Sector name(s): Fisheries Social data** |
| **Sampling scheme: PSS** |
| **Variables:** All social data |
| **Supra region(s): All supra regions** |
| **Survey planning** |
| All segments. |
| **Survey design and strategy** |
| Data is comprehensively provided by the Employer's Liability Insurance Association where all fishermen have to be registered. The separation into the groups "Long distance", "Large scale" and Small scale", however, has to be performed in combination with survey results.<br>It is not yet clear if large scale and small scale can be separated. |
| **Estimation design** |
| Data from the Employer's Liability Insurance Association are not separated in accordance with the data collection requirements, but they provide the total numbers.<br>The structure of the data received from surveys is planned to be applied to the Insurance Association figures.<br>Data from the Employer's Liability Insurance Association are to be regarded as Census. The surveys on fleet economic data include some questions related to social data. These surveys are to be regarded as PSS. Hence, the estimation of social data for the fleet are a combination of Census (Insurance Association) and PSS (questionnaires, FADN panel, see previous chapters). The PSS results are used only to determine ratios, e.g. age distribution, per vessel group. Then these ratios are applied to the total numbers from the Census. |
| **Error checks** |
| Census data from the Employer's Liability Insurance Association have to be regarded as the total population without errors which could impact the data collection on the fishing fleet. Data from the surveys (e.g. age structure) will be checked for plausibility (e.g. age should be between 14 and 90). |
| **Data storage and documentation** |
| Data are stored in two ways, as physical files (paper questionnaires) and as digital data files. The paper questionnaires are stored in an archive and include no personal information, but an ID. The link between the sender information and the ID is stored in a separate place.<br><br>Digital data are stored on an institutional fileserver with access limited to persons who are in charge of the data collection and processing. Backups are created daily. |
| **Revision** |
| Describe the frequency of the methodology review e.g. revision of segmentation, survey method per segment, per |

| |
|---|
| variable, etc.<br>The segmentation is created annually, based upon logbooks and sales notes, where applicable. A major concern will be the potential need for further clustering as there are several segments with few vessels only, and there is a tendency of further decrease in numbers.<br>The sampling rates and survey methods are scrutinised ahead of any survey. |
| **Confidentiality** |
| *Are procedures for confidential data handling in place and documented?*<br>Yes, following Directive 2016/680 of the EU Parliament and Council.<br><br>*Are protocols to enforce confidentiality between DCF partners in place and documented?*<br>Yes, following Directive 2016/680 of the EU Parliament and Council.<br><br>*Are protocols to enforce confidentiality with external users in place and documented?*<br>There are no external end users of confidential data.<br><br>*Are there any issues with publication of data due to confidentiality reasons? Provide an explanation.*<br>No. |

| **Survey Specifications** |
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| *Sector name refers to socio economic data on fisheries, aquaculture and any complementary data collection of fishing activity and processing as given in the EU MAP Delegated Decision annex.*<br>*Sampling scheme refers to survey technique: by census, by sampling, random or non-random, other (with explanation). If sampling then outline sampling design.*<br>*Variables refer to Tables 7, 9 and 10 of the EU MAP Delegated Decision annex. Supra region refers to Table 2 of the EU MAP Implementing Decision annex. If the sampling scheme is the same in all supra regions put 'All Supra regions'.* |
| **Sector name(s):** Socio economic data on aquaculture |
| **Sampling scheme:** Probability sample survey (trout and carp segments) |
| **Variables:** Gross sales per species, Operating subsidies, Subsidies on investments, Other income, Personnel costs, Value of unpaid labour, Energy costs, Raw material: livestock costs, Raw material: feed costs, Repair and maintenance, Other operating costs, Consumption of fixed capital, Investments in tangible assets (net purchase of assets), Total value of assets, Gross debt, Financial income, Financial expenditures, Livestock used, Fish feed used, Paid labour, Number of hours worked by employees and unpaid workers (optional), Employment by age, Employment by level of education |
| **Supra region(s):** NA |
| **Survey planning** |
| Freshwater aquaculture operations for trout (ponds; tanks and raceways) and carp (ponds) larger than 0.3 ha respectively 200 m³. |
| **Survey design and strategy** |

*List data sources; e.g. interviews, registers, log books, sales notes, VMS, financial accounts etc.*

The probability sample survey on economic and social variables for trout and carp segments is conducted via a standardised questionnaire.

*Describe how the sample sizes were determined.*

Starting from a basic population of 2499 farms (=N) that build the German aquaculture sector in 2019 (Destatis) and applying a confidence interval of 95% (z =1.96) together with a sample proportion P=0.5 (Q=1-P) due to an unknown variance and an margin of error ε = 0.05, the resulting sample rate would correspond to a census survey in order to reach a sample size (=n) of 334 responses representing 13 % of total farms.

$$n \geq \quad 1 + \frac{\frac{N}{(N-1)*\varepsilon^2}}{z^2*P*Q}$$

However, due to the strict interpretation and application of data protection law of the German state offices of statistics, the Thünen-Institute has no access to the official register of freshwater fish farmers' addresses combined with information about cultured species and volume that would allow such a census survey. Alternatively, an own database has been built up containing freshwater aquaculture enterprises whose addresses are available via public sources. This database underlies a continuous updating process based on responses from the sector (e.g. termination of business, concerns about data protection, fish farms with a scale <0.3 ha or with a volume <200 m³). This database currently covers 743 addresses (313 for carp and 430 trout) (covering about 30% of the total number of farms in Germany), which pre-define the sample rate and lead - according to the average response rate in previous years - to an achieved sample size of about 100 for the standardised questionnaire. Although this sample size is smaller than targeted (about 4% of total farms), the covered production volume of the sample size still represented about 20% of the total German aquaculture sector for 2018 data.

*Describe survey methods and distribution; e.g. questionnaire forms by post, by email, on website, by phone etc. access to other datasets etc.*

The standardised survey is distributed by post, queries are answered by telephone and email. National statistics utilized for the projection of the probability sample survey to the whole sector are publicly available (Destatis data on aquaculture production; BA data on employment by age, gender and level of education).

*Describe the role of auxiliary information, if any, in the strategy: e.g. for validation, cross referencing, fall back data source etc.*

Typical farms are used as supplementary data source for farm economics and labour characteristics (social variables) to balance shortcomings of the survey (e.g. insufficient response behaviour in case of some variables). For example for the variable "Value of unpaid labour", the information from typical farms is a valuable additional information. Typical farms are defined according to the typical farm approach, which is a standardized sampling and data collection strategy for farm economic datasets that reflect the prevailing production system with common technology, capital input, labour resources and typical production volume within a representative region (see reference links below for more information).

**Estimation design**

*Describe method of calculating population estimate from sample.*

The main reference for projection of the sample survey to the whole sector is directly or indirectly the total sales volume, which is collected in a census by the German Federal Statistical Office "Destatis" (see also Annex 1.2 on Census). For the segment of carp ponds (segment 4.1) the data can be projected directly, for the two relevant trout segments 2.1 and 2.2, a further allocation is based on the survey response shares for these segments as Destatis does not differentiate between these two segments. This approach is applied for the following variables derived from the probability sample survey: "Gross sales per species", "Operating subsidies", "Subsidies on investments", "Other income", "Personnel costs", "Value of unpaid labour", "Energy costs", "Raw material:

livestock costs", "Raw material: feed costs", "Repair and maintenance", "Other operating costs", "Consumption of fixed capital", "Investments in tangible assets (net purchase of assets)", "Total value of assets", "Gross debt", "Financial income", "Financial expenditures", "Livestock used", "Fish feed used".

The variable "Unpaid labour" is projected based on the total number of farms, collected in a census by the German Federal Statistical Office "Destatis". For the segment of carp ponds (segment 4.1) the data can be projected directly, for the two relevant trout segments 2.1 and 2.2 a further allocation is based on the survey response shares for these segments as Destatis does not differentiate between these two segments.

The variables "Paid labour" and "Number of hours worked by employees and unpaid workers (optional)" are projected on sector level on the basis of the employment census conducted by the German Federal Employment Agency (Bundesagentur für Arbeit, BA) (see also Annex 1.2 on census).

The variables "Employment by age", "Employment by level of education" are directly derived from the sample survey and not projected to the whole sector.

*Describe method of calculating derived data: e.g. imputed values.*

Total turnover is projected from the sample survey to the whole sector per segment based on Destatis (total sales volume) and further used for turnover depending variables. Therefore a correlation coefficient according to Bravais-Pearsons is applied, each for the correlation between the variables sales volume and turnover from the survey as well as between turnover and depending variables.

The variable "Value of unpaid labour" is projected by using the total number of farms from Destatis assuming that every farm is run by an unpaid owner, which corresponds to the vast majority of ownerships in Germany's aquaculture. Further, the shares of paid and unpaid (family) labour from the three-annually demographic survey provides the basis to allocate total numbers of unpaid labour to the single DCF segments of aquaculture. In a next step the number of projected full- and part-time unpaid labour is transferred to hours worked (based on survey responses) and the final value is calculated on the basis of fictive wages for unpaid owners and family labour derived from typical German carp and trout farms (according to typical farm approach, see also information on additional methodology below).

*Describe treatment of nonresponse.*

In the case of unit-non response that leads to an underrepresentation of one or more segments, a postal reminder on the survey/the survey itself is send out to the respective segment(s). Responses that do not include information on sales volume per species are treated as a unit-non response.

In the case of item- or partial-non-response a pairwise deletion method is applied when the amount of missing data is small. In case the amount of missing data is more severe, typical farm data will be used where appropriate as supplementary data source, similar to a cold-deck imputation. In the case of data for debts, the willingness to provide data voluntarily is often low. Data for debt are calculated from the interest payment of the enterprises, based on market interest rates for enterprises. These are compared to the data from enterprises that provided data on debt, and if not appropriate adapted to the values from the sample of previous years.

**Error checks**

*Describe potential errors and how and where in the process these are detected, avoided or eliminated e.g., data; duplication, double counting, respondent error, upload error, processing error etc.*

Paper questionnaires are transferred to digital data files by means of their ID and in a final step checked for duplication to avoid double counting within further data processing. To avoid respondent errors, outliers are detected manually as subsequent step to the application of the correlation coefficient.

**Data storage and documentation**

*Describe how the data is stored.*

Data are stored in two ways, as physical files (paper questionnaires) and as digital data files. The paper questionnaires are stored in an archive and include no personal information, but an ID. The link between the sender information and the ID is stored in a separate place.

Digital data are stored on an institutional fileserver with access limited to persons who are in charge of the data collection and processing. Backups are created daily.

*Provide link to webpage where additional methodological documentation can be found, if any.*

Standard Operational Procedure for typical farms: https://literatur.thuenen.de/digbib_extern/dk038513.pdf
Implementation of typical farm approach, cf. PGECON 2019: https://datacollection.jrc.ec.europa.eu/docs/pgecon

**Revision**

*Describe the frequency of the methodology review e.g., revision of; segmentation, survey method per segment, per variable etc.*

Revision is conducted annually on demand. This includes the allocation of segments per species and relevance of segments for data collection according to the predefined thresholds.

**Confidentiality**

*Are procedures for confidential data handling in place and documented?*
Yes, following Directive 2016/680 of the EU Parliament and Council.

*Are protocols to enforce confidentiality between DCF partners in place and documented?*
Yes, following Directive 2016/680 of the EU Parliament and Council.

*Are protocols to enforce confidentiality with external users in place and documented?*
There are no external end users of confidential data.

*Are there any issues with publication of data due to confidentiality reasons? Provide an explanation.*
No.

**Survey Specifications**

*Sector name refers to socio economic data on fisheries, aquaculture and any complementary data collection of fishing activity and processing as given in the EU MAP Delegated Decision annex.*
*Sampling scheme refers to survey technique: by census, by sampling, random or non-random, other (with explanation). If sampling then outline sampling design.*
*Variables refer to Tables 7, 9 and 10 of the EU MAP Delegated Decision annex. Supra region refers to Table 2 of the EU MAP Implementing Decision annex. If the sampling scheme is the same in all supra regions put 'All Supra regions'.*

**Sector name(s):** Socio economic data on aquaculture

**Sampling scheme:** Census (segments specified per variable)

**Variables:** Weight of sales per species (all segments), Employment by employment status (all segments), Employment by nationality (all segments), Employment by gender (all segments), Gross sales per species (mussel on-bottom), Operating subsidies (mussel on-bottom), Subsidies on investments (mussel on-bottom), Other income (mussel on-bottom), Personnel costs (mussel on-bottom), Value of unpaid labour (mussel on-

bottom), Energy costs (mussel on-bottom), Raw material: livestock costs (mussel on-bottom), Repair and maintenance (mussel on-bottom), Other operating costs (mussel on-bottom), Consumption of fixed capital (mussel on-bottom), Investments in tangible assets (net purchase of assets) (mussel on-bottom), Total value of assets (mussel on-bottom), Gross debt (mussel on-bottom), Financial income (mussel on-bottom), Financial expenditures (mussel on-bottom), Livestock used (mussel on-bottom), Paid labour (mussel on-bottom), Unpaid labour (mussel on-bottom), Number of enterprises by size category (mussel on-bottom), Employment by age (mussel on-bottom), Employment by level of education (mussel on-bottom)

**Supra region(s):** NA

**Survey planning**

*Provide a short description of the population the sampling scheme applies to; e.g. 'less active vessels using passive gears'.*

Freshwater aquaculture operations for trout (ponds; tanks and raceways) and carp (ponds) larger than 0.3 ha respectively 200 m³ as well as on-bottom blue mussel culture operations as indicated for the respective variables.

**Survey design and strategy**

*List data sources; e.g. interviews, registers, log books, sales notes, VMS, financial accounts etc.*

The Federal Statistical Office in Germany (Destatis) coordinates an annual aquaculture census on production data (volume, species, number of farms, used fish farming technique per federal state). In case of the German on-bottom blue mussel cultures, the Federal Office for Agriculture and Food (Bundesanstalt für Landwirtschaft und Ernährung, BLE) collects data on landings, crew and other logbook entries. Further, the German Federal Employment Agency (Bundesagentur für Arbeit, BA) registers all persons employed in Germany including monthly data on employment for freshwater and marine aquaculture covering information on number of permanent employees, causal contracts, apprentices, gender and nationalities.

*Describe how the sample sizes were determined.*

The applied national statistics include all authorized fish farms (all aquaculture activities are registered at the state veterinarian agencies on county level in Germany) (Destatis) for the variables listed above, whereas BA conducts a census on employment for all marine and freshwater aquaculture operations (sample sizes = 100%). BLE does on the one hand-side provide census data on e.g. landings and crew, as well as the contact information of all German mussel on-bottom producers (owner register) (sample size = 100%), which allows to address this segment fully for the remaining variables in the survey. Based on the response rate of the latter, an achieved sample size of 50% is reached. This is considered sufficiently, due to the availability of additional census data from the sources listed above.

*Describe survey methods and distribution; e.g. questionnaire forms by post, by email, on website, by phone etc. access to other datasets etc.*

The standardised survey for mussel on-bottom culture is distributed by post. National statistics are partly publicly accessible (Destatis data on aquaculture production) and part of the BA data. BA data on "Employment by nationality and gender" as well as BLE data on landings, crew and other logbook entries are specifically provided for the Thuenen Institute.

*Describe the role of auxiliary information, if any, in the strategy: e.g. for validation, cross referencing, fall back data source etc.*

No auxiliary information used.

**Estimation design**

*Describe method of calculating population estimate from sample.*

Destatis and BLE data are used to project survey variables to the whole sector based on sales volume. See Annex 1.2 above for more information on PSS variable projection for freshwater fish segments.

Within the mussel census survey, the following variables are projected according to sales volume derived from BLE landing statistics: "Gross sales per species", "Operating subsidies", "Subsidies on investments", "Other income", "Personnel costs", "Value of unpaid labour", "Energy costs", "Raw material: livestock costs", "Repair and maintenance", "Other operating costs", "Consumption of fixed capital", "Investments in tangible assets (net purchase of assets)","Total value of assets", "Gross debt", "Financial income", "Financial expenditures", "Livestock used", "Paid labour", "Number of enterprises by size category", "Employment by gender", "Employment by age", "Employment by level of education "

For the mussel on-bottom sector, the variable "Unpaid labour" is identified via census survey and projected to the whole sector according to BLE data on crew per owner ID. The variable "Employment by gender" for the mussel on-bottom segment is projected with BA data from the census survey to the whole sector.

For all segments, the variable "Employment by nationality" is derived directly from the BA census on employment.

The variables "Employment by age", "Employment by level of education" for the mussel on-bottom segment are directly derived from the census survey.

*Describe method of calculating derived data: e.g. imputed values.*

Total turnover is projected from the sample survey to the whole sector per segment based on BLE landing statistics and further used for turnover depending variables. Therefore a correlation coefficient according to Bravais-Pearsons is applied, each for the correlation between the variables sales volume and turnover from the survey as well as between turnover and depending variables.

The variable "Value of unpaid labour" is projected by unpaid FTE * average remuneration per paid FTE.

*Describe treatment of nonresponse.*

Not relevant for national statistics.

In the case of unit-non response that leads to an underrepresentation of the mussel on-bottom segment via census survey, mussel producer organisations are contacted personally. In the case of item- or partial-non-response a pairwise deletion method is applied when the amount of missing data is negligible. Due to the personal contact to producer organisations, no severe non-response occurred in the past.

**Error checks**

*Describe potential errors and how and where in the process these are detected, avoided or eliminated e.g., data; duplication, double counting, respondent error, upload error, processing error etc.*

Paper questionnaires are transferred to digital data files by means of their ID and in a final step checked for duplication to avoid double counting within further data processing. To avoid respondent errors, outliers are detected manually as subsequent step to the application of the correlation coefficient.

**Data storage and documentation**

*Describe how the data is stored.*

Data are stored in two ways, as physical files (paper questionnaires) and as digital data files. The paper questionnaires are stored in an archive and include no personal information, but an ID. The link between the sender information and the ID is stored in a separate place.

Digital data are stored on an institutional fileserver with access limited to persons who are in charge of the data collection and processing. Backups are created daily.

*Provide link to webpage where additional methodological documentation can be found, if any.*

(https://www.destatis.de/DE/Methoden/Qualitaet/Qualitaetsberichte/Land-Forstwirtschaft-Fischerei/einfuehrung.html (access on 05/05/2020; only available in German))

https://statistik.arbeitsagentur.de/cae/servlet/contentblob/4412/publicationFile/858/Qualitaetsbericht-Statistik-Beschaeftigung.pdf (access on 05/05/2020; only available in German)

**Revision**

*Describe the frequency of the methodology review e.g., revision of; segmentation, survey method per segment, per variable etc.*

Revision is conducted annually on demand.

**Confidentiality**

*Are procedures for confidential data handling in place and documented?*
Yes, following Directive 2016/680 of the EU Parliament and Council.

*Are protocols to enforce confidentiality between DCF partners in place and documented?*
Yes, following Directive 2016/680 of the EU Parliament and Council.

*Are protocols to enforce confidentiality with external users in place and documented?*
There are no external end users of confidential data.

*Are there any issues with publication of data due to confidentiality reasons? Provide an explanation.*
No.

**Survey Specifications**

*Sector name refers to socio economic data on fisheries, aquaculture and any complementary data collection of fishing activity and processing as given in the EU MAP Delegated Decision annex.*
*Sampling scheme refers to survey technique: by census, by sampling, random or non-random, other (with explanation). If sampling then outline sampling design.*
*Variables refer to Tables 7, 9 and 10 of the EU MAP Delegated Decision annex. Supra region refers to Table 2 of the EU MAP Implementing Decision annex. If the sampling scheme is the same in all supra regions put 'All Supra regions'.*

**Sector name(s):** Socio economic data on aquaculture

**Sampling scheme:** Other: Indirect (segments specified per variable)

**Variables:** FTEs by gender (all segments), Full-time equivalent (FTE) (all segments), Unpaid labour by gender (all segments), Unpaid labour (trout and carp segments), Number of enterprises by size category (trout and carp segments), Number of hours worked by employees and unpaid workers (optional) (mussel on-bottom)

**Supra region(s):** NA

| **Survey planning** |
| --- |
| Provide a short description of the population the sampling scheme applies to; e.g. 'less active vessels using passive gears'.<br><br>Freshwater aquaculture operations for trout (ponds; tanks and raceways) and carp (ponds) larger than 0.3 ha respectively 200 m³ as well as on-bottom blue mussel culture operations. |
| **Survey design and strategy** |
| *Describe how the sample sizes were determined.*<br><br>More information on determination of sample sizes can be found within Annex 1.2 referring to the probability sample survey for the freshwater sector and the Annex 1.2 referring to data collection by census.<br><br>*List data sources; e.g. interviews, registers, log books, sales notes, VMS, financial accounts etc.*<br><br>The probability sample survey on economics and social variables for trout and carp segments and the census survey for mussel on-bottom are conducted via standardised questionnaires.<br><br>*Describe survey methods and distribution; e.g. questionnaire forms by post, by email, on website, by phone etc. access to other datasets etc.*<br><br>Both standardised questionnaires are distributed by post. For the mussel on-bottom segment personal contact with producer organisations is made beforehand. Queries are answered by telephone and email.<br><br>*Describe the role of auxiliary information, if any, in the strategy: e.g. for validation, cross referencing, fall back data source etc.*<br><br>Public calendar (for public holiday information), information on the amount of holidays for fulltime workers and on German full-time employees hours in a usual week (EUROSTAT) are utilized to calculate FTE. |
| **Estimation design** |
| *Describe method of calculating population estimate from sample.*<br><br>The two FTE variables are projected to the whole sector based on BA census data on employment for all segments and additional information on (public) holidays and working hours per week. For unpaid labour by gender the share of female/male family workers per segment from the three annually standardised questionnaire on demographic data is projected to the number of farms derived from Destatis (freshwater aquaculture) and BLE (mussel on-bottom).<br><br>Number of enterprises by size category for the freshwater segments is indirectly projected from number of employees of the three-annually standardised questionnaire on demographic data to the total number of farms derived from Destatis statistics.<br><br>The variable "Number of hours worked by employees and unpaid workers (optional)" for the mussel segment is indirectly derived from BLE census data in combination with the responses from the three annually standardised questionnaire on demographic data.<br><br>*Describe method of calculating derived data: e.g. imputed values.*<br><br>Public calendar (for public holiday information), information on the amount of holidays for fulltime workers and on German full-time employees hours in a usual week (EUROSTAT) are utilized to calculate FTE variables based on the information of number of hours worked from the standardised surveys and the information of employees from BA statistics.<br><br>*Describe treatment of nonresponse.*<br>In the case of unit-non response that leads to an underrepresentation of one or more segments, a postal reminder |

on the survey/the survey itself is send out to the respective segment(s). Responses that do not include information on sales volume per species are treated as a unit-non response within the freshwater survey.

In the case of item- or partial-non-response a pairwise deletion method is applied when the amount of missing data is small.

**Error checks**

*Describe potential errors and how and where in the process these are detected, avoided or eliminated e.g., data; duplication, double counting, respondent error, upload error, processing error etc.*

Paper questionnaires are transferred to digital data files by means of their ID and in a final step checked for duplication to avoid double counting within further data processing.

**Data storage and documentation**

*Describe how the data is stored.*

Data are stored in two ways, as physical files (paper questionnaires) and as digital data files. The paper questionnaires are stored in an archive and include no personal information, but an ID. The link between the sender information and the ID is stored in a separate place.

Digital data are stored on an institutional fileserver with access limited to persons who are in charge of the data collection and processing. Backups are created daily.

*Provide link to webpage where additional methodological documentation can be found, if any.*

**Revision**

Describe the frequency of the methodology review e.g., revision of; segmentation, survey method per segment, per variable etc.
Revision is conducted annually on demand.

**Confidentiality**

*Are procedures for confidential data handling in place and documented?*
Yes, following Directive 2016/680 of the EU Parliament and Council.

*Are protocols to enforce confidentiality between DCF partners in place and documented?*
Yes, following Directive 2016/680 of the EU Parliament and Council.

*Are protocols to enforce confidentiality with external users in place and documented?*
There are no external end users of confidential data.

*Are there any issues with publication of data due to confidentiality reasons? Provide an explanation.*
No.

| **Survey Specifications** |
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| *Sector name refers to socio economic data on fisheries, aquaculture and any complementary data collection of fishing activity and processing as given in the EU MAP Delegated Decision annex.*<br>*Sampling scheme refers to survey technique: by census, by sampling, random or non-random, other (with explanation). If sampling then outline sampling design.*<br>*Variables refer to Tables 7, 9 and 10 of the EU MAP Delegated Decision annex. Supra region refers to Table 2 of the EU MAP Implementing Decision annex. If the sampling scheme is the same in all supra regions put 'All Supra regions'.* |
| **Sector name(s): Socio economic data on fish processing** |
| **Sampling scheme: Census** |
| **Variables: Full-time equivalent (FTE), Number of enterprises, Number of enterprises by size category, Number of persons employed, Employment by gender, Employment by nationality** |
| **Supra region(s): All Supra regions** |
| **Survey planning** |
| All Fish Processing Segments |
| **Survey design and strategy** |
| The Federal Statistical Office in Germany (Destatis) holds a database ("Unternehmensregister") with data on the number of enterprises and employees. The values for the variables *Number of enterprises* and *Number of enterprises by size* are requested and made available specifically for the Thünen Institute by e-mail.<br><br>Furthermore, the Federal Employment Agency registers all persons employed belonging to the social security scheme in Germany together with the additional characteristics gender and nationality (domestic, EU and Non-EU) and per country for the European Union. Data on *Number of persons employed*, *Employment by gender* and *Employment by nationality* are available for every quarter („Sozialversicherungspflichtig Beschäftigte darunter Auszubildende sowie geringfügig Beschäftigte nach ausgewählten Wirtschaftszweigen WZ 2008") and are specifically provided for the Thünen Institute by e-mail on request. Based on data on full and part time work published on the website of the German Federal Employment Agency ("Beschäftigte nach Berufen (Klassifikation der Berufe 2010) - Deutschland, West/Ost und Länder (Quartalszahlen)", https://statistik.arbeitsagentur.de/SiteGlobals/Forms/Suche/Einzelheftsuche_Formular.html?nn=1523064&topic_f=beschaeftigung-sozbe-bo-heft) the *Full-time Equivalent (FTE)* is calculated.<br><br>These data sets are well established and provide reliable and validated time series. In order to avoid doubling data collection, these primary data are used for the purpose of the data collection in the processing sector. |
| **Estimation design** |
| No estimation is necessary for the variables *Number of enterprises*, *Number of enterprises by size category*, *Number of persons employed*, *Employment by gender* and *Employment by nationality*. Values are directly derived from the census. |
| **Error checks** |
| The quality of the available data can be regarded as very high due to the fact that the data on the fish processing industry by the Federal Statistical Office (Destatis) are collected under European Structural Business Statistics (SBS) standards.<br><br>The data collection of the Federal Employment Agency is based on the registration procedures for legal social security which is why the data quality can be regarded as very high as well. |

| **Data storage and documentation** |
| --- |
| Digital data are stored on an institutional fileserver with access limited to persons who are in charge of the data collection and processing. Backups are created daily.<br><br>Additional methodological documentation can be found on the webpage of the Federal Statistical Office in Germany (www.destatis.de/DE/Methoden/Qualitaet/Qualitaetsberichte/Unternehmen/unternehmensregister.html) and the Federal Employment Agency (https://statistik.arbeitsagentur.de/DE/Statischer-Content/Grundlagen/Methodik-Qualitaet/Qualitaetsberichte/Generische-Publikationen/Qualitaetsbericht-Statistik-Beschaeftigung.pdf?__blob=publicationFile&v=8). |
| **Revision** |
| Methodology will be reviewed when necessary at irregular intervals for examples if changes regarding the methodology or segmentation used by the Federal Statistical Office or the Federal Employment Agency are implemented. |
| **Confidentiality** |
| Are procedures for confidential data handling in place and documented?<br>Yes – following Directive 2016/680 of the EU Parlament and Council.<br><br>Are protocols to enforce confidentiality between DCF partners in place and documented?<br>Yes – following Directive 2016/680 of the EU Parlament and Council.<br><br>Are protocols to enforce confidentiality with external users in place and documented?<br>There are no external end users of confidential data.<br><br>Are there any issues with publication of data due to confidentiality reasons? Provide an explanation.<br>The numbers 1 and 2 and values that would enable their calculation are replaced by "*" due to confidentiality reasons. This applies to the data on nationality per country of the Federal Employment Agency. |

| **Survey Specifications** |
|---|
| *Sector name refers to socio economic data on fisheries, aquaculture and any complementary data collection of fishing activity and processing as given in the EU MAP Delegated Decision annex.*<br>*Sampling scheme refers to survey technique: by census, by sampling, random or non-random, other (with explanation). If sampling then outline sampling design.*<br>*Variables refer to Tables 7, 9 and 10 of the EU MAP Delegated Decision annex. Supra region refers to Table 2 of the EU MAP Implementing Decision annex. If the sampling scheme is the same in all supra regions put 'All Supra regions'.* |
| **Sector name(s): Socio economic data on fish processing** |
| **Sampling scheme: Probability Sample Survey (Companies >20 employees)** |
| **Variables: Consumption of fixed capital, Energy costs, Financial expenditures, Gross debt, Gross investments, Operating subsidies, Other income, Other operating costs, Payment for external agency workers, Personnel costs, Purchase of fish and other raw material for production, Total value of assets, Turnover** |
| **Supra region(s): All Supra regions** |
| **Survey planning** |
| In Germany, 80-90% of employment and turnover of the fish processing sector belong to companies with 20 and more employees. Therefore, this segmentation is used. |
| **Survey design and strategy** |
| In addition to the enterprise register, the Federal Statistical Office in Germany (Destatis) conducts a probability sample survey on several cost items with a threshold of companies with 20 and more employees ("Kostenstrukturerhebung im Verarbeitenden Gewerbe sowie des Bergbaus und der Gewinnung von Steinen und Erden"). The sample size amounts to 18 000 enterprises which represents 45% of the whole German processing sector. The survey by Destatis is conducted via standardized questionnaires sent out by post. The data gathered in this manner is projected to the whole sector and published on the database "GENESIS online" of the Federal Statistical Office of Germany.<br><br>The values of the variables *Energy costs*, *Financial expenditures*, *Gross investments*, *Other operating costs, Payment for external agency workers*, *Personnel costs*, *Purchase of fish and other raw material for production* and *Turnover* are directly derived from the template **42251-0004 (**Kostenstruktur der Unternehmen im Verarbeitenden Gewerbe: Deutschland, Jahre, Wirtschaftszweige (2-/3-/4-Steller)) that is available on the database. https://www-genesis.destatis.de/genesis//online?operation=table&code=42251-0004&bypass=true&levelindex=0&levelid=1633080815848#abreadcrumb<br><br>The values of the variables *Operating subsidies* and *Consumption of fixed capital* are derived from the template **42251-0001** (Beschäftigte, Umsatz, Produktionswert und Wertschöpfung der Unternehmen im Verarbeitenden Gewerbe: Deutschland, Jahre, Wirtschaftszweige (2-/3-/4-Steller)) that can be accessed on the database as well. https://www-genesis.destatis.de/genesis//online?operation=table&code=42251-0001&bypass=true&levelindex=1&levelid=1633093142591#abreadcrumb<br><br>The remaining data (e.g. *Other income*) was obtained by ad-hoc consultations with Destatis. |

Data on the variables *Gross debt* and *Total values of assets* are not included in any of the available national statistics and cannot be obtained by any administrative bodies. Former experiences of the Thünen-Institute for Sea Fisheries with the attempt to gather these data via survey have shown very low response rates due to the sensitivity of the topic. For this reason, publicly available financial accounts (https://www.bundesanzeiger.de/pub/de/start?0) of the 10 biggest German fish processing companies are used. This sample size seems appropriate as their share of the turnover published by Destatis amounted to 70-75 % for 2018 and 2019.

**Estimation design**

The population estimates for the variables *Consumption of fixed capital*, *Energy costs*, *Financial expenditures*, *Gross investments*, *Payment for external agency workers*, *Personnel costs*, *Purchase of fish and other raw material for production*, *Other income*, *Operating subsidies* and *Turnover* were calculated by Destatis before their publication on the database. Detailed information on the methods used for calculating the population estimates from sample can be extracted from the quality report for the "Kostenstrukturerhebung" on the website of Destatis: https://www.destatis.de/DE/Methoden/Qualitaet/Qualitaetsberichte/Industrie-Verarbeitendes-Gewerbe/kostenstruktur-verarbeitendes-gewerbe.html

The values for *Gross debt* and *Total values of assets* from the publicly available financial accounts are projected to the whole sector using their share of the turnover of fish processing companies with 20 and more employees by Destatis.

**Error checks**

The quality of the available data can be regarded as very high due to the fact that the data on the fish processing industry by the Federal Statistical Office (Destatis) are collected under European Structural Business Statistics (SBS) standards. The stratified random sampling covering around 40% of the sectors larger companies allows high quality of the data. The existing duty of disclosure to Destatis ensures high quality of the data as well. For these reasons, no measurement errors are expected.

Certain companies are obligated to publish their accounting documentation online in the "Bundesanzeiger". Due to the existing disclosure requirements, no errors in the financial reports used as primary source are expected.

Processing errors are, as much as possible, addressed through comparison with related data sets (e.g. time series).

**Data storage and documentation**

Digital data are stored on an institutional fileserver with access limited to persons who are in charge of the data collection and processing. Backups are created daily.

There is a quality report available on the website of Destatis with additional methodological information https://www.destatis.de/DE/Methoden/Qualitaet/Qualitaetsberichte/Industrie-Verarbeitendes-Gewerbe/kostenstruktur-verarbeitendes-gewerbe.html

**Revision**

Methodology will be reviewed when necessary at irregular intervals for examples if changes regarding the methodology or segmentation used by the Federal Statistical Office in Germany are implemented.

**Confidentiality**

Are procedures for confidential data handling in place and documented?
Yes – following Directive 2016/680 of the EU Parlament and Council.

Are protocols to enforce confidentiality between DCF partners in place and documented?
Yes – following Directive 2016/680 of the EU Parlament and Council.

Are protocols to enforce confidentiality with external users in place and documented?
There are no external end users of confidential data.

Are there any issues with publication of data due to confidentiality reasons? Provide an explanation.
No.

| **Survey Specifications** |
|---|
| *'Sector name' refers to socio economic data on fisheries, aquaculture and any complementary data collection for fishing activities and processing, as in the EU MAP Delegated Decision annex.*<br>*'Sampling scheme' refers to the survey technique: by census, by sampling, random or non-random, other (with explanation). If sampling, then outline sampling design.*<br>*'Variables' refer to Tables 7, 9 and 10 of the EU MAP Delegated Decision annex.*<br>*'Supra region' refers to Table 2 of the EU MAP Implementing Decision annex. If the sampling scheme is the same in all supra regions, put 'All supra regions'.* |
| **Sector name(s): Socio economic data on fish processing** |
| **Sampling scheme: Probability Sample Survey (Own Survey)** |
| **Variables: Employment by level of education, Employment by age, Financial income, Subsidies on investments, Weight of raw material by country of origin, Weight of raw material by production environment, Weight of raw material by species, Weight of raw material by type of processed material** |
| **Supra region(s): All supra regions** |
| **Survey planning** |
| All Fish Processing Segments.<br>Data on raw material are collected for companies with 20 or more employees. |
| **Survey design and strategy** |
| For the variables where data are not available via other administrative bodies (as it is the case for *Financial income*, *Subsidies on investments, Weight of raw material by country of origin, Weight of raw material by production environment, Weight of raw material by species* and *Weight of raw material by type of processed material*) or data on employment figures are not sufficiently covered by the Employment Agency (as it is the case for *Employment by level of education* and *Employment by age*), the Thünen Institute of Sea Fisheries conducts an additional standardised survey. Experiences from former years have shown that information on this regard are achievable by questionnaires and eventual telephone recalls, so this methodology will be maintained.<br><br>For the data collection conducted by the Thünen Institute of Sea Fisheries, the principles are cost effectiveness and the avoidance of double data collection burden for the enterprises. To achieve this, the survey is only conducted every other year requesting the economic data of two references years. For years with data collection of social variables this procedure is adjusted correspondingly. This approach also considers the willingness to respond. If the respondents are contacted too frequent, the experience shows that the response rate decreases.<br><br>Due to the strict interpretation and application of data protection law of the German state offices of statistics, the Thünen Institute has no access to the official register of fish processing companies' addresses. Alternatively, an own database has been built up containing processing enterprises whose addresses are available via public sources. This database underlies a continuous updating process based on responses from the sector (e.g. termination of business, concerns about data protection et cetera). This database builds the sample size for the standardised questionnaire. Due to the continuous cleansing process the exact sample frame is variable. The standardised survey is distributed by post, queries are answered by telephone and e-mail.<br><br>Due to the use of auxiliary information the effect of bias is counteracted. The data is checked on the basis of additional information on age, fulltime and part time, employment status and education can be accessed on the website of the Federal Employment Agency:<br>https://statistik.arbeitsagentur.de/SiteGlobals/Forms/Suche/Einzelheftsuche_Formular.html?nn=1523064&topic_f=beschaeftigung-sozbe-bo-heft<br><br>Missing entries are interpreted as item non-response, while "slash" entries are treated as zero. |

| **Estimation design** |
| --- |
| The variables *Employment by level of education* and *Employment by age* are projected on sector level on the basis of the employment census conducted by the German Federal Employment Agency (see also Annex 1.2 on census).<br><br>As reference for projection of the variable *Financial income* to the whole sector either the number of enterprises per size category (see also Annex 1.2 on census) or the turnover published by Destatis can be used. *Weight of raw material by country of origin, Weight of raw material by production environment, Weight of raw material by species* and *Weight of raw material by type of processed material* are projected to the number of enterprises per size category.<br><br>The responds to *Subsidies on investments* within the survey are projected to the number of enterprises per size category (see also Annex 1.2 on census). The publication of payments within the European Maritime and Fisheries Fund (EMFF) can be accessed here: https://www.agrar-fischerei-zahlungen.de/Fischerei_empfaenger and serve as auxiliary information for validation and plausibility checks together with further consultation with regional officials for clarification on detailed uses of EMFF funds. |
| **Error checks** |
| Paper questionnaires are transferred to digital data files by means of their ID and in a final step checked for duplication to avoid double counting within further data processing. Processing errors are, as much as possible, addressed through comparison with related data sets (e.g. time series). |
| **Data storage and documentation** |
| Data are stored in two ways, as physical files (paper questionnaires) and as digital data files. The paper questionnaires are stored in an archive and include no personal information, but an ID. The link between the sender information and the ID is stored in a separate place.<br><br>Digital data are stored on an institutional fileserver with access limited to persons who are in charge of the data collection and processing. Backups are created daily. |
| **Revision** |
| Revision is conducted annually on demand. |
| **Confidentiality** |
| Are procedures for confidential data handling in place and documented?<br>Yes – following Directive 2016/680 of the EU Parlament and Council.<br><br>Are protocols to enforce confidentiality between DCF partners in place and documented?<br>Yes – following Directive 2016/680 of the EU Parlament and Council.<br><br>Are protocols to enforce confidentiality with external users in place and documented?<br>There are no external end users of confidential data.<br><br>Are there any issues with publication of data due to confidentiality reasons? Provide an explanation.<br>No. |