



Ministerio de Agricultura, Pesca y Alimentación

Secretaría General de Pesca

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 16 July 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 16 July 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) 2021/39

laying down rules on the format and timetables for the submission of national work plans and annual reports on data collection in the fisheries and aquaculture sectors, and repealing Implementing Decisions (EU) 2016/1701 and (EU) 2018/1283

Spain Annual Report on data collection in the fisheries and aquaculture sectors

2022

Version [4]

Madrid, 21-06-2023

CONTENTS.

Madrid, 30-05-2023.....	2
Section 1: General information	6
<i>Data collection framework at national level.....</i>	<i>6</i>
<i>Text Box 1a: Test studies description</i>	<i>7</i>
STOMACHS	7
HABITATS.....	9
PETFISH	11
RECREATIONAL.....	13
<i>Text Box 1b: Other data collection activities.....</i>	<i>15</i>
CULTIVOS.....	15
IDAO	17
MARCADO	18
Biological parameters of tuna	20
REMASMuest.....	22
REMASVarBio	25
GENGES	27
Section 2: Biological Data	30
<i>Text Box 2.1: List of required species/stocks</i>	<i>30</i>
North Sea and Eastern Arctic. (Eastern Arctic, Norwegian Sea and Barents Sea (ICES areas 1, 2, FAO area 27))	30
North-East Atlantic. (North-East Atlantic and Western Channel (ICES areas 5, 6, 7 (excl. 7d), 8, 9, 10, 12 and 14, FAO area 27))	30
Mediterranean Sea and Black Sea (GFCM GSA 1-29, FAO area 37)	31
The outermost regions. (EU waters around Canary islands (FAO area 34.1.2)).....	31
Other regions. (North-West Atlantic (FAO area 21). NAFO)	31
Other regions. (Eastern Central Atlantic (FAO area 34). CECAF).....	32
Other regions. (Atlantic Ocean and adjacent seas (FAO areas 21, 27, 31, 37, 41, 47, 34, 48). ICCAT)	32
Other regions. (Indian Ocean (FAO area 51 and 57). IOTC)	33
Other regions. (Western Central Pacific (FAO area 71). WCPFC).....	33
Other regions. (Eastern Central Pacific (FAO area 77 and 87). IATTC)	33
Other regions. (Antarctic and Southern Indian Ocean (FAO area 48, 58 and 88). CCAMLR)	34
<i>Text Box 2.2: Planning of sampling for biological variables.....</i>	<i>34</i>
North Sea and Eastern Arctic. (Eastern Arctic, Norwegian Sea and Barents Sea (ICES areas 1, 2, FAO area 27))	34
North-East Atlantic. (North-East Atlantic and Western Channel (ICES areas 5, 6, 7 (excl. 7d), 8, 9, 10, 12 and 14, FAO area 27))	35
Mediterranean Sea and Black Sea (GFCM GSA 1-29, FAO area 37)	36
The outermost regions. (EU waters around Canary islands (FAO area 34.1.2)).....	37
Other regions. (North-West Atlantic (FAO area 21). NAFO)	38
Other regions. (Eastern Central Atlantic (FAO area 34). CECAF).....	38
Other regions. (Atlantic Ocean and adjacent seas (FAO areas 21, 27, 31, 37, 41, 47, 34, 48). ICCAT)	38
Other regions. (Indian Ocean (FAO area 51 and 57). IOTC)	39
Other regions. (Eastern Central Pacific (FAO area 77 and 87). IATTC)	40
Other regions. (Antarctic and Southern Indian Ocean (FAO area 48, 58 and 88). CCAMLR)	40

<i>Text Box 2.3: Diadromous species data collection in freshwater</i>	<i>40</i>
<i>Text Box 2.4: Recreational Fisheries.....</i>	<i>45</i>
North-East Atlantic.....	45
Mediterranean Sea and Black Sea.....	46
<i>Text Box 2.5: Sampling plan description for biological data</i>	<i>47</i>
North Sea and Eastern Arctic. (Eastern Arctic, Norwegian Sea and Barents Sea (ICES areas 1, 2, FAO area 27))	47
North-East Atlantic. (North-East Atlantic and Western Channel (ICES areas 5, 6, 7 (excl. 7d), 8, 9, 10, 12 and 14, FAO area 27))	48
Mediterranean Sea and Black Sea (GFCM GSA 1-29, FAO area 37)	49
The outermost regions. (EU waters around Canary islands (FAO area 34.1.2)).....	50
Other regions. (North-West Atlantic (FAO area 21). NAFO)	51
Other regions. (Eastern Central Atlantic (FAO area 34). CECAF).....	52
Other regions. (Atlantic Ocean and adjacent seas (FAO areas 21, 27, 31, 37, 41, 47, 34, 48). ICCAT)	53
Other regions. (Indian Ocean (FAO area 51 and 57). IOTC)	54
Other regions. (Western Central Pacific (FAO area 71). WCPFC).....	55
Other regions. (Eastern Central Pacific (FAO area 77 and 87). IATTC)	56
Other regions. (Antarctic and Southern Indian Ocean (FAO area 48, 58 and 88). CCAMLR)	56
<i>Text Box 2.6: Research surveys at sea.....</i>	<i>57</i>
FLEMISH CAP GROUND FISH SURVEY.....	57
3LNO GROUND FISH SURVEY. (1st part -3NO)	59
3LNO GROUND FISH SURVEY. (2nd part -3L)	61
Western IBTS 4th quarter (including porcupine survey). (8c y 9a north)	62
Western IBTS 4th quarter (including porcupine survey). (9a south)	64
Western IBTS 4th quarter (including porcupine survey).(7ck)	66
Blue Whiting Survey	68
International Mackerel and Horse Mackerel Egg Survey (triennial).	69
International Mackerel and Horse Mackerel Egg Survey (triennial).	71
International Mackerel and Horse Mackerel Egg Survey (triennial).	73
Sardine, Anchovy Horse Mackerel Acoustic Survey.	74
Sardine DEPM (triennial).....	76
Biomass of Anchovy.	77
Acoustic Survey on Sardine and Anchovy.	79
Acoustic Survey for Juvenile Anchovy in the Bay of Biscay.....	81
Deepwater Longline Survey.	83
Pan-Mediterranean Acoustic Survey.....	85
International Bottom Trawl Survey in the Mediterranean.	87
Bluefin Tuna Larval Survey.	89
Nephrops UWTV Survey.....	91
Western IBTS 1st quarter.	92
Anchovy DEPM (triennial)	94
Acoustic Survey on Sardine and Anchovy-Recruits.	95
Acoustic index for juvenile bluefin tuna in the Bay of Biscay)	97
Section 3: Fishing Activity Data	99
<i>Text Box 3.1: Fishing activity variables data collection strategy.....</i>	<i>99</i>
<i>Text Box 3.2: Fishing activity variables data collection strategy (for inland eel commercial fisheries).....</i>	<i>100</i>

Section 4: Impact of fisheries on marine biological resources	102
<i>Text Box 4.2: Incidental catches of sensitive species.....</i>	<i>102</i>
North Sea and Eastern Arctic. Eastern Arctic, Norwegian Sea and Barents Sea (ICES areas 1, 2, FAO area 27)	102
North-East Atlantic. North-East Atlantic and Western Channel (ICES areas 5, 6, 7 (excl. 7d), 8, 9, 10, 12 and 14, FAO area 27).....	103
Mediterranean Sea and Black Sea (GFCM GSA 1-29, FAO area 37)	106
The outermost regions. EU waters around Canary islands (FAO area 34.1.2)	109
Other regions. North-West Atlantic (FAO area 21). NAFO.....	110
Other regions. Eastern Central Atlantic (FAO area 34). CECAF	112
Other regions. Atlantic Ocean and adjacent seas (FAO areas 21, 27, 31, 37, 41, 47, 34, 48). ICCAT	113
Other regions. Indian Ocean (FAO area 51 and 57). IOTC.....	115
Other regions. Western Central Pacific (FAO area 71). WCPFC	117
Other regions. Eastern Central Pacific (FAO area 77 and 87). IATTC	118
Other regions. Antarctic and Southern Indian Ocean (FAO area 48, 58 and 88). CCAMLR.....	120
<i>Text Box 4.3: Fisheries impact on marine habitats.....</i>	<i>121</i>
Section 5: Economic and social data in fisheries	122
<i>Text Box 5.2: Economic and social variables for fisheries data collection.....</i>	<i>122</i>
Section 6: Economic and social data in aquaculture	123
<i>Text Box 6.1: Economic and social variables for aquaculture data collection.....</i>	<i>123</i>
Section 7: Economic and social data in fish processing	126
<i>Text Box 7.1: Economic and social variables for fish processing data collection</i>	<i>126</i>

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.

Outline the general framework of the national data collection programme in relation to the relevant sections of the EU MAP. If applicable, indicate major methodological changes in approach compared to previous year(s), and to which section(s) they apply.

Give full name, acronym and contact details of all institutes that contribute to the data collection activities, and describe briefly their role in the work plan.

Provide a link to the national data collection website, if there is one.

The National Authority responsible for implementing the Data Collection National Program (PNDB) is the GENERAL SECRETARY FOR FISHERIES, (hereinafter SGP) from the Ministry of Agriculture, Fisheries and Food (hereinafter MAPA), who acts as National Correspondant for the exchange of information between the Commission and the Kingdom of Spain.

It is based in Madrid, C/Velázquez, 144. 28006. Tel. 91 3476110/6057 Fax. 91 3476037.

E-mail: sgprotec@mapa.es

Spain has a central website where general information about data collection framework is stored.

<https://www.mapa.gob.es/es/pesca/temas/proteccion-recursos-pesqueros/programa-nacional-datos-basicos/documentos-clave/>

There are several Units involved in PNDB, collecting different DCF variables each:

Fishing activity variables are collected directly by SGP, from sources such as: logbooks, censuses, sales notes, etc. Furthermore, SGP coordinates the data collection of from Spain's 17 Autonomous Regions (recreational fisheries, environmental and aquaculture data, etc).

Economic data on fisheries and aquaculture are collected by MAPA in the Economic Survey of Marine Fisheries and the Economic Survey of Aquaculture, respectively. These surveys are included in the National Statistical Plan.

Social data on fisheries and aquaculture are collected by the Spanish National Statistics Institute (INE). This Institute also collects socioeconomic data on the fish processing sector, through the Survey of Industrial Companies.

Biological métier-related data and biological stock-related data are collected by different Research Institutes and compiled at the Spanish Institute of Oceanography (hereinafter IEO-CSIC), who processed and made them available to the responsible national body, SGP.

SGP collaborates with these Research Institutes, providing the oceanographic research vessels R/V Miguel Oliver, R/V Vizconde de Eza and R/V Emma Bardán.

The participants Institutes are:

Spanish Institute of Oceanography (IEO-CSIC):

Under the Ministry of Science and Innovation, with headquarters in Corazón de María, 8, 28002 Madrid; Tel: +34 91 342 11 00, (www.ieo.es). It collects fisheries data from the different areas, length sampling and biological sampling both on shore (market) and on board, as well as scientific analysis for the assessment of the Spanish fisheries. It carries out most of the research surveys at sea along the Spanish coast and NAFO area (11 on an annual basis and 4 on a triennial basis) as well as the subsequent analysis of the associated data. All 9 coastal centers that IEO-CSIC has along the Spanish coast are involved in these tasks.

IEO has a space in its central website where general information about data collection framework is shown.

http://www.ieo.es/es_ES/web/ieo/pndb

IIM-CSIC, another research institute from the same Ministry, collaborates in the Flemish Cap survey activities on board and analysing samples.

Instituto Tecnológico, Pesquero y Alimentario (Fundación AZTI - Tecnalia):

Based on Txatxarramendi Ugarte a z/g, 48 395 Sukarrieta-Bizcaia (Spain): Tel: +34 94 602 94 00, Herrera Kaia - Portu aldea, z/g, 20110 Pasaia (Gipuzkoa) Tel: +34 943 00 48 00), (www.azti.es). AZTI is in charge of the collection of fisheries data, biological sampling and assessment of the fisheries in which the fleet based in the Basque Country are involved. It carries out five research surveys at sea in the Bay of Biscay (4 on an annual basis and one on a triennial basis).

COMMENT ON GUIDELINES COMPLIANCE

Table 2.2:

Although the guideline says. "List all biological variables per species/stock, even if you don't plan to collect in a given year. In such case, put '0' in column 'Number of individuals to sample'".

A 'Y' in column "O" of table 2.1 indicates a variable to be collected in some year(s) so a "Y" means a combination of, as a minimum, 5 variables x 3 years = 15 lines per stock/sampling scheme in table 2.2.

It will result in a long list with a lot of "0", even more in countries that plan for 6 years (5 variables x 6 years = 30 lines per stock/sampling scheme).

As Spain decided to submit the plan for 6 years and there are more than one sampling scheme per stock (in most of the stocks), we have slightly modified the presentation of the list of biological variables in table 2.2.

Instead of presenting all variables for each stock, we have decided to reflect just the variables that is planned to be collected, at least, once during the span of the WP and give up the idea of presenting a variable when it is not planned at all in the period (like age and crustaceans).

Example: if we only plan to get sex ratio in a given stock but no other variables, we keep 'sex-ratio' in all years (even if some of them are=0), and in this case we don't need to say also age=0, fecundity=0, maturity=0 and weight=0 for all years, etc.

Our base is the stock. One stock (like mackerel) has 5 variables, other stocks (like skates) could have 3 variables and other stocks can even have only one.

In the first case we keep the 5 variables always (for the 6 years=30 rows by sampling scheme), putting 0 in the years when the variables are not collected. In the second case we show only the 3 planned variables for each year (for the 6 years=18 rows by sampling scheme) putting 0 in the years when the variables are not collected, if any. This saves 12 rows with "0" per stock and per sampling scheme.

ANNEXES

Due to the large number of Annexes 1.1, they are submitted in a separate file named as "Spain_WP_2022-2024_Annexes_20211015".

REFERENCE PERIOD in several tables

In several tables the period 2017-2019 was considered as "reference period". This is due to the fact that 2020 is not considered a representative year due to COVID-19.

(max. 1000 words)

Text Box 1a: Test studies description**STOMACHS**

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.

STOMACHS

1. Aim of the test study

Understanding the trophic web of an ecosystem through the study of predator-prey relationships is key for an accurate application of ecosystem and multispecies models as well as for estimating natural mortality. This data and models are required to anticipate the responses of ecosystems to fishing pressures and to make good predictions about the status of fisheries stocks. Traditionally, food web studies have been made through the visual identification of stomach contents, which is a tedious and expensive activity which has limitations for (semi)digested, early life stages or gelatinous organisms. Genetic methods can represent an alternative allowing the accurate and cost-effective characterization of stomach contents. Yet, their application is not straight forward as there are limitations such as those related with quantification, detecting cannibalism, and detecting preys of preys. Thus, the aims of the study will consist of:

- -Establishing a framework for the inclusion of genetic derived stomach content data into the fisheries and ecosystem assessment process
- -Developing standard genetic methods for stomach content sampling, DNA extraction and analysis
- -Assessing the accuracy of genetic methods for determining the prey composition of a variety of fish species
- -Setting the basics of a routine food-web monitoring program through genetic analyses of stomach contents.

2. Duration of the test study

Three years (2022-2023-2024)

3. Methodology and expected outcomes of the test study

The aims of the study will be achieved by a series of tasks that will be performed in parallel as they are interdependent.

- To fully understand the potential and limitations of genetic approaches compared to traditional methods, we will establish a working group including geneticists, taxonomists experts in stomach content analyses, fisheries assessors, ecosystem modelers and sampling and data collection experts. Using the multidisciplinary expertise of the group, we will assess minimum data requirements, logistically possible sampling designs and develop a draft proposal for routine monitoring. We will also make use of our connections with other organisms through ICES working groups (WGAGFM) and workshops (WKBECOSS) and through the stomach content working group of the NANSEA Regional Coordination Group. OUTCOME 1: Report assessing the potential of genetic methods to fulfil the needs of fisheries assessment and ecosystem modelling.
- To develop a standardized protocol while benchmarking genetic analyses, we will analyse stomach contents from several species, including demersal and pelagic and including also tropical tunas in areas beyond national jurisdiction. Results from genetic analyses using alternative procedures (including storage, DNA extraction, sequencing, etc...) will be compared to those obtained with visual inspection analyses. OUTCOME 2: Standardized protocol for genetic stomach content analyses
- To advance towards a routine monitoring of stomach contents through genetic analyses, we will integrate the information gathered from outcomes 1 and 2 and contrasted with collaborating institutes such as IEO and IFREMER in order to develop a common framework, with survey coordinators in order to further confirm feasibility, and with end users, such as modellers and fisheries assessors in order to fully test the benefits of including genetic derived stomach content information. OUTCOME 3: Proposal for a routine monitoring of stomach content analyses through genetics

(max 900 words per study)

Brief description of the results (including deviations from the plan and justifications as to why if this was the case).

The three outcomes expected in the STOMACHS test study are 1) to understand the needs of fisheries assessment and ecosystem modelling and assess the potential of genetic methods to fulfil them, 2) to develop standardized protocols for genetic stomach contents, and 3) to develop a proposal for a routine monitoring of stomach contents analysis through genetics. During the first year of the project, we have primarily focused on outcomes 1 and 2.

Regarding the outcome 1, we have identified the data needed by ecosystem and multispecies models, the knowledge that needs to be obtained for a reliable implementation of ecosystem-based management approaches and the potential and limitations of genetic methods to fulfil these needs. Briefly, multispecies/ecosystem models need data on (1) predator-prey relationships (who eats whom, who compete against whom), (2) the proportion of each prey in the diet of predators (preferably in energetic terms such as weight and/or volume), (3) the developmental stage of both prey and predators, and (4) how feeding behaviour changes over time and space (comprehensive temporal and spatial data on the diet of marine organisms). Genetic methods show great potential to feed needs 1 and 4 as they provide a higher

accuracy in prey identification (including prey that degrade rapidly such as gelatinous organisms), and are a more cost-effective, less time-consuming, and less taxonomic expertise-non-dependant method. It shows moderate potential to feed need 2 due to the limitations of DNA metabarcoding to provide reliable abundance estimates while being able to provide abundance data regarding organisms not usually considered by visual inspection (e.g., jellyfish). Finally, genetic methods are not able to provide data on need 3.

We have developed a preliminary sampling guide for stomach collection and preservation for genetic analysis. This guide has been developed by modifying current stomach collection methods applied to different fish species, including small pelagic and demersal species, and tuna. The sampling guidestill needs to be contrasted with sampling experts to assess whether it is logistically possible.

Regarding the outcome 2, we have developed a protocol for the genetic analysis of stomach contents through DNA metabarcoding. The protocol aims to minimise the amount of predator reads by using blocking primers, i.e., primers that avoid the binding of the amplification primer to the predator DNA, thus favouring the amplification of prey DNA instead. For fish with a relatively small stomachs, the use of blocking primers allows skipping the stomach dissection and content extraction steps, which implies saving a notable amount of time thus speeds up the analysis process. We have analysed the stomach contents of some commercially important fish species (European anchovy, European sardine, Atlantic mackerel, Atlantic horse mackerel, European hake, and skipjack tuna) and, in the case of Atlantic mackerel, compared the results obtained by DNA metabarcoding with the ones obtained by visual means. We expect to do method comparison for assess the diet of two more species during the second year of the test study.

Our results show that genetic methods can identify differences in fish diet due to size, ecology (e.g., pelagic vs demersal), or prey availability, while providing the detection (and accurate taxonomic identification) of a much higher prey diversity than the visual approach. Note the importance of gelatinous organisms in the diet of some of the species analysed (e.g., European sardine, European mackerel); in the case of Atlantic mackerel, the relative abundance of gelatinous organisms accounted for about 15%, whereas it represented less than 1% of the prey volume by the visual approach.

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

The project is preogressing well, so we anticipate we will provide the expected outcomes at the end of the three-year time of the test study.

Incorporation of study results into regular sampling by the Member State.

This will be handled in outcome 3 (develop a proposal for a routine monitoring of stomach content analysis through genetics) in the following years.

(max. 900 words per study)

Text Box 1a: Test studies description

HABITATS

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.

HABITATS

1. Aim of the test study

Ecosystem effects of bottom contact fishing gears are of major concern. Among others, it can produce physical disturbance of the seafloor which can be traduced into a reduction of habitat complexity by removing emergent epifauna, smoothing sedimentary bedforms, and removing taxa that produce habitat structure. And thus, it produces significant effects on the overall habitat stability and productivity. There is a clear association of fishes with structural habitat features that provide essential fish habitat. Wich includes species of commercial interest.

Fishing gear that makes contact with the seafloor has different levels of impact, depending on the gear type, the properties of the seafloor, the biodiversity living within or on the seabed, and the intensity and frequency of contact. Therefore, a spatially and temporally explicit approach is required to assess the impact of bottom contact fishing gears.

Within this context, the objectives of the present Pilot Study are:

- Characterisation of bottom contact fishing gears and their potential impact on seabed habitats.
- Perform experimental surveys to obtain data necessary to assess the environmental status of seabed habitats in areas of fishing activity.
- To integrate ecosystem level information obtained from surveys to assess the spatial distribution and magnitude of impacts of bottom contact fishing gears.
- To develop standard protocols for the collection of data dealing with environmental impacts of bottom contact fishing gears.
- To set up the essentials of a routine monitoring of data for the monitoring the status of seabed habitats of fishing grounds.

2. Duration of the test study

5 year pilot study (2022-2026)

3. Methodology and expected outcomes of the test study

- Identification and characterisation of fishing gears with potential impact on the seabed.
- Identification and description of methodologies for the characterization and identification of the potential impacts of fishing gear on the seafloor and seabed habitats and species.
- Definition of a survey strategy: adopting the Basque Country as case study, validate the proposed characterization methodologies and the potential impacts identified.
 - Identification and delimitation of fishing grounds of for each fishing gear. Estimation of fishing effort based on Vessel Monitoring System (VMS) and Automatic Identification System (AIS) data.
 - Field surveys. Different survey technologies will be applied according to benthic habitats under study.
 - Acquisition of multibeam echosounder bathymetry information for the characterisation of the seafloor morphology. That includes the characterisation of habitats and seabed species communities on Habitats of Community Interest according to Habitats Directive (Council Directive 92/43/EEC of 21 May 1992)
 - Beam-trawl and sediment grab samples acquisition for the characterisation of sedimentary fishing grounds. It will include the characterisation of pockmark fields (Priority Habitat: 1180 Submarine structures made by leaking gases). A stratified survey will be performed covering fishing grounds showing different fishing effort. That includes areas in which fishing activity is not performed according to historical VMS data.
 - Underwater video and images recording on rocky seafloor (Priority Habitat 1170 Reef and other hard substrata). A stratified survey will be performed covering fishing grounds where different fishing gears are used and showing different fishing effort.
 - Data processing, integration and interpretation for the assessment of benthic habitats conservation status and estimation of potential impacts derived from fishing activity.
- Results obtained during the study will be evaluated for their adequacy for assessing and monitoring the environmental and conservation status of seafloor habitats and impacts produced by bottom contact fishing gears.

Based on the outcomes obtained from the Pilot Study and the experience gained the incorporation of the approach under routine marine fisheries surveys will be evaluated.

4. Expected outcomes

- Incorporation of the developed approach under routine marine fisheries surveys, to collect comprehensive information to advance in developing effective management measures.
- Production of information to implement efficient spatio-temporal management measures.
- Advance in ecosystem-based fisheries management.

(max 900 words per study)

Brief description of the results (including deviations from the plan and justifications as to why if this was the case).

This first year of the project has been focused on obtaining the necessary data for the subsequent assessment of the impact of mobile fishing gear on the seabed, and the work has therefore focused on the study of the environmental status of bottom trawling areas. Samples of surface sediments and macro infauna have been taken with dredges, samples of mega epifauna have been obtained with bottom trawls using a beam trawl net, and an inspection has been carried out with a remotely operated vehicle (ROV).

The sampling stations were selected based on three factors:

- stations with similar characteristics but located in different isobaths,
- geographically close stations but with different levels of bottom fishing restrictions (partial or total closure to trawling), and
- stations characterized by different fishing effort intensities.

The sampling stations located in total or partial closures of trawling areas, show higher values of macro infauna density, richness and biomass, reaching up to four times the biomass measured at nearby stations, with similar characteristics but located in usual fishing areas.

The stations subjected to medium fishing pressure generally show a higher percentage of individuals of larger size, with exoskeleton, with a longer life span, with sexual reproduction and pelagic larvae, with a free way of life, are suspensivorous, sessile or swimmers and present a mode of bioturbation by superficial deposition. The rest of the stations shows intermediate situations.

In view of the results obtained, it is concluded that the presence of macro infauna and mega epifauna communities depends both on the natural environmental conditions (i.e., sedimentological characteristics, depth and organic matter content), and on the effect of fishing activity, being sometimes, and with the limited number of samples available, difficult to distinguish the effect of fishing against environmental conditions.

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

The oceanographic survey was successfully performed and the objectives set were achieved. A total of 11 surface sediment samples were obtained for subsequent granulometric analysis in the laboratory and the identification of infaunal organisms (those living inside the sediment). Eleven bottom trawls were carried out with a beam trawl and one transect with a ROV was performed, for the characterization of epifaunal organisms (those living on the sediment).

Incorporation of study results into regular sampling by the Member State.

The results obtained during the current study can contribute to the assessment and monitoring of the environmental and conservation status of benthic habitats and the impact produced by bottom-contact fishing gears. The incorporation of the developed approach in routine campaigns is considered highly relevant, as it contributes to collect information that allows developing knowledge to continue advancing towards an efficient fisheries management, including spatially and temporally explicit management measures; and provide information for an ecosystem management of fisheries.

(max. 900 words per study)

Text Box 1a: Test studies description

PETFISH

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.

PETFISH

1. Aim of the test study

Current fishery regulations require the collection of data on the incidental bycatch of seabirds, marine mammals, reptiles and species of fish and protected invertebrates. The regulations require reporting the incidence of bycatch through the identification of the Protected, Endangered and Threatened species (PETs) involved and the number of individuals captured in current onboard observer programs.

Moreover, understanding the determinants of the probability of capture is a high conservation priority in order to implement efficient spatio-temporal management measures. However, the collection of more comprehensive information (i.e., specific collection of bycatch data) is necessary to advance in developing effective management measures to reduce bycatch and thus advance in ecosystem-based fisheries management. Moreover, areas of high fishing activity tend to be concentrated in productive marine areas and overlap with areas of high biodiversity, where PETs can occur. Therefore, a spatially-explicit approach to assess PETs bycatch requires the integration of spatial information on different ecosystem components. Within this framework, the objectives of this study are:

- To establish a framework for the inclusion of bycatch data into fisheries monitoring
- To develop standard protocols for the collection of bycatch information of PETs
- To increase sampling coverage specifically directed at monitoring bycatch
- To integrate ecosystem level information (e.g., oceanography, prey and predators) obtained from ecosystem-based surveys to assess the spatial distribution of PETs
- To set up the essentials of a routine monitoring of PETs bycatch following an ecosystem-based approach

2. Duration of the test study

Three years (2022-2023-2024).

3. Methodology and expected outcomes of the test study

The objectives of the study will be accomplished by the following tasks:

- To establish a framework for including PETs bycatch monitoring on current onboard fishery sampling programmes. We will create an expert committee gathering scientists with multidisciplinary background in PETs ecology, sustainable fishery, ecosystem functioning, fish ecology and fisheries monitoring, in addition to the observers of the routine fishery programmes. The output of the expert committee will have the premise of not compromising the data routinely collected by the observers, and therefore the expert committee will assess the need to increase sampling coverage to specifically address fishing bycatch of PETs. Particular attention (i.e., interaction and outputs) will be given to related ICES Working Groups such as the Working Group on Bycatch of Protected Species (WGBYC), Working Group on Marine Mammal Ecology (WGMME), and Joint OSPAR/HELCOM/ICES Working Group on Seabirds (JWGBIRD), as well the regional agreements in the framework of the Convention on Migratory Species and the OSPAR convention.
- In order to develop an integrative protocol, we will follow the guidelines described in the series of workshops on Practical Implementation of Statistical Sound Catch Sampling Programmes (WKPICS) to develop a combined protocol to sample fisheries catch and PETs bycatch. Thus, the observers' onboard protocol will be used as a base document, determining target population, stratification, sampling effort allocation and selection of sampling units (trips). Then, new objectives will be defined and new tasks will be added to monitor PETs bycatch in different fisheries. Developing experimental protocols for current data collection programmes is the way forward to perform a few years of initial testing to analyse the feasibility of the collection of new ecosystem descriptors. Once established and after debugging the initial protocol, an established protocol could be transferred for its implementation in other data collection programmes.
- To integrate ecosystem-level information collected on annual integrated ecosystem surveys to understand the spatial distribution of PETs. Integrated ecosystem surveys taking place in Bay of Biscay and carried out by different regional institutes already routinely collect data each year following a standard and shared protocol between collaborating institutes (AZTI, IEO, IFREMER – La Rochelle University), which guarantees the interoperability and comparability of these data. PETs distribution outputs will be crossed with fishery bycatch data to assess potential conflict areas, providing a spatial perspective of PETs bycatch.

(max 900 words per study)

Brief description of the results (including deviations from the plan and justifications as to why if this was the case).

Along 2022, several achievements have been made:

- Thanks to the census of seabirds conducted by scientific observers during the trawls (as part of the additional data that should be collected onboard), two studies, addressing the effects of fisheries discards on seabird communities, have been submitted to be published (one already published) on scientific journals: Zorroza et al. (2023). Evaluating the dependence of an opportunistic Yellow-legged Gulls on marine habitat and fishing discards and Pedrajas et al.(submitted). Scavenging from trawlers: discard processes shape seabird communities in commercial fisheries.

- The protocols to collect data onboard have been updated by incorporating two new actions: 1) census of seabirds has been extended to cetaceans, 2) samples on bycaught cetaceans are now collected onboard by observers to conduct analysis (e.g., trophic analysis) that could contribute to better understand the bycatch.
- The ICES database has been adapted with a new entry to allow the inclusion of PETS bycatch data. These data, stored up to now in Excel files, are being now incorporated to the database to have all the information collected on board together. A quick screening of these data showed that common dolphin was the species most frequently caught by trawlers, followed by the northern gannet. Trolling and pole-and-line-artisanal tuna fisheries were also analysed, and the species with the highest bycatch rate was found to be the great shearwater, although it was released alive (Louzao et al (submitted)). Assessing selectivity and bycatch of endangered, threatened and protected species in the trolling and pole-and-line artisanal tuna fisheries).
- Current sampling coverage by observers on bottom pair trawling (PTB) has been concluded to be sufficient to detect bycatch with a 95% of probability.
- Common dolphin bycatch on PTB was positively associated to the catch of small pelagic fishes such as anchovy or mackerel and negatively associated with the target species of the fishery (i.e., hake).
- Three oceanographic surveys were conducted in 2022, allowing us to collect data on PET species distribution for March, May and September. The integration of ecosystem information (oceanographic data and prey distribution) revealed a seasonality in common dolphin distribution, being associated with shelf waters and small pelagic prey species in autumn, and with mesopelagic species and offshore waters in spring. These results are related to bycatch data, as higher bycatch rates are observed in autumn-winter, when the species is along the shelf (Astarloa et al, in prep). This highlights the importance of combining different data sources.

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

Regarding the original expected output:

- The PET monitoring protocol has been refined to include not only the information required by EUMAP (EUMAP, 2017/1004/EC y 2016/1251/EU) but also to include additional data that will contribute to better understanding of the bycatch issue such as the number of individuals that were present during the fishing operations, the location of bycatch event, or the diet of the bycaught individual at the moment of being caught. Efforts are also being made to increase the usefulness of the database so that all data can be easily stored and extracted when needed.
- Sampling coverage was increased in 2021 compared to 2020 and increased again in 2022. Analysis conducted on current sampling coverage concluded that it is sufficient to detect bycatch with a 95% of probability.
- Integration of ecosystem level information is possible thanks to the annual oceanographic surveys and has already been fulfilled for common dolphin, whose distribution has been modelled by considering environmental and prey data belonging from two different surveys (two seasons). This integration contributes to a better understanding of the bycatch seasonality.

Incorporation of study results into regular sampling by the Member State.

The census of PET species during the fishing operations should be included in all protocols, as it is necessary to assess the selectivity of the gear/fishery. Two fisheries may have the same bycatch rate, based on specimens caught per day, but completely different behaviour. One may attract many individuals but catch only few of them, while the other may catch all the individuals that it has attracted. Information on selectivity, for example, is important for conducting Spatial Bycatch Risk assessments.

(max. 900 words per study)

Text Box 1a: Test studies description

RECREATIONAL

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.

RECREATIONAL

1. Aim of the test study

Under the DCF, AZTI collected the required data for marine recreational fisheries using off-site methods (e.g., Telephone and email surveys). The information collected is being used to provide the catch and effort estimates for the mandatory species for the Atlantic region. These off-site methodologies are incorporated under the routinary sampling programme. The aim of this study is to take a step forward and start using on-site methodologies (e.g, Access Point Surveys) to collect the information required. This test study will allow us to improve the design, and the implementation of these methodologies based on the experience acquired during these test years:

2. Duration of the test study

Two years (2022-2023).

3. Methodology and expected outcomes of the test study

The aims of the study will be achieved by a series of tasks:

The objectives of the study will be accomplished by the following tasks:

- Identification of main access points and fishing sites for onshore recreational fisheries and marinas, piers etc. for recreational fishermen from boat, including spearfishing. This will allow to collect the relevant information needed for a proper survey design (e.g, number PSU, Stratification variables, temporal clusters etc.).
- Once the sampling design is ready the interviewers trained for this specific task, will intercept recreational fishermen in the assigned specified times at the specified sites. Catch, effort and biological information (when possible) will be collected. Additional data (demographic, socio-economic etc will be also collected).
- With the information collected, an analysis of the data will be carried out.
- In all the survey stages (design, implementation, data analysis etc.), best practise guidelines coming for the ICES WGRFS will be adopted.

On the expected results, catch and effort estimates will be provided. In addition, if sufficient biological information (length data) is collected this will be also analyse providing length distribution frequencies for these species. A comparison between the estimates obtained from the different methodologies will be also carried out (off-site vs on-site).

Finally, the experience gained during these years will allow to incorporate the on-site methods under the routinary marine recreational fisheries surveys.

(max 900 words per study)

Brief description of the results (including deviations from the plan and justifications as to why if this was the case).

An on-site sampling design has recently been implemented to obtain detailed information about recreational fishermen's profile, their fishing effort, and catches. Such on-site sampling is being carried out from 2022 and will be complementary to the data obtained from off-site surveys (telephone surveys) to characterize the fishing activity in the Basque Country and estimate catches and effort (see section 2.4).

On-site sampling is designed into two different stages:

- The first sampling consists in counting recreational fishermen by fishing mode along the Basque coast, surveying the entire coastline (from shore), through several weeks at different time periods and days of the week. The aim of this sampling is to identify hot spots of recreational fishing activity as well as the most interesting sampling points and/or time-periods for the second phase.
- The second sampling phase is based on making face-to-face interviews with recreational fishermen during their fishing activity in the main harbours. Surveys are based on a questionnaire that collects information about the fishermen's profile, duration of the fishing activity, target species and landings.

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

We consider that the original expected outcomes of the study in 2022 have been achieved. 164 fishermen have been interviewed from August 2021 to December 2022, in the main harbours of the Basque Country.

Fishers fishing from the shore accounted for the majority of the surveys, due to the larger number of people practicing this fishing modality and also due to their easier accessibility. Fishers fishing from boats and specially, spear fishermen, are more difficult to find when they arrive in port. We have identified a need to improve the sampling design in order to have better access to some locations such as rocks and small paths, and also to piers in order to survey fishers fishing from boats and spearfishers.

Incorporation of study results into regular sampling by the Member State.

Sampling will be tested in 2022-2023. The objective is to establish a routinary sampling for recreational fisheries in the region by 2024.

(max. 900 words per study)

Text Box 1b: Other data collection activities

CULTIVOS

General comment: This text box applies to the work plan and the annual report. 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.

1. Aim of the data collection activity

The main objective of this project is to carry out sampling in the mollusc production areas of the Basque coast in order to take the necessary samples of molluscs (mussels and oysters) and water to carry out the control of these areas. This is required by the regulations in force regarding official controls of bivalve molluscs intended for human consumption.

This project is linked to the "Procedure for the control and monitoring of the production of live bivalve molluscs in the Basque Country" which is part of the Official Control required by EU Regulations 2019/627 and 2017/625). Therefore, the information obtained will allow the Directorate of Fisheries and Aquaculture of the Basque Government to achieve the following milestones:

- i. Opening and closing of the mollusc production areas according to the levels of biotoxins in mollusc meat and/or presence of biotoxin-producing phytoplankton.
- ii. Classification of the mollusc production areas according to microbiological conditions, in accordance with current regulations.
- iii. Evaluation of the quality (in terms of food safety) of the molluscs.

In addition, the availability of historical data allows to adjust the risk levels for the presence of biotoxins in mollusc flesh and the daily variation rates. This will be used to better adjust monitoring plans to a limited risk, from a food safety point of view.

2. Duration of the data collection activity

This is a routine project. From 2022 to 2027, in a yearly basis.

3. Methodology and expected outcomes of the data collection activity

The molluscs and water samples will be taken throughout the year in the mollusc production areas of the Basque coast. The analyses to be carried out will be those required by the regulations in force: microbiological parameters in mollusc flesh (*E. coli* and *Salmonella*), biotoxins in mollusc flesh (ASP, PSP, lipophilic) and pollutants in mollusc flesh (Cd, Hg, Pb, PAHs, dioxins, dioxin-like PCBs and non-dioxin-like PCBs), and the presence of toxic phytoplankton in water.

Sampling and analytical efforts will focus on times when shellfish harvesting is allowed for human consumption, which vary depending on the results obtained. In general, sampling for chemical contaminants will be carried out quarterly/semi-annually/annually depending on the parameter; sampling for microbiology and phytoplankton will be carried out monthly/quarterly; sampling for biotoxins will ideally be weekly, but the frequency will be modified depending on the extraction activity and the possibility of sampling according to wave conditions. Biotoxin sampling will be carried out only in the mollusc production areas where shellfish harvesting is allowed, with the cooperation of the producers. There is no specific target number of samples, as it depends on the activities, but it is expected to collect and analyse around 100-150 samples of molluscs (not all parameters are analysed in all samples) and around 12-16 samples of phytoplankton.

The results obtained will make it possible to carry out the control of the mollusc production areas of the Basque coast and subsequent annual classification of these areas. In this way, the aim is to guarantee the quality of the molluscs extracted in these areas for human consumption. Similar controls are carried out in other areas of Spain where mollusc production areas are present. The Ministry of Agriculture, Fisheries and Food collects annually information concerning the number of controls carried out as well as the decisions to open/close mollusc production areas. In addition, the Ministry communicates guidelines and protocols for sampling and decision making.

(max 900 words per activity)

Brief description of the results (including deviations from the plan and justifications as to why if this was the case).

In 2022, 7 mollusc sampling campaigns have been carried out in the estuarine mollusc production areas of the Basque coast, and 14 water and mollusc sampling campaigns in the coastal mollusc production area of Mendexa.

In the five estuarine production zones/sub-areas (Hondarribia, Mundaka-Arketas, Mundaka-Portuondo, Mundaka-Kanala and Plentzia), monthly sampling was carried out between January and March, and between October and December to obtain samples of molluscs (mussels or oysters) for analysis of *Eschericia coli* (*E. coli*). In addition, in the sampling campaign carried out in May, samples of molluscs were taken for the analysis of *E. coli* and the pollutants required by current legislation (metals, PAHs, Dioxins and PCBs).

In Mendexa, 14 sampling campaigns were carried out by AZTI throughout 2022 to take samples of molluscs and water. These samplings have been complemented with those carried out by Matxitxako Molluscs and AZTI for the control of biotoxins within the BIOTOX project.

A total of 47 samples of molluscs (mussels or oysters) were taken for *E. coli* analysis, 12 samples for *Salmonella* analysis, 6 samples for metal analysis (Cd, Hg, Pb), 8 samples for PAHs analysis, 4 samples for dioxins and PCBs analysis, and 14 samples for biotoxins analysis (other 50 samples were taken in BIOTOX project). In addition, 14 water samples were taken with a net and 42 samples were taken with a hose for toxin-producing plankton analysis.

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

The original expected outcomes of the study have been achieved

Follow-up to the activities (what are the next steps, how the results will be used).

The analytical results obtained have enabled the classification of the mollusc production areas for 2022 (report sent in September to the Basque Government's Directorate of Fisheries and Aquaculture) and the publication of the order establishing this classification (Order of 30 September 2022, BOPV no. 207, 28 October 2022).

This data collection activity is routinary and will be carried out yearly

(max. 900 words per study)

Text Box 1b: Other data collection activities

IDAO

General comment: This text box applies to the work plan and the annual report. 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.

1. Aim of the data collection activity

In tropical tuna purse seine fishery, fishing efficiency has increased with the incorporation of new technology on board and with the use of Fish Aggregating Devices (FADs) (Lopez et al., 2014; Torres-Irineo et al., 2014; Gaertner et al., 2016). The difficulties of providing new indicators based on fine scale data to reflect these technological changes and the impact on fishing efficiency has hampered to standardize the FAD fishing CPUEs (Gaertner et al., 2016; Wain et al., 2021). This has prevented on integrating the purse seiner CPUE in stock assessment models and resulted in a lack of skipjack and juvenile yellowfin and bigeye tuna indices. In order to improve tropical tuna assessments, science-industry collaborative projects like this, are making possible to gain of knowledge on technological implementation on this fleet and to advance on the CPUE standardization (Wain et al., 2021).

The introduction of FADs in purse seine fishery and the satellite-linked echosounder buoys attached (Scott & Lopez, 2014) provides an alternative and catch-independent method to evaluate tuna abundance. These instrumental buoys give daily information on buoy position and tuna aggregation underneath the FADs, being unique observation platforms of tuna and other aggregated species. The information extracted from echosounder buoys needs to be routinely collected and can be used to determine buoy derived indices that has been recently incorporated in several tropical tuna stock assessment (ICCAT, 2020). In this sense, this research action aims to:

- Establish routine data collection protocols of buoy derived information (i.e. acoustic information collected by the echosounder buoys and information derived from the buoy track as GPS position and speed),
- Development of methodological frameworks to extract reliable scientific information from echosounder buoys.
- Creation of standardize data base to be used for determination of buoy derived abundance index (BAI).

This project is conducted with the collaboration of the tropical purse seine fishing companies and buoys providers. The data is managed under a strict confidentiality rules.

2. Duration of the data collection activity

The data collection is done in monthly and yearly basis from 2022 to 2027

3. Methodology and expected outcomes of the data collection activity

Establish routine procedures for data collection and database management. This requires from establishing data sharing and use agreement with buoy providers companies and data owner (purse seine fishing companies). To create a standardize database filtering protocols are defined for preprocessing the data (to filter out erroneous locations, data related to failures in satellite communication and location data acquisition, land positions and on-board positions). Then biomass indicators provided by different buoy models are converted to decibels. Finally, biomass is re-estimated based on the TS (target-strength or strength of the target of each species) by species and species composition.

The information derived from echosounder buoys will be used for:

- Determination of buoy derived abundance index (BAI) for tropical tuna which is being used in the stock assessment as indicator of skipjack and juvenile yellowfin and bigeye tuna indicators.
- Quantification of FAD fishing effort indicators.
- Study of tuna and other species behavior around FADs.

Gaertner, Daniel, Ariz, J., Bez, N., Clermidy, S., Moreno, G., Murua, H., Marsac, F. (2016). Results achieved within the framework of the EU research project: Catch, Effort, and eCOsystem impacts of FAD-fishing (CECOFAD) (No. IOTC-2016-WPTT18-35).

ICCAT, 2020. Report of the 2019 ICCAT yellowfin tuna stock assessment meeting. (Grand-Bassam, Cote d'Ivoire, 8-16 July 2019)

Lopez, J., Moreno, G., Sancristobal, I., & Murua, J. (2014). Evolution and current state of the technology of echo-sounder buoys used by Spanish tropical tuna purse seiners in the Atlantic, Indian and Pacific Oceans. *Fisheries Research*, 155, 127–137. <https://doi.org/10.1016/j.fishres.2014.02.033>

Torres-Irineo, E., Gaertner, D., Chassot, E., & Dreyfus-León, M. (2014). Changes in fishing power and fishing strategies driven by new

technologies: The case of tropical tuna purse seiners in the eastern Atlantic Ocean. Fisheries Research, 155, 10–19. <https://doi.org/10.1016/j.fishres.2014.02.017>

Wain G, Loreleï Guéry, David Michael Kaplan, Daniel Gaertner, Quantifying the increase in fishing efficiency due to the use of drifting FADs equipped with echosounders in tropical tuna purse seine fisheries, ICES Journal of Marine Science, Volume 78, Issue 1, January-February 2021, Pages 235–245, <https://doi.org/10.1093/icesjms/fsaa216>

(max 900 words per activity)

Brief description of the results (including deviations from the plan and justifications as to why if this was the case).

Millions of acoustic records from thousands of buoys from main RFMOs for the 2012-2021 series were evaluated to create biomass measures for the GLMM analysis. The analysis generates the standardized BAI index based on acoustics from buoy echo sounders used to monitor tropical tunas. Each observation was calculated as the 90th percentile of a "virgin" segment of buoy trajectories. A virgin segment represents a deployment that has been potentially colonized by tuna but has not been fished. The standardization results show different percentages of variance explained, always significantly positive results and no significant residual patterns were observed.

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

Millions of acoustic records from thousands of buoys from main RFMOs for the 2012-2021 series were evaluated to create biomass measures for the GLMM analysis. The analysis generates the standardized BAI index based on acoustics from buoy echo sounders used to monitor tropical tunas. Each observation was calculated as the 90th percentile of a "virgin" segment of buoy trajectories. A virgin segment represents a deployment that has been potentially colonized by tuna but has not been fished. The standardization results show different percentages of variance explained, always significantly positive results and no significant residual patterns were observed.

Follow-up to the activities (what are the next steps, how the results will be used).

During the development of these indices, several points of improvement have been detected. These studies should evolve through a collaborative work between AZTI and the staff of the different committees (IATTC, IOTC, ICCAT), tuna fleets, buoy suppliers and organizations such as ISSF. In this regard, the participation of the fishing industry, which agreed to provide the historical data collected by their echo sounder buoys, is fundamental to generate these catch-independent indices of abundance. We deeply appreciate the participation of new fishing associations and companies in this project and hope that other companies will join this initiative, retrieving historical information and committing to regularly provide these high-resolution buoy data beyond 2024.

We are seeing how this information and associated advances in scientific methodology can provide significant improvements to complement current tropical tuna stock assessments, providing indices that are less dependent on fisheries data and less affected by changes in fishing efficiency.

(max. 900 words per study)

Text Box 1b: Other data collection activities

MARCADO

General comment: This text box applies to the work plan and the annual report. 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.

1. Aim of the data collection activity

Conventional and electronic tagging program for temperate tunas in the Bay of Biscay.

Conventional and electronic tagging of bluefin tuna and albacore tuna data are sent annually to the Atlantic Regional Fisheries Organization (ICCAT) responsible for the conservation of tunas. The data are available Through ICCAT to the scientific community to contribute to spatial movement models so they can be used integrated, with data from other programs, in assessment models (estimated migration rates, defining stock structure, parametrizing growth, etc.) or assimilated by assessment models using methods that are being developed. Another aspect of the conventional tuna tagging is to promote the responsible recreational fishing and ensure the quality of the data: Associations are advised, skippers are trained for tagging with good practices and their tagged fish releases are accredited.

2. Duration of the data collection activity

From 2022 to 2027, in a yearly basis.

3. Methodology and expected outcomes of the data collection activity

Methodology: Electronic tagging is carried out by expert taggers with recreational or professional fishermen on an opportunistic basis. Conventional tagging is carried out by recreational fishermen in the daily activity and during the dedicated days organized by local recreational fishermen associations. During the organized tagging days, the video recording is compulsory for all the participants, so each valid release and its quality has been reviewed by the scientists.

Outcomes: As an example, the structure of the Atlantic and Mediterranean albacore stocks and their connection have been estimated thanks, essentially, to the migration rates obtained in conventional tag depletion models. Electronic tagging for bluefin tuna can be incorporated to the last developments of S3 assessment model. Aspects related to albacore and bluefin tuna stock structure, such as transatlantic or inter-area migration rates (transition matrices), geographic habitat use (seasonal, inter-annual), vertical habitat use and others, important for their correct assessment and conservation, are investigated by means of the data obtained in this tagging program. These are largely unknown aspects since the usual and fundamental data for the evaluation of the state of the stocks are based on data originated by the fishery to be managed (indirect methods) while conventional and electronic tagging data are largely independent from the fishery activity. Tagging data are complementary to those obtained from fishery data collection.: in the case of the electronic tagging data an important post processing is necessary. Improvement of methodological aspects such as methods of geolocation by light and trajectory estimation are investigated. Ontogenetic aspects or ethological changes, which may seem less important for conservation, are also investigated.

(max 900 words per activity)

Brief description of the results (including deviations from the plan and justifications as to why if this was the case).

1. Electronic tagging.

During 2022, 14 pop up tags were deployed around Canary Island in Albacore tuna (*Thunnus Alalunga*) in the comercial vessel "Planeta Neptuno Dos" during a 7 days cruise.

Electronic archival tagging activities were carried out during summer 2022 in the Bay of Biscay. We performed several tagging cruises onboard live bait commercial vessels, recreational and fishing charters.

The commercial bait boats used were F/V Pittar and F/V Tuku Tuku. The F/V Pittar was used to perform the acoustic survey for bluefin tuna BFTindex22 (14 days), and the albacores caught with trolling lines during the survey (16) were tagged. At the end of the fishing season, we embark onboard the F/V Tuku Tuku in a commercial fishing trip (7 days) close to the Galician coast. The fish found during this trip was bigger than the ones inside the Bay of Biscay, but the fishing was scarce, and we could tag 5 albacores.

On the other hand, our aim was to tag as much as possible with recreational vessels, due to a better handling of the fish and no space constraints for scientist onboard, for which we chartered a vessel from www.fishandsailbasquecountry.com during 6 fishing trips and another 5 fishing trips were carried out with recreational collaborators.

The tagging activities were successful in terms of tagged numbers and in terms of size of the albacores, which ranged between 46 and 103 cm fork length. As a result, electronic archival tagging was done on a total of 48 individuals along the Bay of Biscay between June and October. Overall, the crews were very helpful and kind.

2. Conventional Tagging

During the summer 2022 we carried out 3 tagging events with recreational angler for conventional tagging. 203 albacore and 44 bluefin tunas were tagged by recreational anglers.

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

The tagging activities were successful not only in terms of tagged numbers and in terms of size of the tunas but also in the recoveries reported. 4 electronic tags were recaptured with very valuable data. Tagging tunas is a fishery dependant activity and 2022 It's been better than expected.

Follow-up to the activities (what are the next steps, how the results will be used).

During the following years we will continue carrying out tagging activities. The data, updated annually, are available to the scientific community through the International Commission for the Conservation of Atlantic Tunas according to its standards (ICCAT, 2008).

(max. 900 words per study)

Text Box 1b: Other data collection activities

Biological parameters of tuna

General comment: This text box applies to the work plan and the annual report. 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.

1. Aim of the data collection activity

The state of exploitation of tropical tuna (skipjack; *Katsuwonus pelamis*, yellowfin; *Thunnus albacares*, and bigeye; *Thunnus obesus*) species in the Atlantic and the Indian Oceans is evaluated using stock assessment models. These models, explicitly describe the key fish dynamics and key processes of the population dynamic such as growth, reproduction, and maturity, with equations that need accurate parameters from biological studies. The lack of knowledge on biological processes can reduce the reliability and confidence in stock assessment outcomes and undermine the sustainable management of fish stocks and fisheries. Besides, the understanding of stock structure and population dynamics of these species is needed to determine the appropriate units for stock assessment, particularly for species with large transboundary distribution ranges, or migratory behaviour. Species response to management decisions cannot be accurately predicted if the boundaries that characterize a stock are not correctly defined. Finally, in order to move towards an ecosystem-based fisheries management, a better understanding of the habitat utilization and trophic relationships of the three tropical tuna species in the Atlantic and Indian Oceans is also needed. This knowledge will be useful to evaluate species-specific vulnerability to different fisheries.

Therefore, an increased knowledge of these species' life-history characteristics, habitat utilization and an accurate validation of stock structure of tropical tuna fisheries in the Atlantic and Indian Oceans will be essential to implement and enforce management strategies that ensure long-term sustainable fisheries. On the light of this evidence, the main aim of this work is the development and implementation of a sampling scheme that supports the collection and analyses of biological samples to provide improved estimates of age, growth, reproduction, stock structure and trophic ecology of tropical tunas for the Atlantic and the Indian Oceans.

2. Duration of the data collection activity

Samples will be taken intermittently during 2022, taking advantage of the presence of observers on board, access to deep-freezing cannery factory and port sampling opportunities.

3. Methodology and expected outcomes of the data collection activity

3.1 Age and longevity estimates:

Sagittal otoliths and fin spines will be used to provide estimates of age, growth and longevity by direct reading of daily and/or annual increment bands. Results will be used to perform a growth curve that fit to the estimate age and length data used in the stock assessment model. To validate the annual periodicity of the bands being counted and verify age estimates, a relatively new approach, based on the use

of the decline period in the ^{14}C signal (~1980-present) can also be explored in a subset of samples.

3.2 Reproductive biology:

Individual sex will be identified visually, and macroscopic maturity status will be assessed visually from the gonads. Only female gonads (i.e., ovaries) will kept for further histological analyses. Histological analyses together with gonad index (GI) will permit to set the size at first maturity, expand the knowledge on spawning timing and locations and estimate of spawning frequency and batch fecundity. These parameters are needed to determine the productivity of the species that contribute to the recruitment of new individuals to the population and will help to understand the fluctuations in population dynamics, and hence, allow to better assess population resilience to both fishing activities and environmental changes.

3.3 Stock structure delineation:

The combined analysis of otolith and fin spine microchemistry with genetic markers will allow to explore population structure and connectivity of tuna at different time scales. Otolith or fin spine microchemical analyses provide demographic information over an individual's lifetime whilst genetic markers resolve connectivity and population structure over evolutionary time scales. Thus, these two complementary approaches allow us to unravel individual movements as well as to estimate long term population exchange rates. The application of microchemical analyses (both stable isotopes or trace elements) in population structure generally relies on first establishing baseline references from source groups. There is currently a baseline of otolith stable isotope data for these species from the potential nursery grounds in the Atlantic and Indian Oceans. Expanding this baseline would help to have a temporal continuity and make it more robust. This is needed to make projections of population composition (i.e., nursery origin of adults captured from different fishery grounds) and evaluate whether the stock complexity is being captured by current stock assessment models.

3.4 Trophic ecology

Stomachs and muscle tissue will be collected from individuals. Stomach content will be analysed both visually and genetically, to make for the first time a calibration exercise for these species. This will help to determine main prey items consumed by these species. Examination of stable isotope ratios (^{13}C and ^{15}N) in muscle tissue will provide information on individual trophic position. Together, this information can help to better understand the food web dynamics and energy transfer between and within ecosystems, a prerequisite for ecosystem-based management approach that sustains healthy marine ecosystems and the fisheries they support.

All fish will be measured to the nearest fork length (FL), weighted and sex identified when possible

(max 900 words per activity)

Brief description of the results (including deviations from the plan and justifications as to why if this was the case).

1. Data collection activities:

The project has support Indian Ocean sampling program in order to collect required tissue samples (gonads, otoliths, stomach, muscle, spine) to assess important biological parameters. The samples have been collected in tuna processing plants and onboard sampling through observers.

In 2022, this project supported the work to define the foundations to create a routine and coordinated European-wide sampling network for sampling and sample processing. This sampling network has the ultimate aim of updating the biological parameters necessary for the assessment of the target tropical tuna stocks. The network will be agreed during 2023.

2. Age and longevity estimates.

In the Indian Ocean, the work has focused on obtaining age data for the estimation of skipjack (*Katsuwonus pelamis*) growth parameters. These data are still in the process of standardisation and analysis. The final results of this analysis will be obtained during 2023 and will be presented at relevant international fora. The project has also supported ongoing studies on age/growth studies on yellowfin tuna.

In the Atlantic Ocean, the work has focused on presenting a literature review of the available literature on growth, reproduction and mortality parameters of bigeye tuna (*Thunnus obesus*), identifying specific knowledge gaps and discussing possible implications for the assessment of the current stock status (Artetxe-Arrate et al., 2022 - SCR/2022/172 ICCAT).

3. Reproductive biology.

The reproductive studies conducted in this project has contributed to the development and assessment reproductive parameters of yellowfin, bigeye and skipjack tuna in the Indian Ocean. Individual sex was identified visually, and macroscopic maturity status assessed visually from the gonads. Only female gonads (i.e., ovaries) were kept for further histological analyses. Histological analyses together with gonad index (GI) were assessed and this permitted to set the size at maturity, expand the knowledge on spawning timing and locations. Further analysis will be conducted to estimate spawning frequency and batch fecundity. These parameters are needed to determine the productivity of the species that contribute to the recruitment of new individuals to the population and will help to understand the fluctuations in population dynamics, and hence, allow to better assess population resilience to both fishing activities and environmental changes.

Additionally, this project allowed a collaboration with the University of Basque Country to develop new methods to estimate reproductive

parameters through molecular markers (Diaz de Cerio et al., 2012). This work aims to define alternative methods to histological processing to estimate useful parameters for stock assessment, e.g., length at maturity. During 2022, a pilot test was carried out on a subsample of yellowfin tuna caught in the Indian Ocean. Different preservation methods (i.e., fresh-ultra-frozen-RNA later, fresh-ultra-frozen-formol-RNA later) have been tested to analyse the degradation derived from these methods and to establish sampling protocols to carry out this study on a larger scale. The results of this pilot test will be analysed during 2023.

4. Trophic ecology.

During 2022, work focused on fine-tuning the methodology for collecting samples and preserving stomachs for the genetic sequencing of stomach contents specific to tropical tuna samples. The related tasks were i) stomach sampling strategy definition, ii) stomach samples selection and collection.

5. Stock structure delineation.

In 2022, no significant progress has been made in relation to the study of the population structure of tropical tunas. In 2023, it is planned to analyse the oxygen concentration ($\delta^{18}O$) in otoliths of yellowfin tuna (*Thunnus albacares*) to investigate the population structure and connectivity of this species in the western Indian Ocean (FAO area 51), where fishing effort is highest. This study will help to understand the mixing rates between yellowfin tuna caught in the north and south of this area. The project will also support the analysis of skipjack muscle (*Katsuwonus pelamis*) samples collected as part of a large-scale genetic study that aims to resolve the population structure of this species in the Indian Ocean and East Atlantic.

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

Most of the objectives foreseen for each working line were achieved, especially those related to samples collection plan for 2022 and samples processing and analysis. However, the interpretation and final result achievement will be completed during 2023 providing new or updated biological parameters estimations to be used in tuna stocks assessment at RFMOs. Further description of achievements in the section above.

Follow-up to the activities (what are the next steps, how the results will be used).

In 2023 the activities related to the estimations of biological parameters will continue and sampling strategy for Atlantic Ocean consolidated. This data collection activity tends to be conducted routinely and thus will be carried out yearly.

(max. 900 words per study)

Text Box 1b: Other data collection activities

REMASMuest

General comment: This text box applies to the work plan and the annual report. 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.

1. Aim of the data collection activity

To undertake the field campaigns to obtain the necessary data for the evaluation of density, biomass and total stock of shellfish resources (bivalve molluscs, sea urchin, anemones and gooseneck barnacle) and algae (*Gelidium corneum*) for the sustainable exploitation of these resources in the estuaries and coast of the Basque country (northern Spain).

2. Duration of the data collection activity

The data collections are made annually. Twice for bivalve molluscs (summer and winter) and once for the rest of shellfish and algae resources. From 2022 to 2027, in a yearly basis.

3. Methodology and expected outcomes of the data collection activity

Bivalve molluscs (clams and cockles):

In each of the three estuaries subject to bivalve mollusc exploitation (clams and cockles) an stratified random sampling methodology is employed. For this a number of 88, 65 and 17 sampling stations are distributed in the Oka, Butroe and Bidasoa estuaries respectively. In each sampling station the first 15 cm of sediments are obtained in a quadrat of 40x40 cm and they are sieved on a 1 mm mesh size to obtain all the specimens.

Sea urchin (*Paracentrotus lividus*):

Depending on the extent of the coastal area to be assessed, between 50 and 100 sampling points are distributed between 0 and 10 m depth in a random sampling methodology. At each sampling point, a photograph is taken with a camera mounted on a tripod with a 50x50 cm square.

Gooseneck barnacle (*Pollicipes pollicipes*):

In a selected area of the Basque coast 14 sampling points are distributed. In each sampling point two transects (named a and b) were sampled, with two replicates in each, in which 30 x 30 cm squares were scraped. In each transect, the barnacle cover over an area of 5 metres on each side of the transect, the height of the intertidal at which the barnacle disappears corrected for the tide height of the day and time of sampling, the orientation of the shore at the sampling site and a photograph of the selected sample was obtained.

Anemones (*Anemonia viridis*):

In different sub-areas of the areas subject to be exploited a variable number of transects is established between 0 and 15 m depth. The separation distance between transects was of approximately 200 m. In addition, 3 points or stations were defined in each transect (at 2.5 m, 7.5 m and 12.5 m depth). Depending on the extension of the area to be evaluated, the number of sampling point could be between 30 and 50. In each sampling point a visual estimation of the cover and number of individuals was carried out, in an area of 5 metres in the surrounding area. Subsequently, three photographs were taken with anemones, representative of the bottom of that sub-zone (these photographs corresponded to 50x50 cm squares) and with the help of an adapted fork and a net bag with a circular mouth, all the anemones were collected from the square corresponding to the first photograph. In order to know the population structure in each depth band, if the number of anemones was less than 30 individuals, the sample was completed up to 30 individuals, with specimens collected in the area surrounding the corresponding sampling point. Only at those points where the anemone cover was low was this last action not carried out so as not to significantly affect the existing population. A stainless steel structure with an underwater camera attached to the top of it was used to take photographs (Figure 8). The area photographed corresponded to a 50x50 cm box (base of the structure). All this work was carried out by scuba diving.

Gelidium:

In three sectors subject to exploitation in the coast of the Basque country, a total number of 30 transects were prospected. In each transect, samples were taken at 4, 8 and 12 m depth. In each sampling point a quadrat of 50x50 cm was scraped. Seaweed samples were stored in plastic bags without water and frozen until laboratory processing.

(max 900 words per activity)

Brief description of the results (including deviations from the plan and justifications as to why if this was the case).

1. Bivalve molluscs (clams and cockles):

Bivalve molluscs were sampled in three estuaries (Oka 79 sampling stations, Butroe 63 stations and Bidasoa 22 stations) in two periods (summer and winter). All specimens retained in the sediment (40x40 cm and 15 cm deep) and sieved by a 2 mm mesh were collected. The sampling was carried out on foot, in the intertidal zone, at low tide.

2. Sea urchin (*Paracentrotus lividus*):

49 stations were sampled, in the coastal area of Ea (Bizkaia), images of the bottom were taken by diving, in the subtidal zone at depths of less than 5 m.

3. Gooseneck barnacle (*Pollicipes pollicipes*):

On the one hand, 30 samples were obtained from 14 areas in the coastal rocks between Donostia and Orio (Gipuzkoa). This way, detailed information is obtained from this area.

On the other hand, 11 points were sampled along the Basque coast (Bizkaia and Gipuzkoa). This action was not indicated in the initial plan.

In both cases, the sampling was carried out on foot, accessed by sea using a boat, and consisted of the scraping of rocks (square of 30x30

cm) in the intertidal zone.

4. Anemones (*Anemonia viridis*):

This resource was not sampled this year because it was not planned to be extracted. It was decided at the last moment.

5. Gelidium (*Gelidium corneum*):

30 stations were sampled on the eastern stretch of the Basque coast, between Orio and Hondarribia.

This year, in addition, the rest of the Basque coast was also sampled: 71 points, in order to compare the current situation with that of 1986.

The sampling consisted of a visual inspection of the landscape, and sampling of algae in squares of 50x50 cm to evaluate the weight of the resource. The sampling was carried out by autonomous diving suit with displacement between points by boat.

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

The objective foreseen has been reached in all resources, except in the case of anemones, which was not carried out because it was not planned to extract this resource during the year 2022. On the other hand, barnacles and *Gelidium* algae were sampled along the entire Basque coast.

Task carried out in 2022:

Resource	Location	Sampled zone	Sampling stations (number)	Date
Bivalves (winter)	Oka estuary	Sukarrieta, Axpe-Busturia, Kanala, Arketas (Bizkaia)	79	February 2 and 3
Bivalves (winter)	Bidasoa estuary	Hondarribia (Gipuzkoa)	22	February 2
Bivalves (winter)	Butroe estuary	Plentzia (Bizkaia)	63	March 2 and 3
Bivalves (summer)	Oka estuary	Sukarrieta, Axpe-Busturia, Kanala, Arketas (Bizkaia)	79	July 14 and 15
Bivalves (summer)	Butroe estuary	Plentzia (Bizkaia)	63	August 11 and 12
Bivalves (summer)	Bidasoa estuary	Hondarribia (Gipuzkoa)	22	September 13
Gooseneck barnacle (BC)	Gipuzkoa East coast	Jaizkibel, Mompás (Gipuzkoa)	4	March 28
Gooseneck barnacle (BC)	Bizkaia Centre coast	Plentzia, Gaztelugatxe, Aketxe, Ea (Bizkaia)	16	March 29
Gooseneck barnacle (BC)	Bizkaia West coast	Bilbao (Bizkaia)	2	May 5
Gooseneck barnacle (Orio-Donostia)	Orio-Donostia coast	Donostia (Gipuzkoa)	12	July 13
Gooseneck barnacle (Orio-Donostia)	Orio-Donostia coast	Orio (Gipuzkoa)	16	July 14
Gooseneck barnacle (Orio-Donostia)	Orio-Donostia coast	Donostia (Gipuzkoa)	2	July 29
<i>Gelidium</i>	Costa Orio-Hondarribia	Jaizkibel (Gipuzkoa)	15	June 15
<i>Gelidium</i>	Costa Orio-Hondarribia	Pasaia-Orio (Gipuzkoa)	15	June 16
<i>Gelidium</i> *	Costa Orio-Zumaia	Orio-Zumaia (Gipuzkoa)	19	June 29
<i>Gelidium</i> *	Costa Muskiz-Armintza	Muskiz-Lemoiz (Bizkaia)	18	August 8
<i>Gelidium</i> *	Costa Bakio-Ea	Bakio-Ea (Bizkaia)	23	August 10
<i>Gelidium</i> *	Costa Lekeitio-Zumaia	Lekeitio-Zumaia (Bizkaia-Gipuzkoa)	11	August 11
Sea urchin (<i>Paracentrotus lividus</i>)	Ea coast	Ea (Bizkaia)	49	June 8

*Only in 2022. Not planned for other years.

Follow-up to the activities (what are the next steps, how the results will be used).

This data collection activity is routine and will be carried out yearly.

Text Box 1b: Other data collection activities

REMASVarBio

General comment: This text box applies to the work plan and the annual report. 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.

1. Aim of the data collection activity

To process the data obtained in the field campaigns for the evaluation of density, biomass and total stock of shellfish resources (bivalve molluscs, sea urchin, anemones and gooseneck barnacle) and algae (*Gelidium corneum*) for the sustainable exploitation of these resources in the estuaries and coast of the Basque country (northern Spain).

2. Duration of the data collection activity

The data collections are made annually. Twice for bivalve molluscs (summer and winter) and once for the rest of shellfish and algae resources. From 2022 to 2027, in a yearly basis

3. Methodology and expected outcomes of the data collection activity

Bivalve molluscs (clams and cockles):

Once in the laboratory, the samples were separated, the species of commercial interest identified, the individuals counted, and the biomass calculated in dry weight by drying in an oven at 80° C for 12 hours. Each sampling point is representative of a certain area of the intertidal that was calculated from aerial images geo-referenced in a Geographic Information System (GIS). Thus, by multiplying the biomass determined at each of the sampling points by the corresponding area, the stock in tonnes for each of them is obtained. The sum of all of them would determine the total stock of the estuary. Other parameters were the length, measured along the longest axis using a calliper to the lower millimetre and age, calculated from growth rings for each specimen.

To determine significant differences in stock abundance, density, and biomass by zones within the estuary and by time, the corresponding comparisons were carried out using the non-parametric Kruskal-Wallis test, with the Mann-Whitney U test as a posteriori test. To determine temporal trends in stock abundance, density and biomass, either by zones or for the estuary as a whole, a simple linear regression analysis was carried out between the values of each parameter and time.

Sea urchin (*Paracentrotus lividus*):

The photographs taken at each of the sampling stations were processed using ImageJ software. ImageJ is a public domain Java image analysis program inspired by NIH Image for Macintosh. Versions for Windows, Mac OS, Mac OS X and Linux are available on the web at <http://rsbweb.nih.gov/ij/>. There is also a user help Wiki: <http://imagejdocu.tudor.lu/doku.php>. This software was used to count the number of individuals at each sampling station, as well as to measure their total diameter (including barbs) from the image calibrated with the reference of the 50 cm side of the sampling square. Thus, considering the biometric ratios calculated by Bald et al. (2008) it was possible to determine, from the measurements made with ImageJ, the body diameter and weight of the individuals photographed at each sampling station.

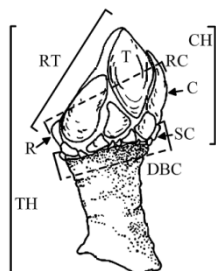
Based on the information collected in situ, the following biological parameters were calculated for each of the stations: (i) the density in individuals per square metre; (ii) the biomass per square metre for each station; (iii) percent cover; (iv) percentage of compliance with the minimum legal catch size; (v) total and exploitable stock.

Gooseneck barnacle (*Pollicipes pollicipes*):

Once the samples had been thawed, they were processed, separating and cleaning each sample and specimen, removing stones, mussels, algae, etc. Subsequently, each sample was processed as follows:

- Count all individuals (adults and juveniles).

- Weigh each individual fresh. From the individual weights, the total weight of each sample was calculated by summing each value.
- Measure each individual, using a digital caliper. Three measurements were taken: (a) the total length of the individual (TH) (including the capitulum or nail and the peduncle or foot); (b) the length of the capitulum (RT); and (c) the diameter of the base of the capitulum (DBC), distance between the base of the rostrum (R) and the apex of the subcarina (SC), according to the following scheme:



With the data collected in the previous section, the following steps were taken:

- Establish distribution maps in the selected area.
- Determine the density ($\text{ind} \cdot \text{m}^{-2}$) and biomass ($\text{kg} \cdot \text{m}^{-2}$) of the resource at each sampling point.
- Assess the quantity (stock) of the resource available.

For the monitoring of barnacle catches in the coastal sections under study, professional shellfish gatherers were provided with a logbook in which to keep a record of their catches.

Anemones (*Anemonia viridis*):

Anemone data (presence/absence, abundance, distribution) were integrated into a Geographic Information System for later representation and analysis together with other sources of information.

Based on the information collected on site, the following parameters were calculated: (i) Average total and exploitable density of individuals; (ii) Average total and harvestable biomass; (iii) Percentage of average coverage; (iv) Percentage of compliance with the minimum legal catch size; (v) Total and exploitable stock.

In addition, distribution maps of the resource in the selected area were generated.

Once the availability of the resource in the study area had been determined in accordance with the methodology described in the previous section, and given that its possible exploitation could be assumed, at least in part, a plan for the exploitation of the anemone in the selected area was drawn up.

Gelidium:

In the laboratory, the epiphytes were separated and their dry weight and that of *Gelidium* were determined by drying at 70°C for 48 hours. The fronds were measured from base to apex, to the lower half centimetre, distinguishing 1 cm size classes. Based on the information collected on site, the total biomass of *Gelidium* was calculated for each sector and temporal trends were studied (between 1983 and this day) related to human activities and environmental factors such as light, temperature (both positive action) and wind (negative action or casting off).

(max 900 words per activity)

Brief description of the results (including deviations from the plan and justifications as to why if this was the case).

1. Bivalve molluscs (clams and cockles):

Bivalve molluscs samples were processed in three estuaries (Oka 79 sampling stations, Butroe 63 stations and Bidasoa 22 stations) in two seasons (summer and winter). Clams were found in 35, 23 and 11 sampling stations respectively in winter, and in 40, 15 and 14 in summer. Furthermore, cockles were collected in, respectively, 40, 15 and 0 stations in winter, and in 46, 29 and 3 in summer. The estimated stock for the Oka, Butroe and Bidasoa estuaries was 12.1, 1.2 and 0.3 t in winter, respectively, and 9.3, 0.6 and 0.4 t in summer. Since 1998, the clam resource in the Oka estuary has shown a downward trend, despite the slight recovery in recent years, while no trend has been shown in the case of cockles. In the Butroe estuary, globally there is no clear trend for clams, while cockle stock shows a statistically significant decreasing trend ($p < 0.01$). In the Bidasoa estuary, the clam reflects a decrease since 2014, breaking the recovery trend observed between 2008 and 2013; for cockles, biomass and summer stock show a significant trend towards reduction since 2004.

2. Sea urchin (*Paranthropus lividus*):

Images from the 49 stations sampled in the coastal area of Ea (Bizkaia) were processed. Sea urchins were found in 38 stations: in total 1388 specimens were counted, and 652 measured. In 2022, a total stock of 72,894 kg was estimated, being 24,127 kg exploitable (> 40 mm in diameter). The average density in stations with presence of sea urchin was 146 ind·m⁻², and the average biomass 0.9 kg·m⁻².

Gooseneck barnacle (*Pollicipes pollicipes*):

30 samples from 14 points in the coastal area between Donostia and Orio (Gipuzkoa) were processed. The resulted average biomass was 3.33 kg·m⁻² and the exploitable biomass was 1.40 kg m⁻². The estimated total biomass in the study area in 2022 was 6,151 kg and the exploitable fraction 2,700 kg.

Moreover, other 11 points were sampled along the Basque coast (Bizkaia and Gipuzkoa). Generally, it was concluded that barnacle areas of the Basque Country were overexploited in 2022; specifically, seven out of the eleven areas were in a worrying situation.

3. Anemones (*Anemonia viridis*):

In 2022 there was not samples to process because it was not necessary, as there was no interest in exploiting it by the fishing sector.

4. Gelidium (*Gelidium corneum*):

Samples from 30 stations in the eastern section of the Basque coast, between Orio and Hondarribia, were processed.

The downward trend observed in the time series starting in 1983 seems to have stagnated in the years 2015-2016 (both in coverage and biomass), and there is even a slight improvement in recent years (in biomass).

In addition, 71 points along the entire Basque coast were also processed this year: the current coverage situation is clearly worse than in 1986-87: in almost all stations, Gelidium has currently less coverage than 35 years ago.

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

The objectives foreseen for each resource were achieved: samples of bivalve molluscs, barnacles, sea urchin and Gelidium were processed; with respect to anemones, since there was no request for extraction, it was decided not to evaluate their situation in 2022.

On the other hand, the situation of barnacles and Gelidium along the entire Basque coast (initially unforeseen) was also assessed.

Follow-up to the activities (what are the next steps, how the results will be used).

This activity is routinary and will be carried out yearly.

(max. 900 words per study)

Text Box 1b: Other data collection activities

GENGES

General comment: This text box applies to the work plan and the annual report. 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.

1. Aim of the data collection activity

Genetic analyses of marine organisms can provide information about evolution, structure and ecology of the species, populations and communities. This knowledge can be key for improving marine ecosystems and marine resources management. The aims of the study are:

- To determine the connectivity among populations of commercial fish species such as hake, sardine, anchovy, mackerel, anglerfish, bluefin, skipjack and bigeye tunas to define management units and to assign catches to origin.

- To assess genetic diversity and adaptation potential of commercial fish species to determine their resilience to pressures such as fishing and climate change.
- To evaluate alternative genetics-based approaches such as close-kin mark recapture (CKMR) to estimate spawning stock biomass of commercial fish species.
- To establish environmental DNA (eDNA) analyses as alternative to traditional approaches for monitoring fish diversity, abundance and distribution as well as to understand trophic webs.
- To evaluate other less mature genetic methods such as epigenetic age determination for ageing as tools for easing fisheries assessment.
- To transfer acquired knowledge and data to assessment and evaluation groups as well as to decision-making agents.

This Project is recognized as research activity as part of the data gathering operational program of Spain (section 13.1)

2. Duration of the data collection activity

Six years (2022-2027) in a yearly basis.

3. Methodology and expected outcomes of the data collection activity

The aims of the study will be achieved by a series of tasks that will be performed in parallel:

- To determine connectivity, we will collect tissue samples of identified species using scientific surveys and commercial catches. For each species, sampling design will be performed according to the question of interest and distribution of the species. We will use state of the art genetic methods such as restriction site associated DNA sequencing and low coverage whole genome sequencing to identify informative genetic markers such as Single Nucleotide Polymorphisms (SNPs), insertions/deletions, inversions etc. Using these markers, evolutionary significant units will be identified. OUTCOME 1: Population structure of commercial fish species in the Northeast Atlantic; OUTCOME 2: Diagnostic SNP panels for origin assignment.
- Using previously identified genetic markers, we will perform genetic-environment association studies to identify markers under selection that could indicate adaptation to changing conditions. OUTCOME 3: Report on the adaptive potential of selected commercial fish species including genetic markers under selection.
- Evaluation of CKMR for spawning biomass estimations will be performing by: i) assessing the most suitable species for application of this method considering their biological parameters and sampling logistics, ii) establishing a network for regular collection of tissue samples as we anticipate that in the order of thousands will be needed, iii) generating a genetic chip that will allow to analyse thousand of genetic markers in a cost-effective way, iv) identifying kins using the genetic chip and applying the CKMR model in order to estimate SSB based on the number of kins found. OUTCOME 4: report on the suitability of Northeast Atlantic fish commercial species for application of CKMR; OUTCOME 5: Sampling design for CKMR studies of selected species. OUTCOME 6: SNP chip to determine kins for selected species; OUTCOME 7: Estimation of SSB based on CKMR analyses of selected fish species.
- Establishment of eDNA analyses as alternative to traditional approaches will be performed by analysing eDNA from a wide range of samples including water samples collected in the Bay of Biscay at different seasons and depths, including in protected and non-protected areas. Obtained taxonomic information derived from genetic data will be compared to estimates using catches, sightings and acoustics. OUTCOME 8: eDNA derived estimates of fish diversity, abundance and distribution in the Bay of Biscay. OUTCOME 9: Standardized procedures for application of eDNA for routine monitoring.
- Evaluation of less mature methods such as epigenetics for ageing will be performed by literature searches, knowledge sharing among colleagues and small pilot studies such as comparisons of epigenetic and otolith-based reading age estimations in fish of known age. OUTCOME 10: report on new avenues on the application of genetic methods for fisheries management
- Knowledge transfer will be achieved through assistance to ICES, ICCAT and IOTC working groups, as well through communication of results to relevant stakeholders at the regional, national and international levels. OUTCOME 11: Report of the communication and knowledge activities performed

(max 900 words per activity)

Brief description of the results (including deviations from the plan and justifications as to why if this was the case).

OUTCOME 1: Population structure of commercial fish species in the Northeast Atlantic

- The population structure of the European hake has been obtained based on about 8000 SNP markers

- The population of the Atlantic Mackerel has been obtained based on about 8000 SNP markers

OUTCOME 2: Diagnostic SNP panels for origin assignment.

- Diagnostic SNP markers have been generated for hake and anglerfish and are being included in a SNP array

OUTCOME 3: Report on the adaptive potential of selected commercial fish species including genetic markers under selection.

- Data for these analyses have been generated for hake and are being generated for sardine

OUTCOME 4: report on the suitability of Northeast Atlantic fish commercial species for application of CKMR

- The report has been completed and will be published soon

OUTCOME 5: Sampling design for CKMR studies of selected species.

- Sampling design has been performed and survey coordinators are being contacted

OUTCOME 6: SNP chip to determine kins for selected species

- The SNP chip is being under development

OUTCOME 7: Estimation of SSB based on CKMR analyses of selected fish species.

- Model for hake and anglerfish is being developed

OUTCOME 8: eDNA derived estimates of fish diversity, abundance and distribution in the Bay of Biscay.

- An assay for sardine, anchovy and maurolicus has been developed and is being currently tested

OUTCOME 9: Standardized procedures for application of eDNA for routine monitoring.

- Standardized sampling and analysis procedures have been established

OUTCOME 10: report on new avenues on the application of genetic methods for fisheries management

- The epigenetic ageing has been considered for application of tuna and NEA fisheries.

OUTCOME 11: Report of the communication and knowledge activities performed

- The work has been presented as 10 oral communications, summarized in two publications and presented to 2 ICES working groups.

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

The achievement of the original expected outcomes is on track. Some of them have been accomplished and others are in progress. No deviations from the original plan are expected

Follow-up to the activities (what are the next steps, how the results will be used).

The future activities will be planned to complete the foreseen outcomes, reinforcing the communication of results to the relevant ICES, ICAT and IOTC working groups and with the aim of establishing the sampling monitoring programs and routine protocols for the inclusion of genetic methods in the fisheries assessment process.

(max. 900 words per study)

Section 2: Biological Data

Text Box 2.1: List of required species/stocks

North Sea and Eastern Arctic. (Eastern Arctic, Norwegian Sea and Barents Sea (ICES areas 1, 2, FAO area 27))

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.1.

Deviations from the work plan

The Spanish vessels participate in two fisheries in this area. One targeting cod (*Gadus morhua*) and the other targeting redfish (*Sebastes mentella*)

Due to a misunderstanding in the assignment of the observer to the vessel, the planned trip in the cod fishery was carried out by AZTI and not by the IEO.

In the case of the redfish fishery, there were no Spanish vessels in the fishery. Therefore, the length measurements of *Sebastes mentella* were taken as by-catch in the cod fishery.

Actions to avoid deviations

In the future, greater care will be taken to avoid this type of misunderstanding, which, it must be said, has never occurred before.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.1: List of required species/stocks

North-East Atlantic. (North-East Atlantic and Western Channel (ICES areas 5, 6, 7 (excl. 7d), 8, 9, 10, 12 and 14, FAO area 27))

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.1.

Deviations from the work plan

All deviations are explained in tables

Some deviations are related to the non-activity of the Spanish fleet targeting *Sebastes mentella* in the Irminger Sea, and the Spanish fleet targeting deep water species in Hatton Bank in 2022. As a result, the species associated with these fisheries (*Sebastes* spp., *A. bairdii*, *C. rupestris*) could not be sampled. These types of deviations are unavoidable.

Some deviations are related to the presence or absence of species in the samplings. This is due to the fact that these species have not been caught and cannot be sampled under the concurrent sampling scheme.

Actions to avoid deviations

The deviations generated are due to circumstances outside the sampling program (species not present in the sampled trips), so no action is necessary.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.1: List of required species/stocks

Mediterranean Sea and Black Sea (GFCM GSA 1-29, FAO area 37)

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.1.

Deviations from the work plan

All deviations are explained in tables.

Some elasmobranch species covered by the commercial sampling scheme did not appear on the trips selected for sampling: *Mustelus asterias*, *M. punctulatus*, *Myliobatis Aquila*, *Prionace glauca*, *Pteroplatytrygon violacea*, *Scylliorhinus stellaris*, *Torpedo torpedo*, so they could not be sampled.

In addition to the species planned to be sampled for length, a total to 133 species (497 samplings, 72564 individuals) were sampled in the framework of the concurrent sampling.

Actions to avoid deviations

The deviations generated are due to circumstances outside the sampling program (species not present in the sampled trips), so no action is necessary.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.1: List of required species/stocks

The outermost regions. (EU waters around Canary islands (FAO area 34.1.2))

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.1.

Deviations from the work plan

No deviations.

Actions to avoid deviations

Not applicable

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.1: List of required species/stocks

Other regions. (North-West Atlantic (FAO area 21). NAFO)

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.1.

Deviations from the work plan

All deviations are explained in tables. The deviations are related to the non-presence of the species in the observed trips and cannot be

avoided.

Actions to avoid deviations

The deviations generated are due to circumstances outside the sampling program (species not present in the sampled trips), so no action is necessary.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.1: List of required species/stocks

Other regions. (Eastern Central Atlantic (FAO area 34). CECAF)

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.1.

Deviations from the work plan

All deviations explained in tables. The deviations are related to the non-presence of the species in the observed trips and also to the non-activity of the fleets in some fishing areas. None of them can be avoided.

Actions to avoid deviations

The deviations generated are due to circumstances outside the sampling program (species not present in the sampled trips), so no action is necessary.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.1: List of required species/stocks

Other regions. (Atlantic Ocean and adjacent seas (FAO areas 21, 27, 31, 37, 41, 47, 34, 48). ICCAT)

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.1.

Deviations from the work plan

No deviations.

In addition to the individuals reported in Table 2.1, 75 individuals of *Lepidocybium flavobrunneum* were sampled.

Actions to avoid deviations

Not applicable

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.1: List of required species/stocks

Other regions. (Indian Ocean (FAO area 51 and 57). IOTC)

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.1.

Deviations from the work plan

No deviations

In addition to the individuals reported in Table 2.1, 14 individuals of *Lepidocybium flavobrunneum*, 1 individual of *Lampris guttatus* and 4 individuals of *Sphyræna* spp. were sampled.

Actions to avoid deviations

Not applicable

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.1: List of required species/stocks

Other regions. (Western Central Pacific (FAO area 71). WCPFC)

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.1.

Deviations from the work plan

No deviations.

Actions to avoid deviations

Not applicable

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.1: List of required species/stocks

Other regions. (Eastern Central Pacific (FAO area 77 and 87). IATTC)

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.1.

Deviations from the work plan

No deviations.

In addition to the individuals reported in Table 2.1, 10 individuals of *Lepidocybium flavobrunneum*, 7 individuals of *Coryphaena hippurus* and 154 individuals of *Prionace glauca* were sampled.

Actions to avoid deviations

Not applicable

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.1: List of required species/stocks

Other regions. (Antarctic and Southern Indian Ocean (FAO area 48, 58 and 88). CCAMLR)

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.1.

Deviations from the work plan

No deviations.

Actions to avoid deviations

Not applicable

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.2: Planning of sampling for biological variables

North Sea and Eastern Arctic. (Eastern Arctic, Norwegian Sea and Barents Sea (ICES areas 1, 2, FAO area 27))

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.2.

Deviations from the work plan

Due to a misunderstanding in the assignment of the observer to the vessel, the planned trip was carried out by AZTI and not by the IEO.

As a result, the variables collected are not the same as those planned by the IEO. (AZTI only collects length and age for cod and only length for other species).

The absence of these data for Cod (*Gadus morhua*) in this fishery did not affect the assessment, as the fishery by Spanish vessels accounted for less than 2% of the TAC for this stock in 2022.

The deviations concerning *Sebastes mentella* are unavoidable as there was no fishery targeting this species.

Actions to avoid deviations

In the future, greater care will be taken to avoid this type of misunderstanding, which, it must be said, has never occurred before.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.2: Planning of sampling for biological variables

North-East Atlantic. (North-East Atlantic and Western Channel (ICES areas 5, 6, 7 (excl. 7d), 8, 9, 10, 12 and 14, FAO area 27))

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.2.

Deviations from the work plan

Sampling scheme identifier: ESP_IEO_P5_AtSea

There was no effort by Spanish vessels in the *Sebastes mentella* fishery in Irminger Sea, or in the deep-water species fishery in Hatton Bank in 2022. Therefore, the species associated with these fisheries (*Alepocephalus bairdii*, *Coryphaenoides rupestris* and *Sebastes mentella*) could not be sampled. This deviation is unavoidable.

Sampling Scheme Identifier ESP_IEO_P1_Biological_Specific: some general considerations about the planing of sampling for biological variables (Age, Weight, Sex, Maturity) according to this identifier

The field "**Number of samples reached**" reflects the number of sampling events.

- In the case of planned sampling (P) on landings, the number of sampling events may be greater than the number of PSUs (the planned PSUs were established as the minimum number of sampling events that would be necessary to perform during the year). Considering that each PSU should be associated with a set of data (live weight, sex, maturity, age) representative of the landing fraction of a target population from a given area in a given time period (quarterly, annually, triennially), some PSUs may need to be split into two or more sampling events to achieve this objective. This is the case when the sample (usually boxes) obtained at the fish market is too small and additional samples are needed (e.g. during the winter months, the quantities landed are sometimes small and more difficult to obtain due to bad weather). For demersal species, it is difficult to adequately represent the length distribution of landings in a single sampling event, so additional samples targeting the tails of the length distribution are sometimes needed. In addition, sampling may be intensified during the peak spawning season if deemed necessary.
- In the case of opportunistic sampling (O) on sureys, each sampled haul is considered as a sampling event.

"**Number of samples reached**" is sometimes **higher** than planned (>150%) because:

- The sampling design is not focused on the total number of individuals sampled throughout the year, but on reaching a minimum number of fishes in each sampling to ensure the quality for each them.
- A large number of samplings are needed to adequately cover all strata, because there are a large number of fisheries (target species vs. gears) in the ICES area and the sampling design is randomly stratified. The samplings needed by ICES assessment groups to carry out the relevant assessments requires sampling of an important part of the fisheries affecting the target species
- Some parameters like age@length require a larger number of samples to obtain representative age-length keys for the target stocks. This increase in the sampled number not involve additional costs, since work plan in laboratories is carried out according to the requirements of the working groups to which the data must be provided.
- When the originally planned sample size was not sufficient to ensure data quality, the sample size was increased when it was possible, to improve quality levels.

"**Number of samples reached**" in some parameters were **lower** than planned (<90%) in some cases:

- Although the methodology used to collect the data from landing samples is designed to achieve a representative sample of each of the commercial categories of the target species, the individuals from the commercial landings have often been gutted, making it impossible to carry out a complete sampling (weight or even sex or maturity data).
- In certain periods, is the bad weather, does not allow the commercial fleet to operate and prevents the purchase of the necessary samples.

Sampling Scheme Identifier ESP_AZTI_Biological_Specific

Trachurus trachurus: Only 47 fish were sampled, compared to 400 planned. We had problems in sampling HOM, due to the accessibility of the sample (landings in the sampled ports were concentrated in a few throughout the year) and to some difficulties in preserving the sample from the purchase until the analysis in the laboratory.

Trachurus trachurus fecundity:

Since the WGMEGS changed from the annual AEPM method to the daily DEPM method for calculating jack mackerel biomass, the IEO and AZTI do not sample adults horse mackerel for fecundity because adults are only sampled in the area where the peak spawning occurs, which is not in the Spanish waters and it does not coincide with the Spanish surveys.

However, both institutes analyze in their laboratories the samples collected by other countries in their national surveys. The samples analyzed in 2022 from the IEO triennial surveys were: 104 screening histology, 26 samples screening wholemount, 103 samples were image analyzed for POFs staging and 26 samples were analyzed for batch fecundity.

Table 2.2, Column Q: 'Achieved number of samples' for the cases where the sampling scheme type is 'Research survey at sea'

Although the guidelines say 'For research surveys at sea, put "NA" (where 'NA' means 'not available')', we have entered in this column the number of hauls in which the reported individuals were collected. We believe that these numbers are more informative than a simple 'NA'. For surveys, hauls are considered sampling units.

Actions to avoid deviations**Sampling Scheme Identifier ESP_IEO_P1_Biological_Specific**

Although we try to adjust the number of samples planned, one of the major difficulties is the inability to adequately cover the full-length range. In most cases, this is due to the spatial distribution of the species itself in the areas from which the samples are taken and the inability of the fishery to access the tails of the size distribution. Shortfalls in biological samples from the commercial fleet are usually compensated by samples collected during surveys, the number of which cannot be planned, as it depends on adaptive sampling.

Sampling Scheme Identifier ESP_AZTI_Biological_Specific

Trachurus trachurus: On the one hand, a researcher will keep track of the landings of HOM using the sales notes, in order to give them support to sample the landings, even if they are concentrated in a few weeks. On the other hand, we have had meetings with the samplers and the technicians in charge of the biological analysis in the laboratory in order to improve the coordination between them.

For the other species (e.g. *Merluccius*, *Lophius*, *Lepidorhombus*) it is difficult to set a number, because sampling depends on the quantities landed and the proportion of the species in the landings. In addition, species such as sardine and anchovy are also highly dependent on the landings. In all cases, researchers try to adjust the number of samples by monitoring landings and improving the cooperation between researchers and samplers. Shortfalls in biological samples from the commercial fleet are usually compensated by samples collected during surveys, the number of which cannot be planned, as it depends on adaptive sampling.

(One text box of max. 1 000 words per region/RFM/RFO/IO)

Text Box 2.2: Planning of sampling for biological variables**Mediterranean Sea and Black Sea (GFCM GSA 1-29, FAO area 37)**

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.2.

Deviations from the work plan

Biological variables related to the population should be collected from commercial samples every year (Group 1 species) or every three years (Group 2 species) according to the rules of the GFCM-DCRF Manual. As 2022 was the third year of the triennial period 2020-2022 for most of Group 2 species, this Annual Report presents the results of the sampling of the triennial species.

As planned, the estimation of the biological parameters and their uncertainties has been carried out using the INBIO 2.0 tool ("Estimation of biological parameters and their uncertainties through simulation techniques"), developed by the IEO in R environment.

Sampling Scheme Identifier ESP_IEO_P2_Biological_Specific

Regarding the biological variables, the number of individuals achieved for some of them is out of the threshold:

In the GSA01, the sampling of small pelagics species (*Sardina pilchardus* and *Engraulis encrasicolus*) was lower than planned (see AR

comments in Table 2.2) due to the decrease in landings in the sampling ports. In the case of *Merluccius merluccius* and *Mullus barbatus*, the low sampling of the biological variables is related to the short length range and the protocol fix number by length class. The sampling of *Octopus vulgaris*, a Group 2 species, was affected by the 2020 COVID lockdown. On the other hand, *Trachurus mediterraneus* and *Trachurus trachurus* were sampled higher than planned (see AR comments in Table 2.2).

In the GSA05, *Raja clavata* was selected for biological sampling from commercial fisheries in the new WP 2022-2027. It was planned to sample every three years, i.e. the results will be reported in the 2024 AR. *Engraulis encrasicolus* (age) was sampled lower than planned (see AR comments in Table 2.2). *Aristeus antennatus* and *Sepia officinalis* were sampled higher than planned (see AR comments in Table 2.2).

In the GSA06, the sampling of small pelagics species (*Sardina pilchardus* and *Engraulis encrasicolus*, *Micromesistius poutassou* and *Scomber colias*) was sampled lower than planned (see AR comments in Table 2.2) due to decrease in the quantities landed in the sampling ports, in some cases dramatic. In the case of *Merluccius merluccius* the low sampling of the biological variables is related to the short length range and the protocol fix number by length class. *Lophius* could not be sampled due to the coincidence of the sampling period (reproductive period) with the closed season for trawlers in the area. *Aristeus antennatus* was sampled higher than planned (see AR comments in Table 2.2).

Table 2.2, Column Q: 'Achieved number of samples' for the cases where the sampling scheme type is 'Research survey at sea'

Although the guidelines say 'For research surveys at sea, put "NA" (where 'NA' means 'not available')', we have entered in this column the number of hauls in which the reported individuals were collected. We believe that these numbers are more informative than a simple 'NA'. For surveys, hauls are considered sampling units.

Actions to avoid deviations

For the species with biological parameters sampled lower than planned, deviations could be avoided by increasing the number of individuals in each sampling/trip. However, this point depends on the availability of catches of these species, which was the main drawback for the 2022 sampling.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.2: Planning of sampling for biological variables

The outermost regions. (EU waters around Canary islands (FAO area 34.1.2))

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.2.

Deviations from the work plan

All deviations are explained in tables.

Actions to avoid deviations

The difficulty in obtaining samples in the market is not an easy thing to solve, it depends on the weather, the catches and the variability of the market, but the IEO team is constantly trying to find the best way to obtain samples.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.2: Planning of sampling for biological variables

Other regions. (North-West Atlantic (FAO area 21). NAFO)

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.2.

Deviations from the work plan

All deviations explained in tables. The deviations are related to the non-presence of the species in the observed trips and are unavoidable.

Actions to avoid deviations

Not applicable

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.2: Planning of sampling for biological variables

Other regions. (Eastern Central Atlantic (FAO area 34). CECAF)

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.2.

Deviations from the work plan

All deviations explained in tables.

The lack of biological data for the species from the purse seine fleet (*Engraulis encrasicolus* and *Sardina pilchardus*) was due to the low activity of this fleet (restricted to 3 months), which prevented the collection of the biological material expected under the sampling scheme ESP-IEO_P3_BioSpec.

The deviations are related to the non-activity of the fleets in some fishing areas and the decrease in activity in other areas. None of them can be avoided.

Actions to avoid deviations

Not applicable

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.2: Planning of sampling for biological variables

Other regions. (Atlantic Ocean and adjacent seas (FAO areas 21, 27, 31, 37, 41, 47, 34, 48). ICCAT)

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.2.

Deviations from the work plan

Swordfish (*Xiphias gladius*): in the **Atlantic** the fresh swordfish are landed whole, so biological variables can only be recorded with observers on board or when we have access to eviscerated individuals in the port.

In the **Mediterranean** the swordfish (*Xiphias gladius*) are commercialized whole without evisceration, so data on age, maturity, and sex ratio can only be collected from damaged specimens on board. We did not sample for fecundity because it is not a target variable for this

species that appears in the sampling plan for error.

Bullet tuna (***Auxis rochei***) and Atlantic bonito (***Sarda sarda***): biological variables are collected either on board or ashore, depending on availability. The weight data are collected on board because the fish are landed in boxes and cannot be unpacked to obtain individual weights. The rest of the biological variables are collected in port, the samples are purchased and they are analyzed in the laboratory.

Albacore (***Thunnus alalunga***): dorsal fin spines had been collected for several years in the past to provide estimates of age, growth and longevity by direct reading of annual increment bands. The results were used to produce annual length-age keys (ALKs) and were used in the modeling of the stock using different stock assessment methods.

A von Bertalanffy growth equation was estimated for North Atlantic stock and presented in ICCAT Albacore Working Group. V. Ortiz de Zárate and E.A. Babcock. 2016. *Estimating individual growth variability in albacore (Thunnus alalunga) from the North Atlantic stock: Aging for assessment purposes*. *Fisheries Research*, 180, 54-66.

Actually, the Albacore Working Group recommended focusing on a growth study of the larger fraction of the adult albacore population and differential growth by sex. The Spanish albacore fishery targets the juvenile and sub-adult fractions of the albacore population therefore is not possible to collect the necessary large fish samples that are not available to these fleets. In this scenario the collection of dorsal fin spines was not continued.

The selectivity pattern of the Spanish fleets targeting albacore leaves out the adult population that integrates the spawning population in the North Atlantic stock. Most of the catches are of immature fish in the Bay of Biscay. This is not a spawning area and therefore is not an appropriate area to encounter spawning individuals to study the maturity stages, fecundity or sex ratio, in essence the reproductive biology of albacore.

Blue shark (***Prionace glauca***): there was an error in planning given that age, fecundity and maturity variables are not required by end users.

Actions to avoid deviations

Deviations are due to problems inherent to the large pelagic fisheries. The objectives are considered to be met.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.2: Planning of sampling for biological variables

Other regions. (Indian Ocean (FAO area 51 and 57). IOTC)

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.2.

Deviations from the work plan

No deviations.

Actions to avoid deviations

Not applicable.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.2: Planning of sampling for biological variables

Other regions. (Eastern Central Pacific (FAO area 77 and 87). IATTC)

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.2.

Deviations from the work plan

No deviations.

Actions to avoid deviations

Not applicable.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.2: Planning of sampling for biological variables

Other regions. (Antarctic and Southern Indian Ocean (FAO area 48, 58 and 88). CCAMLR)

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 2.1(a) of the EU MAP Delegated Decision annex. This text box applies to the annual report and complements Table 2.2.

Deviations from the work plan

No deviations

Actions to avoid deviations

Not applicable

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.3: Diadromous species data collection 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 for the data collected 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.

Method selected for collecting data. (MS should briefly describe the method for collecting the variables presented in Table 2.3. Detailed descriptions are to be included in Annex 1.1. If variables are not directly collected but estimated the method of estimation should be described here.)

Anguilla anguilla

In Spain, each autonomous region constitutes an eel management unit. In some of the regions sampling for the determination of the required parameters are already taking place; but not in others. For these EMUs where sampling design needs to be developed it is not possible to give much detail about the sampling design.

The SUDOANG project has compiled various eel information from Spain that can be found at:

- Electrofishing data from the SUDOANG project are hosted at <https://bit.ly/3ilgrT>.
- Recruitment and estimated escapement data can be downloaded from the interactive tool VISUANG

(<https://sudoang.eu/en/visuang/>)

- Data generated in the Oria, Ter and Guadiaro catchments can be downloaded from the interactive tool VISUANG (<https://sudoang.eu/en/visuang/>)

ES-Basque Country (ES-Bas)

The Basque country has used the SUDOANG protocols to sample recruitment, Standing Stock and silvering eels.

<https://sudoang.eu/wp-content/uploads/2019/02/Protocols-for-recruitment-silvering-and-otolith-preparation.zip>

1) The abundance of recruits will be estimated by:

- a. Monthly samplings of the glass eel entrance in the estuary using sieve trawling during the maximum recruitment period (October- February). Sampling includes the measurement of length and weight.
- b. Using the glass eel fishery catch and effort data compiled in the daily catches report.
- c. Sampling daily the eel entrance in a fish trap located in the tidal limit of the Oria River during the migration period (May-October). Sampling includes the measurement of length and weight.

2) The abundance of the standing stock (yellow eel); will be determined by electrofishing surveys in 25 sampling points. Sampling includes the measurement of length and weight.

3) The number or weight and sex ratio of emigrating silver eels will be determined applying Durif et al. (2003; 2005) to the eels obtained in the electrofishing surveys. Sampling includes the measurement of length and weight.

EMU_ES_Asturias (EMU_ES_Astu)

1) The abundance of recruits will be estimated using the glass eel fishery catch and effort data.

2) The length and weight of glass eel will be taken from 50 individuals monthly sampled from Nalon and Ribadesella fish market, from October to February.

3) The abundance of the standing stock (yellow eel) will be determined by electrofishing surveys. The length and weight of the yellow eels will be taken for each individual obtained from the electrofishing surveys.

3) The number or weight and sex ratio of emigrating silver eels will be determined applying Durif et al. (2003; 2005) to the eels obtained in the electrofishing surveys. The length and weight of the silvering eels will be taken for each individual obtained from the electrofishing surveys.

EMU_ES_Galicia (EMU_ES_Gali)

1) The abundance of the standing stock (yellow eel); will be determined from electrofishing surveys.

2) The abundance of silver eels will be derived from electrofishing surveys

EMU_ES_Murcia (EMU_ES_Murc)

- The abundance of recruits (eelglass) will be determined by sampling with specific trap gear.

- The proportion of yellow and silver eels as well as their size and weight will be determined by sampling the catches from the Mar Menor fishery.

EMU_ES_Valencia (EMU_ES_Vale)

1) The abundance of recruits will be estimated using the glass eel fishery catch and effort data compiled in the daily catches report. Sampling includes the measurement of length and weight of 150 glass eel

2) The abundance of the standing stock (yellow and silver eel) will be determined by electrofishing surveys in 10 river sampling points.

3) The number or weight and sex ratio of emigrating silver eels will be determined by sampling of 100 individuals obtained from the Albufera fishery catches.

EMU_ES_Cantabria (EMU_ES_Cant)

1) The abundance of recruits will be estimated using the glass eel fishery catch and effort data and if possible using fishery independent methods once an appropriate sampling design is defined

2) The abundance of the standing stock (yellow eel); will be determined by electrofishing surveys.

3) The number or weight and sex ratio of emigrating silver eels will be determined applying Durif et al. (2003; 2005) to the eels obtained in

the electrofishing surveys.

EMU_ES_Cataluña (EMU_ES_Cata)

1) The abundance of recruits will be obtained by:

- a. Scientific based sampling. Monthly samplings of the glass eel entrance in the estuary using fyke nets with fine mesh during the maximum recruitment period (October-March). A subsampled kept to obtain length and weight measures of 50 individuals.
- b. Commercial based sampling. Using the glass eel fishery catch and effort data compiled in the daily catches report from 8 fishermen guilds. Commercial catches are allowed from October to March.

2) The length and weight of the glass eel stage will be obtained by:

- a. Scientific based sampling. A subsampled of monthly sampling will be kept to obtain length and weight measures of 50 individuals.
- b. Commercial based sampling. Measuring 50 individuals from 4 sites, 3 times during the fishing season.

2) The abundance of the standing stock (yellow eel and silver eel) will be determined in the Ter river by electrofishing surveys in 17 sampling points per year. The Sudoang protocol will be applied.

3) All individuals caught during electrofishing surveys will be measured (length and weight). The number, size and sex ratio of emigrating silver eels will be determined applying Durif et al. (2003; 2005). The Sudoang protocol will be applied.

EMU_ES_Navarra (EMU_ES_Nava)

Eel has disappeared in most of this EMU; and the population is restricted to the lower part of the Bidasoa River.

1) The abundance of recruits won't be estimated since Bidasoa River estuary is located below the limits of Navarra territory (between the Basque Country and France)

2) The abundance and length of the standing stock (yellow eel) will be determined by electrofishing surveys in October each year.

3) The number, length, weight and sex ratio of emigrating silver eels will be determined applying Durif et al. (2003; 2005) to the eels obtained in the electrofishing surveys in October each year

EMU_ES_Andalucía (EMU_ES_And)

1) Abundance is estimated:

a. Sampling is carried out annually in the winter-spring months, between December and April. They begin after the first heavy winter rains and are only sampled when the intensity of lunar light does not exceed 60%.

b. Forty sampling points are sampled using eel and shrimp traps. Twenty pots (10 per shore alternating eel and shrimp traps) are placed approximately 20 meters apart. They are fixed with corrugated steel bars nailed to the bed with a hammer. Their location will be recorded with GPS when the satellite error is less than 6 meters.

c. The pots are collected after 48 hours and lifted in the same order in which they were placed (from the starting point to the end). The catches of each of the pots are processed independently on the shore.

d. Data are taken on length, weight, eye diameter, presence or absence of lateral line and pectoral fin coloration. Once the biometric data have been collected, the specimens are returned to the water as close as possible to the stretch where they were captured.

Salmo Salar

Navarra

There is no professional fishing targeting *Salmo salar* (only recreational)

1) The abundance and length of parrs will be determined by electrofishing surveys in September each year.

2) The number, biometric data (length, height, maxilla length and weight), age (scales reading), sanitary status (Red Vent Syndrome, presence of sea lice, wounds, etc.), origin (wild or fish farm) and sex of all adult salmon captured in the fish trap (Bera Salmonid Monitoring Station) during the upstream migration will be determined.

3) The number, biometric data (length, height, maxilla length and weight), age (scales reading), sanitary status (Red Vent Syndrome, presence of sea lice, wounds, etc.), origin (wild or fish farm) and sex of all adult salmon captured by anglers during the angling season downstream of the fish trap (Bera Salmonid Monitoring Station) will be determined.

Galicia

- 1) The abundance of parr will be derived from electrofishing surveys.
- 2) The abundance of smolts will be derived from numbers in the fish trap.
- 3) Abundance of adults will be estimated from recreational catch and fish trap numbers.
- 4) Biometry of adults will be derived from recreational catch and fish trap samples.

Cantabria

Salmon is sampled in all of the rivers with current salmon presence. Adults are sampled by traps and parrs by electric fishing

Basque Country

Salmon fishing is not allowed in the Basque Country. In the 1980s, salmon had disappeared from all Basque rivers. Nowadays, they have recolonised several rivers and the species is sampled in all of the rivers with current salmon presence. Adults are sampled by traps, parrs by electric fishing and smolts by smolt trapping (rotary screwtrap) in one of the basins (Urumea).

Asturias

There is a recreational salmon fishery in Asturias. The species is sampled in all of the rivers with current salmon presence. Adults are sampled by traps (sampled every 1-2 days.) and parrs by electricfishing. In addition, there is an annual underwater Visual Census: once a year 2 divers enter each river and make an assesment of the population.

Salmo trutta (sea trout)

Navarra

- 1) The number, biometric data (length, height and weight), age (scales eading) and sex of all sea trout captured in the fish trap (Bera Salmonid Monitoring Station) during the upstream migration will be determined.
- 2) The number, biometric data (length, height and weight), age (scales eading) and sex of all sea trout captured by anglers during the angling season downstream of the fish trap trap (Bera Salmonid Monitoring Station) will be determined.

Galicia

- 1) An index of abundance will be derived from density in the lowest reach of rivers, obtained from electrofishing surveys
- 2) An index of abundance of adults will be estimated from recreational catch and fish trap numbers.
- 3) Biometry of adults will be derived from recreational catch and fish trap samples.

Cantabria

This species is not very abundant in this management unit. Therefore, there is no specific sampling for it. However, when it appears sporadically in sampling for other species, this information is noted and the specimen is measured and weighed.

Asturias

This species is not very abundant in this management unit. Therefore, there is no specific sampling for it. However, when it appears sporadically in sampling for other species, this information is noted and the specimen is measured and weighed.

Basque Country

This species is not very abundant in this management unit. Therefore, there is no specific sampling for it. However, when it appears sporadically in sampling for other species, this information is noted and the specimen is measured and weighed.

(max 250 words per species and area)

Were the planned numbers achieved? Yes/ No

Anguilla anguilla

EMU_ES_Basq - NO

The 100% of the target regarding the abundance recruit sampling was not met because there was a mistake in the NWP, the planned target should be 5 instead of 6. The sampling is done from October to February, i.e., 5 months – 5 sampling events. This will be corrected in the next update of the multiannual plan, in coordination with the National Correspondent.

EMU_ES_Astu - NO

2) The length and weight of glass eel was taken from 50 individuals monthly sampled from Nalon and Ribadesella fish market, from November to February.

3)4) There is no data because the contract for electrofishing could not be awarded on time this year. The contract was awarded in December and by then it was no longer possible to do electrofishing. However, the electrofishing survey is assured for 2023 since the contract awarded was for two years.

EMU_ES_Gali - NO

The number of 418 samples corresponds to both yellow eel and silver eel individuals together.

EMU_ES_Murc - NO

The number of glass eel recruitment monitoring surveys has not been reached (1 out of 3) due to problems with the traps. These problems have been solved and the target of 3 surveys is expected to be reached by 2023.

The number of checked individuals has not been reached for yellow eel (16 out of 50) but has been exceeded for silver eel (82 out of 50). The total number of samplings, including yellow and silver eels, is almost reached (98 out of 100). This is because the controls have been carried out randomly and many silver eels and few yellow eels have been obtained. For the next campaigns we will try to direct the controls to balance the number of yellow and silver specimens.

EMU_ES_Vale - NO

1) The measurement of length and weight of 150 glass eel from fishery catches was achieved.

2) The electrofishing surveys in 10 river sampling points (Turia river) was not achieved due to high a flow rate at some of the points. Actually, it's working to define new sampling points in the same river to replace the problematic ones.

3) The sampling of 100 eels obtained from the Albufera fishery catches was achieved. In fact, it was surpassed and 171 eels were measured, including both silver and yellow stage together, as it was planned. This will be corrected in the next update of the multiannual plan, in coordination with the National Correspondent.

EMU_ES_Cant - NO

1) The Fisheries independent recruitment survey was made in the Deva and Nansa rivers considering both rivers together, including 3 sampling points in the first one and 2 sampling points in the second one. Sampling has been taken monthly for 4 months (December to March) when glass eels arrive at the mouth of estuaries of Cantabria and enter in freshwater.

2-3) The reason for the electrofishing survey failure was that budget constraints.

EMU_ES_Cata - NO

The planned number of glass eel measured, i.e., length and weight, in Ebro was not fully achieved because in the first sampling no catches were obtained.

EMU_ES_Nava - YES

EMU_ES_Anda - NO

In 2022, three points could not be sampled due to different reasons: At the point located on the Guadalete River (AG9), the reeds had grown too much, and it was not possible to place the pots. When we went to place the pots at point MGH1B on the Guadalhorce River, there was a high current speed, so the pots could not be placed either. In the Barbate River, point AB12 is located at a channel adjacent to the riverbed and had a higher-than-normal water column, so the staff were unable to place the pots.

Salmo salar

Navarra - YES

The planned minimum number of units is unreal for Bidasoa River. The number of salmon that were allowed to be caught in 2022 was 47, i.e., very much lower than 300 planned units.

Galicia- NO

Number of sampled adults planned were not achieved due to low catches in rivers Eo, Mandeo, Ulla and Miño.

Parr surveys could not be completed due to high discharge in rivers Eo, Xubia, Mandeo, Anllóns, and Lérez

Cantabria - NO

In the year 2022, planned numbers were not achieved for Asón, Deva, Nansa and Pas rivers because the number of salmon individuals caught were lower than that of planned in each river. Besides, sampling points for parr were reduced in Agüera, Asón, Deva and Pas due to budget constrains.

Basque Country - YES

The smolt trap in the Urumea was not sampled due to the diverting channel of the paper mill where the rotary screw trap was installed and thus it was no longer working since 2020. This will be corrected in the next update of the multiannual plan, in coordination with the National Correspondent.

The number of electrofishing points targeting parr in the river Mayor and Lea was updated in AR 2017, i.e., na before, now two points per river. Besides, the Lea trap no longer exists. At the end of December 2018, the existing fish passage was demolished, as it had major hydraulic deficiencies. Although there is a new fish passage, the station has not been set again. All these will be corrected in the next update of the multiannual plan, in coordination with the National Correspondent.

Asturias - NO

Porcia and Eo river underwater visual census sampling was not carried out due to adverse meteorological conditions.

Salmo Trutta

Navarra - YES

The Planned minimum number of units for adults catch sampling is unreal for Bidasoa River. The number of sea trout that were allowed to be caught in 2022 was 10, i.e., very much lower than that of 300 planned.

Galicia - NO

Juvenile surveys could not be completed due to high discharge in rivers Xubia, Mandeo, Anllóns, and Lérez.

(max 250 words per species and area)

Text Box 2.4: Recreational Fisheries

North-East Atlantic

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.

In the case of Highly migratory species [SelfOnShore_recreational (off site surveys)], the data are collected by declaration of fishermen on the basis of Article 10 of RD 347/2011 (<https://www.boe.es/eli/es/rd/2011/03/11/347>).

For other species see table 2.4 and annex 1.1

(max 900 words per region)

Deviations from the work plan

Sampling scheme identifier: ESP-AZTI_OffSiteSurveysRecreational (Basque Country Region)

The routinary survey, carried out from 2015 to 2019 and based on the list of telephones of licensed fishers, could not be done afterwards due to problems with the Data Protection Regulation. It was not possible to access to the contact information of licensed fishers. This problem had been identified in previous years and some actions were proposed to overcome it (i.e. changes in the web where fishers buy their license), but the problem persists.

Actions to avoid deviations

Sampling scheme identifier: ESP-AZTI_OffSiteSurveysRecreational (Basque Country Region)

A new sampling scheme for offsite surveys in the Basque Country has been designed during 2022 and will be carried out during 2023. The new sampling scheme consists in a large-scale telephone survey to the population of Basque Country. With these surveys we will avoid data protection constraints, and we will get an estimation of the participation rate in the Basque Country (until now we were using the list of licensed fishers), by recreational fishing mode (i.e. coastal fishing, boat fishing, spearfishing), region and season. In addition, the survey is multi-specific, so it will allow us defining the main target species as well as estimating both the dedicated fishing effort and corresponding catches, considering not only the minimum list of species mandatory in the EUMAP but also the whole species range targeted by different recreational fishers.

On the other hand, an on-site sampling design is being implemented. This study has been planned as a test study under the current multiannual NWP (see section 1a), and will be carried out during years 2022 and 2023. The objective of this test study is to establish a routinary onsite sampling for recreational fishery in the region to complement the offsite methods already established as routinary sampling.

(max. 900 words per region)

Text Box 2.4: Recreational Fisheries

Mediterranean Sea and Black Sea

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.

In the case of Highly migratory species [SelfOnShore_recreational (off site surveys)], the data are collected by declaration of fishermen on the basis of Article 10 of RD 347/2011 (<https://www.boe.es/eli/es/rd/2011/03/11/347>).

For other species see table 2.4 and annex 1.1

(max 900 words per region)

Deviations from the work plan

No deviations.

Actions to avoid deviations

Not applicable.

(max. 900 words per region)

Text Box 2.5: Sampling plan description for biological data

North Sea and Eastern Arctic. (Eastern Arctic, Norwegian Sea and Barents Sea (ICES areas 1, 2, FAO area 27))

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight additional information on sampling schemes and sampling frames that the Member State considers useful to understand the sampling design planned for the region and the implementation year(s).

Additional information on sampling schemes

No additional information

Additional description on sampling frames

No additional information

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)

Deviations from the work plan

Frame identifier: **OTB_DEF_>=120**

Due to a misunderstanding in the assignment of the observer to the vessel, the scheduled trip was carried out by AZTI and not by the IEO.

Frame identifier: **OTM_DEF_100-119.**

The deviations are related to the non-activity of the Spanish fleet targeting *Sebastes mentella* in this area and are unavoidable.

Actions to avoid deviations

In the future, greater care will be taken to avoid this type of misunderstanding, which, it must be said, has never occurred before.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.5: Sampling plan description for biological data

North-East Atlantic. (North-East Atlantic and Western Channel (ICES areas 5, 6, 7 (excl. 7d), 8, 9, 10, 12 and 14, FAO area 27))

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight additional information on sampling schemes and sampling frames that the Member State considers useful to understand the sampling design planned for the region and the implementation year(s).

Additional information on sampling schemes

No additional information

Additional description on sampling frames

No additional information

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)

Deviations from the work plan

Sampling scheme identifier: ESP-IEO_P5_AtSea

All deviations explained in tables.

The deviations are related to the non-activity of the Spanish fleet targeting *Sebastes mentella* in Irminger Sea (Frame: **OTM_DEF_100-119**), and targeting deep water species in Hatton bank (Frame: **OTB_DWS_100-129**) in the year 2022. None of them can be avoided.

Sampling scheme identifier ESP_IEO_P1_OnShore

Frame identifier **IEO_P1_M_CN, IEO_P1_M_GC, IEO_P1_M_NEAFC**

In the sampling scheme "ESP_IEO_P1_OnShore", a mistake was detected in the WP, in the columns "Average number of PSUs during the reference period" and "Planned number of PSUs". The correct values are in green:

Sampling frame identifier	Average number of PSUs during the reference period	Average number of PSUs during the reference period	Planned number of PSUs	Planned number of PSUs
	WRONG	RIGHT	WRONG	RIGHT
IEO_P1_M_CN	4437	4437	884	1124
IEO_P1_M_GC	1305	1305	260	96
IEO_P1_M_NEAFC	1566	762	312	132
IEO_P1_M_Unsampled	28971	13054	0	0

According to the corrected reference number of PSUs and the corrected planned number of PSUs, the Achieved % of PSUs in 2022 becomes as follows.

Sampling frame identifier	Average number of PSUs during the reference	Planned number of PSUs	Total number of PSUs in the implementa	Achieved number of PSUs in the implement	Achieved % of PSUs	Divergence (%) of implementation year vs.
---------------------------	---	------------------------	--	--	--------------------	---

	period		tion year	ation year		reference period
IEO_P1_M_CN	4437	1124	4725	734	65	106
IEO_P1_M_GC	1305	96	978	161	168	89
IEO_P1_M_NEAFC	762	132	722	135	102	95
IEO_P1_M_Unsampled	13054	0	11628	0	NA	89

Deviations in reference and planned PSU for **IEO_P1_M_CN** are related to an error in the transmission of values to the original work plan. However, there was also an implementation error during the year, since the subcontracted company considered the trips (which are SSU) as PSU (which should be visit: port-day).

Deviations in **IEO_P1_M_GC** are related to tests carried out to expand and improve the efficiency of the sampling program on-shore.

Sampling scheme identifier: ESP_IEO_P1_AtSea

All deviations explained in tables.

Actions to avoid deviations

ESP_IEO_P1_OnShore

In order to avoid the logistical problems of the subcontracted company, the IEO team in charge of coordinating the sampling will maintain closer contact with the company to solve logistical problems and adapt to the real needs of the sampling programme.

Work is underway with the fleet to reduce the refusal rate.

ESP_IEO_P1_AtSea

Work is underway with the fleet to reduce the refusal rate on-board and trying to get more stable teams of scientific observers.

The stratum IEO_P1_S_GC_PS of the at-sea sampling programme is being moved to the on-shore sampling programme, where more sampled trips and less sampling refusals are being obtained.

Changes in fleet activity are not predictable, therefore no action is required

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.5: Sampling plan description for biological data

Mediterranean Sea and Black Sea (GFCM GSA 1-29, FAO area 37)

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight additional information on sampling schemes and sampling frames that the Member State considers useful to understand the sampling design planned for the region and the implementation year(s).

Additional information on sampling schemes

No additional information

<p>Additional description on sampling frames</p> <p>No additional information</p> <p>(One text box (max. 1 000 words) per region/RFMO/RFO/IO)</p>
<p>Deviations from the work plan</p> <p>Results lower than planning:</p> <p>The GSA02, the Alboran Island, is sampled in the fishing season (from May to October). Bad weather conditions prevented the completion of the sampling of OTB_DWS_02 strata in 2022 (see AR comments in Table 2.5).</p> <p>In some cases, it was not possible to reach the number of trips planned to be sampled during 2022 due to the decision of fishermen to change the target species of the trip (sampling frame OTB_DEF_Mall05 and OTB_DEF_Men05) (see AR comments in Table 2.5).</p> <p>Part of the trawlers from the reference ports in Southern GSA06 have changed their target species (from <i>Aristeus antennatus</i> to <i>Parapenaeus longirostris</i>, very abundant), so that the onboard sampling on the strata OTB_DWS_South06 was more difficult (see AR comments in Table 2.5).</p> <p>In addition, the sampling frame PS_SPF_06 was poorly sampled due to the low landings of purse seines targeting small pelagic species in Catalonia.</p> <p>In Catalonia, the observers had problems to buy the samples, and this situation prevented the achievement of the objectives (see AR comments in Table 2.5 for sampling frames PS_SPF06_stock and LLS_DEF06_stock).</p> <p>On the other hand, in the sampling frames OTB_DEF_North06, PS_SPF_06 and GTR_DEF05_stock, the sampling was reduced but the results were sufficient to estimate the volume and length of the catches (see AR comments in 2.5).</p> <p>Finally, in GSA07, the observers often found difficulties to get on board (see AR comments in Table 2.5)</p> <p>Results higher than planning:</p> <p>In PS_SPF_01, more sampling than planned was carried out in order to improve the quality in calculation of the length distributions of small pelagics (see AR comments in Table 2.5). The improved length data will be used in the assessment of <i>Engraulis encrasicolus</i> and <i>Sardina pilchardus</i> in GSA01.</p> <p>Actions to avoid deviations</p> <p>Work is being done to minimize refusals, but collaboration is sometimes difficult to achieve. The limited space available on board in some fleets is also a problem with a difficult solution.</p> <p>When unexpected problems occur (temporary fishing closures, fisherman's decisions, bad weather, etc.) the sampling team redistributes the sampling effort. On the other hand, sampling effort is increased when the quality of the length distributions is not considered as good as it should be.</p> <p>(One text box of max. 1 000 words per region/RFMO/RFO/IO)</p>

Text Box 2.5: Sampling plan description for biological data

The outermost regions. (EU waters around Canary islands (FAO area 34.1.2))

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight additional information on sampling schemes and sampling frames that the Member State considers useful to understand the sampling design planned for the region and the implementation year(s).

Additional information on sampling schemes

No additional information

Additional description on sampling frames

No additional information

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)

Deviations from the work plan

All deviations are explained in tables. Most of deviations are related to the low activity of the fleets in some fishing areas and to the refusals. None of them can be avoided.

Actions to avoid deviations

Regarding the difficulties in developing scientific observation on board due to logistical problems, the team in charge of coordinating the embarkments will intensify the contacts with the ship owners to try to overcome the obstacles.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.5: Sampling plan description for biological data

Other regions. (North-West Atlantic (FAO area 21). NAFO)

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight additional information on sampling schemes and sampling frames that the Member State considers useful to understand the sampling design planned for the region and the implementation year(s).

Additional information on sampling schemes

No additional information

Additional description on sampling frames

The out-of-frame parts of the population in all NAFO regions are =0, so no unsampled frames have been included in the table 2.5 for this RFMO.

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)

Deviations from the work plan

No deviations.

Actions to avoid deviations

Not applicable

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.5: Sampling plan description for biological data

Other regions. (Eastern Central Atlantic (FAO area 34). CECAF)

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight additional information on sampling schemes and sampling frames that the Member State considers useful to understand the sampling design planned for the region and the implementation year(s).

Additional information on sampling schemes

ESP-IEO_P3_AtSea_Africa

Sampling plans are highly conditioned by both the signing of new agreements (SFPAs) and their Protocols, which means that they are variable, not stable over time.

The EU currently has Sustainable Fisheries Partnership Agreements (SFPAs) for mixed fisheries (including demersal and/or small pelagic fisheries) with Morocco, Mauritania, Senegal, The Gambia and Guinea-Bissau. It should be noted that the EU-Morocco SFPA expired in July 2018, being the latest SFPA signed in 2019 and therefore, no fishery during almost one year between one agreement and the other. The fishery in Guinea-Bissau was ceased in November 2017, when the Protocol expired, and resumed in July 2019, after the signature of the current Protocol. In Senegal, the current SFPA (2014) and their two Protocols (2014 and 2019) included the possibility of a deep-sea trawl fishery targeting black hakes, that had been inactive since 2006. Also, the ratification of the EU SFPA with The Gambia in 2020 meant the reactivation of a fishing ground for EU black-hake trawlers that had not been accessible under an agreement since 1996. The fisheries in Mauritania are currently developed through an extension of the latest SFPA, while the negotiations for a new SFPA are still in place.

For more information about the SFPAs see the following EU web:

https://ec.europa.eu/oceans-and-fisheries/fisheries/international-agreements/sustainable-fisheries-partnership-agreements-sfpas_en

Additional description on sampling frames

ESP-IEO_P3_AtSea_Africa - OTB_CRU_>=40_0_0

The observation programme on board shrimp vessels operating in Mauritania and Guinea-Bissau alternates both fishing grounds on an annual basis.

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)

Deviations from the work plan

The renewal of agreements with Morocco, Guinea Bissau, Senegal and The Gambia was a highlight of the past year. The renewed of the EU-Morocco fisheries agreement will be in force until 17 July 2023. The renewed EU-Guinea Bissau fisheries agreement will be in force until June 2024. The EU-Senegal fisheries agreement, which includes a category of experimental trawlers targeting black hake, will be in force until the end of 2024. The last fisheries agreement EU-Mauritania was signed in 2021 for six years.

Although fishing activities in NW Africa was conducted regularly during 2022, sampling actions were hindered by different issues, depending on the fishing ground or métier. Under these circumstances, only some métiers/stocks could be sampled at low levels. The activity of the purse seine fleet (PS_SPF_0_0_0) was limited to a few months in the period from January to May due to the price of diesel oil which forced the sector to fish in Spanish waters and left the licences of the European Agreement almost unused. This resulted in a low achievement in

sampling.

Regarding freezer shrimp bottom trawlers (OTB_CRU_>=40_0_0), the deviations were due to the logistical problems of the on-board observer program which only allowed sampling on 3 out of 4 trips.

Regarding at-sea sampling, the trips in the hake trawl fleet (OTB_DEF>=70) were fewer than planned due to the difficulties associated with this fleet and the embarkments in African ports. Finally, 6 out of the 16 planned trips were carried out, 5 in the fresh fleet (planned one per month) and 1 in the freezer fleet (planned one per quarter).

Actions to avoid deviations

Deviations due to changes in the strategy followed by the fleet are all external circumstances related to the fishing activity and no actions can be taken by us to avoid the deviation.

Deviations due to the logistical problems of the on-board observer program are difficult to resolve, but the IEO team will continue to improve coordination with the sector involved.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.5: Sampling plan description for biological data

**Other regions. (Atlantic Ocean and adjacent seas (FAO areas 21, 27, 31, 37, 41, 47, 34, 48).
ICCAT)**

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight additional information on sampling schemes and sampling frames that the Member State considers useful to understand the sampling design planned for the region and the implementation year(s).

Additional information on sampling schemes

No additional information

Additional description on sampling frames

In tuna fisheries the out-of-frame parts of the population in all ICCAT regions are =0 in all sampling schemes, so no unsampled frames have been included in the table 2.5 for this region/RFMO.

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)

Deviations from the work plan

Desaggregated by sampling frame identifier

LL_MED-AtSea: 71% of the planned number of PSUs was achieved. This is partly due to the recovery plan for the Mediterranean stock of *Thunnus alalunga*. This recovery plan drastically reduces the allowable landings of this species and therefore the number of PSUs in the year (81% of the reference period). We have compensated for this lack of information by increasing the LL_MED_Port programme, achieving a 185% over the planned number of PSU.

LL_MED_Port: Sampling coverage was above 150% in order to compensate for the undersampling of LL_MED_AtSea. In addition, the sampling coverage was increased due to ICCAT requirements in the context of the recovery plan for Mediterranean swordfish.

BB_BFT_Strait_Port and **HAND_BFT_Strait_Port:** sampling coverage was above 150% due to the ICCAT requirements for species under recovery plans, in this case BFT.

BB_BFT_CantabrianSea_IEO_Port: No activity during 2022. They sold the quota.

LLSWO_ATL_Port Although we didn't reach the planned number of PSUs, we achieved a sampling coverage very close to the planned one. The sampling carried out throughout the year was sufficient to obtain a good quality length distribution of the catches.

BB_MSP_Canary_Port Although we didn't reach the planned number of PSU (89%), we achieved a sampling coverage very close to the planned one.

BB_TROP_Dakar_Port: there was a significant decrease in the activity of the bait boat fishery in 2022. The number of vessels operating in this metier was reduced from 7 to 3. In addition, the vessels started to operate in July 2022 due to problems with fishing licences.

PS_ATL_Port The reason for the decrease in the number of samples in the purse seine fishery is a reduction in the number of trips made, together with the inactivity of one of the vessels. Finally, 10% of the landings were made in other ports without a sampling team.

In addition to the sampled trips reported in Table 2.5, 6 trips were carried out by AZTI on board of purse seiners targeting tropical tunas in the Atlantic Ocean.

BB_ALB_CantabrianSea_IEO_Port: Figures were not available at the time this report was finalized.

TROL_ALB_CantabrianSea_IEO_Port: Figures were not available at the time this report was finalized.

Actions to avoid deviations

It is hoped that, by 2023, the coverage of the LL_MED_AtSea sampling programme will be increased by improving the cooperation with the fleet and by increasing the coverage of the longline fishery targeting swordfish.

BB_MSP_Dakar_Port: The sampling plan needs to be revised for the future and adapted to the new number of bait boats.

PS_ATL_Port: The sampling plan needs to be revised for the future and adapted to the new number of purse seine vessels, as the number of vessels has been reduced from 10 to 8 in 2023.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.5: Sampling plan description for biological data

Other regions. (Indian Ocean (FAO area 51 and 57). IOTC)

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight additional information on sampling schemes and sampling frames that the Member State considers useful to understand the sampling design planned for the region and the implementation year(s).

Additional information on sampling schemes

No additional information

Additional description on sampling frames

In tuna fisheries the out-of-frame parts of the population in all IOTC regions are =0 in all sampling schemes, so no unsampled frames have been included in the table 2.5 for this region/RFMO.

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)

Deviations from the work plan

LLSWO_IND_AtSea: the sampling coverage was 200% of PSU because we had observed two vessels whose activity straddled between years.

In addition to the sampled trips reported in Table 2.5, 3 trips were carried out by AZTI on board of purse seiners targeting tropical tunas in the Atlantic Ocean.

Actions to avoid deviations

No actions

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.5: Sampling plan description for biological data

Other regions. (Western Central Pacific (FAO area 71). WCPFC)

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight additional information on sampling schemes and sampling frames that the Member State considers useful to understand the sampling design planned for the region and the implementation year(s).

Additional information on sampling schemes

No additional information

Additional description on sampling frames

In tuna fisheries the out-of-frame parts of the population in all WCPFC regions are =0 in all sampling schemes, so no unsampled frames have been included in the table 2.5 for this region/RFMO.

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)

Deviations from the work plan

PS_WPAC_AtSea_IEO: The number of vessels did not increase from 3 to 4 units in 2022 as expected. Therefore, the number of PSUs did not increase accordingly. In 2023, the number of vessels operating in the Pacific Ocean is 4.

The side-effects of COVID, including industry concerns about the increased likelihood of COVID infection (observer coverage on these vessels is voluntary, as there is a mandatory 100% observer coverage under the regional observer programme) and the closure of many ports in the Western and Central Pacific, prevented the deployment of observers in the WCPFC area.

Actions to avoid deviations

PS_WPAC_AtSea_IEO: in 2023, the four vessels expected in 2022 are now operating in Pacific waters. Ports in the WCPFC area are gradually opening and it is expected that observer coverage in the WCPFC area can be resumed.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.5: Sampling plan description for biological data

Other regions. (Eastern Central Pacific (FAO area 77 and 87). IATTC)

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight additional information on sampling schemes and sampling frames that the Member State considers useful to understand the sampling design planned for the region and the implementation year(s).

Additional information on sampling schemes

No additional information

Additional description on sampling frames

In tuna fisheries the out-of-frame parts of the population in all IATTC regions are =0 in all sampling schemes, so no unsampled frames have been included in the table 2.5 for this region/RFMO.

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)

Deviations from the work plan

PS_EPAC_AtSea_IEO: The number of vessels did not increase from 3 to 4 units in 2022, as expected. Therefore, the number of PSUs did not increase accordingly. In 2023, the number of vessels operating in the Pacific Ocean is 4.

LLSWO_EPAC_AtSea: the sampling coverage was 200% of PSU because we had observed two vessels whose activity straddled between years.

Actions to avoid deviations

PS_EPAC_AtSea_IEO: in 2023, the four vessels expected in 2022 are now operating in the waters of the Pacific Ocean.

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 2.5: Sampling plan description for biological data

Other regions. (Antarctic and Southern Indian Ocean (FAO area 48, 58 and 88). CCAMLR)

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight additional information on sampling schemes and sampling frames that the Member State considers useful to understand the sampling design planned for the region and the implementation year(s).

Additional information on sampling schemes

No additional information

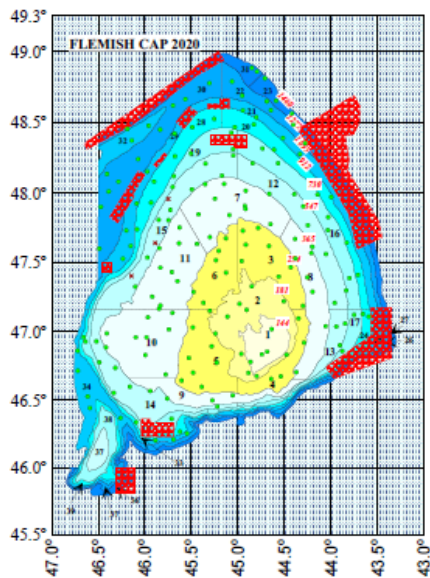
<p>Additional description on sampling frames</p> <p>No additional information</p> <p>(One text box (max. 1 000 words) per region/RFMO/RFO/IO)</p>
<p>Deviations from the work plan</p> <p>All deviations are explained in tables.</p> <p>Actions to avoid deviations</p> <p>Not applicable</p> <p>(One text box of max. 1 000 words per region/RFMO/RFO/IO)</p>

Text Box 2.6: Research surveys at sea

FLEMISH CAP GROUND FISH SURVEY

<p>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.</p>
<p>Name of the research survey: FLEMISH CAP GROUND FISH SURVEY</p> <p>Acronym: FCGS</p> <p>National Name of the research survey: Flemish Cap</p> <p>1. Objectives of the survey</p> <p>The main objectives of the survey are the estimation of abundance and biomass index of the target species, as well as the knowledge of their population demographic structure and the oceanographic conditions on the Flemish Cap Bank (NAFO Division 3M). To this end the following tasks are implemented:</p> <ul style="list-style-type: none"> • Detailed length distribution and biological sampling of the catch for each target species, recording length, weight, sex, maturity and the collection of otoliths and gonads. For other species only length and length-weight sampling are performed. • Observation of the oceanographic conditions on the Bank. The collection of oceanographic data (temperature and salinity) is carried out mainly through the CTD profiling; with a grid-pattern design, placing CTD stations separated 15 nautical miles, both in latitude and longitude, with the aim of covering the whole Bank. • Stomach sampling of most abundant species, to be done every two years (even years). • Collection of invertebrates data, with special attention to corals and sponges, to allow identification of potentially vulnerable marine ecosystems. • Collection of marine litter data classified in different items or codes, according to their characteristics. <p>Target species: Cod (<i>Gadus morhua</i>), Redfish (<i>Sebastes mentella</i>, <i>S. fasciatus</i> and <i>S. norvegicus</i>), American plaice (<i>Hippoglossoides platessoides</i>), Greenland halibut (<i>Reinhardtius hippoglossoides</i>), Roughhead grenadier (<i>Macrourus berglax</i>) and Northern shrimp (<i>Pandalus borealis</i>)</p> <p>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.</p> <p>Manual: http://archive.nafo.int/open/studies/s46/S46.pdf</p>

Bottom trawl fishing hauls that lasting for 30 minutes and are distributed using a stratified random sampling scheme. The trawling gear used is the Lofoten (NAFO 1990). Temperature and salinity profiles are taken with a CTD according to a predefined square grid. The survey starts in the second half of June, and needs 35 days at sea.



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

Participants: Spain (IEO-CSIC and IIM-CSIC) and Portugal (IPMA)

Research vessel: R/V Vizconde de Eza.

Relevant international planning group: Portuguese-Spanish surveys in Flemish Cap - coordination meeting for the survey (FCCM)

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

Spain contributes with vessel, staff and samples analysis in laboratory and Portugal contributes with staff and samples analysis in laboratory.

There is not signed agreement about task sharing.

(max 450 words per survey)

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

Summary Report of the FLEMISH CAP International Survey COORDINATION MEETING (FCCM) 2022

<http://www.repositorio.ieo.es/e-ieo/handle/10508/16090>

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

Survey results, including abundance indices and length distributions of the main commercial species and age distributions for cod, redfish, American plaice, roughhead grenadier and Greenland halibut, provide independent information about the stock status of commercial fisheries.

The results are provided regularly to the NAFO Scientific Council, and they are also the base for many later studies.

These results are used by the NAFO SC to make an assessment on the state of the resources, which is the key tool for the NAFO Fisheries Commission to take the appropriate management measures.

Results are used in the assessment of the following stocks: Cod (Div. 3M), American plaice (Div. 3M), Redfish (Div. 3M), Northern shrimp (Div. 3M), Greenland halibut (SA2 and Div. 3KLMNO), Roughhead grenadier (SA2+3).

Samples for histological assessment of sexual maturity of cod, redfish, American plaice were taken (see table 2.2), and also stomachs

samples of 10 species were taken to study their trophic relationships (see Table 4.1)

The results of the survey have contributed to the preliminary identification of vulnerable marine ecosystems (VME). The data was made available to the NAFO WGESA to improve mapping of VME species in the NAFO Regulatory Area (Divs. 3LMNO). As a result of the 2022 Data call: "new information on Vulnerable Marine Ecosystems (VMEs) in the North Atlantic from ICES member countries for the Joint ICES/NAFO Working Group on Deep-water Ecology (WGDEC)", VME indicators data from the 2021 EU-NAFO surveys have been uploaded to the ICES VME database.

A map of the sampling hauls (Figure 1) is included in Annex 2.6.-Research surveys Maps.

7. Extended comments

The survey FCGS 2022, scheduled from 4-7-2022 to 6-8-2022 had to be interrupted for 8 days (July 09-16) due to an engine breakdown in the vessel that had to be repaired in St John's (Canada), which meant a delayed of 8 days. Besides, logistical reasons caused the vessel to re-enter in St. John's on August 4, remaining at port one day more. All these force majeure inconveniences, caused the FCGS survey had to be extended until August 25, out of the official time period.

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

3LNO GROUND FISH SURVEY. (1st part -3NO)

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: **3LNO GROUND FISH SURVEY** (1st part -3NO)

Acronym: PLATUXA

National Name of the research survey: **Platuxa**

1. Objectives of the survey

The main objectives of the survey are the estimation of abundance and biomass index of the target species, as well as the knowledge of their population demographic structure and the oceanographic conditions on the Grand Bank (NAFO Division 3NO). To this end the following tasks are implemented:

- Detailed length distribution and biological sampling of the catch for each target species, recording length, weight, sex, maturity and the collection of otoliths and gonads. For other species only length and length-weight sampling are performed.
- Collection of oceanographic data from the area using a CTD at the end of each fishing-haul.
- Collection of catch data (weight and number) of invertebrates with special attention to corals and sponges, to allow identification of potentially vulnerable marine ecosystems.
- Sampling biennial of stomach contents of the main species to continue the study of their trophic relationships (even years).
- Collection of marine litter data classified in different items or codes, according to their characteristics.

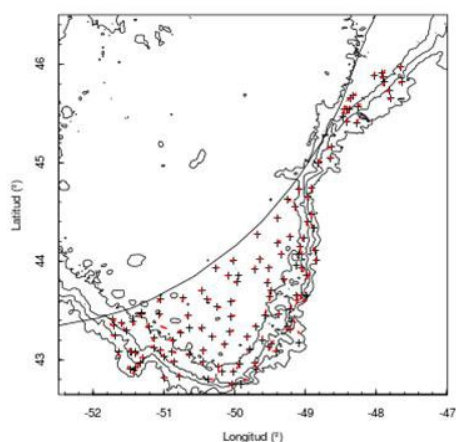
Target species: Cod (*Gadus morhua*), Redfish (*Sebastes spp.*), American plaice (*Hippoglossoides platessoides*), Yellowtail flounder (*Limanda ferruginea*), Witch flounder (*Glyptocephalus cynoglossus*), Black dogfish (*Centroscyllium fabricii*), Thorny skate (*Amblyraja radiata*); White hake (*Urophycis tenuis*), Greenland halibut (*Reinhardtius hippoglossoides*), Northern shrimp (*Pandalus borealis*), Roughhead grenadier (*Macrourus berglax*) and Shortfinned squid (*Illex illecebrosus*).

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.

Manual: http://www.repositorio.ieo.es/e-ieo/bitstream/handle/10508/632/PROTOCOLO%20CAMPAC3%91A%203LNO%20GROUND FISH%20SURVEY_v2-

[revisi%C3%B3n%20enero%202013%20\(2\).pdf?sequence=9](#)

Stratified random sampling scheme, diurnal Bottom trawl fishing hauls from 6 am to 9.30 pm with an average hauling time of 30 minutes. The trawling gear used is the 'Campelen 1800'. Hydrographic profiles by haul are taken with a CTD. In NAFO Division 3NO there are planned 30 days at sea including sailing days.



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

Spain is the only participant. The vessel is RV Vizconde de Eza.

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

Not applicable.

(max 450 words per survey)

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

Survey report of 2022 is not available. The last one is Platuxa (1st part, 3NO) 2021 Survey Report

<https://digital.csic.es/handle/10261/307055>

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

Survey results, including abundance indices and length distributions of the main commercial species and age distributions for cod, American plaice, roughhead grenadier and Greenland halibut, provide independent information about the stock status of commercial fisheries.

The results are provided regularly to the NAFO Scientific Council, and they are also the base for many later studies.

These results are used by the NAFO SC to make an assessment on the state of the resources, which is the key tool for the NAFO Fisheries Commission to take the appropriate management measures.

Results are used in the assessment of the following stocks: Northern shrimp 3LNO, Greenland halibut 3LNO, American plaice 3LNO, Atlantic cod 3NO, Yellowtail flounder 3LNO, Redfish 3LN 3O, Witch flounder 3NO, Roughhead grenadier, Thorny skate 3LNO and White hake 3NO.

Samples for histological assessment of sexual maturity of American plaice were taken (see table 2.2) and stomachs samples of 11 species were taken for the study of their trophic relationships (see Table 4.1)

The results of the survey have contributed to the preliminary identification of vulnerable marine ecosystems (VME). The data was made available to the NAFO WGESA to improve mapping of VME species in the NAFO Regulatory Area (Divs. 3LMNO). As a result of the 2022 Data call: "new information on Vulnerable Marine Ecosystems (VMEs) in the North Atlantic from ICES member countries for the Joint ICES/NAFO Working Group on Deep-water Ecology (WGDEC)", VME indicators data from the 2021 EU-NAFO surveys have been uploaded to the ICES VME database.

A map of the sampling hauls (Figure 2) is included in Annex 2.6.-Research surveys Maps.

7. Extended comments

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

3LNO GROUND FISH SURVEY. (2nd part -3L)

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: **3LNO GROUND FISH SURVEY** (2nd part -3L)

Acronym: PLATUXA

National Name of the research survey: **Fletán Negro 3L**

1. Objectives of the survey

The main objectives of the survey are the estimation of abundance and biomass index of the target species, as well as the knowledge of their population demographic structure and the oceanographic conditions on the Grand Bank (NAFO Division 3L). To this end the following tasks were implemented:

- Detailed length distribution and biological sampling of the catch for each target species, recording length, weight, sex, and the collection of otoliths and gonads. For other species only length and length-weight sampling were performed.
- Collection of oceanographic data data from the area using a CTD at the end of each fishing-haul.
- Collection of catch data (weight and number) of invertebrates with special attention to corals and sponges, to allow identification of potentially vulnerable marine ecosystems.
- Sampling biennial of stomach contents of the main species to continue the study of their trophic relationships (even years).
- Collection of marine litter data classified in different Items or codes, according to their characteristics.

Target species: Cod (*Gadus morhua*), Redfish (*Sebastes spp.*), American plaice (*Hippoglossoides platessoides*), Witch flounder (*Glyptocephalus cynoglossus*), Thorny skate (*Amblyraja radiata*), Greenland halibut (*Reinhardtius hippoglossoides*), Northern shrimp (*Pandalus borealis*), Roughhead grenadier (*Macrourus berglax*) and Black dogfish (*Centroscyllium fabricii*)

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.

Manual: [http://www.repositorio.ieo.es/e-
ieo/bitstream/handle/10508/632/PROTOCOLO%20CAMPAC3%91A%203LNO%20GROUND FISH%20SURVEY_v2-
revisi%C3%B3n%20enero%202013%20\(2\).pdf?sequence=9](http://www.repositorio.ieo.es/e-
ieo/bitstream/handle/10508/632/PROTOCOLO%20CAMPAC3%91A%203LNO%20GROUND FISH%20SURVEY_v2-
revisi%C3%B3n%20enero%202013%20(2).pdf?sequence=9)

Stratified random sampling scheme, diurnal Bottom trawl fishing hauls from 6 am to 9.30 pm with an average hauling time of 30 minutes. The trawling gear used is the 'Campelen 1800'. Hydrographic profiles by haul are taken with a CTD. In NAFO Division 3L there are planned 28 days at sea including sailing days.

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

Spain is the only participant. The vessel is RV Vizconde de Eza.

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

Not applicable.
(max 450 words per survey)

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

The 2nd. part of 3LNO Groundfish survey was not carried out in 2022.

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

7. Extended comments

The 2nd part of 3LNO Groundfish survey; (National name: Fletán Negro 3L), scheduled immediately after FCGS survey with 1-day inbetween to change team and crew in St. John's-Canada, had to be cancelled due to lack of days at sea available produced by the delays in the survey FCGS 2022.

The survey FCGS 2022 had to be interrupted for 8 days (July 09-16) due to an engine breakdown in the vessel that had to be repaired in St John's (Canada), which meant a delayed of 8 days. Besides, logistical reasons caused the vessel to re-enter in St. John's on August 4, remaining at port one day more. All these force majeure inconveniences, caused the FCGS survey had to be extended until August 25.

So, the 2nd part of 3LNO Groundfish survey had to be cancelled as the vessel time availability end at the end of august.

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Western IBTS 4th quarter (including porcupine survey). (8c y 9a north)

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: **Western IBTS 4th quarter (including porcupine survey)**. (8c y 9a north)

Acronym: IBTS_Q4

National Name of the research survey: **Demersales**

Identifier in assessment working groups: **WIBTS-SPNSGFS-Q4-**

1. Objectives of the survey

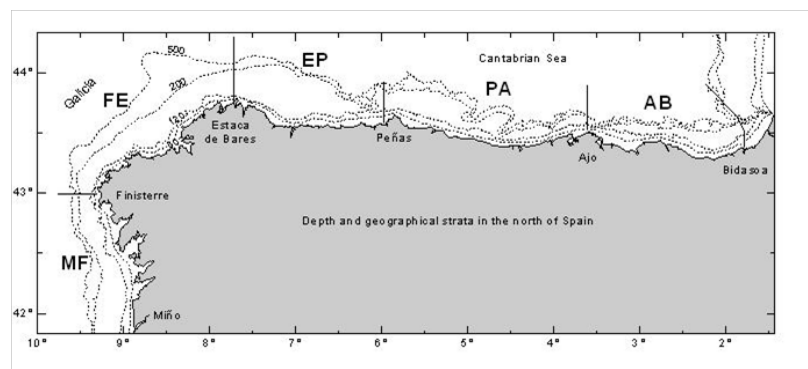
- Estimation of abundance indices by age of megrim (*Lepidorhombus boscii* and *L. whiffiagonis*), blue whiting, horse mackerel and mackerel, as well as indices by size class of hake and monkfish (*Lophius budegassa* and *L. piscatorius*),
- Estimation of the recruitment strength of the species mentioned, mainly hake, monkfish and megrims.
- Estimation of abundance indices (number and biomass) of other demersal species of fishing interest (Norway lobster, sparids, etc), as well as the fauna associated to them.
- Determination of geographical and bathymetric distribution of the different species.
- Obtaining the length distributions of all species of fish, Norway lobster and main cephalopods in the catches.
- Collecting biological data of the main commercial species: maturity stages, sex ratio, etc...
- Getting oceanographic data.

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.

Manual for the International Bottom Trawl Surveys

[https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20\(SISP\)/SISP%2010%20%20E2%80%93%20Revision%202011_Manual%20for%20the%20North%20Sea%20International%20Bottom%20Trawl%20Surveys.pdf](https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%2010%20%20E2%80%93%20Revision%202011_Manual%20for%20the%20North%20Sea%20International%20Bottom%20Trawl%20Surveys.pdf)

Stratified random sampling based on 30 minutes bottom trawl hauls during day light, getting abundance indices stratified by haul. Sampling for abundance indices covers the depths between 70 and 500 m and is stratified random, the hauls are allocated in 15 strata determined by combining 3 depth strata (70-120m, 121-200 m and 201-500m) and five geographical sectors. Hauls allocation is proportional to the area of each stratum.



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

UK-Scotland/Scotia; UK-North Ireland/Corystes; Ireland/Celtic Explorer; France/Thalassa; Spain/Miguel Oliver; Portugal/Mar Portugal

Relevant international planning group: IBTSWG-International Bottom Trawl survey Working Group of ICES

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

Individual tasks to the survey participants are allocated by the responsible ICES survey planning group. Each participating country is responsible for the activities conducted on its national part of the international survey. There is no particular cost sharing agreement in place for this survey.

(max 450 words per survey)

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

ICES (2022): International Bottom Trawl Survey Working Group (IBTSWG). ICES Scientific Reports. Report. <https://doi.org/10.17895/ices.pub.20502828.v1>

https://ices-library.figshare.com/articles/report/International_Bottom_Trawl_Survey_Working_Group_IBTSWG_/20502828

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

Data obtained are used for calibration of assessment models of groundfish on the South Platform within the ICES WGBIE, especially the southern stock of hake (*Merluccius merluccius*), megrims (*Lepidorhombus whiffiagonis* y *L. boscii*), anglers (*Lophius budegassa*, and *L. piscatorius*), and Norway lobster (*Nephrops norvegicus*) on the Iberian continental shelf. Moreover, survey data are provided to WGDEEP of assessment of deep species (*Phycis blennoides*, *Molva macrophthalma*, *Helicolenus dactylopterus*, ...), to WGEF of assessment of elasmobranch species (*Galeus melastomus*, *Scyliorhinus canicula*, *Etmopterus spinax*, rays...) and to WGWIDE to provide information for the assessment of blue whiting (*Micromessistius poutassou*), North Eastern Atlantic mackerel (*Scomber scombrus*), horse mackerel (*Trachurus trachurus*) and boarfish (*Capros aper*). They are also used in the calibration of assessments of the southern stocks of horse mackerel on 9a (*Trachurus* spp.), anchovy (*Engraulis encrasicolus*) and mackerel (*Scomber* spp.) to WGHANSA.

A map of the sampling hauls carried out and CTD stations performed (Figure 3 and 4) is included in Annex 2.6.

These surveys are coordinated at IBTSWG group and all that group's recommendations are followed.

7. Extended comments

There was no time deviation from the initial planning in this survey.

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Western IBTS 4th quarter (including porcupine survey). (9a south)

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: **Western IBTS 4th quarter (including porcupine survey). (9a south)**

Acronym: IBTS_Q4

National Name of the research survey: **Arsa-otoño**

1. Objectives of the survey

- -Estimate distribution and relative abundance the main commercial species and provide recruitment indices.
- -Monitor changes in the stocks of commercial fish species independently of commercial fisheries data.
- -Monitor the distribution and relative abundance of all fish and invertebrates species.
- -Collecting data for the determination of biological parameters for selected species;
- -Collecting hydrographical and environmental information.

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.

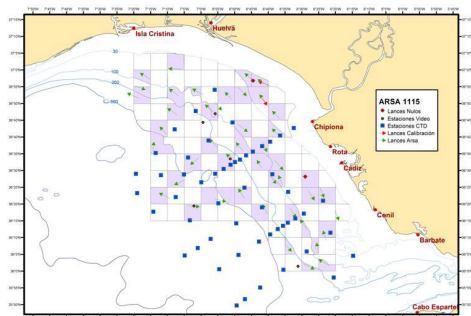
Manual for the International Bottom Trawl Surveys

[https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20\(SISP\)/SISP%2010%20%E2%80%9320Revisio](https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%2010%20%E2%80%9320Revisio)

The whole area (7224 km²) has been separated into five depth strata (15-30, 31-100, 101-200, 201-500 and 501-800 m). The sampling design is random stratified with proportional allocation with a total of 42 fishing stations and swept-area method.

Length distribution of all fish and main species of crustacean and cephalopods are collected and biological parameters are obtained in the most important commercial species

Temperature and salinity are collected during each tow with a CTD attached to the gear. A CTD by haul will be carried out in the survey area.



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

UK-Scotland/Scotia; UK-North Ireland/Corystes; Ireland/Celtic Explorer; France/Thalassa; Spain/Miguel Oliver; Portugal/Mar Portugal.

Relevant international planning group: IBTSWG-International Bottom Trawl survey Working Group of ICES

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

Individual tasks to the survey participants are allocated by the responsible ICES survey planning group. Each participating country is responsible for the activities conducted on its national part of the international survey. There is no particular cost sharing agreement in place for this survey.

(max 450 words per survey)

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

Relevant international planning group: IBTSWG-International Bottom Trawl survey Working Group of ICES

https://ices-library.figshare.com/articles/report/International_Bottom_Trawl_Survey_Working_Group_IBTSWG_/20502828

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

Data obtained are used for assessment models of groundfish on the South Platform within the ICES WGBIE, especially the southern stock of hake (*Merluccius merluccius*), and Norway lobster (*Nephrops norvegicus*) on the Iberian continental shelf. Moreover, survey data are provided to WGCEPH of cephalopods species like octopus (*Octopus vulgaris*), cuttlefish (*Sepia officinalis* and squid (*Loligo vulgaris* and *Loligo forbesii*), to WGEF of assessment of elasmobranch species (*Galeus melastomus*, *Scyliorhinus canicula*, *Etmopterus spinax*, rays...) and to WGWIDE to provide information for the assessment of blue whiting (*Micromessistius poutassou*), North Eastern Atlantic mackerel (*Scomber scombrus*), horse mackerel (*Trachurus trachurus*) and boarfish (*Capros aper*). They are also used in the calibration of assessments of the southern stocks of horse mackerel on 9a (*Trachurus* spp.) anchovy (*Engraulis encrasicolus*) and mackerel (*Scomber* spp.) to WGHANSA.

A map of the sampling hauls carried out (Figure 5) is included in Annex 2.6.

7. Extended comments

The number of valid hauls was 45 valid (no deviations), 154 species of fish, 42 of crustacean and 60 of mollusca were recorded during the survey. Length distribution of all fish and main species of crustacean and cephalopods were recorder. Biological samples were studied for the most important species. 45 CTD casts were carried out in the survey area.

The works finished one day before the scheduled date

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Western IBTS 4th quarter (including porcupine survey).(7ck)

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: **Western IBTS 4th quarter (including porcupine survey).** (7ck)

Acronym: IBTS_Q4

National Name of the research survey: **Porcupine**

Identifier in assessment working groups: **WIBTS-SPPGFS-Q3 / SP-PORC**

1. Objectives of the survey

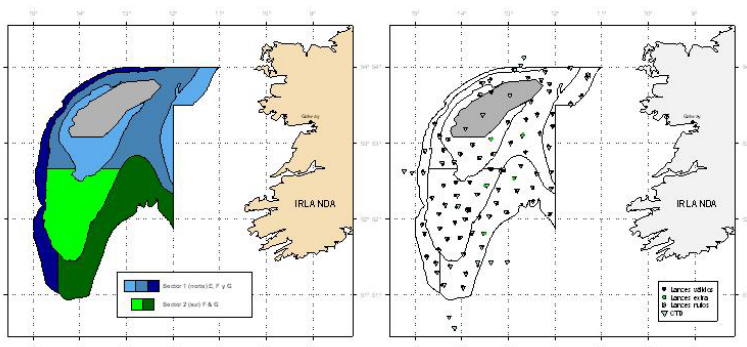
- To estimate stratified abundances indices by age of megrims (*L. whiffiagonis*) and by length of hake (*Merluccius merluccius*), monkfishes (*Lophius budegassa* and *L. piscatorius*), four spotted megrim (*L. boscii*), Norway lobster (*Nephrops norvegicus*) and other fish species.
- To estimate recruitment indices and spatial trends of younger ages of hake, megrims and monkfishes.
- To estimate stratified abundances indices of commercial fish species (*N. norvegicus*, *Phycis blennoides*, *Helicolenus dactylopterus*, *Molva molva*, *Conger conger*)
- To describe the spatial distribution patterns of demersal and benthic species on Porcupine Bank.
- To collect otoliths and biological parameters of the main commercial fish species (hake, megrims, anglerfishes, *H. dactylopterus*....)
- To collect data for the determination of biological parameters for the demersal species selected by DCF.
- To collect hydrographic data.

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.

Manual for the International Bottom Trawl Surveys

[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](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)

The sampling design was random stratified with two geographical sectors (Northern and Southern) and three depth strata (180-300 m, 301–450 m and 451-800 m). Hauls allocation is proportional to the strata area following a buffered random sampling procedure.



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

UK-Scotland/Scotia; UK-North Ireland/Corystes; Ireland/Celtic Explorer; France/Thalassa; Spain/Vizconde de Eza; Portugal/Mar Portugal
 Relevant international planning group: IBTSWG-International Bottom Trawl survey Working Group of ICES

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

Individual tasks to the survey participants are allocated by the responsible ICES survey planning group. Each participating country is responsible for the activities conducted on its national part of the international survey. There is no particular cost sharing agreement in place for this survey.

(max 450 words per survey)

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

ICES (2022): International Bottom Trawl Survey Working Group (IBTSWG). ICES Scientific Reports. Report. <https://doi.org/10.17895/ices.pub.20502828.v1>

https://ices-library.figshare.com/articles/report/International_Bottom_Trawl_Survey_Working_Group_IBTSWG_/20502828

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

Data obtained are used to calibrate the assessment models of groundfish stocks on the ICES areas 7c-k in the working group WGBIE, hake, megrims and anglers. Moreover, data of the survey are provided to working group WGCSE for the assessment of the Norway lobster (*Nephrops norvegicus*), haddock (*Melanogrammus aeglefinus*), whiting (*Merlangius merlangius*) and cod (*Gadus morhua*), to working group WGDEEP of assessment of deep species (*Phycis blennoides*, *Argentina* sp., *Molva macrophthalma*, *M. molva* and *Helicolenus dactylopterus*), to working group WGEF of assessment of elasmobranch species (*Galeus melastomus*, *Deania calcea*, *Scyliorhinus canicula*, *Scymnodon ringens*...) and to the working group WGWIDE to provide information for the assessment of blue whiting (*Micromessistius poutassou*) and boarfish (*Capros aper*), WGCEPH squids (*Loligo forbesi*, *Todarodes sagittatus*, *Illex coindetii*).

A map of the sampling hauls carried out and CTD stations performed (Figure 6) is included in Annex 2.6.

7. Extended comments

Porcupine Groundfish survey was carried out without major problems, apart from the particularly bad weather conditions.

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Blue Whiting Survey

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: **Blue Whiting Survey**

Acronym: IBWSS

National Name of the research survey: **Blue Whiting**

1. Objectives of the survey

The survey aims to determine the distribution and abundance at age and length of the Northeast Atlantic blue whiting stock during the spawning season to the west of Britain and Ireland, and a physical, chemical and biological characterization of the pelagic ecosystem. This estimate is used as a tuning index by ICES to determine the size of the population and the results are submitted annually to WGWIDE.

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.

Manual for International Pelagic Surveys (IPS)

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

Systematic grid with random start, tracks 21 nmi apart, from self-break in the eastern limit to 13°W in the western limit, following the methodology defined in the “ICES Manual for International Pelagic Surveys (IPS) chapter 2.1.1” The Spanish part of the International Survey is located in a polygon showed below in the area called Porcupine Seabight (Strata n° 7).

The Acoustic data are collected using a Simrad EK80 scientific echosounder at 18-38-70-120-200 kHz. Day/night observation. Pelagic fishing stations to identify the species composition of the acoustic recordings. Hydrological characterisation (CTD).



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

The survey is performed in collaboration with research vessels from Ireland (R/V Celtic Explorer), Faroe Islands (R/V Jakup Sverri), Netherlands (R/V Tridens) and Norway (R/V Vendla), and coordinated by the ICES Working Group on International Pelagic Surveys (WGIPS). During the survey effort was refined and adjusted by the survey coordinator (Norway) using real time observations.

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

The IBWSS is carried out by three EU MSs (Ireland, Netherlands and Spain), and two non EU MSs, each contributing with its own vessel. Cost sharing: the operational costs of the vessels are shared by EU MSs applying an allocation key proportional to national share of the EU TAC.

(max 450 words per survey)

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

<http://doi.org/10.17895/ices.pub.20502822>

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

This estimate is used as a tuning index by ICES to determine the size of the population and the results are submitted annually to WGWiDE.

A map of the acoustic sampling transects, trawl hauls and CTD stations performed (Figure 7) is included in Annex 2.6.

7. Extended comments

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

International Mackerel and Horse Mackerel Egg Survey (triennial).

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: **International Mackerel and Horse Mackerel Egg Survey (triennial) (march april)**

Acronym: MEGS

National Name of the research survey: **Careva**

1. Objectives of the survey

- This survey (CAREVA) provides indices for the strength of the SSB and a relative abundance index of Atlantic mackerel (*Scomber scombrus*) spawning stock.
- Egg production and spawning area estimation for both mackerel and horse mackerel.
- Fecundity estimation
- Determine the egg distribution area and density of other commercial species (hake, sardine, etc.)
- Characterise the main oceanographic conditions of the surveyed area

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.

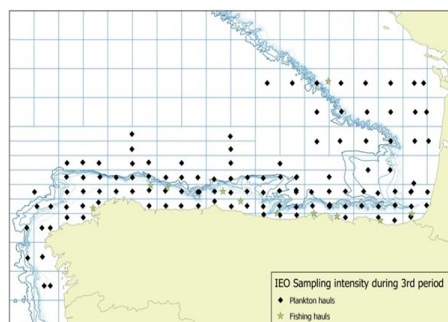
Manual for the Mackerel and Horse Mackerel Egg Surveys.

[https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20\(SISP\)/SISP%206%20Manual%20for%20the%20mackerel%20and%20horse%20mackerel%20egg%20surveys.%20sampling%20at%20sea_Jan%202019.pdf](https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%206%20Manual%20for%20the%20mackerel%20and%20horse%20mackerel%20egg%20surveys.%20sampling%20at%20sea_Jan%202019.pdf)

- In most of the western area plankton samplers are deployed at the centre of half standard ICES rectangles, which are 0.5° latitude, by 0.5° longitude. To the north of Spain (Cantabrian Sea) more sampler deployments are undertaken, because of the proximity of the shelf edge to the coast.
- The number of stations and geographic coverage is coordinated internationally within the framework of the WGMEGS and depends on the availability of ship days in the different countries, to allow full coverage of the spawning stock area. Also, the number of stations and their location depend on the abundance and distribution of the target species (the map shows the number

and geographical distribution of the stations in 2019, as an example).

- The standard plankton samplers used in the survey are Bongo 40 (oblique tows). All of these samplers generally have temperature, salinity and depth probes attached to the frames and they are also fitted with either mechanical flowmeters to enable the volume of water filtered on each deployment to be calculated.
- CTD profiles with Seabird 25 are also obtained in each BONGO station.
- Adult fish samples are obtained by pelagic trawls. Those samples are obtained either on board the vessel in which the ichthyoplankton survey CAREVA is carried out, or on board other vessels that simultaneously carry out other pelagic surveys in the area (i.e. PELACUS acoustic survey).



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

Spain /Vizconde de Eza, Ramon Margalef, Enma Bardan; Portugal/; Denmark/; UK-Scotland/; Ireland/; Germany/; The Netherlands/; Faroe Islands/;

Relevant international planning group: WGMEGS: Working Group on Mackerel and Horse Mackerel Egg Surveys

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 responsible ICES survey planning group. Each participating country is responsible for the activities conducted on its national part of the international survey. There is no particular cost sharing agreement in place for this survey

(max 450 words per survey)

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

Coordination group report:

https://ices-library.figshare.com/articles/report/Working_Group_on_Mackerel_and_Horse_Mackerel_Egg_Surveys_WGMEGS_outputs_from_2022_meeting/_22128536

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

Result of this survey are used as a fishery independent index in the assessment of mackerel (*Scomber scombrus*) and horse mackerel (*Trachurus trachurus*) in the context of the WGWIDE (The working group of widely distributed stocks, ICES), and the results are also presented as qualitative information in the WGHANSA (working group on southern horse mackerel, anchovy and sardine for horse mackerel).

Results of 2022 surveys:

http://www.repositorio.ieo.es/e-ieo/bitstream/handle/10508/16281/2022_IEO_SURVEYS.pdf?sequence=1

7. Extended comments

CAREVA survey was originally scheduled to start on 13th March on board R/V Vizconde de Eza (Secretaría General de Pesca). However, due to a power failure on the R/V Miguel Oliver (Secretaría General de Pesca), which was carrying out the Portuguese PELAGO acoustic

survey, there was an exchange of vessels between the two surveys. Finally, CAREVA survey started on board the Miguel Oliver with a few days delay (first station was carried out on 18th March). These facts caused a reduction of days of effective work and resulted in a restructuring of the survey design in order to cover the designated survey area in the available time

A map showing the sampling design of a plankton hauls carried out to adapt to the reduced survey days of the MEGS (CAREVA) survey (Figure 8) is included in Annex 2.6.

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

International Mackerel and Horse Mackerel Egg Survey (triennial).

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: **International Mackerel and Horse Mackerel Egg Survey (triennial) (april may)**

Acronym: MEGS

National Name of the research survey: **Jureva**

1. Objectives of the survey

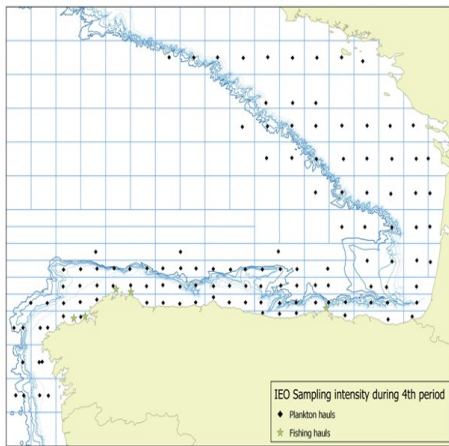
- This survey (JUREVA) provides indices for the strength of the SSB and a relative abundance index of horse mackerel (*Trachurus trachurus*) spawning stock.
- Egg production and spawning area estimation for both mackerel and horse mackerel.
- Fecundity estimation
- Determine the egg distribution area and density of other commercial species (hake, sardine, etc.)
- Characterise the main oceanographic conditions of the surveyed area

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.

Manual for the Mackerel and Horse Mackerel Egg Surveys.

[https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20\(SISP\)/SISP%206%20Manual%20for%20the%20mackerel%20and%20horse%20mackerel%20egg%20surveys,%20smapping%20at%20sea_Jan%202019.pdf](https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%206%20Manual%20for%20the%20mackerel%20and%20horse%20mackerel%20egg%20surveys,%20smapping%20at%20sea_Jan%202019.pdf)

- In most of the western area plankton samplers are deployed at the centre of half standard ICES rectangles, which are 0.5° latitude, by 0.5° longitude. To the north of Spain (Cantabrian Sea) more sampler deployments are undertaken (in an east-west direction), because of the proximity of the shelf edge to the coast.
- The number of stations and geographic coverage is coordinated internationally within the framework of the WGMEGS and depends on the availability of ship days in the different countries, to allow full coverage of the spawning stock area. Also, the number of stations and their location depend on the abundance and distribution of the target species (the map shows the number and geographical distribution of the stations in 2019, as an example).
- The standard plankton samplers used in the survey are Bongo 40 (oblique tows). All of these samplers generally have temperature, salinity and depth probes attached to the frames and they are also fitted with either mechanical flowmeters to enable the volume of water filtered on each deployment to be calculated.
- CTD profiles with Seabird 25 are also obtained in each BONGO station.
- Adult fish samples are obtained by pelagic trawls. Those samples are obtained either on board the vessel in which the ichthyoplankton survey JUREVA is carried out, or on board other vessels that simultaneously carry out other pelagic surveys in the area (i.e. PELACUS acoustic survey).



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

Spain /Vizconde de Eza, Ramon Margalef, Enma Bardan; Portugal/; Denmark/; UK-Scotland/; Ireland/; Germany/; The Netherlands/; Faroe Islands/;

Relevant international planning group: WGMEGS: Working Group on Mackerel and Horse Mackerel Egg Surveys

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 responsible ICES survey planning group. Each participating country is responsible for the activities conducted on its national part of the international survey. There is no particular cost sharing agreement in place for this survey

(max 450 words per survey)

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

Coordination group report:

https://ices-library.figshare.com/articles/report/Working_Group_on_Mackerel_and_Horse_Mackerel_Egg_Surveys_WGMEGS_outputs_from_2022_meeting/_22128536

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

Result of this survey are used as a fishery independent index in the assessment of mackerel (*Scomber scombrus*) and horse mackerel (*Trachurus trachurus*) in the context of the WGWIDE (The working group of widely distributed stocks, ICES), and the results are also presented as qualitative information in the WGHANSA (working group on southern horse mackerel, anchovy and sardine for horse mackerel).

Results of 2022 surveys:

http://www.repositorio.iew.es/e-iew/bitstream/handle/10508/16281/2022_IEO_SURVEYS.pdf?sequence=1

7. Extended comments

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

International Mackerel and Horse Mackerel Egg Survey (triennial).

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: **International Mackerel and Horse Mackerel Egg Survey (triennial) (march may)**

Acronym: MEGS

National Name of the research survey: **trienal AZTI**

1. Objectives of the survey

The main objective of the survey is to provide indices for the strength of the SSB and a relative abundance index of Atlantic mackerel (*Scomber scombrus*) and horse mackerel (*Trachurus trachurus*) spawning stock applying the method of eggs production (EPM).

To achieve this goal, the necessary parameters/variables are: (1) Egg production and spawning area estimation for both mackerel and horse mackerel, (2) Fecundity estimation for mackerel and horse mackerel and (3) Temperature and salinity. Additionally, the abundance and area of distribution of other commercial species (hake, sardine, anchovy, etc.) are determined along with the main oceanographic conditions of the surveyed areas.

AZTI provides data for period 3 (March-April) and period 5 (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.

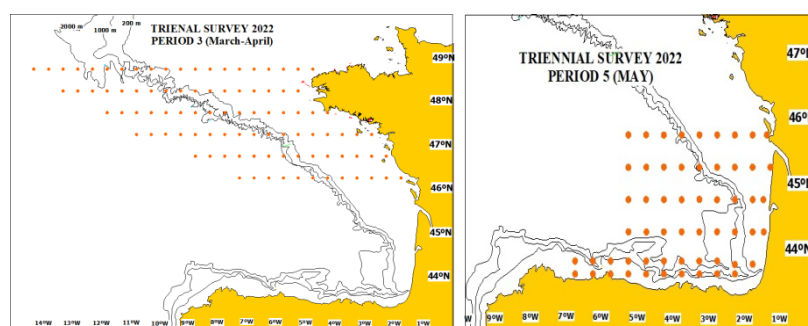
Details of survey design and methods are in. Manual for the mackerel and horse mackerel egg surveys (MEGS): sampling at sea. Series of ICES Survey Protocols. SISP 6 - MEGS V1.3. 62 pp.

[https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20\(SISP\)/SISP%206%20Manual%20for%20the%20mackerel%20and%20horse%20mackerel%20egg%20surveys,%20smampling%20at%20sea_Jan%202019.pdf](https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%206%20Manual%20for%20the%20mackerel%20and%20horse%20mackerel%20egg%20surveys,%20smampling%20at%20sea_Jan%202019.pdf)

The standard plankton net used in the ICES triennial egg surveys by AZTI is the Bongo 40 furnished with RBR (CTD) to record environmental variables through the water column. The procedures used in these surveys are described in detail in the manual of surveys (see link above). On completion of the hauls, plankton is preserved in a 4% buffered formaldehyde solution. At sea, fish eggs from plankton samples are sorted out and once at lab, the eggs (Mackerel and horse mackerel species) are identified and staged.

The figures below show the initial design of plankton stations to limit the spawning area of mackerel and horse mackerel during AZTI surveys.

Adult samples of mackerel are captured using pelagic trawls at those areas where the presence of eggs is positive.



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

Spain / Vizconde de Eza, Ramon Margalef, Enma Bardan; Portugal; Denmark; UK-Scotland; Ireland; Germany; The Netherlands; Faroe Islands;

Relevant international planning group: WGMEGS: Working Group on Mackerel and Horse Mackerel Egg Surveys

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 responsible ICES survey planning group. Each participating country is responsible for the activities conducted on its national part of the international survey.

There is no particular cost sharing agreement in place for this survey.

(max 450 words per survey)

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

All the information on the coordinated MEGS surveys can be consulted at:

https://ices-library.figshare.com/articles/report/Working_Group_on_Mackerel_and_Horse_Mackerel_Egg_Surveys_WGMEGS_/18618464

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

The information collected during the international mackerel and horse mackerel surveys are used for the following proposal:

- Biomass index for mackerel.
- Egg production index for horse mackerel.

This information is provided to the assessment WGWISE.

Moreover:

- Size of all the species caught on the trawl hauls as an environmental indicator.
- Identification and estimation of the abundance of 7 commercial plankton species (eggs and larvae) as an environmental indicator.

7. Extended comments

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Sardine, Anchovy Horse Mackerel Acoustic Survey.

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: **Sardine, Anchovy Horse Mackerel Acoustic Survey**

Acronym: SAHMAS

National Name of the research survey: **PELACUS**

1. Objectives of the survey

- The main objective of this survey was to achieve a biomass' estimation by echointegration of the main pelagic fish distributed in the Spanish Cantabrian and NW waters (sardine, anchovy, horse mackerel, mackerel, blue whiting, bogue, boar fish, and chub mackerel). Together with this, the following objectives were also foreseen:
- Determine the distribution area and density of the main fish species
- Determine the main biological characteristics (length, sex, maturity stage and age) of the main fish species
- Estimate the relative abundance and distribution area of sardine and anchovy eggs by means of CUFES
- Estimate the adults parameters needed to apply the Daily Egg Production Method to sardine.
- Characterise the main oceanographic conditions of the surveyed area

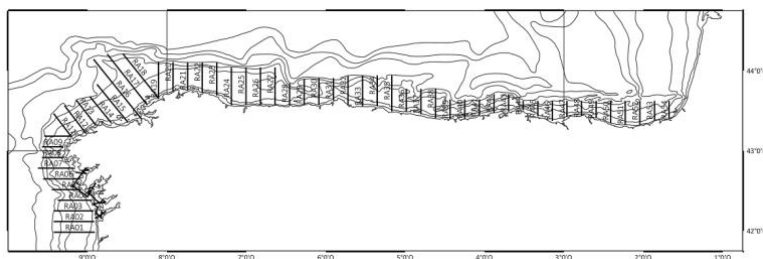
- Determine the distribution pattern, taxonomic diversity and dry biomass by size classes of the plankton population presented in the surveyed area.
- Determine the natural abundance of N15 in sardine, anchovy and mackerel and their trophic position.
- Determine the distribution area and density of apical predators
- Determine the distribution area and density of marine microplastics litter

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.

Manual for Acoustic Surveys Coordinated under ICES Working Group on Acoustic and Egg Surveys for Small Pelagic Fish (WGACEGG)

[https://www.ices.dk/sites/pub/Publication%20Reports/Techniques%20in%20Marine%20Environmental%20Sciences%20\(TIMES\)/TIMES64.pdf](https://www.ices.dk/sites/pub/Publication%20Reports/Techniques%20in%20Marine%20Environmental%20Sciences%20(TIMES)/TIMES64.pdf)

Acoustic, Systematic track with parallel transects evenly distribute each 8 nmi. Backscattering energy attributed to fish species after scrutinisation of the echograms. Biomass estimates using echointegration method. Pelagic fishing stations for echo-trace allocation and biological characterisation. CUFES for mapping egg (anchovy and sardine) distribution area. Trained observers recorded marine mammal, seabird, floating litter and vessel presence and abundance. Data on the hydrography and hydrodynamics of the water masses are collected via the deployment of rosettes and conductivity, temperature and depth sensors. Information on the composition, distribution and biomass of phytoplankton and zooplankton is derived from the analyses of samples taken by plankton nets.



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

Spain/Miguel Oliver; Portugal; France/

Relevant international planning group: WGACEGG: Working Group on Acoustic and Egg Surveys for Sardine and Anchovy in ICES Areas 7, 8 and 9

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

Individual tasks to the survey participants are allocated by the responsible ICES survey planning group. Each participating country is responsible for the activities conducted on its national part of the international survey. There is no particular cost sharing agreement in place for this survey

(max 450 words per survey)

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

<https://www.ices.dk/community/groups/pages/wgacegg.aspx>

<https://doi.org/10.17895/ices.pub.8234>

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

This survey provides a series of both quantitative and qualitative indices for several fish species.

Biomass indices for the main pelagic fish species (sardine, anchovy, horse mackerel, mackerel, blue whiting, chub mackerel); of which those for anchovy in 9a, horse mackerel in 8c and sardine (both 8c and 9a) are used as independent survey indices for assessment purposes in ICES WHANSA and WIDE working groups. Together with these, the survey also provides ancillary variables such as SST, SSS, CTD casts, marine mammal and bird observations and marine surface litter, as well as biological information from fishing stations,

which are used for further analysis within the MSFD measures.

A map of the acoustic sampling tracks and CTD stations performed (Figure 9) is included in Annex 2.6.

7. Extended comments

The survey started on April 2nd and ended on April 30th, with a gap of 12 days between legs. Weather conditions were good in the 9aN area but deteriorated northward, losing two working days near Fisterra cap. On April 12th, the first leg was ended near Ribadeo. Due to an outbreak of Covid-19 outbreak on board the vessel, the survey was suspended until the outbreak was under control. The ship owner (General Secretary of Fisheries) gave an extra week to try to finish the survey (mainly 8cE, i.e. Cantabrian Sea). Given the lack of time, the acoustic data were recorded from 07:00 up to 22:00, which means a little earlier than sunrise and a little later than sunset. Moreover, the fishing stations were restricted to only those areas with an important amount of echotraces. Fortunately, the weather conditions during this second leg were good, which helped to complete the survey, and all the objectives were achieved.

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Sardine DEPM (triennial).

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: **Sardine DEPM (triennial)**

Acronym: SDEPM

National Name of the research survey: **Sareva**

1. Objectives of the survey

- Estimate the spawning stock biomass of sardine (*Sardina pilchardus*) based on the application of Daily Egg Production Method (DEPM). The total spawning biomass from the SDEPM (Portuguese and Spanish) is used in the assessment such as fishery independent index for the sardine stock pil 27 8c9a (ICES divisions 8.c and 9.a-Cantabrian Sea and Atlantic Iberian waters)
- Delimitate and estimate the spawning area of sardine.
- Estimate Daily egg production and Total egg production of sardine.
- Estimate the relative abundance and distribution area of sardine eggs by means of CUFES
- Determine the egg distribution area and density of other commercial species (anchovy, mackerel, horse mackerel, etc.)
- Characterise the main oceanographic conditions of the surveyed area.

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.

Sardine DEPM survey methodology is described in ICES Cooperative Research Report 332.

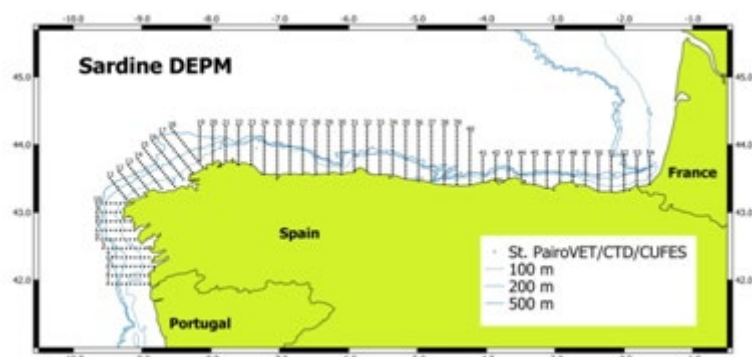
[https://www.ices.dk/sites/pub/Publication%20Reports/Cooperative%20Research%20Report%20\(CRR\)/CRR%20332.pdf](https://www.ices.dk/sites/pub/Publication%20Reports/Cooperative%20Research%20Report%20(CRR)/CRR%20332.pdf)

SAREVA survey consisted of ichthyoplankton, hydrographic and adult sampling:

- Plankton samplers, PairoVET and CUFES are used on a survey grid consisting of fixed transects perpendicular to the coast and spaced 8 nm. CUFES is used as an auxiliary sampler for adaptive decisions in order to delimit the spawning area and to modify the intensity of the PairoVET sampling. The inshore limit of the transects is determined by bottom depth (as close to the shore as possible) while the offshore extension is decided adaptively (based on the presence/absence of eggs) and always covering the extension of the platform to the 200 m isobath.
- CTD profiles are obtained in each PairoVET station. A sensor continuously registers temperature, salinity and fluorescence at 5 m

depth on the transects.

- Fishing hauls are undertaken for the estimation of the adult parameters (sex ratio, female weight, batch fecundity and spawning fraction) and are conducted by pelagic trawling following the species schools detection by the echo-sounder. For logistical reasons, the adult samples for the DEPM that would correspond to this survey will be taken in the PELACUS survey, which coincides in time and space. In addition, complementary fish market sampling will be carried out.



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

Spain/ RV. Vizconde de Eza, RV. Miguel Oliver (Adult sampling); Portugal/RV Vizconde de Eza

Relevant international planning group: WGACEGG: Working Group on Acoustic and Egg Surveys for Small Pelagic Fish in NE Atlantic

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

The sardine DEPM surveys have been carried out in a collaborative work between Portugal (Instituto Português do Mar e da Atmosfera, IPMA) and Spain (Instituto Español de Oceanografía, IEO) what led to increased coordination and standardisation of the surveys and analytical methodologies.

Individual tasks to the survey participants are allocated by the responsible ICES survey planning group. Each participating country is responsible for the activities conducted on its national part of the international survey.

(max 450 words per survey)

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

Triennial survey. Next in 2023 and 2026

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

7. Extended comments

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Biomass of Anchovy.

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: **Biomass of Anchovy**

Acronym: BIOMAN

National Name of the research survey: **BIOMAN**

1. Objectives of the survey

- To estimate annually the total biomass of anchovy and sardine in the Bay of Biscay applying the DEPM, this implies to estimate all the parameters to apply the DEPM. To estimate the age structure of these populations (biomass by age, numbers by age, percentage by age, weight by age and length by age) and the spatial distribution of the species. The anchovy estimates in 8abcd are used for the assessment and posterior management of the stock. For sardine, biomass estimates in 8abd have to be incorporated in the assessment in the next benchmark.
- To obtain daily egg production for sardine in 8abd. These estimates are used for survey trends-based assessment of the stock.
- Biological characterization of the species, spawning area delimitation of anchovy and sardine in the Bay of Biscay.
- Hydrological conditions of the prospective area.
- To obtain the anchovy and sardine egg abundances at 3m depth with CUFES
- To obtain the distribution and abundance of zooplankton in the Bay of Biscay
- To obtain the distribution and abundances of marine mammals, sea birds, marine debris and human activities.
- To obtain the distribution and abundance of micro, meso and macro plastics
- Collection of water samples on the surface and at different depths in stations spread over the sampling area for eDNA analysis

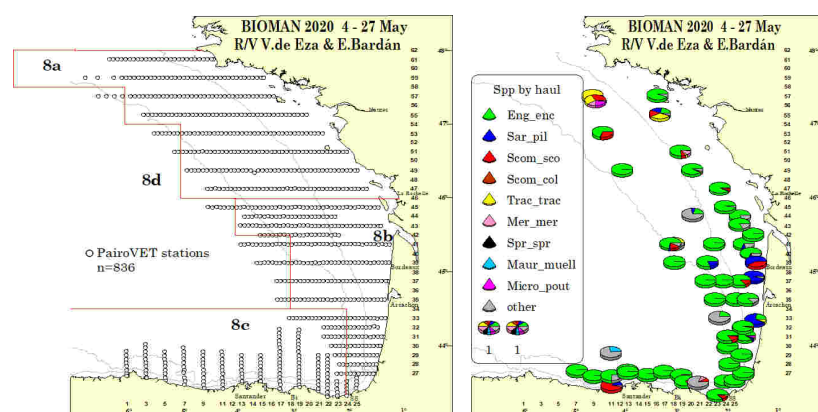
2. Description of the survey design and methods used in the survey for each type of data collection as listed in Table 2.6 for this specific survey.

The DEPM is applying following the protocol accorded at WGACEGG. In (ICES -Cooperative Research Report 332). [http://www.ices.dk/sites/pub/Publication%20Reports/Cooperative%20Research%20Report%20\(CRR\)/CRR%20332.pdf](http://www.ices.dk/sites/pub/Publication%20Reports/Cooperative%20Research%20Report%20(CRR)/CRR%20332.pdf)

Coverage: southeast of the Bay of Biscay (anchovy and sardine main spawning area).

Sampling strategy: adaptive. The survey starts from the West, looking for the western limit of the spawning, and continues to the north until the limit of the 8a.

- Plankton sampling: Stations are located at intervals of 3 nmi along 15 nmi apart transects, perpendicular to the coast. At each station a vertical plankton haul is performed using a PairoVET net. The Continuous Underway Fish Egg Sampler (CUFES, Checkley et al., 1997) is used for adaptive decisions in order to delimit the spawning area of the species and to modify the intensity of the PairoVET sampling.
- adult sampling: The adult samples are obtained, coinciding in space and time with the plankton sampling. When areas with anchovy or sardine eggs are encountered, the pelagic trawl is directed to those areas. In each haul, a sample of 2 kg of anchovy and/or sardine is randomly selected. 100 individuals of each species are measured and a biological sampling (60 - 120 individuals) is conducted. Length, weight, sex, maturity and extraction of otolith are measured for each individual.
- hydrographic sampling: Sample depth, temperature, salinity and fluorescence profiles are obtained at each sampling station using a CTD coupled to the PairoVET



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

Spain&Portugal/Vizconde de Eza for plankton sampling. Spain/ Miguel Oliver&Emma Badán, Portugal/Vizconde de Eza for adults sampling
WGACEGG: Working Group on Acoustic and Egg Surveys for small pelagic fish in NE Atlantic

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

Not applicable

(max 450 words per survey)

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

Relevant international planning group: WGACEGG: Working Group on Acoustic and Egg Surveys for small pelagic fish in Northeast Atlantic. Link to de last meeting report: <https://doi.org/10.17895/ices.pub.8234>

WD BIOMAN 2022 DOI: [10.13140/RG.2.2.16247.09124](https://doi.org/10.13140/RG.2.2.16247.09124)

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

This survey provides input to the assessment working group on horse mackerel, anchovy and sardine (WGHANSA):

- Anchovy spawning biomass (this equals total stock biomass since all anchovies are mature in spring) and biomass-at-age estimates in ICES 8abcd that are use yearly in the assessment of anchovy for the international catch advice in ICES 8abcd.
- Sardine egg abundance estimated that is used yearly for the trends-based assessment for the international advice in ICES 8abd.

Moreover:

- Size of all the species caught on the trawl hauls as an environmental indicator.
- The CTD profiles are send to an international database.
- Data on marine mammals and seabirds are in a common international database.

7. Extended comments

Other objectives were added to the survey since 2016: to obtain other indicators of the MSFD as sardine total biomass and biomass at age for ICES 8abd, microplastic abundances, marine mammals and sea bird abundances, human activities and marine litter abundances. eDNA to identify marine mammals and fish. This objective was not in the planification in the original national plan (2017).

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Acoustic Survey on Sardine and Anchovy.

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: **Acoustic Survey on Sardine and Anchovy**

Acronym: ECOCADIZ_ESP

National Name of the research survey: **ECOCADIZ**

1. Objectives of the survey

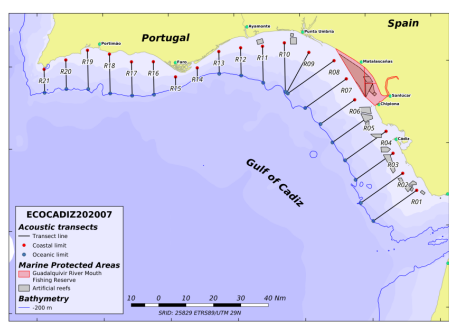
- To estimate by hydroacoustics (echo-integration) and to map the abundance and biomass of the main neritic pelagic species inhabiting the Gulf of Cadiz shelf waters, especially the Gulf of Cadiz anchovy spawning stock.
- To determine the distribution area and density of the main fish species.
- To characterize the biology of the above species in relation to their main habitats, especially according to the size composition and/or age structure, and to the maturity, repletion and condition stages.
- To estimate the relative abundance and to map the distribution area of anchovy eggs by means of CUFES.
- To map the distribution and abundance of the apical predators within the surveyed pelagic community and their relation to oceanographic and biological factors.
- To oceanographically characterize the surveyed area.
- To map the distribution area and density of floating macro-litter and micro-plastics.
- To collect anchovy “extra” samples for the estimation of the adults’ parameters needed to triennially apply the Daily Egg Production Method to Gulf of Cadiz anchovy.

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.

Manual for Acoustic Surveys Coordinated under ICES Working Group on Acoustic and Egg Surveys for Small Pelagic Fish (WGACEGG)

[https://www.ices.dk/sites/pub/Publication%20Reports/Techniques%20in%20Marine%20Environmental%20Sciences%20\(TIMES\)/TIMES64.pdf](https://www.ices.dk/sites/pub/Publication%20Reports/Techniques%20in%20Marine%20Environmental%20Sciences%20(TIMES)/TIMES64.pdf)

Acoustic estimation of the abundance and biomass of the survey target species during daylight, along to a systematic grid composed by (21) transects, between 20 – 200 m isobaths, 8 nm-equally spaced and normal to the shoreline, with a Simrad™ EK-60 scientific echosounder working in a multi-frequency fashion (18, 38, 120 and 200 kHz; ICES CRR 332, Massé et al., 2018; ICES, 2021). The echo-traces identification, size, age composition and other biological aspects of the assessed species are obtained from the results from opportunistic ground-truthing fishing hauls. Backscattering energy attributed to fish species after scrutinisation of the echograms. Biomass estimates using echointegration method. Hydrographic characterization of the surveyed area is carried out by night through the sampling of a systematic grid of discrete CTD (with coupled multisensors)-LADCP casts and along-transect sub-superficial continuous sampling with VMADCP and ThermoSal-F. The climatic characterization of the surveyed area is obtained from the analysis of continuous records of weather variables by an Aanderaa weather station. The ichthyoplankton (anchovy eggs) distribution and sub-superficial density is recorded by a Continuous Underway Fish Egg Sampler (CUFES) along transects during the acoustic sampling. Information on the distribution and abundance of apical predators and floating macro-litter is collated by direct observation. Sub-superficial density of micro-plastics is opportunistically sampled with Manta Trawl hauls.



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

Spain/ RV.Miguel Oliver.

WGACEGG: Working Group on Acoustic and Egg Surveys for Sardine and Anchovy in ICES Areas 7, 8 and 9

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

Not applicable

(max 450 words per survey)

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

ICES WGACEGG 2022 meeting report not yet available. Link to the 2021 report: https://ices-library.figshare.com/articles/report/Working_Group_on_Acoustic_and_Egg_Surveys_for_small_pelagic_fish_in_NE_Atlantic_WGACEGG_outputs_from_2020_meeting/18618404.

The current name of ICES WGACEGG is *Working Group on Acoustic and Egg Surveys for small pelagic fish in NE Atlantic*.

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

Survey's data and estimates are utilized in the ICES expert groups of both stock assessment of pelagic fish species (WGHANSA, WGWIDE, WKCOLIAS) and acoustic and egg surveys for small pelagic fish in NE Atlantic (WGACEGG). The latter group reviews the results and establishes standardized protocols to properly conduct both this survey and other ones of similar methodology in the ICES areas 7, 8 and 9. The acoustic estimates from this series are of a special importance for anchovy in Division 9a, since they provide a time-series of biomass indicators which are used in the assessment of the southern component of the stock.

7. Extended comments

The 2022 survey was not conducted. The ECOCADIZ 2022 survey was planned to be conducted during the usual dates (first fortnight of August) onboard R/V Miguel Oliver. However, the usual ship-time scheduled for ECOCADIZ in 2022 was invested in other surveys/compromises instead and no other research vessel was available to conduct the survey. Given that there are two other acoustic-trawl series covering the Gulf of Cadiz on an annual basis (PELAGO in spring time and ECOCADIZ-RECLUTAS in fall) and the lack of available ship time, this series has temporarily been suspended until further notice. Its continuation is not still secured, as long as the surveyed area doesn't cover the entire distribution of the Iberotlantic stock of sardine nor the 9aN anchovy stock but southern spawning component.

ECOCADIZ and ECOCADIZ-RECLUTAS surveys protocols are detailed in Doray *et al.* (2021; Doray, M., Boyra, G., and van der Kooij, J. (Eds.). 2021. ICES Survey Protocols – Manual for acoustic surveys coordinated under the ICES Working Group on Acoustic and Egg Surveys for Small Pelagic Fish (WGACEGG). 1st Edition. *ICES Techniques in Marine Environmental Sciences* Vol. 64. 100 pp. <https://doi.org/10.17895/ices.pub.7462>).

At present there is no a relevant international database to upload the survey series data. Detailed and aggregated data are available to scientific community. Estimates are provided to WGACEGG, WGHANSA, WGWIDE and WKCOLIAS, both graphically and in a tabulated way, in their reports. Additional working documents (i.e, survey reports), containing more detailed information are also presented in these WGs. WGACEGG is generating a common database (grid maps and grid files of: NASC by species, Eggs sampled by CUFES, oceanographic variables; species composition of hauls) from surveys under its scope (IFREMER, IPMA, AZTI and IEO). At a national scale, survey data are stored in the SIRENO database.

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Acoustic Survey for Juvenile Anchovy in the Bay of Biscay.

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: **Acoustic Survey for Juvenile Anchovy in the Bay of Biscay**

Acronym: JUVENA_ESP

National Name of the research survey: **JUVENA**

1. Objectives of the survey

The main objective of the project is estimating the abundance of juvenile anchovy in the Bay of Biscay in Autumn, as a tool for predicting the recruitment of anchovy. Secondary objectives are:

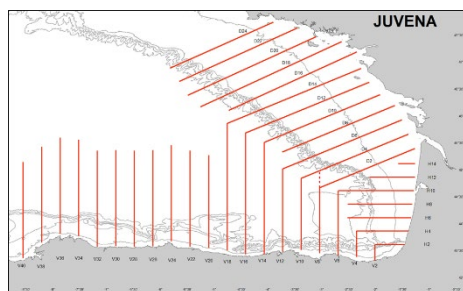
- Studying the biological condition of juvenile anchovy and its influence on the recruitment process.
- Characterizing the hydrographic conditions and the abundance and distribution of the components of the pelagic ecosystem relevant to understand the dynamics of the recruitment.
- Studying the interactions between top predators and their preys in the Bay of Biscay, as well as inter-specific interactions between marine birds and sub-superficial predators.
- Acoustic identification and vertical distribution of mesopelagic species in the Bay of Biscay.

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.

Manual for Acoustic Surveys Coordinated under ICES Working Group on Acoustic and Egg Surveys for Small Pelagic Fish (WGACEGG)

[https://www.ices.dk/sites/pub/Publication%20Reports/Techniques%20in%20Marine%20Environmental%20Sciences%20\(TIMES\)/TIMES64.pdf](https://www.ices.dk/sites/pub/Publication%20Reports/Techniques%20in%20Marine%20Environmental%20Sciences%20(TIMES)/TIMES64.pdf)

The methodology used to estimate the abundance of juvenile anchovy is the acoustic-trawl methodology. Acoustic data processing is performed by layer echo-integration. The identification and sizing is obtained by pelagic fishing hauls. The hauls are grouped by strata of homogeneous species and size composition. Inside each of these homogeneous strata, the echo-integrated acoustic backscattering is assigned to species according to the composition of the hauls. Afterwards, the energy corresponding to each specie-size is converted to biomass using their corresponding conversion factor. Details of the methodology of the JUVENA surveys were described in "Boyra, G., Martinez, U., Cotano, U., Santos, M., Irigoien, X., and Uriarte, A. 2013. Acoustic surveys for juvenile anchovy in the Bay of Biscay: abundance estimate as an indicator of the next year's recruitment and spatial distribution patterns. *ICES Journal of Marine Science*, 70: 1354–1368."



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

Spain: RV. Angeles Alvariño, RV. Enma Bardan

WGACEGG: Working Group on Acoustic and Egg Surveys for Sardine and Anchovy in ICES Areas 7, 8 and 9

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

Not applicable

(max 450 words per survey)

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

<https://www.ices.dk/community/groups/pages/wgacegg.aspx>

https://www.researchgate.net/publication/369439814_Acoustic_surveying_of_anchovy_Juveniles_in_the_Bay_of_Biscay_JUVENA_2022_Survey_Report

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

The main use of the results of the surveys is to provide assessment advice for anchovy stock in the Bay of Biscay. In particular the JUVENA survey provides assessment information on the recruitment level of anchovy in the Bay of Biscay. These results are reported to ICES WGACEGG, where the validity of the results is checked, and to ICES WGHANSA, where the results are used as input for the ICES CBBM assessment model for anchovy in the Bay of Biscay along with information on anchovy abundance provided by Bioman and PELGAS surveys, as well as the anchovy catches from the fleet.

7. Extended comments

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Deepwater Longline Survey.

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: **Deepwater Longline Survey**

Acronym: PALPRO_ESP

National Name of the research survey: **PALPRO**

1. Objectives of the survey

- To obtain data on biodiversity and biomass estimates.
- To obtain biological samples (tissues) of the most deep-water representative species.
- To test the suitability of the commercial longline fishing gear (for deep-water sharks) modified for scientific surveys.
- To test depth, salinity and temperature sensors adapted to deep for monitoring the fishing gear.

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 methodology is published in the report of WGDEEP 2016.

A modified commercial deep-water fishing gear adapted was used for the survey. The fishing gear is a two equal horizontal line sections of 1750 m + 1750 m, each with 150 hooks (300 in total). Each hook was baited with 1/3 of mackerel.

The horizontal line was attached to the bottom with 1.5 kg stone each five hooks. To improve the catch efficiency of species that feed above the bottom, the stones of the horizontal line were removed in two "floating" sections of 75 + 75 hooks allowing these sections to get more buoyancy. The fishing gear was linked to the surface by two vertical lines and two buoys placed at the beginning and end of the horizontal line.

For the continuous recording of depth, temperature and salinity the long line was monitored with five small sensors DST centi and DST CTD able to withstand 2500 m depth. The survey area was 10.5 km north of the Cape Matxitxako (VIIIc east) in a narrow canyon of about 28 km length that decreases progressively in depth from 500 to 2.500 m.

The average duration of the haul was 7:30 hours. For the calculation of the fishing effort several categories of the hook status were recorded.

Null	(N)	Lost of bait during the hauling
Entire	(E)	Hook with bait
Eaten	(C)	with bait partially eaten
Broken	(R)	Tangled-broken hook
Empty	(V)	Empty (no catch, no bait)
With catch	(P)	with catch

The specimens were identified, measured (cm), weighted (g) and sexed on board.

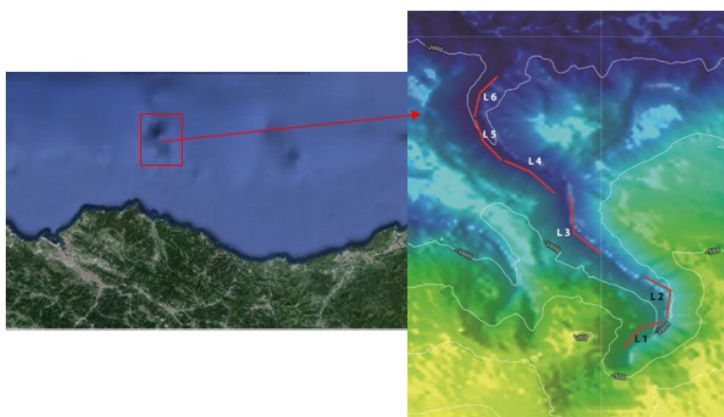
For the analysis of effort and CPUEs hauls' catches were grouped in four depth strata: 650-1050 m, 1051-1450 m, 1451-1850 m and 1851-2250 m.

The Effort in each stratum (EFFORT_{st}) was estimated as the number of hooks able to fish during the haul (P + E + C) divided by the total of hooks and multiplied by the soak time (minutes):

$$\text{EFFORT}_{st} = ((P + E + C) / \text{total hooks}) \times \text{min}$$

The Catch per Unit of Effort of each stratum (CPUEs) was calculated as the catch (kg) divided by the EFFORT_{st}:

$$\text{CPUE}_{st} = \text{kg} / \text{EFFORT}_{st}$$



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

It is not an International coordinated survey

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

Not applicable

(max 450 words per survey)

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

Results of the surveys are available through of the annual report:

G. Díez, M. Basterretxea, I Oyarzabal, E. Cuende, A. Maceira, A. Abaroa, A. Pedrajas. 2021. Campaña de palangre de profundidad para la estima de abundancia de tiburones y otras especies en la Subdivisión ICES 8c (PALPROF 2021). Informe Interno de AZTI para Dirección de Pesca y Acuicultura, Dpto. de Desarrollo Económico y Competitividad, Eusko Jaurlaritza – Gobierno Vasco., 88 pp.

In 2021, 2022 it was presented a Working Document in the ICES WGEF summarising the first six years of the survey:

Diez, G., Basterretxea M., Cuende E., Oyarzabal, I., Pedrajas, A. Abundance, biomass and CPUE of deep-water sharks in the longline survey (PALPROF) in the Bay of Biscay (ICES 8c) from 2015 to 2020. Working Document presented to the Working Group on Elasmobranch Fishes. ICES WGEF, 15th – 24th, June 2021, WG On line. 10 pp.

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

Results of abundance and biomass index (kg (in 300 hooks/min) as well as biodiversity information by depth strata have been used for a characterization of the deep-water fish fauna in the Basque Country continental slope.

The series of data have been presented and included in the Report of the ICES WGEF 2022 for the assessing the status of several deep sea shark stocks.

The data series of elasmobranch data (abundance, N° species, sex, maturity, length, position, date and haul information) have been also submitted in 2021 to data.call@ices.dk for answering the Joint OSPAR and NEAFC Request for data and metadata to be used as the basis to answer the for advice on deep sea sharks, rays and chimaeras. The aim of this request was intended to localize and record data across all countries with records on species from annex 1 from national or international coordinated surveys in order to to provide valuable

information before the ICES WGEF 2022 meeting.

7. Extended comments

Diez G, Arregi L, Basterretxea M, Cuende E, Oyarzabal I (2021). Preliminary observations on abundance and distribution of fish fauna in a canyon of the Bay of Biscay (ICES Division 8c). Journal of the Marine Biological Association of the United Kingdom 101, 169–178. <https://doi.org/10.1017/S0025315420001265>.

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Pan-Mediterranean Acoustic Survey.

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: **Pan-Mediterranean Acoustic Survey**

Acronym: MEDIAS

National Name of the research survey: **MEDIAS**

1. Objectives of the survey

The MEDIAS project started in 2009 within the cooperation of seven research Institutes from six Mediterranean Member States of the European Union. The target was to harmonize and standardize the five ongoing acoustic surveys in the Mediterranean: Gulf of Lions (IFREMER), Iberian Coast (IEO), Sicilian Channel (IAMC/MCFS), Adriatic Sea (ISMAR), and North Aegean Sea (HCMR). The general aim is to produce information on small pelagic species for management decisions and provide input to assessment for stocks which are managed internationally, principally, anchovy (*Engraulis encrasicolus*) and sardine (*Sardina pilchardus*). Surveys take place during summer, during the anchovy peak of spawning.

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 MEDIAS survey design covers the Spanish Mediterranean continental shelf (20 to 200 m depth) from the French border to Punta Europa (Strait of Gibraltar). Transects run perpendicular to the coastline/bathymetry. The inter-transect is 4 or 8 nautical miles in order to achieve the minimization of the coefficient of variation of the acoustic estimates for the target species taking into account the topography of each area. Survey is performed during the day.

A calibrated EK80 (Simrad) scientific echosounder is used, equipped with five frequencies (18, 38, 70, 120 and 200 kHz), for the collection of acoustic data. The frequency for assessment is 38 kHz, while the 18, 70, 120 and 200 kHz operate as complementary frequencies. The elementary distance sampling unit (EDSU) is 1 nautical mile. The fish density values are obtained as NASC (Nautical Acoustic Scattering Coefficient) (m²/mn²) values.

Opportunistic pelagic hauls are carried out in order to ground truth the fish echotracers detected by the echosounder. Target species of the MEDIAS surveys are anchovy and sardine, for which abundance (n° individuals), biomass (tons) are estimated by length, sex and age but biological data for all species in the pelagic community regarding length frequency distribution and length-weight relationships are also acquired. Hydrological variables are collected by CTD's.

For the next period the sampling area of the Spanish MEDIAS survey has been enlarged to the GSA05 following the recommendation of the MEDIAS SC.

National coordinator of the survey is Magdalena Iglesias (IEO-C.O. de Baleares).

[http://www.medias-project.eu/medias/website/handbooks-menu/handbooks/MEDIAS-Handbook-\(April-2021\)/](http://www.medias-project.eu/medias/website/handbooks-menu/handbooks/MEDIAS-Handbook-(April-2021)/)



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

Participating Member States: France, Italy, Greece, Slovenia, Malta, Croatia, Bulgaria, Romania and Spain/ RV. Miguel Oliver.
(<http://www.medias-project.eu/medias/website/>)

The international coordination of the survey is carried out in the “MEDIAS coordination meeting”.

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

Each participating country is responsible for the activities conducted on its national part of the international survey. There is no particular cost sharing agreement in place for this survey.

(max 450 words per survey)

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

<http://www.medias-project.eu/medias/website/>

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

Standardised data obtained has been used for tuning assessments models developed by IEO within the framework of GFCM for the most important species exploited by the purse seine fishery along the Iberian Peninsula (GSAs 1 and 6). MEDIAS data are also used for scientific papers and PhD and Master Theses.

Number and weight of all species or taxons captured during the survey and mean yields of most abundant species were estimated. Sheets including mean standardized abundance and biomass and length frequency distribution during 2022 survey were also prepared, including a summary of historical data series for density and size indicators. Its is included in the national report.

7. Extended comments

During the MEDIAS 2022 acoustic evaluation survey carried out in the waters of the Spanish continental shelf in the Mediterranean Sea, in order to evaluate the sardine and anchovy stocks of GSA06 and 01, the research vessel Miguel Oliver had motor propulsion problems, which did not allow it to work properly during the first part of the survey (the speed of the boat did not exceed 7.9 knots and the identifying fishing hauls could not be carried out). This fact caused the loss of 8 days of the survey, since they had to sail to Barcelona to collect the necessary pieces to repair the engine. GSA06 could be covered in entirety, but the number of days remaining in the survey allowed to cover only a part of GSA0. It was decided to survey the bays of Almería and Málaga, since they are the areas where sardines and anchovies are concentrated. Likewise, and due to a B/O calendar problem, the survey began on July 10, ending in mid-August. The anchovy spawning peak in this area is July, so it is important to keep the sampling dates.

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

International Bottom Trawl Survey in the Mediterranean.

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: **International Bottom Trawl Survey in the Mediterranean**

Acronym: MEDITS

National Name of the research survey: **MEDITS**

1. Objectives of the survey

Main objective is to evaluate the abundance and distribution of stocks, independently of the data provided by commercial fisheries, and to assess the impact of the fishing activity on the environment. Specific objectives:

- To get standardized indices of abundance and biomass of demersal species
- To know their geographic and bathymetric distribution.
- To describe their demographic structure.
- To collect biological data of the target species.
- To get data on temperature and salinity of water masses where these species are distributed.

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 is developed along the Spanish Mediterranean: GFCM GSAs 1 (Northern Alboran), 2 (Alboran Island), 5 (Balearic Islands) and 6 (Northern Spain). Only Mallorca and Menorca have been surveyed in GSA5, but in 2021 an additional survey has been made in Ibiza and Formentera to cover the whole GSA 5.

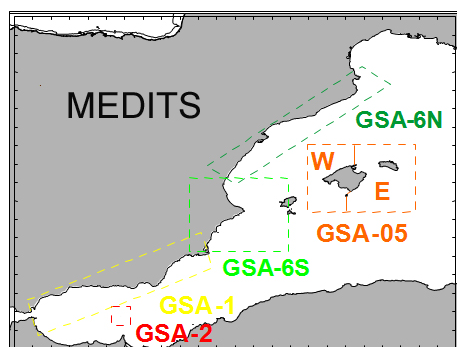
Sampling follows a stratified scheme, according to depth limits: 30, 50, 100, 200, 500 and 800 m. Hauls duration is 30 and 60' at <200 and >200 m depth, respectively. Hauls are performed during daylight.

Surveys have been developed in April-June (55 days), on board the research vessel Miguel Oliver (70 meters long, 14 meters wide, 2495 TRB and 2000 KW). The additional survey around Ibiza and Formentera islands has been made with this vessel in August 2021 (10 days).

The gear used is the GOC-73 bottom trawl, designed for experimental fishing. MARPORT is used to estimate horizontal and vertical net openings and effective duration of sampling. The water temperature and salinity is recorded with a CTD SBE-37 coupled to the net.

https://www.sibm.it/MEDITS%202011/docs/Medits_Handbook_2017_version_9_5-60417r.pdf

<https://www.sibm.it/MEDITS%202011/principaleprogramme.htm>



The data are stored in the IEO database SIRENO. Five file types are defined in order to store and exchange the data:

- TA: Haul Characteristics
- TB: FAul Catches
- TC: Length, sex, and maturity at aggregated level

•TE: Age weight and maturity by length at individual level

•TL: marine litter data.

The national coordinator of the MEDITS survey is Enric Massutí (IEO Baleares). The regional coordinators are Cristina García (IEO Málaga) for GSA01 and GSA02, Antonio Esteban (IEO Murcia) for GSA06 and Beatriz Guijarro (IEO Baleares) for GSA05.

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

Participating Member States: Albania, Cyprus, Spain, France, Greece, Croatia, Italy, Malta, Montenegro and Slovenia. For the list of vessels, see Annex I of the Medits Handbook_v9.

The international coordination of the survey is carried out during the annual "MEDITS coordination meeting".

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

Each participating country is responsible for the activities conducted on its national part of the international survey. There is no particular cost sharing agreement in place for this survey.

(max 450 words per survey)

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

The last MEDITS Coordination Meeting took place in Ljubljana (Slovenia) on 24 and 25 October 2022. The report is not yet available.

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

Standardised data obtained has been used for tuning assessment models XSA (Extended Survivors Analysis) and a4a (Statistical Catch at Age) developed by IEO within the framework of GFCM WG for Demersal Stock Assessment, for the most important species exploited by the trawl fisheries along the Iberian Peninsula (GSA1 and 6) and Balearic Islands (GSA5).

MEDITS data are also used for scientific papers, contributions to congresses, PhDs and Master theses, as well as in several projects funded at national and European level.

Number and weight of all taxons captured during the survey and mean yields were estimated. Sheets including mean standardized abundance and biomass and length frequency distributions were also prepared. This information is part of the National Reports and the Outline Reports, presented to the Secretaría General de Pesca (National Authority of the DCF) and to the annual MEDITS coordination meeting, respectively:

7. Extended comments

The 2022 Spanish MEDITS survey was performed from 6 May to 5 July covering GSA1 (Northern Alboran), GSA2 (Alboran Island), GSA5E (Mallorca-Menorca in Balearic Islands), and GSA6 (Northern Spain) and from 13 to 20 August (total of 66 days) covering GSA5W (Ibiza-Formentera in Balearic Islands), on board of the R/V *Miguel Oliver* and according to the standardised stratified depth strata: 30-50, 51-100, 101-200, 201-500 and 501-800 m. A total of 286 valid trawl hauls (60 in GSA1, 8 in GSA2, 34 in GSA5W, 65 in GSA5E and 119 in GSA6) were performed by several scientific teams of the IEO. One haul in GSA1 was considered null.

The following two tables summarize some data collected during the survey:

GSA	Total catches		Number of species/taxa identified			
	Individuals*	Weight (kg)	Fishes	Crustaceans	Molluscs	Other invertebrates and Algae
1	410530	7489	144	57	64	91
2	28088	852	68	28	27	32
5E	363746	8480	155	55	50	185
5W	226289	4799	116	51	44	149
6	591516	7601	157	75	60	88

(*) Not including algae and some colonial species.

GSA	Number of individuals/samples
-----	-------------------------------

	Length frequencies	Biological sampling	Otoliths and Illicia
1	38063	8244	784
2	5987	883	7
5E	41349	8215	586
5W	24717	6216	447
6	76592	12259	1314

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Bluefin Tuna Larval Survey.

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: **Bluefin Tuna Larval Survey**

Acronym: TUNIBAL

National Name of the research survey: **TUNIBAL**

1. Objectives of the survey

Main objective: developing a fishery-independent abundance index for the spawning biomass and the recruitment of Atlantic bluefin tuna and Mediterranean albacore in their major spawning area in the Balearic Sea to be used in assessment models.

Secondary objectives include:

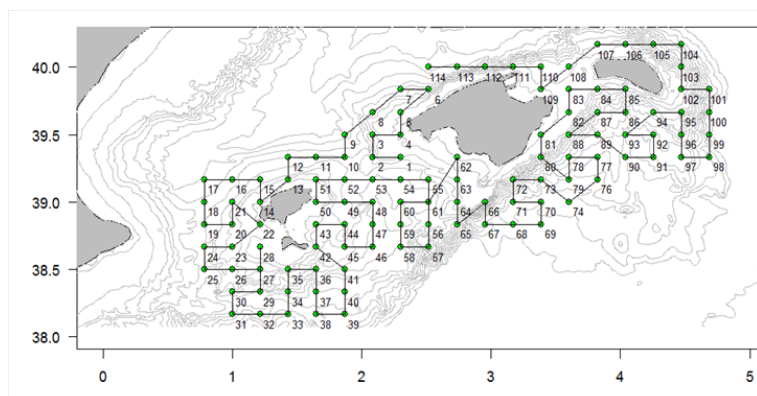
- Determine the influence of hydrographic scenarios on the structure, distribution and abundance of larval populations of large and medium pelagic species with special attention to the targeted species.
- Completing the database for the development of habitat models for the tuna species, models based on data taken in-situ by hydrographic profiles. The models are used to calibrate the fishery-independence abundance indices
- Estimate the viability of the survey to estimate fishery-independent abundance indices for other tuna species in the Balearic Sea
- Deepening knowledge about growth, trophic ecology (interactions predator prey), survival and the genetic structure of larval populations of bluefin tuna and related species in the Balearic Sea.
- Determining the processes that determine planktonic productivity and biodiversity in the Balearic Sea
- Improve inter-calibration of quantitative sampling carried out with different plankton samplers
- Compare fishery-independent indices for the bluefin tuna eastern stock and the albacore in the Mediterranean with indices developed for the western and Atlantic stocks

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 methodology used to estimate the abundance of tuna larvae includes

In all stations, an oblique plankton fishing between 0 and 30 meters, with Bongo 20 networks equipped with meshes of 55 and 200 microns and mounted above the structure of the Bongo 90 equipped with meshes of 500 microns is conducted. All networks are equipped with flow meters. To know precisely the depth of departure and the relative position of the plankton nets with respect to the vessel we will use an Acoustic Positioning System. Fishing will be carried out using a 4 mm steel cable, maintaining the speed of the ship at 2 knots. Additionally, in positive stations for bluefin tuna larvae are carried using other samplers. Besides, in each station a hydrographic profile with a CTD mounted in the rosette, is conducted between 0 and 350 or 650 meters. In standard stations, Niskin bottles will be sampled at depths of 5, 25, deep chlorophyll maximum, 200, 500, the LIW (maximum salinity). The methods are standardized with NOAA and University of Miami (USA).

The area coverage includes a grid of stations covering the major spawning area of tuna species in the Balearic Sea.



The methodology is detailed in:

Ingram W. Jr., Álvarez-Berastegui D., Reglero P., Balbín R., García A., Alemany F. 2017. Incorporation of habitat information in the development of indices of larval bluefin tuna (*Thunnus thynnus*) in the Western Mediterranean sea. *Deep Sea Research Part II: Topical Studies in Oceanography*, 140: 203-211. <https://doi.org/10.1016/j.dsr2.2017.03.012>

Álvarez-Berastegui D., Saber S., Ingram W.G.Jr, Díaz-Barroso L., Reglero P., Macías D., García-Barcelona S., Ortiz de Urbina J., Tintoré J., Alemany F. 2018. Integrating reproductive ecology, early life dynamics and mesoscale oceanography to improve albacore tuna assessment in the Western Mediterranean. *Fisheries Research*, 208C (2018) pp. 329-338. <https://doi.org/10.1016/j.fishres.2018.08.014>

Alemany, F., Quintanilla, L., Velez-Belchí, P., García, A., Cortés, D., Rodríguez, J. M., Fernández de Puelles, M. L., González-Pola, C., López-Jurado, J. L. 2010 Characterization of the spawning habitat of Atlantic bluefin tuna and related species in the Balearic Sea (western Mediterranean). *Prog. Oceanogr.* 86, 21–38. (doi:10.1016/j.pocean.2010.04.014)

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

The survey is coordinated by IEO (Patricia Reglero and Diego Alvarez). Scientists from SOCIB (Spain), University of Bergen (Norway) and other institutions are invited to participate. It is being discussed the possibility of conducting acoustic sampling of spawners in collaboration with ICCAT.

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

Not applicable

(max 450 words per survey)

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

<https://doi.org/10.20350/digitalCSIC/15277>

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

Samples have been collected but analyses are still ongoing. Abundance estimates and environmental indicators will be provided to the SCRS of bluefin tuna and albacore at ICCAT when available. During the SCRS of bluefin tuna in 2022 an update of the larval abundance index for 2022 has been presented (SCRS/2022/071).

A map of the route followed during hydrographic and plankton sampling (Figure 10) and a map of CTD data used (figure11,12,13) are included in Annex 2.6.

7. Extended comments

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Nephrops UWTV Survey.

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.

ame of the research survey: **Nephrops UWTV Survey (FU 30)**

Acronym: UWTV30

National Name of the research survey: **ISUNEPCA**

1. Objectives of the survey

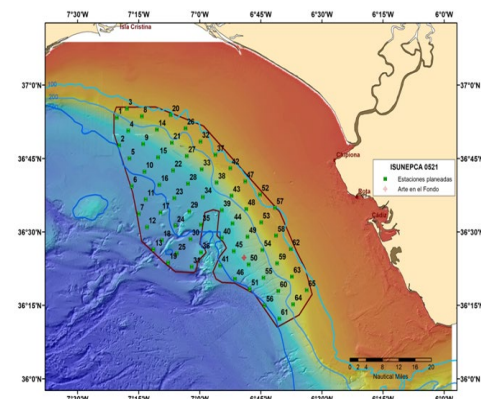
- To obtain estimates of *Nephrops* burrows densities in the Gulf of Cádiz from a randomized isometric grid of UWTV stations spacing 4 nautical miles using the underwater images.
- To define the *Nephrops* distribution in the Gulf of Cadiz
- To obtain density estimates of benthic-demersal macrofauna species and the occurrence of trawl marks on the sea bed
- To calibrate benthic-demersal macrofauna observed in the underwater videos and those obtained in the beam trawl.
- To measure oceanographic variables using a sledge mounted CTD

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.

Manual for *Nephrops* Underwater TV Surveys, coordinated under ICES Working Group on *Nephrops* Surveys (WGNEPS)

[https://www.ices.dk/sites/pub/Publication%20Reports/Cooperative%20Research%20Report%20\(CRR\)/CRR340.pdf](https://www.ices.dk/sites/pub/Publication%20Reports/Cooperative%20Research%20Report%20(CRR)/CRR340.pdf)

The UWTV survey design follows a randomized isometric grid of stations at 4 nm spacing. The stations ranged from 130-650 m depth with an average depth around 410 m. Additionally, stations located on the shallower edge of the study area are considered in order to verify the boundary of the *Nephrops* distribution. The sledge, once stable on the seabed, is towed at between 0.6-0.7 knots in order to obtain the best possible conditions for counting burrows and 10 good minutes are recorded. This time corresponds to 200 m swept, approximately. HiPAP transponder on the sledge is used to obtain the sledge position. The distance over ground estimate (DOG) is calculated using the sledge position and the field of view of the video footage is 75 cm (FOV), which was confirmed using line lasers.



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

UK-Scotland/Scotia; UK/Endeavour; AFBI/Corystes; Ireland/Celtic Explorer, Celtic Voyager; France/Celtic Voyager; Denmark/Havfisker; Sweden/Asterix; Spain/Ángeles Alvaríño, Ramón Margalef

Relevant international planning group: WGNEPS_ICES Working Group of *Nephrops* Surveys.

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

Individual tasks to the survey participants are allocated by the responsible ICES survey planning group. Each participating country is

responsible for the activities conducted on its national part of the international survey. There is no particular cost sharing agreement in place for this survey.

(max 450 words per survey)

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

UWTV surveys design and methodologies have been developed and standardized by the Expert Group on Nephrops surveys (WGNEPS) which have been adopted in UWTV survey (ISUNEPCA). The following link corresponds to the 2022 report.

https://ices-library.figshare.com/articles/report/Working_Group_on_Nephrops_Surveys_WGNEPS_outputs_from_2022_meeting_/22211161

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

The Nephrops abundance estimates obtained in UWTV30 survey (ISUNEPCA) are used by ICES Working Group for the Bay of Biscay and Iberian waters Ecoregion (WGBIE) to provide a fishery independent estimate of the stock size, exploitation status and catch advice for Nephrops in FU 30 (ICES Division 9a, Gulf of Cadiz). Beam trawl results were used to know the presence of other burrowing megafauna which co-occurring with Nephrops and that could be source of confusion in the identification of Nephrops burrows. Environmental sampling are used to characterize the Nephrops habitat. Results are also presented in the Working Group on Nephrops surveys (WKNEPS) that is the coordination group for Nephrops UWTV and trawl surveys within ICES and has a quality assurance and development role.

A map of the video stations carried out (Figure 14) was included in Annex 2.6.

7. Extended comments

A new UWTV30 survey area was established in the WGBIE 2023 (ICES, 2023) since nowadays new and more accurate information is available. The information used for this purpose are:

- The Andalusia Regional Government monitoring system instead traditional VMS,
- information obtained from the bottom trawl survey index time series (SpSGFS-cspr-WIBTS-Q1 (G7511) and SpGFS-caut-WIBTS-Q4 (G4309)) (1994-2020 period),
- beam trawl and sediment samples obtained in the ISUNEPCA UWTV survey (U9111) during 2017–2019,
- more detailed seabed morphology information and new information about the relationship between sediments and habitats in the Gulf of Cadiz.

The new area coverage is 2332,13 Km² (approximately 22% less than the current area). A new sampling grid with stations spacing 3.5 nm, instead 4 nm used currently, is also modified to ensure good coverage and accurate burrow surfaces. Technical problems between the sledge and the oceanographic vessel's cable resulted in large losses of time that affected the number of video stations carried out during the survey. Due to lack of time only could be realized 71 dives. CTD failed during the survey so the oceanographic data could not be recorded

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Western IBTS 1st quarter.

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: **Western IBTS 1st quarter (Not mandatory survey)**

Acronym: IBTS_Q1

National Name of the research survey: **Arsa-primavera**

1. Objectives of the survey

- Estimate distribution and relative abundance of the main commercial species and provide recruitment indices
- Estimate changes in the stocks of commercial fish species independently of commercial fisheries data
- Monitoring of distribution and relative abundance of all fish and invertebrates species
- Collect data for the determination of biological parameters for selected species
- Collect hydrographical and environmental information.

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.

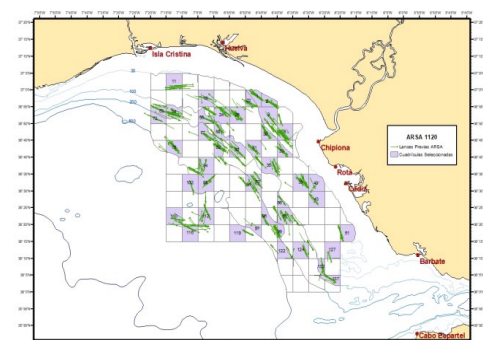
Manual for the International Bottom Trawl Surveys

[https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20\(SISP\)/SISP%2010%20%E2%80%93%20Revision%202011_Manual%20for%20the%20North%20Sea%20International%20Bottom%20Trawl%20Surveys.pdf](https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Survey%20Protocols%20(SISP)/SISP%2010%20%E2%80%93%20Revision%202011_Manual%20for%20the%20North%20Sea%20International%20Bottom%20Trawl%20Surveys.pdf)

The whole area (7224 km²) has been separated into five depth strata (15-30, 31-100, 101-200, 201-500 and 501-800 m). The sampling design is random stratified with proportional allocation with a total of 45 fishing stations and swept-area method.

Length distribution of all fish and main species of crustacean and cephalopods are collected and biological parameters are obtained in the most important commercial species

Temperature and salinity are collected during each tow with a CTD attached to the gear. A CTD by haul will be carried out in the survey area.



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

UK-Scotland/Scotia; UK-North Ireland/Corystes; Ireland/Celtic Explorer; France/Thalassa; Spain/Miguel Oliver; Portugal/Mar Portugal.

Relevant international planning group: IBTSWG-International Bottom Trawl survey Working Group of ICES

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

Individual tasks to the survey participants are allocated by the responsible ICES survey planning group. Each participating country is responsible for the activities conducted on its national part of the international survey. There is no particular cost sharing agreement in place for this survey.

(max 450 words per survey)

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

Relevant international planning group: IBTSWG-International Bottom Trawl survey Working Group of ICES

https://ices-library.figshare.com/articles/report/International_Bottom_Trawl_Survey_Working_Group_IBTSWG_/20502828

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in

which context the results are used (on a routine basis), both in international and national context.

Data obtained are used for assessment models of groundfish on the South Platform within the ICES WGBIE, especially the southern stock of hake (*Merluccius merluccius*), and Norway lobster (*Nephrops norvegicus*) on the Iberian continental shelf. Moreover, survey data are provided to WGCEPH of cephalopods species like octopus (*Octopus vulgaris*), cuttlefish (*Sepia officinalis*) and squid (*Loligo vulgaris* and *Loligo forbesii*), to WGEF of assessment of elasmobranch species (*Galeus melastomus*, *Scyliorhinus canicula*, *Etmopterus spinax*, rays...) and to WGWIDE to provide information for the assessment of blue whiting (*Micromessistius poutassou*), North Eastern Atlantic mackerel (*Scomber scombrus*), horse mackerel (*Trachurus trachurus*) and boarfish (*Capros aper*). They are also used in the calibration of assessments of the southern stocks of horse mackerel on 9a (*Trachurus* spp.) anchovy (*Engraulis encrasicolus*) and mackerel (*Scomber* spp.) to WGHANSA.

A map of the sampling hauls carried out (Figure 15) is included in Annex 2.6

7. Extended comments

The number of valid hauls was 45 (44 valid) (no deviations), 153 species of fish, 52 of crustacean and 52 of mollusca were recorded during the survey. Length distribution of all fish and main species of crustacean and cephalopods were recorder. Biological samples were studied for the most important species. 45 CTD casts were carried out in the survey area.

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Anchovy DEPM (triennial)

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: **Anchovy DEPM (triennial). (Not mandatory survey)**

Acronym: -

National Name of the research survey: **Bocadeva**

1. Objectives of the survey

The main objective of BOCADEVA series is the estimation of spawning stock biomass (SSB) of Anchovy (*Engraulis encrasicolus*), based on the application of the Daily Egg Production Method (DEPM)

- To estimate the extension of Anchovy Spawning area in the Gulf of Cadiz.
- To estimate the Daily egg production (Po) and total production (Ptotal) of Anchovy in the Gulf of Cadiz.
- To determine the egg distribution area and density of other commercial species
- To characterize oceanographic and meteorological conditions in the study area during the survey

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.

Manual Pelagic survey series for sardine and anchovy in ICES subareas 8 and 9.

[https://www.ices.dk/sites/pub/Publication%20Reports/Cooperative%20Research%20Report%20\(CRR\)/CRR%20332.pdf](https://www.ices.dk/sites/pub/Publication%20Reports/Cooperative%20Research%20Report%20(CRR)/CRR%20332.pdf)

Vertical sampling (PairoVET)

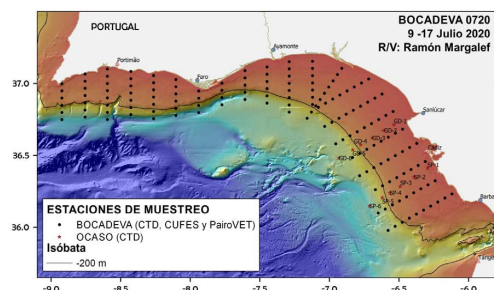
The sampling grid is established on the continental shelf following a systematic sampling scheme, with the 21 transects being perpendicular to the coast and equally spaced 8 nm. Egg samples are taken every 3 nm in the inner shelf (ICES, 2003). The inshore limit of transects is determined by bottom depth (as close to the shore as possible), while the offshore extension is decided adaptively depending on the results

of the CUFES sample.

Vertical hauls are carried out with a PairoVET sampler equipped with nets of 150 µm of mesh size. Hauls are carried out up to a maximum depth of 100 m or of 5 m above the bottom in shallower depths, (speed of about 1 m/s). Flowmeters are used to calculate the volume of filtered water during each haul. Egg samples are analysed onboard. A preliminary identification and counting of anchovy eggs and larvae, as well as other commercial species is carried out. Samples are sorted, counted and preserved in a 4 % buffered formaldehyde solution. Anchovy eggs are classified in 11 developmental stages, according to the key proposed by Moser and Ahlstrom (1985).

Continuous sampling (CUFES)

During the CUFES sampling (Checkley et al., 2000) the volume of filtered water (600 l/min, approximately) is also integrated each 3 nm (at a fixed depth of 5 m). The CUFES collector was arranged with a 335 µm net. Anchovy eggs were classified in three stages: No-Embryo (I-III), Early Embryo (IV-VI) and Late Embryo (VII-XI).



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

Spain/RV.Ramon Margalef; Portugal/

WGACEGG:Working Group on Acoustic and Egg Surveys for small pelagic fish in Northeast Atlantic

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

Not applicable.

(max 450 words per survey)

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

Triennial survey. Next in 2023 and 2026.

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

7. Extended comments

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Acoustic Survey on Sardine and Anchovy-Recruits.

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: **Acoustic Survey on Sardine and Anchovy-Recruits (Not mandatory surveys)**

Acronym: -

National Name of the research survey: **ECOCADIZ-reclutas**

1. Objectives of the survey

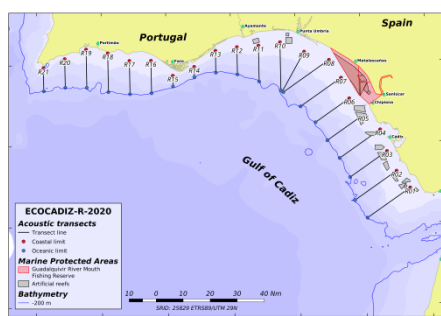
- To estimate by hydroacoustics (echo-integration) and map the abundance and biomass of the main neritic pelagic species inhabiting the Gulf of Cadiz shelf waters, especially in those waters considered according to previous studies as recruitment areas of the Gulf of Cadiz anchovy and sardine.
- To characterize the biology of the above species in relation to their main habitats (especially according to the size composition and/or age structure, and to the maturity, repletion and condition stages.
- To estimate the abundance and biomass of the juvenile fraction (age 0 fish) of anchovy and sardine in the surveyed area.
- To detect, identify and capture those echo-traces corresponding to anchovy (and sardine) recruits in the insonified water column.
- To delimit the extension of anchovy (and sardine) recruitment area in the surveyed area from the spatial distribution of this population fraction.
- To oceanographically characterize the surveyed area.

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.

Manual for Acoustic Surveys Coordinated under ICES Working Group on Acoustic and Egg Surveys for small pelagic fish in NE Atlantic (WGACEGG)

[https://www.ices.dk/sites/pub/Publication%20Reports/Techniques%20in%20Marine%20Environmental%20Sciences%20\(TIMES\)/TIMES64.pdf](https://www.ices.dk/sites/pub/Publication%20Reports/Techniques%20in%20Marine%20Environmental%20Sciences%20(TIMES)/TIMES64.pdf)

Acoustic estimation of the abundance and biomass of the survey target species during daylight, along to a systematic grid composed by (21) transects, between 20 – 200 m isobaths, 8 nm-equally spaced and normal to the shoreline, with a Simrad™ EK-60 scientific echosounder working in a multi-frequency fashion (18, 38, 70, 120 and 200 kHz; ICES CRR 332, *Massé et al.*, 2018; ICES, 2021). Since 2018 on, the EK-60 echosounder was replaced by the EK-80 one. The echo-traces identification, size and age composition and other biological aspects of the assessed species are obtained from the results from opportunistic ground-truthing fishing hauls. Backscattering energy attributed to fish species after scrutinisation of the echograms. Biomass estimates using echointegration method. Hydrographic characterization of the surveyed is carried out by night through the sampling of a systematic grid of discrete CTD (with coupled multisensors)-LADCP casts and along-transect sub-superficial continuous sampling with VMADCP and TSG-F. The climatic characterization of the surveyed area was obtained from the analysis of continuous records of weather variables by an *Aanderaa* weather station.



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

Spain/ RV Ramon Margalef,

WGACEGG: Working Group on Acoustic and Egg Surveys for Small Pelagic Fish in NE Atlantic.

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

Not applicable

(max 450 words per survey)

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

ICES WGACEGG 2022 meeting report not yet available. Link to the 2021 report: https://ices-library.figshare.com/articles/report/Working_Group_on_Acoustic_and_Egg_Surveys_for_small_pelagic_fish_in_NE_Atlantic_WGACEGG_outputs_from_2020_meeting_/18618404. A presentation containing the 2022 survey results (only preliminary information) is uploaded in the WGACEGG 2022 sharepoint: <https://community.ices.dk/ExpertGroups/wgacegg/layouts/15/start.aspx#/2022%20Meeting%20Documents/Forms/AllItems1.aspx?RootFolder=%2FExpertGroups%2Fwgacegg%2F2022%20Meeting%20Documents%2F05%2E%20Presentations&FolderCTID=0x012000F56FB0330418724BBA5F50F2CF2A2A05&View=%7BA48D26EE%2D0917%2D4461%2DA40D%2DF844D5CADA3C%7D>.

The current name of ICES WGACEGG is *Working Group on Acoustic and Egg Surveys for small pelagic fish in NE Atlantic*.

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

Survey's data and estimates are utilized in the ICES expert groups of both stock assessment of pelagic fish species (WGHANSA, WGWIDE, WKCOLIAS) and acoustic and egg surveys for small pelagic fish in NE Atlantic (WGACEGG). The latter group reviews the results and establishes standardized protocols to properly conduct both this survey and other ones of similar methodology in the above ICES areas. The acoustic estimates from this series are of a special importance for anchovy in Division 9a and sardine in 8c-9a stocks, since they provide a direct estimate of the recruitment (age-0 fish) of these species in one of their main recruitment areas. Although the series is still short is expected that in a few years may be included in the respective stock assessments.

Maps showing the achieved research survey sampling activities (Figure 16 and 17) are presented in Annex 2.6.

7. Extended comments

The survey was conducted on board R/V *Ángeles Alvariño* since the R/V *Ramón Margalef*, routinely used in this survey series, was not available because maintenance works at shipyard. The adjustment of the survey to the *Ángeles Alvariño*'s surveys calendar entailed a reduction of 3 days (14 days at sea) in relation to the usually planned days (17 days at sea). Half working day was also invested in engine repair at port. Because such limitations the acoustic equipment was not calibrated (the calibration values obtained in the previous survey were used instead), neither the evaluation of vessel's self-noise was carried out, nor the sampling of the RH03 transect of CTD-LADCP stations. The number of pelagic trawl fishing hauls was also lower than usual. This year, however, a top predator census by an onboard observer was carried out for the first time in the series.

ECOCADIZ and ECOCADIZ-RECLUTAS surveys protocols are detailed in Doray *et al.* (2021; Doray, M., Boyra, G., and van der Kooij, J. (Eds.). 2021. ICES Survey Protocols – Manual for acoustic surveys coordinated under the ICES Working Group on Acoustic and Egg Surveys for Small Pelagic Fish (WGACEGG). 1st Edition. *ICES Techniques in Marine Environmental Sciences* Vol. 64. 100 pp. <https://doi.org/10.17895/ices.pub.7462>).

At present there is no a relevant international database to upload the survey series data. Detailed and aggregated data are available to scientific community. Estimates are provided to WGACEGG, WGHANSA, WGWIDE and WKCOLIAS, both graphically and in a tabulated way, in their reports. Additional working documents (i.e. survey reports) containing more detailed information are also presented in these WGs. WGACEGG is generating a common database (grid maps and grid files of: NASC by species, Eggs sampled by CUFES, oceanographic variables; species composition of hauls) from surveys under its scope (IFREMER, IPMA, AZTI and IEO). At a national scale, survey data are stored in the SIRENO database.

(max. 450 words per survey)

Text Box 2.6: Research surveys at sea

Acoustic index for juvenile bluefin tuna in the Bay of Biscay)

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: **Acoustic index for juvenile bluefin tuna in the Bay of Biscay (Not mandatory surveys)**

Acronym: -

National Name of the research survey: **BFT-index**

1. Objectives of the survey

Main objective: developing a fishery-independent abundance index for juvenile bluefin tuna in the Bay of Biscay.

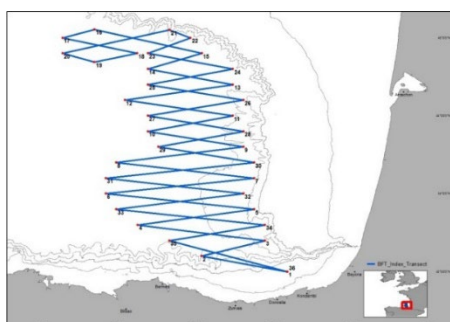
- Secondary objectives include:

- Analysing the geographical distribution of bluefin tuna schools in the Bay of Biscay,
- Assessing the size distributions in each tuna school detected in the Bay of Biscay,
- Identifying differential geographical distribution of tunas of different size classes in the Bay of Biscay,
- Studying the interactions between bluefin tunas and their main prey (anchovy) in the Bay of Biscay, as well as inter-specific interactions between marine birds and sub-superficial predators.
- Acoustic identification of bluefin tuna behavior within schools in the Bay of Biscay.

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 methodology used to estimate the abundance of juvenile bluefin tuna is an acoustic survey following systematic transects, using long-range omnidirectional sonar as a detection tool and an EK60 echosounder to measure school dimensions and estimate biomass.

The identification and sizing of tunas is obtained by pole-and-line fishing and release and by a stereoscopic camera. Acoustic data processing is performed by both layer echo-integration, for schools observed during sampling fishing events, and school echo-integration for schools observed during transects without stopping the vessel. In the first case, the data are post-processed so as to keep only pings containing acoustic backscattering corresponding to tuna aggregations, by keeping only non-zero echointegration pings. This produces an along-track compacted echogram from which we obtain the mean density of the school calculated as the mean of the volume backscattering coefficient (sv; MacLennan et al 2002) of the non-zero pings. The shape of the schools is assumed to be a revolution ellipsoid with horizontal isotropy, i.e., with circular horizontal cross section. Details of the methodology of the surveys were described in "Goñi N, Onandia I, Lopez J, Arregui I, Uranga J, Melvin G D, Boyra G, Arrizabalaga H, Santiago J, 2016. Acoustic-based fishery-independent abundance index of juvenile bluefin tunas in the bay of biscay: 2015 and 2016 surveys. SCRS/2016/137, 15 p." and in "MacLennan, D.N., Fernandes, P.G., Dalen, J., 2002. A consistent approach to definitions and symbols in fisheries acoustics, ICES J. Mar. Sci. 59, 365-369."



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

The survey is coordinated by AZTI. Scientists from DFO Canada took part in the 2016 survey, and scientists from Ifremer, France, will be invited to participate in the survey every year. The possibility of organizing a parallel survey for juvenile bluefin tunas in the Gulf of Lions is being discussed with Ifremer scientists.

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

Not applicable

(max 450 words per survey)

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

Goñi N, Uranga J, Arregui I, Martinez U, Rico I, Onandia I, Boyra G, Santiago J (2022). Datos independientes de pesquerías de atún rojo:

EP BFT Index - índice acústico de juveniles de BFT en el Golfo de Vizcaya 2022. Informe Final para GOBIERNO VASCO, Departamento de Desarrollo Económico e Infraestructuras - Viceconsejería de Agricultura, Pesca y Políticas Alimentarias.

6. List the main use of the results of the survey (e.g. indices, abundance estimates, environmental indicators). Specify in which context the results are used (on a routine basis), both in international and national context.

The main use of the results of the survey is to build an acoustic-based, fishery-independent index to be used in the assessment of the Eastern Atlantic and Mediterranean bluefin tuna stock by ICCAT. The need for fishery-independent abundance indices is growing, in a context of highly altered fishing strategies following TAC reductions, and as in this region the only juvenile abundance index for bluefin tuna so far is based in baitboat catches, i.e. sensitive to tuna vertical distribution and feeding behavior. After gathering 8 years of survey (started in 2015) we hope to provide an abundance index for the stock assessment.

The results were presented in the bluefin species group of the SCRS species groups meetings in 2015, in the bluefin species group intersessional meeting in 2016, and in the bluefin species group of the SCRS species groups meetings in 2018, 2019 and 2021. Due to the shortness and different focus of the SCRS bluefin tuna group meeting in 2020, it was not presented at that occasion. Likewise, an analysis based on data collected during the BFT Index survey was submitted for presentation at the ICES Annual Science Conference, but this conference was postponed to 2021.

https://www.iccat.int/Documents/CVSP/CV073_2017/n_6/CV073062044.pdf

https://www.iccat.int/Documents/CVSP/CV072_2016/n_7/CV07201862.pdf

https://www.iccat.int/Documents/CVSP/CV075_2018/n_6/CV075061399.pdf

https://www.iccat.int/Documents/CVSP/CV076_2019/n_2/CV076020455.pdf

https://www.iccat.int/Documents/CVSP/CV079_2022/n_3/CV079030141.pdf

7. Extended comments

The summer 2022 was characterized by a lower abundance of bluefin tunas in the area compared to historical series. Size measurement were made through the omnidirectional high resolution sonar Simrad M3i, to complete sampling by fishing. An important aggregation of adult fish was detected out of survey transects very close to the shore, while only fish up to 3 years old were detected in the survey transects themselves, which underlines the patchiness of bluefin tuna spatial distribution. This observation gives a new perspective to interpret the absence or scarcity of certain age classes in some editions of the campaign: the most probable cause of their absence or scarcity is the spatial heterogeneity of the distribution of bluefin tuna. The high abundance of albacore tuna found in the area may affect the presence of bluefin tuna, this fact will be further investigated.

(max. 450 words per survey)

Section 3: Fishing Activity Data

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 on representative samples where data are not to be recorded under the 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 in case complementary data collection is planned

Explain the reasons for implementing complementary data collection

Data are recorded under the Control Regulation (EC) No 1224/2009. No complementary data collection is planned.

(max. 900 words)

Deviations from the work plan

No deviation.

Actions to avoid deviations

Not applicable.

(max. 900 words)

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.

MS is invited to describe inland eel commercial fisheries landings, effort and capacity data collection. Please list or describe e.g. number of fishing entities, fishing methods as well as associated units used.

The only diadromous species with a commercial fishery is the eel. The autonomous regions are in charge of the management of the fishery in inner waters (including coastal waters). - Each autonomous region has its own way of managing the stock; different fishing techniques are allowed and the data gathering is performed differently.

EMU_ES_Asturias (EMU_ES_Astu)

The only diadromous species with a commercial fishery is the eel. There is only glass eel commercial fishery. The Asturian regional administration is in charge of the management of the fishery in inner waters (including coastal waters). Glass eel fishermen (boat and land licenses) are asked to record daily the glass eel catches (kg) and the fishing effort data (fishing hours), fishing area and market place. This information is received from Nalon river (catches sold at Cudillero and San Juan de la Arena guilds), from Tinamayor exploitation plan (Deva and Cabra rivers whose catches are sold at Bustio guild) and from the free zone (rest of rivers).

EMU_ES_Galicia (EMU_ES_Gali)

Only one management unit has been defined in the Galicia-Costa RBD, in which recreational fishing activity has been completely forbidden. Yellow and silver eel fishery is performed from boat using a limited number of gears. The boats need a specific license for the fishing gear that will be used in each fishing trip. They might have more than one fishing gear license, but only one of them can be used in each fishing operation. According to the resolution that allows eel fishing in the Arousa, Ferrol and Vigo Rivers ("Resolución do 23 de decembro de 2010, da Dirección Xeral de Ordenación e Xestión dos Recursos Mariños, pola que se autoriza o plan de pesca de anguía para as confrarías de pescadores das rías de Arousa, Ferrol e Vigo" publicado no DOG nº 251 de 31 de diciembre de 2010), the maximum number of sieves is 80, and the fishing period is limited from the 1st of February to the 29th of October. Nowadays, there are 66 boats allowed to fish using the 'butrón' sieve, but only 37 of them are active nowadays. Regarding the 'anguila' sieve, there are 41 boat licenses but this gear has been practically abandoned, and there is only 1 boat currently working with it.

Miño-Sil RBD is one of the most important eel fishing areas in Spain. The Miño River is the most important fishing point. The lower part of the Miño River limits the border of Spain and Portugal and for that reason the permanent International Commission of the Miño is responsible for the management of this part of the River. The catches are established using auctions data from the different fishermen guilds, which are assigned to a determined river basin. In the Galician fishermen guilds, yellow and silver eel catches are not split up. The estuaries are considered basins themselves because of their size, and are managed as basin units. In this way, the estuaries listed below contain catches data from the following fishermen guilds:

- Arousa Estuary: Cambados, Carril, and Rianxo fishermen guilds.

- Eo River: Asturians fishermen guilds.
- Ferrol Estuary: Barallobre, Mugardos and Ferrol fishermen guilds.
- Pontevedra Estuary: Pontevedra fishermen guilds.
- Vigo Estuary: Arcade and Redondela fishermen guilds.

Data from the Miño River are collected from the Miño River Command. Two thirds of the river basin drainage area is located inside the autonomous region of Galicia. The rest of the area is located among Asturias and Castilla-León autonomous regions of Spain, whilst a little part of the lower basin belongs to Portugal. Eel fishing is regulated according to the autonomous region where fishing is carried out. There is an international stretch of Miño between Spain and Portugal. There, the eel fishing is professional and land fishing is allowed only if sieves are used. The conic tackle was allowed only for 2 years after the publication of the regulation of the international stretch of Miño and until the sand barrier of the Miño estuary is dredged that will facilitate the entry of the migratory species.

EMU_ES_Murcia (EMU_ES_Murc)

Eel fishery is professional and the minimum landing size for eel is set at 38 cm. The number of boats varies between 30 and 40 per year. Eels are fished using a "paranza" (a fixed box made with net or/and canes) or bottom set long lines. This fishery takes place in the Mar Menor and catches are sold through the "Lo Pagán" guild. The MAr Menor is a hypersaline coastal lagoon.

EMU_ES_Valencia (EMU_ES_Vale)

Although there used to be a recreational fishery for adult eel, today in Valencia all fisheries are commercial only.

- Regarding glass eel fishery, actually there are 4 professional associations of glass eel fishermen, all of them in the province of Valencia. In the Albufera, Perelló-Perellonet-Mareny fishing association has the exploitation rights. Albufera's fishermen fish in different "Golas", the channels that connect the Albufera lagoon with the sea. In addition, there is another association which practices professional fishery of glass eel in the Molinell river mouth. All of them use fixed places for glass eel fishery and the only rig allowed on them is named "monot".
- The professional yellow/silver eel fishery is practised with a rig named "mornell", which is the only allowed and has standardised measures. These rigs could be placed in fixed or variable sites. There are several difference between province in the eel professional fishery:

O Valencia: There are 4 fishing associations: In the Albufera, -which is a 2100 ha costal lagoon between Turia and Júcar Rivers-, El Palmar, Silla, Catarroja associations exercise their rights to exploit the yellow and silver eel. Eel fishery in the Albufera has its own regulation and two types of fishing are considered: the fixed place fishing (named "redolins") and the traveling fishing. The fishermen community of El Palmar is the fishing organization with the major tradition and number of members, and the only one that is allowed to fish in fixed places in the lagoon. On the other hand, Molinell association operates in the Molinell river, which constitutes the channel that connects Pego-Oliva marsh (an agrarian landscape with a traditional economic activity) with the sea. They also use fixed places for eel fishery.

O Alicante: In this province, professional fishery occurs in 15 fishing preserves located between the El Hondo wetlands (Elche) and the salt flats of Santa Pola. In the fishing preserve of Alicante, a maximum number of fishing rigs (named "mornells") is allowed.

The fishermen guilds and associations give their catches data to the territorial service of each province responsible for the continental fishing. In the case of glass eel, they also report the fishing days.

EMU_ES_Cantabria(EMU_ES_Cant)

Nowadays, only professional glass eel fishery exists in Cantabria, mainly located in the Deva, Nansa, Pas and Campiazo river basin s. Recreational fishery was forbidden in 2015. Professional fishermen sell their catches in the market or in other licensed establishments. Fishermen fish in land and they are only allowed to use one sieve (≤ 1.2 m²) per fishermen. Since 2005, fishermen report their catches.

EMU_ES_Cataluña (EMU_ES_Cata)

Eel fishery is professional. There are two RBDs in Catalonia: the Catalonia Inner River Basin, which include small and medium Rivers, and the Ebro RBD, which is the second largest river basin in Spain. The delta of the Ebro River is the most important eel fishing spot in Catalonia regarding the number of active fishermen with license and eel catches. The glass eel fishery is professional in the Ter, Muga and Fluvià Rivers (province of Girona; Catalonia Inner River Basin) and the delta of the Ebro River (province of Tarragona). In both areas, the fishing effort is regulated by the number of fishing licenses and sites. There are 8 fishing entities involved in eel fishery, 3 fishermen guild in the Girona rivers (12 licenses) and 5 fishermen guild in the Ebro (around 250 licenses). Fishing is only allowed for 6 months (October to March). Fishing methods of glass eel are basically by means of adapted fyke nets, placed in the river mouth, canals or along the estuary. Yellow and silver eel recreational fishing is only allowed with rods and 'catch and release' modality, except from the lagoons of the Delta, where there is a professional yellow and silver eel fishery.

(max. 900 words)

Deviations from the work plan

EMU_ES_Asturias (EMU_ES_Astu)

The only diadromous species with a commercial fishery is the eel. There is only glass eel commercial fishery. The Asturian regional administration is in charge of the management of the fishery in inland waters (including coastal waters). Glass eel fishermen (boat and land licenses) are asked to record daily the glass eel catches (kg), the fishing effort data (fishing hours), the fishing area and the market place.

This information is received from three management plans and two zones (Western Zone and Central Zone). The plans are:

- the Nalon management plan (glass eels caught in Nalon basin and sold in Cudillero and San Juan de la Arena guilds),
- the Eastern management plan (glass eels caught in Eastern bassins from Purón until Libardón basin and sold in Ribadesella guild) and
- the Tinamayor management plan (glass eels caught in Deva and Cabra bassins and sold in Bustio guild).

In 2022 the formerly called “free zone” was divided in three glass eel fishing areas. One of them was established as a new management plan (Eastern MP).

EMU_ES_Valencia (EMU_ES_Vale)

There are no deviations from the work plan. The fisheries described maintain the same organization and exploitation conditions.

There are some errors in the text due to deficiencies in the translation and/or interpretation:

- In the Albufera, Perelló, Perellonet and Mareny fishing associations have the exploitation right. They are three different associations. It was an error of interpretation.
- In the fishing preserves of Alicante, a maximum number of fishing rigs (named “mornells”) is allowed.
- The fishermen's guilds and associations give their catches data to the territorial service of each province responsible for the continental fishing.

Actions to avoid deviations

(max. 900 words)

Section 4: Impact of fisheries on marine biological resources

Text Box 4.2: Incidental catches of sensitive species

North Sea and Eastern Arctic. Eastern Arctic, Norwegian Sea and Barents Sea (ICES areas 1, 2, FAO area 27)

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight information on sampling schemes and sampling frames related to incidental catches of sensitive species.

Additional information on planning the observation of incidental catches of sensitive species:

Sampling scheme **ESP-IEO_P5_AtSea**

See Text Box 4.2: Incidental catches of sensitive species. Other regions. North-West Atlantic (FAO area 21). NAFO.

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)
<p>Results</p> <p>No incidental catches of sensitive species in the observed trips.</p> <p>Deviations from the work plan</p> <p>No deviations</p> <p>Actions to avoid deviations</p> <p>Not applicable</p> <p><i>(One text box of max. 1 000 words per region/RFMO/RFO/IO)</i></p>

Text Box 4.2: Incidental catches of sensitive species

North-East Atlantic.North-East Atlantic and Western Channel (ICES areas 5, 6, 7 (excl. 7d), 8, 9, 10, 12 and 14, FAO area 27)

<p>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.</p>
<p>This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight information on sampling schemes and sampling frames related to incidental catches of sensitive species.</p> <p>Additional information on planning the observation of incidental catches of sensitive species:</p> <p>Sampling scheme ESP-IEO_P5_AtSea</p> <p>See Text Box 4.2: Incidental catches of sensitive species. Other regions. North-West Atlantic (FAO area 21). NAFO</p> <p>Sampling scheme ESP_IEO_P1_AtSea</p> <p>- 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?</p> <p>Yes/No</p> <p>The métiers operating in the Bay of Biscay and Iberian waters have been considered in the risk analysis carried out by the FishPi2 project (MARE/2016/22), publish in 2019, when the Spanish at-sea sampling program was already running. Besides, the main objective of the "ESP_IEO_P1_AtSea" sampling scheme is the sampling of commercial catches, so that the mentioned risk analysis was not taken into account for its design or selection of métiers. However, the record and sampling of incidental catch of sensitive species (marine mammals, reptiles, birds and fish) is carried out by the on-board observers. No specific sampling protocol is applied for indicator species of vulnerable marine ecosystems.</p> <p>- What are the gear types/metiers that present the highest risk of bycatch per species/taxa of PETS in a given region?</p> <p>According to the conclusions obtained from the FishPi2 project, in the Bay of Biscay (BB) and Iberian (IB) waters the métiers with highest risk of bycatch of sensitive species are, in descending order: set gillnet [GNS], trammel net [GTR], bottom otter trawl [OTB], and set long lines [LLS]. The first and third ones are included in the "ESP_IEO_P1_AtSea" sampling scheme.</p> <p><u>MARE 2016-22 - MARE 2016-22 strengthening regional cooperation - European Commission (europa.eu)</u></p>

- What are the methods to calculate the observation effort?

The observation effort was calculated taking into account the total effort of each sampling stratum, trying to reach 1% of coverage.

- 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.

Yes, the guidelines of the expert groups on bycatch (WGBYC) as well as sampling of commercial catches (WGCATCH) have been followed.

Additional information on observer protocols:

The on-board observers collect the following data: identification of species, number and weight of individuals, length measurements, location and timing of bycatches. In relation to marine mammals, data on the use of acoustic deterrent devices ("pingers") on board are also collected: presence/absence, number and model.

- 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?

Yes. All hauls are sampled in the métiers of the national fishing grounds with daily trips. However, not all hauls are sampled in trawlers operating in ICES Subarea 7, whose trips last 12 days on average. In this case, both types of hauls, sampled and unsampled, are properly identified and recorded.

- 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?

Yes

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

Yes

Additional information on sampling schemes

No additional information

Additional description on sampling frames

No additional information

Sampling scheme **ESP-AZTI_AtSea_PET_ICES**

- 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?

The risk assessment carried out by WGBYC and fishPi project has been considered where in the case of cetaceans bycatch in the Bay of Biscay, the PTB_8abd is considered as a high risk metier.

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

Based on the final report from ICES WKEMBYC (ICES 2020), in the BoB there are several high-risk metiers regarding cetaceans (in this specific sampling scheme common dolphins). These include, PTB, PS, GNS and GTR. However, in the case of the Spanish fleet in this region, PTB_8abd, is the most relevant metier considering common dolphins bycatch rates.

- What are the methods to calculate the observation effort?

The coverage agreed is the 2% of the total effort for this metier. This 2% is based on FAO'S 2019, report "FAO. 2019. Monitoring the incidental catch of vulnerable species in Mediterranean and Black Sea fisheries:

Methodology for data collection. FAO Fisheries and Aquaculture Technical Paper No. 640. Rome, FAO."

- 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 design follows the best practice guidelines provided by ICES WKPICS 1,2,3 and WGCATCH expert groups.

Additional information on observer protocols (if already filled in Annex 1.1, indicate where it can be found):

- 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?

Yes. The observers involved in this survey, are experience observers with high training in the identification of these species.

- 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?

These metiers are not covered under this sampling scheme.

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

In this sampling scheme, the main objective is the data collection of cetaceans and other megafauna bycatch. The metier sampled is the PTB_8abd. For this metier the most important phase to check during the fishing operation is the pre-sorting, period, once the codend is onboard. The observer is instructed to check in detail this part of the fishing operation. In addition, and once this checking is finished, the observer also checks the conveyor belt to identify any other rare species bycatch and is instructed to indicate the % of the observed period.

Additional information on sampling schemes

No additional information

Additional description on sampling frames

No additional information

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)

Results

Sampling scheme **ESP-IEO_P5_AtSea**,

No effort in these sampling scheme (Frame identifiers: **OTM_DEF_100-119**, and **OTB_DWS_100-129**).

Sampling scheme **ESP_IEO_P1_AtSea**

No by catch of PETS in the observed trips in this sampling scheme.

Sampling scheme **ESP-AZTI_AtSea_PET_ICES**

Frame identifier: **PTB_8abd**: In 2022, 8 cetaceans were bycaught in 6 fishing operations, all of them in winter period.

Three common dolphins in three different trips in January-February, all of them arrived already dead onboard and were released, after biological data and samples were taken. On November two common dolphins were bycaught in one fishing operation and another two dolphins in December in the same haul. All of them arrived death and the same procedure of data collection was applied before being released. A single bottlenose dolphin was captured in one haul in December and the same procedure applied.

Onboard observers were present during all pre-sort operation, where cetacean bycatch can be properly observed.

Deviations from the work plan

No deviations

Actions to avoid deviations

Not applicable

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 4.2: Incidental catches of sensitive species

Mediterranean Sea and Black Sea (GFCM GSA 1-29, FAO area 37)

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight information on sampling schemes and sampling frames related to incidental catches of sensitive species.

Additional information on planning the observation of incidental catches of sensitive species:

Sampling scheme **ESP-IEO_P2_AtSea**

- 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?

Not yet. The RCGMed&BS 2021 has planned a workshop to agree at regional level the list of high risk métiers on bycatch by group of sensitive species. In 2022.

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

Spanish Mediterranean: following the results of the three pilot studies on bycatch (2018: study of bycatch in bottom trawlers; 2019: study of bycatch in set longliners; 2021: study of bycatch in set nets), the metier with the highest risk of bycatch per species/taxa of PETS is OTB_DEF.

- What are the methods to calculate the observation effort?

The PSU is the fishing trip. The observation effort should be up to 0.5 % of the average number of fishing trips of the previous years in the sampling stratum.

Methods: Monitoring the incidental catch of vulnerable species in Mediterranean and Black Sea fisheries: Methodology for data collection. FAO Fisheries and aquaculture Technical Paper N° 640. Rome, FAO.

Link: <http://www.fao.org/gfcm/publications/series/technical-paper/640/en/>

- 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.

Y

Sampling desing and protocol: Monitoring the incidental catch of vulnerable species in Mediterranean and Black Sea fisheries: Methodology for data collection. FAO Fisheries and aquaculture Technical Paper N° 640. Rome, FAO.

Link: <http://www.fao.org/gfcm/publications/series/technical-paper/640/en/>

Additional information on observer protocols:

- 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?

Y

Y

Observers sampling protocol (handbook): MED2. Manual de instrucciones para observadores a bordo

Link: http://www.iew.es/es_ES/web/iew/pndb (section P2: Evaluación de recursos pesqueros en el Mediterráneo)

- 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?

Not sampling planned in gill nets and hook and line fisheries

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

Y

Observers sampling protocol (handbook): MED2. Manual de instrucciones para observadores a bordo

http://www.iew.es/es_ES/web/iew/pndb (section P2: Evaluación de recursos pesqueros en el Mediterráneo)

Additional information on sampling schemes

No Additional information

Additional description on sampling frames

No Additional information

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)

Results

Sampling of bycatch is carried out in the métiers OTB_DEF and OTB_DWS, in all GSAs where the Mediterranean Spanish fleet is operating. In previous pilot studies on bycatch (2018: study of bycatch in bottom trawlers; 2019: study of bycatch in set longliners; 2021: study of bycatch in set nets), the métier with the highest risk of bycatch per species/taxa of PETS is OTB_DEF.

The following two tables summarize some data collected in 2022.

Table 1. Number of observed trips with PETS.

Area	Sampling Scheme	Number of PSUs in 2022	Observed PSUs in 2022	PSUs with PETS
GSA01	OTB_DEF_West01	7774	52	0
GSA01	OTB_DEF_East01	6277	59	16
GSA01	OTB_DWS_01	3438	22	5
GSA02	OTB_DWS_02	249	10	9
GSA05	OTB_DEF_Mall05	3237	24	12
GSA05	OTB_DWS_Mall05	3122	49	18
GSA05	OTB_DEF_Men05	169	5	2
GSA05	OTB_DWS_Men05	819	19	9
GSA06	OTB_DEF_South06	26066	88	12
GSA06	OTB_DEF_North06	24725	60	1
GSA06	OTB_DWS_South06	4778	15	1
GSA06	OTB_DWS_North06	7128	36	3

Table 2: Species and number of individuals reported in the 2022 sampled trips

Area	Metier	Specie	Dead	Unknow status
GSA01	OTB_DES	<i>Galeus atlanticus</i>	0	7
		<i>Leucoraja naevus</i>	42	136

		<i>Raja brachyura</i>	20	0
		<i>Raja montagui</i>	0	8
	OTB_DWS	<i>Centrophorus granulosus</i>	8	0
		<i>Galeus atlanticus</i>	0	10
GSA02	OTB_DWS	<i>Centrophorus granulosus</i>	0	1
		<i>Galeus atlanticus</i>	0	5057
		<i>Hepranchias perlo</i>	0	1
		<i>Leucoraja circularis</i>	1	3
		<i>Leucoraja naevus</i>	0	36
GSA05	OTB_DES	<i>Dasyatis pastinaca</i>	0	5
		<i>Gymnura altavela</i>	0	1
		<i>Leucoraja circularis</i>	2	6
		<i>Leucoraja naevus</i>	4	167
		<i>Raja brachyura</i>	4	0
		<i>Raja montagui</i>	5	0
		<i>Raja polystigma</i>	4	43
	OTB_DWS	<i>Centrophorus granulosus</i>	2	0
		<i>Centrophorus uyato</i>	2	0
		<i>Dasyatis pastinaca</i>	0	17
		<i>Leucoraja circularis</i>	2	23
		<i>Leucoraja naevus</i>	9	154
		<i>Raja brachyura</i>	4	14
		<i>Raja montagui</i>	4	0
		<i>Raja polystigma</i>	0	33
GSA06	OTB_DES	<i>Oxynotus centrina</i>	1	0
		<i>Raja brachyura</i>	13	0
		<i>Raja montagui</i>	22	5
	OTB_DWS	<i>Oxynotus centrina</i>	0	1
		<i>Somniosus rostratus</i>	3	0

Deviations from the work plan

No deviation

Actions to avoid deviations

Not applicable

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 4.2: Incidental catches of sensitive species

The outermost regions. EU waters around Canary islands (FAO area 34.1.2)

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.
<p>This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight information on sampling schemes and sampling frames related to incidental catches of sensitive species.</p> <p>Additional information on planning the observation of incidental catches of sensitive species</p> <p>Sampling scheme ESP-IEO_P3_AtSea_Canarias</p> <p>- 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?</p> <p>Yes</p> <p>- What are the gear types/metiers that present the highest risk of bycatch per species/taxa of PETS in a given region?</p> <p>Trawlers</p> <p>- What are the methods to calculate the observation effort?</p> <p>Checked for birds, mammals and reptiles in all fishing hauls. Checked for fishes in random hauls.</p> <p>- 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.</p> <p>Yes</p> <p>Additional information on observer protocols:</p> <p>- 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?</p> <p>Yes</p> <p>- 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?</p> <p>No</p> <p>- In large catches: does the protocol instruct to check for rare specimens during sorting of the catch (i.e. at conveyor belt)? Is the observer instructed to indicate what percentage of the sorting or hauling process has been checked at "haul level"?</p> <p>Yes</p> <p>Additional information on sampling schemes</p> <p>ESP-IEO_P3_AtSea_Africa; ESP-IEO_P3_AtSea_Canarias: Onboard observers are instructed to collect data on by-catch species. A specific datasheet is designed to collect information on turtles, including measurements, physical state and geographic position. Moreover, if other rare specimens (marine mammals and birds) would appear the observer on board is required to identify and record their catch.</p> <p>Additional description on sampling frames</p> <p>Though no mitigation devices are used in the trawler fleets (OTB_CRU_>=40_0_0, OTB_DEF_>=70_0_0; OTB_MCF_>=70_0_0), no marine mammals or birds have been caught. Each haul is checked for birds, mammals and reptiles. For fishes it is checked in random hauls only.</p> <p>It must be noted that Spanish onboard observer program in the trawler fleets was not originally designed for the recording of incidental by-catch of pets but to monitor and record data of retained catches and discards and to collect sampled in order to estimate discards and to calculate biological variables/parameters of commercial species.</p>

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)
<p>Results</p> <p>No incidental catches of sensitive species in the observed trips</p> <p>Deviations from the work plan</p> <p>No deviations</p> <p>Actions to avoid deviations</p> <p>Not applicable</p> <p><i>(One text box of max. 1 000 words per region/RFMO/RFO/IO)</i></p>

Text Box 4.2: Incidental catches of sensitive species

Other regions. North-West Atlantic (FAO area 21). NAFO

<p>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.</p>
<p>This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight information on sampling schemes and sampling frames related to incidental catches of sensitive species.</p> <p>Additional information on planning the observation of incidental catches of sensitive species</p> <p>Sampling scheme ESP-IEO_P5_AtSea</p> <p>- 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?</p> <p>No assessment of the relative risk of bycatch have been taken place as the only gear type monitored in the area is OTB</p> <p>The main objective of the "ESP_IEO_P5_AtSea" sampling scheme is the sampling of commercial catches.</p> <p>Furthermore, the record and sampling of incidental catch (all protected sea birds, mammals, reptiles and fish species) is carried out by the observers for all fisheries.</p> <p>- What are the gear types/metiers that present the highest risk of bycatch per species/taxa of PETS in a given region?</p> <p>OTB_MDD_40-60-130-280 (NAFO 3LMNO) and OTB_DWS_100-129 (ICES 12, 6b1).</p> <p>- What are the methods to calculate the observation effort?</p> <p>The sampling effort is allocated according to the scientific experience gained from the study of fisheries in the area. The number of fishing trips was calculated based on data from previous years in order to keep the coverage from previous years and to comply with the requirements of the end users.</p> <p>- 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.</p> <p>Y</p> <p>Working Group to Reflect on the Rules Governing Bycatches, Discards and Selectivity in the NAFO Regulatory Area (WG-BDS).</p> <p>ICES Working Group on Bycatch of Protected Species (WGBYC).</p> <p>ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC).</p>

Additional information on observer protocols:

Observers on board have instructions for collecting data on incidental by-catch species. Specific forms designed for recording data of by-catch including measurements, photographs, physical condition of the carcass and geographic location are included in the observers manual. Observations of marine mammals and seabirds are also collected by observers opportunistically.

Observers collect the following data: identification of species, number and weight of individuals, length measurements and hauls data of by catch.

Pictures of by catch species are taken by observers using a camera for data validation at the Lab.

However the onboard observer instructions do not indicate the need to record if the codend is (or not) checked for every haul or if and which percentage of the sorting process has been checked.

The bycatch data are stored in a national data base and submitted to end users when data are required.

- 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?

Y.

Observers remain on board during the entire trip that can last around 1-3 months. Then, they do not sample all hauls. However all hauls, sampled and unsampled, are recorded.

When in a haul there is a significant occurrence of a sensitive species, the observer has to sample the haul.

- 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?

Not sampling planned in gill nets and hook and line fisheries

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

Yes

Additional information on sampling schemes

No additional information

Additional description on sampling frames

OTB_MDD_40-60-130-280 (Bottom trawlers operating in NAFO SA3 targeting Greenland Halibut, Cod, Redfish, Skates, Squid and Shrimp)

In the NAFO fishery the by-catch of Greenland sharks (*Somniosus microcephalus*) has been analyzed

<https://www.nafo.int/Portals/0/PDFs/sc/2017/scr17-023.pdf?ver=2017-08-29-103932-237>

The data analysis shows that Greenland sharks is not abundant and that this species appears in these divisions sporadically and in depths of more than 300 meters.

OTB_MDD_40-60-130-280 (Bottom trawlers operating in NAFO SA3 targeting Greenland Halibut, Cod, Redfish, Skates, Squid and Shrimp) and OTB_DWS_100-129 (Bottom trawlers operating in Hatton targeting deepwater species)

A specific sampling protocol is applied for sampling indicators of benthic invertebrates in OTB fisheries. The sampling design is done to check the sorting process of 10% hauls and when there is an important occurrence of organisms as well.

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)

Results

Data collected for incidental catches of Greenland sharks (*Somniosus microcephalus*) and Phocidae by OTB_MDD_40-60-130-280. Data will be reported to the WGBYC in 2023.

Deviations from the work plan

No deviations

Actions to avoid deviations

Not applicable

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 4.2: Incidental catches of sensitive species

Other regions. Eastern Central Atlantic (FAO area 34). CECAF

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight information on sampling schemes and sampling frames related to incidental catches of sensitive species.

Additional information on planning the observation of incidental catches of sensitive species

Sampling scheme **ESP-IEO_P3_AtSea_Africa**

- 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?

Trawlers

- What are the methods to calculate the observation effort?

Checked for birds, mammals and reptiles in all fishing hauls. Checked for fishes in random hauls.

- 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.

Yes

Additional information on observer protocols:

- 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?

Yes

- 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?

No

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

Yes

Additional information on sampling schemes

Member State may add specific contextual information related to a region and the implementation year(s), for instance

highlighting new developments not yet detailed in the quality document, regional adaptation and/or perspectives for the future. Insert the information under the same sampling scheme identifier as in Table 2.5.

Onboard observers (ESP-IEO_P3_AtSea_Africa; ESP-IEO_P3_AtSea_Canarias) are instructed to collect data on by-catch species. A specific datasheet is designed to collect information on turtles, including measurements, physical state and geographic position. Moreover, if other rare specimens (marine mammals and birds) would appear the observer on board is required to identify and record their catch.

Additional description on sampling frames

Member State may add complementary description to what includes the ‘Sampling frame description’ column of Table 2.5. Insert the information under the same identifier and name as in columns ‘Sampling frame identifier’ and ‘Sampling frame description’ of Table 2.5, and in the same order (Sampling frame identifier + Sampling frame description).

Though no mitigation devices are used in the trawler fleets (OTB_CRU_>=40_0_0, OTB_DEF_>=70_0_0; OTB_MCF_>=70_0_0), no marine mammals or birds have been caught. Each haul is checked for birds, mammals and reptiles. For fishes it is checked in random hauls only.

It must be noted that Spanish onboard observer program in the trawler fleets was not originally designed for the recording of incidental by-catch of pets but to monitor and record data of retained catches and discards and to collect sampled in order to estimate discards and to calculate biological variables/parameters of commercial species.

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)

Results

Sampling scheme: **ESP-IEO_P3_AtSea_Africa**

Frame identifier: **OTB_CRU_>=40_0_0, OTB_DEF_>=70_0_0 and OTB_MCF_>=70_0_0:**

All fishing hauls were checked for birds, mammals and reptiles incidental mortality. Rest of species listed in Table 1D which includes some bony and cartilaginous fishes and invertebrates species were checked in random hauls sampled and subsequently recorded as discards.

Recorded incidental catches were one turtle and one dolphin (both unspecified) in OTB_CRU and one common dolphin (*Delphinus delphis*) in OTB_DEF. In all cases, the specimens arrived dead on board.

Deviations from the work plan

No deviations

Actions to avoid deviations

Not applicable

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 4.2: Incidental catches of sensitive species

Other regions. Atlantic Ocean and adjacent seas (FAO areas 21, 27, 31, 37, 41, 47, 34, 48).

ICCAT

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight information on sampling schemes and sampling frames related to incidental catches of sensitive species.

Additional information on planning the observation of incidental catches of sensitive species

Sampling scheme **ESP_IEO_P4_AtSea_all**

- 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.

Cortés, E., A. Domingo, P. Miller, R. Forselledo, F. Mas, F. Arocha, S. Campana, R. Coelho, C. Da Silva, F.H.V. Hazin, H. Holtzhausen, K. Keene, F. Lucena, K. Ramirez, M.N. Santos, Y. Semba-Murakami, and K. Yokawa (2015). Expanded ecological risk assessment of pelagic sharks caught in Atlantic pelagic longline fisheries. Collect. Vol. Sci. Pap. ICCAT 71:2637–2688.

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

Longliners and purse seiners.

- What are the methods to calculate the observation effort?

In longline fisheries, onboard observers take data on catches and technical characteristics of each individual set. Catches are referred to several effort units, such as the number of sets by trip or number of hooks.

In addition, the observers on board longliners and purse seiners have protocols for collecting data on incidental bycatch species when occurred for all the sets.

- 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 design and protocol follow the recommendations of the expert groups on tuna RFMOs

Additional information on observer protocols:

- 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 observers on board purse seiners have protocols for collecting data on incidental bycatch species when occurred. Specific training and forms are designed for recording bycatch during the set. All the stages are observed and checked including the identification and destiny of the species caught in the cod-end, and if the species are released or evade the net by themselves.

- 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?

As a general procedure in the longline fisheries, we used the census of the capture of the selected trips. So all specimens in the selected sets are noted and sampled. When a very rare specimen is caught in a set this is photographed and/or frozen to be studied at our laboratory. When the observer cannot sample a set completely, this circumstance is noted by the onboard observer in the set sheet.

The observers on board longliners have protocols for collecting data on incidental bycatch species when occurred. Specific training and forms are designed for recording bycatch. In addition, the onboard observer protocol instructs observers to report on the use of mitigation devices

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

The scientific observers on board are instructed to check all the specimens contained in the codend (case of purse seine) and in the hooks (case of longline).

Additional information on sampling schemes

No additional information

Additional description on sampling frames

No additional information

(One text box (max. 1 000 words) per region/RFMO/RFO/IO)

Results

LLSWO_ATL_AtSea: In 2022, sharks and marine turtles were observed as incidental by-catches in the on-board observer programme on longliners in the Atlantic.

LL_MED_AtSea: In 2022, sharks, sea birds and marine turtles were observed as incidental by-catches in the on-board observer programme on longliners in the Mediterranean Sea.

PS_ATL_AtSea_IEO: In 2022, sharks, Mobula and marine turtles were observed as incidental by-catches in the on-board observer programme on purse seiners in the Atlantic Ocean.

Deviations from the work plan

No deviations

Actions to avoid deviations

Not applicable

(One text box of max. 1 000 words per region/RFMO/RFO/IO)

Text Box 4.2: Incidental catches of sensitive species

Other regions. Indian Ocean (FAO area 51 and 57). IOTC

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight information on sampling schemes and sampling frames related to incidental catches of sensitive species.

Additional information on planning the observation of incidental catches of sensitive species:

Sampling scheme **ESP_IEO_P4_AtSea_all**

- 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.

Murua, H., J. Santiago, R. Coelho, I. Zudaire, C. Neves, D. Rosa., I. Zudaire, Y. Semba, Z. Geng., P. Bach, H. Arrizabalaga, P. Bach, J.C. Baez, M.L. Ramos, J.F Zhu & J. Ruiz (2018). Updated Ecological Risk Assessment (ERA) for shark species caught in fisheries managed by the Indian Ocean Tuna Commission (IOTC). Submitted to 21th IOTC Scientific Committee. IOTC-2018-SC21-14_Rev.1.

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

Longliners and purse seiners.

- What are the methods to calculate the observation effort?

In longline fisheries, onboard observers take data on catches and technical characteristics of each individual set. Catches are referred to several effort units, such as the number of sets by trip or number of hooks.

In addition, the observers on board longliners and purse seiners have protocols for collecting data on incidental bycatch species when occurred for all the sets.

- 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 design and protocol follow the recommendations of the expert groups on tuna RFMOs

<p>Additional information on observer protocols:</p> <p>- 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?</p> <p>The observers on board purse seiners have protocols for collecting data on incidental bycatch species when occurred. Specific training and forms are designed for recording bycatch during the set. All the stages are observed and checked including the identification and destiny of the species caught in the cod-end, and if the species are released or evade the net by themselves.</p> <p>- 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?</p> <p>As a general procedure in the longline fisheries, we used the census of the capture of the selected trips. So all specimens in the selected sets are noted and sampled. When a very rare specimen is caught in a set this is photographed and/or frozen to be studied at our laboratory. When the observer cannot sample a set completely, this circumstance is noted by the onboard observer in the set sheet.</p> <p>The observers on board longliners have protocols for collecting data on incidental bycatch species when occurred. Specific training and forms are designed for recording bycatch. In addition, the onboard observer protocol instructs observers to report on the use of mitigation devices</p> <p>- In large catches: does the protocol instruct to check for rare specimens during sorting of the catch (i.e. at conveyor belt)? Is the observer instructed to indicate what percentage of the sorting or hauling process has been checked at “haul level”?</p> <p>The scientific observers on board are instructed to check all the specimens contained in the codend (case of purse seine) and in the hooks (case of longline).</p> <p>Additional information on sampling schemes</p> <p>No additional information</p> <p>Additional description on sampling frames</p> <p>No additional information</p> <p>(One text box (max. 1 000 words) per region/RFMO/RFO/IO)</p>
<p>Results</p> <p>LLSWO_IND_AtSea: In 2022, sharks were observed as incidental by-catches in the on-board observer programme on longliners in the Indian Ocean.</p> <p>PS_IND_AtSea_IEO: In 2022, sharks and Mobulas were observed as incidental by-catches in the on-board observer programme on purse seiners in the Indian Ocean.</p> <p>Deviations from the work plan</p> <p>No deviations</p> <p>Actions to avoid deviations</p> <p>Not applicable</p> <p>(One text box of max. 1 000 words per region/RFMO/RFO/IO)</p>

Text Box 4.2: Incidental catches of sensitive species

Other regions. Western Central Pacific (FAO area 71). WCPFC

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight information on sampling schemes and sampling frames related to incidental catches of sensitive species.

Additional information on planning the observation of incidental catches of sensitive species:

Sampling scheme **ESP_IEO_P4_AtSea_all**

- 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?

No

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

Longliners and purse seiners.

- What are the methods to calculate the observation effort?

In longline fisheries, onboard observers take data on catches and technical characteristics of each individual set. Catches are referred to several effort units, such as the number of sets by trip or number of hooks.

In addition, the observers on board longliners and purse seiners have protocols for collecting data on incidental bycatch species when occurred for all the sets.

- 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 design and protocol follow the recommendations of the expert groups on tuna RFMOs

Additional information on observer protocols:

- 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 observers on board purse seiners have protocols for collecting data on incidental bycatch species when occurred. Specific training and forms are designed for recording bycatch during the set. All the stages are observed and checked including the identification and destiny of the species caught in the cod-end, and if the species are released or evade the net by themselves.

- 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?

As a general procedure in the longline fisheries, we used the census of the capture of the selected trips. So all specimens in the selected sets are noted and sampled. When a very rare specimen is caught in a set this is photographed and/or frozen to be studied at our laboratory. When the observer cannot sample a set completely, this circumstance is noted by the onboard observer in the set sheet.

The observers on board longliners have protocols for collecting data on incidental bycatch species when occurred. Specific training and forms are designed for recording bycatch. In addition, the onboard observer protocol instructs observers to report on the use of mitigation devices

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

The scientific observers on board are instructed to check all the specimens contained in the codend (case of purse seine) and in the hooks (case of longline).

<p>Additional information on sampling schemes</p> <p>No additional information</p> <p>Additional description on sampling frames</p> <p>No additional information</p> <p>(One text box (max. 1 000 words) per region/RFMO/RFO/IO)</p>
<p>Results</p> <p>PS_WPAC_AtSea_IEO: In 2022, sharks were observed as incidental by-catches in the on-board observer programme on purse seiners in the Indian Ocean.</p> <p>Deviations from the work plan</p> <p>No deviations</p> <p>Actions to avoid deviations</p> <p>Not applicable</p> <p><i>(One text box of max. 1 000 words per region/RFMO/RFO/IO)</i></p>

Text Box 4.2: Incidental catches of sensitive species

Other regions. Eastern Central Pacific (FAO area 77 and 87). IATTC

<p>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.</p>
<p>This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight information on sampling schemes and sampling frames related to incidental catches of sensitive species.</p> <p>Additional information on planning the observation of incidental catches of sensitive species:</p> <p>Sampling scheme ESP_IEO_P4_AtSea_all</p> <p>- 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?</p> <p>No</p> <p>- What are the gear types/metiers that present the highest risk of bycatch per species/taxa of PETS in a given region?</p> <p>Longliners and purse seiners.</p> <p>- What are the methods to calculate the observation effort?</p> <p>In longline fisheries, onboard observers take data on catches and technical characteristics of each individual set. Catches are referred to several effort units, such as the number of sets by trip or number of hooks.</p> <p>In addition, the observers on board longliners and purse seiners have protocols for collecting data on incidental bycatch species when occurred for all the sets.</p> <p>- 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.</p>

<p>The sampling design and protocol follow the recommendations of the expert groups on tuna RFMOs</p> <p>Additional information on observer protocols:</p> <p>- 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?</p> <p>The observers on board purse seiners have protocols for collecting data on incidental bycatch species when occurred. Specific training and forms are designed for recording bycatch during the set. All the stages are observed and checked including the identification and destiny of the species caught in the cod-end, and if the species are released or evade the net by themselves.</p> <p>- 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?</p> <p>As a general procedure in the longline fisheries, we used the census of the capture of the selected trips. So all specimens in the selected sets are noted and sampled. When a very rare specimen is caught in a set this is photographed and/or frozen to be studied at our laboratory. When the observer cannot sample a set completely, this circumstance is noted by the onboard observer in the set sheet.</p> <p>The observers on board longliners have protocols for collecting data on incidental bycatch species when occurred. Specific training and forms are designed for recording bycatch. In addition, the onboard observer protocol instructs observers to report on the use of mitigation devices</p> <p>- In large catches: does the protocol instruct to check for rare specimens during sorting of the catch (i.e. at conveyor belt)? Is the observer instructed to indicate what percentage of the sorting or hauling process has been checked at “haul level”?</p> <p>The scientific observers on board are instructed to check all the specimens contained in the codend (case of purse seine) and in the hooks (case of longline).</p> <p>Additional information on sampling schemes</p> <p>No additional information</p> <p>Additional description on sampling frames</p> <p>No additional information</p> <p>(One text box (max. 1 000 words) per region/RFMO/RFO/IO)</p>
<p>Results</p> <p>LLSWO_EPAC_AtSea: In 2022, sharks and marine turtles were observed as incidental by-catches in the on-board observer programme on purse seiners in the Pacific Ocean.</p> <p>PS_EPAC_AtSea_IEO: In 2022, sharks and marine turtles were observed as incidental by-catches in the on-board observer programme on purse seiners in the Eastern Pacific Ocean.</p> <p>Deviations from the work plan</p> <p>No deviations</p> <p>Actions to avoid deviations</p> <p>Not applicable</p> <p><i>(One text box of max. 1 000 words per region/RFMO/RFO/IO)</i></p>

Text Box 4.2: Incidental catches of sensitive species

Other regions. Antarctic and Southern Indian Ocean (FAO area 48, 58 and 88). CCAMLR

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.

This text box is complementary to information on the sampling schemes provided in the quality document (Annex 1.1). It serves to highlight information on sampling schemes and sampling frames related to incidental catches of sensitive species.

Additional information on planning the observation of incidental catches of sensitive species:

Sampling scheme **ESP_IEO_P5_AtSea-CCAMLR**

- 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?

No assessment of the relative risk of bycatch for different gears has been done as the only gear type monitored in the area is LLS.

The objectives of the "ESP_IEO_P5_AtSea_CCAMLR" sampling scheme is the sampling of retained and discarded catch, incidental catch and potential VMEs.

The record and sampling of incidental catch (sea birds, mammals and reptiles) is carried out routinely although the incidence has been found to be very low.

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

LLS_DWS_0_0_0 in 88.1 and 48.6 CCAMLR subareas.

- What are the methods to calculate the observation effort?

There are two observers designated on board and the observer's coverage for the LLLS fleet is 100%. A tally period of a minimum of 25% of the hooks in every haul must be observed for each of the observers.

- 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.

Y

The Scheme of International Scientific Observation (SISO) meets periodically in a Workshop. The last meeting was in 2017. Forms and procedures are reviewed and all recommended changes are submitted to the Scientific Committee for their approval.

There is a Working Group on Incidental Mortality Associated with Fishing but it has not met since 2011.

The Working Groups on Fish Stock Assessment (FSA) and Statistics, Assessments and Modelling (SAM) meet annually and usually make recommendations to the SC about improvements in the data collection.

Additional information on observer protocols:

Observers on board have instructions for collecting data on incidental by-catch species. Specific forms designed for recording data of by-catch including measurements, photographs, physical condition of the carcass and geographic location are included in the observers manual and forms. Observations of marine mammals and seabirds are also collected opportunistically by observers.

Observers collect the following data on incidental catch: identification of species, number and weight of individuals, length measurements and haul data.

Pictures of the incidental catch species are taken by observers using a digital camera for data validation at the Lab when in doubts.

The self-training guide is useful for seabird identification. (Annex 1.1)

All vessels must carry the guide "Fish the Sea not the Sky" on board and have it visible to the crew:
<https://www.ccamlr.org/en/document/publications/fish-sea-not-sky>

The incidental catch data are stored in the CCAMLR data base and submitted to end users when required to the CCAMLR Secretariat and agreed by the original data base owners.

- 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?

<p>NA.</p> <p>This is a LLS fishery.</p> <p>- 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?</p> <p>Yes.</p> <p>Observers should monitor interactions of seabirds and marine mammals with fishing gear in all CCAMLR fisheries. It is critical that an observer differentiates between observations recorded during assigned observation periods and those recorded when the observer is alerted by the vessel, as this has an effect on mortality calculations. For example, if the crew delivers a dead bird to the observer and tells him that it was found during the turning of the gear, this should be made clear in the scientific observation logbook</p> <p>- In large catches: does the protocol instruct to check for rare specimens during sorting of the catch (i.e. at conveyor belt)? Is the observer instructed to indicate what percentage of the sorting or hauling process has been checked at "haul level"?</p> <p>Yes.</p> <p>The observers form includes the number of hooks observed</p> <p>A specific sampling protocol is applied for sampling indicators of benthic invertebrates in lonliners operating in the Southern ocean for all areas. The sampling design is done to check the sorting process of 25% of the hauls and when there is an occurrence of invertebrate organisms above the established threshold. The protocol is available in the CCAMLR web page: https://www.ccamlr.org/en/compliance/vulnerable-marine-ecosystems-vmes</p> <p>Additional information on sampling schemes</p> <p>No additional information</p> <p>Additional description on sampling frames</p> <p>No additional information</p> <p>(One text box (max. 1 000 words) per region/RFMO/RFO/IO)</p>
<p>Results</p> <p>No incidental catches of sensitive species.</p> <p>Deviations from the work plan</p> <p>Not applicable</p> <p>Actions to avoid deviations</p> <p>Not applicable</p> <p>(One text box of max. 1 000 words per region/RFMO/RFO/IO)</p>

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. This text box applies to the work plan and the annual report.

<p>1. Aim of the study</p> <p>No additional studies planned.</p> <p>2. Duration of the study</p> <p>3. Methodology and expected outcomes of the study</p> <p>(max 900 words per study)</p>
<p>Brief description of the results (including deviations from the plan and justifications as to why if this was the case).</p> <p>Not applicable.</p> <p>Achievement of the original expected outcomes and justification if this was not the case.</p> <p>Not applicable.</p> <p>Follow-up to the activities (what are the next steps, how the results will be used).</p> <p>Not applicable.</p> <p><i>(max. 900 words per study)</i></p>

Section 5: Economic and social data in fisheries

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

<p>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 data to be collected under Tables 7, 8 and 9 of the EU MAP Delegated Decision annex.</p>
<p>1. Description of clustering</p> <p>The fleet segmentation is carried out assessing for each vessel: the main gear used during the year under study; the length of the vessel; and the fishing ground where most of its activity takes place. To be included in any segment, vessels must have at least one day of activity. Once we have classified all vessels into different segments, we perform the clustering.</p> <p>This clustering is carried out to maintain statistical confidentiality in those segments where there is a low number of vessels. When this happens, we unify segments that are similar to other segments. This clustering consists, in general, of unifying these segments with others that are slightly smaller or larger than them, but that use the same gear and fish in the same Region.</p> <p>When this is not possible, segments that use different gears can be unified (for instance, DFN with PMP), or even segments that fish in a region next to other region can also be unified. However these vessels are not included in the economic survey as they are not really representative of the segment.</p> <p>2. Description of activity indicator</p> <p>Activity indicator based on salaries is not applied in the Spanish Fleet because this data is subsequently obtained from the Economic Survey. However, we consider this variable is not representative of the real activity, since the salary obtained by the shipowner may come from other sources of income independent of fishing activity.</p> <p>3. Deviation from the RCG ECON (ex. PGECON) definitions</p> <p>No deviation</p> <p>(max. 900 words)</p>

Deviations from the work plan

For the "Consumption of fixed capital" variable, the method of collecting the information was changed from a Sample method to a Census method implemented through the PIM method to include inactive vessels. This change was applied to all vessels in order to standardise the methodology.

In the rest of the variables, the variations of increase in the "planned sample rate %" are due to the planned oversampling to avoid the loss of quality of the results due to non-response, as indicated in the Annex.

And the variations of decrease in the "planned sample rate %" are due to the fact that the size of the strata is related to the variability within them, therefore it varies each year depending on the vessels that are part of that stratum and it depends on the activity carried out by the vessels in the year of study.

Actions to avoid deviations

The actions taken to reduce the variations is the increase of the samples, oversampling them to increase the reliability and representativeness of the data and to ensure that they continue to be robust.

(max. 900 words)

Section 6: Economic and social data in aquaculture

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

Data extracted on 27/10/2021 12:54:25 from [ESTAT]

Dataset: **Production from aquaculture
excluding hatcheries and
nurseries (from 2008 onwards)
[FSH_AQ2A\$DEFAULTVIEW]**

Last updated: 14/10/2021 23:00

Time frequency: Annual
Aquaculture method: All methods
Aquatic environment: Total
Species: total fishery products
Fishing regions: Total fishing areas
Unit of measure: Tonnes live weight

TIME	2019	2019	2019	2019
GEO (Labels)	Tonnes	%Production	€	%Value
European Union - 27 countries (from 2020)	1.114.378,9683		3.478.757.685	
Belgium	86	0,01%	538.016	0,02%
Bulgaria	11.959,376	1,07%	29.676.074,321	0,85%
Czechia	20.989	1,88%	41.236.773,6226	1,19%
Denmark	40.221,41	3,61%	:	:
Germany (until 1990 former territory of the FRG)	37.998,4	3,41%	137.934.192	3,97%
Estonia	1.061,9693	0,10%	3.748.344,48	0,11%
Ireland	34.977	3,14%	157.663.391	4,53%
Greece	128.747,9	11,55%	508.064.962,98	14,60%
Spain	306.507,43	27,50%	632.217.529,6929	18,17%
France	194.328,3152	17,44%	758.561.530,7051	21,81%
Croatia	20.443,945	1,83%	120.687.212,389	3,47%
Italy	126.476,95	11,35%	399.013.411,197	11,47%
Cyprus	8.079,1	0,72%	43.752.799,9	1,26%
Latvia	626,4	0,06%	1.847.880	0,05%
Lithuania	3.775,2	0,34%	11.975.235,1568	0,34%
Hungary	17.315,12	1,55%	35.985.338,3406	1,03%
Malta	13.823,4378	1,24%	161.912.204,98	4,65%
Netherlands	45.750	4,11%	78.412.142,76	2,25%
Austria	4.250,025	0,38%	29.654.489,9372	0,85%
Poland	39.730,54	3,57%	104.191.372,8055	3,00%
Portugal	12.880,76	1,16%	108.029.648,6126	3,11%
Romania	:	:	:	:
Slovenia	2.138,2	0,19%	6.391.935,08	0,18%
Slovakia	2.688,69	0,24%	7.099.933,8355	0,20%
Finland	15.295,8	1,37%	62.369.684,5	1,79%
Sweden	11.600	1,04%	37.793.580,68	1,09%

Special value
: not available

No thresholds apply

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

No desviation

(max. 900 words)

Deviations from the work plan

In these strata, the data collection scheme was C (Census) but the entire stratum was not covered, because the classification of the statistical units in the different strata is highly variable since it depends on the annual activity of the companies and this activity can vary depending on the species they cultivate and produce each year.

Aquaculture Technique	Aquaculture species group	Data collection scheme	Planned sample rate (%)	Updated planned sample rate (%)
Polyculture	Salmon	C	100,00%	80%
Hatcheries & nurseries	Trout	C	100,00%	71%
Tanks and race-ways	Sea bass & Sea bream	C	100,00%	80%
Tanks and race-ways	Carp	C	100,00%	67%
Tanks and race-ways	Other freshwater fish	C	100,00%	86%
Tanks and race-ways	Other marine fish	C	100,00%	83%
Longline	Mussel	C	100,00%	40%
Other	Other molluscs	C	100,00%	70%
Polyculture	Microalgae	C	100,00%	69%

CLUSTERS

Salmon.Polyculture.All methods	5	Salmon.Fish farming techniques.Tanks and raceways	4
		Salmon.Hatcheries and nurseries.All methods	1
Trout.Fish farming techniques.Tanks and raceways	75	Trout.Fish farming techniques.Ponds	5
		Trout.Fish farming techniques.Tanks and raceways	69
		Trout.Fish farming techniques.Recirculation systems	1
Other fresh water fish.Fish farming techniques.Tanks and raceways	7	Eel.Fish farming techniques.Tanks and raceways	1
		Eel.Fish farming techniques.Recirculation systems	1
		Sturgeon (Eggs for human consumption).Fish farming techniques.Tanks and raceways	2
		Other fresh water fish.Fish farming techniques.Tanks and raceways	2
		Other fresh water fish.Fish farming techniques.Recirculation systems	1
Other marine fish.Polyculture.All methods	6	Other marine fish.Fish farming techniques.Recirculation systems	5
		Other marine fish.Fish farming techniques.Cages	1
Mussel.Shellfish farming techniques.Off bottom.Rafts	1920	Mussel.Shellfish farming techniques.Off bottom.Rafts	1919
		Mussel.Shellfish farming techniques.On bottom	1
Oyster.Shellfish farming techniques.Off bottom.Rafts	41	Oyster.Shellfish farming techniques.Off bottom.Rafts	39
		Oyster.Shellfish farming techniques.Off bottom.Long-line	2
Clam.Shellfish farming techniques.On bottom	732	Clam.Shellfish farming techniques.On bottom	731
		Clam.Shellfish farming techniques.Other	1
Crustaceans.Fish farming	2	Crustaceans.Fish farming techniques.Ponds	1

techniques.Recirculation systems		Crustaceans.Fish farming techniques.Recirculation systems	1
Other molluscs.Shellfish farming techniques.Other	10	Other molluscs.Shellfish farming techniques.On bottom	8
		Other molluscs.Shellfish farming techniques.Other	2
Multispecies.Fish farming techniques.Enclosures and pens	34	Multispecies.Fish farming techniques.Enclosures and pens	30
		Other aquatic organisms.Fish farming techniques.Tanks and raceways	1
		Other aquatic organisms.Fish farming techniques.Enclosures and pens	1
		Other aquatic organisms.Fish farming techniques.Recirculation systems	2
Seaweeds (Microalgae).Polyculture.All methods.	13	Seaweeds (Microalgae).Fish farming techniques.Tanks and raceways.	5
		Seaweeds (Microalgae).Fish farming techniques.Recirculation systems.	8
Seaweeds (Macroalgae).Polyculture.All methods.	4	Seaweeds (Macroalgae).Fish farming techniques.Enclosures and pens.	1
		Seaweeds (Macroalgae).Fish farming techniques.Recirculation systems.	1
		Seaweeds (Macroalgae).Shellfish farming techniques.Off bottom.Long-line	2

Actions to avoid deviations

As the deviations depend on the activity of the company, no action can be taken to reduce them.

(max. 900 words)

Section 7: Economic and social data in fish processing

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

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. MS should provide justification for complementary data collection for fish processing.

This text box is optional, since all information on the sampling schemes is available in Annex 1.2 document template. MS is invited to highlight additional information here on sampling schemes and sampling frames deemed necessary to understand the actual sampling design planned for the region and the implementation year(s).

The data collected by the industrial survey is used as structural statistics to respond to the regulatory needs imposed by the EU

(max. 900 words)

Deviations from the work plan

No deviations.

Actions to avoid deviations

Not applicable

(max. 900 words)