Annual Report of Spanish Program for the collection, management and use of data in the fisheries sector

Year 2015

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I. General framework

This document describes the Annual Report of the Spanish Program for the collection, management and use of data in the fisheries sector. It has been developed as laid down in Council Regulation (EC) No 199/2008, Commission Regulation (EC) No 665/2008 and Commission Decision No 93/2010/EC (hereinafter Commission Decision).

Similarly, Article 5 of Commission Regulation (EC) No. 665/2008 of the sets the deadlines for submission of the Annual Report of the National Multi-annual Program for Member States that wish to receive a Community financial assistance which, from 1-1-2014 onwards, will be granted through the European Maritime and Fisheries Fund (EMFF).

The program is structured following the guidelines given by the Commission "*Guidance for the submission of Annual Reports ... ... Version for Annual Reports 2015 (January 2016)*" and is submitted in two documents:

"Spain_Annual Report 2015_text_30_May-2016

"Spain_Annual Report 2015_tables_30_May-2016

These documents have included activities in the field of fisheries research, aquaculture and collection of economic data and processing indutry in 2015, the objectives achieved and the difficulties in reaching some of them.

II. National data collection organisation

This technical report details the targets achieved and difficulties found during 2015.

In 2015 there was a national coordination meeting on November, 4th in General Secretariat of Fisheries headquarters in Madrid. The main target of this meeting was to exchange experience gained during the year and advance the planning of data collection for the following year. The topics discussed were, among others: performing of the program in the year 2015 (problems with data requirements, logbooks and sale notes, etc.), planning the implementation of the 2015 report, specific changes in 2016, posible modifications for 2016, review of the actions arising from the implementation of the new regulation (recording of by catch species, contribution of DCF to MSDF, adaptation to the future to cope with new situations caming from landing obligation, etc.), and the way on how all changes will affect the Program in the near future, the adaptation of the IEO database (SIRENO) to the new system, possible problems with collecting data of transversal variables, with collecting data for the development of biological indicators, with data collection of recreational fisheries and possible solutions to solve them.

II. A. National correspondent and participating institutes

The National Authority responsible for implementing the Data Collection National Program is the GENERAL SECRETARIAT OF FISHERIES, (hereinafter SGP) from the Ministry of Agriculture, Food and Envionment (hereinafter MAGRAMA), 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.

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Pursuant to Article 8 of Commission Regulation (EC) No 665/2008, Spain has a central website as established by Council Regulation (EC) No 199/2008, where general information about data collection framework is stored.

http://www.magrama.gob.es/es/pesca/temas/proteccion-recursos-pesqueros/programa-nacional-datos-basicos/documentos-clave/

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The tranversal variables data that are integrated into the database coming from internal administrative sources (administrative data, management, control and inspection data) and external sources from national and international organisms, are collected by the SGP, who also collects information on Recreational Fishing.

Economic figures in the fisheries sector are collected by the MAGRAMA in the Economic Survey of Marine Fisheries, statistical operation that is included in the National Statistical Plan.

Aquaculture data are collected by the MAGRAMA through the Economic Survey of Aquaculture, statistical operation that is included in the National Statistical Plan.

The data from processing industry are collected by the National Statistics Institute of Spain (INE), 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), who processed and made them available to the responsible national body, the SGP.

The SGP colaborates with these Research Institutes related below, providing the oceanographic research vessels R/V Miguel Oliver, R/V Vizconde de Eza y R/V Emma Bardán.

The participants Institutes are:

Spanish Oceanografic Institute (IEO):

From the Ministry of Economy and Competitiveness with headquarters in Corazón de María, 8, 28002 Madrid; Tel: +34 91 342 11 00, (www.ieo.es). It performs the collection of fisheries data from the different areas, length sampling and biological sampling, at market (on shore) and on board, and scientific analysis for the assessement of the Spanish fisheries. It carries out most of the research surveys at sea (9 annual y 4 triennal) and the subsequent analysis of the data associated with them. In these tasks are involved the 9 coastal centers that IEO has along the Spanish coast.

E mail: jap@vi.ieo.es

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

Txatxarramendi Ugartea 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 the BIOMAN and JUVENA survey in Bay of Biscay and performs one of the Mackerel / horse mackerel egg survey (MHMGS) triennial surveys.

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Marine Research Institute (IIM-CSIC) of VIGO:

Eduardo Cabello 6, 36 280-Vigo (Spain) Tel: +34 986 23 19 30), (www.iim.csic.es). It collaborates in the implementation of the Flemish Cap Groundfish Survey and subsequent scientific analysis for the assessment of Spanish fisheries in the NAFO area.

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II. B. Regional and International coordination.

II. B1 Attendance of international meetings

Coordination meetings and international scientific meetings attended by Spain are shown in table II_B_1.

II. B2 Follow-up of regional and international recommendations.

The follow-up of regional and international recommendations are listed in table II_B_2.

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III. Module of the evaluation of the fishing sector

III. A. General description of the fishing sector

A summary of the Spanish fisheries is presented in Table III_A_1. For more detailed information see Annex I of the “Spanish data collection and management Program for the period 2014-2016". Description is not repited here, in order to reduce pages and because this information was given previously and already available in NP Proposal.

The changes from the previous year are noteworthy in most of the areas. The most notable changes are described below.

Area CECAF

In the CECAF Area, the fisheries in the fishing ground “From Morocco to Guinea-Bissau” are regulated by Fisheries Partnership Agreements (FPAs) signed between the EU and coastal countries of North-West Africa.

After years without fishing agreement with **Morocco** (since 2011), a new FPA was ratified in July 2014, involving the re-opening of some EU fisheries in this fishing ground in September 2014.

The last protocol of the FPA between the EU and **Mauritania** was signed in December 2015, allowing some métiers included in the Data Collection to return to their fishing activities after one year of closure. The fishing possibilities for cephalopod freezer trawlers were excluded in this Protocol.

Last Sustainable Fisheries Partnership Agreement (SFPA) between the EU and **Senegal** was signed in September 2014, including fishing possibilities for trawlers targeting black hake.

A new Protocol of the FPA between the EU and **Guinea-Bissau**, signed in October 2014, allowed the return of shrimpers and cephalopod freezer trawlers to this fishing ground at the beginning of 2015, after the closure of the EU fisheries that followed the “coup d'état” occurred in this country in 2012.

Area NAFO

According to the NAFO Scientific Council, most of the NAFO stocks are in low biomass levels and many of them are closed to fishing, although in recent years some of these stocks show signs of recovery.

Most of the Northern Shrimp (*Pandalus borealis*) in Div. 3LNO stock is located in Division 3L where fishing was permitted and regulated by TACs that have been declining in recent years. The NAFO Scientific Council following theprecautionary approach advised the fishery closure, so, the NAFO Fisheries Commission adopted a moratorium on this stock in 2015.

III. B. Economic variables

All Supra Regions.

III.B.1 Achievements: Results and deviation from NP proposal.

During the year 2015 the Economic Survey on Maritime Fisheries was carried out in order to know the results of the reference period of 2014. The first step of this survey was made during the first quarter of 2015 and it consisted in reaching the knowledge of the population to investigate.

From 2012 onwards, the criteria to elaborate the initial population for the Survey were changed. The new framework to be utilized will contain a vessel list with activity during the reference year of the survey. Non active vessels will comprise a list of vessels that still being operative in the vessel register didn’t have any activity during the reference year.

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Over the abovementioned population framework, the strata were built as defined in Appendix III of UE Decision 2010/93. Once the vessel population was stratified following those instructions, the sample size was calculated, according to the following statistical procedures:

Total sample size with an expected error of 4% at 95% confidence level. This was calculated under the assumption that the population has a normal type distribution. The formula utilized to calculate the sample size (n) was the following

$$n = \frac{\left(\sum_{h=1}^{h=L} N_h S_h\right)^2}{\frac{N^2 e^2 \overline{X}^2}{z^2} + \sum_{h=1}^{h=L} N_h S_h^2} \qquad (1)$$

Where h is the number of strata (from 1 to L), Nh the strata size, N the population size, Sh the standard deviation for h strata $\overline{X}$ the average GT of the population, e the error of the estimated and z, the typified variable for the confidence level chosen.

The total sample was shared among the strata according to Neyman´s affixation (assignation according to the dispersion) by applying the following formula:

$$nh = n\frac{N_h S_h}{\sum_{h=1}^{h=L} N_h S_h} \qquad (2)$$

Where n, h, Nh and Sh are the same statistical variables than in (1)

The use of the formulas previously described doesn't assure that with the sample size obtained for each stratum, we will have enough representatives in the population contained in each stratum, once we have had proceed to the collection. For this reason, Spain has applied additional criteria that produce a bigger sample size for some strata. For year 2014, over data of 2013 (and as it was for previous year), samples under 2% of its population were increased until they reached the 2%. The total sample size improves the requisite of an expected error of 4% at 95% confidence level.

After applying the considerations and formula already explained, the simple size to investigate in 2015, over the 2014 data, it was of 911 vessels.

For the field work in 2015, 911 vessels ship owners or representatives were visited. Out of these, 208 didn't give a reply to the survey (negative) and 703 gave a satisfactory reply.

Over the total population comprised by a total of 8.693 vessels, the statistical inference was applied.

Regarding the population size having into account what was initially planned and what finally occurred at the moment of the studio performance, there were no variation, since it was successfully included within the population all the vessels with activity during the reference year. With regard to the planning and what actually carried out on the survey size, there were significant differences due to the increase in the sampling size, which moved from 450 surveys to 911 in 2015.

As for the strata aggregation (clusters), it was considered that in all cases the aggregated clusters are of medium importance, meaning that these are similar strata to what was aggregated. In all the cases, the grouping was among strata belonging to the same supra region.

The groups are as indicated in table III_B_2 of the attached document and all of them are justified by the necessity to preserve the statistical confidentiality in those vessel groups in which there are less than 10 units.

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The aggregation followed the principle of most possible similarity; this is, it was grouped the strata with same features.

Capital value and cost value

Capital value and cost value variables are catalogued according to legislation (Decision 93/2010) as economic variables, not transversal. For this same reason, these are considered in this part III.B.1, and in table III.B.3 but not in III.F.1 as set in the foot note on the spread sheet.

Spain calculates the capital value as requested in (EC) Regulation n 199/2008 of the Council following the permanent inventory method proposed in the capital valuation report num. FISH/2005/03 and adapting as far as possible to the spread sheet of the mentioned report.

The original data source of the Spanish fleet is the Operative Fishing Vessel Register of the Ministry of Agriculture, Food and Environment that contains information of the 8693 Spanish fishing vessels that are part the population for the period 2014. It is possible to obtain from this record the data concerning to age and technical features of the vessels. This very same population is what is being used to obtain population data of capital value and cost value.

With these initial data, the data series as planned in the spread sheet is calculated, distributing the vessel number that are part of the Spanish fleet according to their age and put in by segments. For the capacity unit price calculation, the GT is the unit selected for the vessel capacity.

The requested parameters for the calculation are established as follows:

- **Depreciation types**. To apply the descendent amortization method, original spread sheet types are used (the general assumptions): hull 7%, engine 25%, electronics 50%, other equipment 35%. To apply the lineal amortization method, Spanish legislation types are used. Specifically, it has been consulted amortization coefficient tables of the Royal Decree 1777/2004 which sets the Regulation on corporate taxes.

GROUPING 03. FISHERIES
Group 031. Maritime fisheries with vessels and traps

	Maximun lineal coeficient %	**Maximun period (years)**
1. Decks and load and download facilities	6	34
2. Fishing vessels	10	20
3. Fishing location devices, detectors, telephones, radio gonio-metrics and radar.	18	12
4. Fishing gears	25	8
5. Fishing processing machinery and facilities of fish and its products.	12	18

(Hull 10%, engine 12%, electronics 18% y other equipment 25%. Valor residual hull 2,5%)

- **Use life of each active** It has been used also the maximum period proposed for the different actives in the above mentioned Regulation. (Unlimited hull, engine 18, electronics 12, and other equipment 8).
- **Sharing of the capital components in the total value**. The following percentages are considered:
  - Hull →51%
  - Engine →22%
  - Electronics (electronic equipment) →10%
  - Other equipment (fishing gears and other equipment) →17%

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This information is obtained from the data collected in the Economic Survey of Maritime Fishing questionnaires, carried out by the Ministry of Agriculture, Food and Environment in the framework of valuation of every active type.

Estimation of capacity unit prices (CUP):

The starting point is the estimation of the capital value. From all the indicators presented, Spain chooses the vessel historical value. By means of the Economic Survey for Maritime Fisheries, it is obtained this information: vessel value (addition of the acquisition price plus repairing and significant transformations that this vessel has suffered since the day of acquisition and that may have modified its value). The vessel gross value is questioned and this must include the significant investments on it during its activity

Therefore, it is used the accounting information provided by the ship owner in the successive collecting data surveys. Since the vessels are stratified by vessel type and length and since the age is known, it can be inferred for vessels with the same features, the value obtained within each stratum and for a certain age. With these estimations, it is established a data base which contains most of the Spanish fleet vessels with a gross value and age. The fleet total value so calculated is used to estimate the price per unit of capacity.

In the “MACRO” approach, which considers the replacement of actives, the price per capacity unit is constant in the whole series of vessel data in the spread sheet. Once the replacement values are calculated, the path established in the spread sheet is used to obtain the depreciation values for the vessels, using the formula as corresponds according to the depreciation method used, decreasing or lineal. In the first method, to calculate the capital opportunity costs, it is used the data of the interest rates as in the Treasure bonds (2.88% in 2014 for 10 year-bonds).

In the “MICRO” approach, which considers the historical active value, the price per capacity unit obtained as explained before, is deflated to the previous years using the Industrial Price Index (IPI), published by the INE (for the division 30. “Manufacture of other transport material”. CNAE-2009, included in the group 3011, “Vessel construction and floating structures”).

On the other side, within this same approach are also used other Industrial Price Indexes to calculate in a non aggregated fashion the engines gross values, on board equipments and fishing gears that comprises the Spanish fishing fleet (“division 28: Manufacture of machinery and equipment n.c.o.o. 26: manufacture of IT, electronic, optic devices and 25: manufacturing of metallic, but machinery and equipment, respectively.

To obtain depreciated vessel values from historical gross data, classified by segments, the procedure is the established in the spread sheet, both as for the decreasing method and the lineal one, as it is also done in the MACRO approach.

In the MICRO approach, for the calculation of interest costs, it is used the interest rate of loans for more than 5 years (6.99% in 2014). Also, it is applied a ratio which measures the indebtedness of the fisheries sector and which is obtained from the values in the Economic Survey of Maritime Fisheries, linking the debts of ship owners with their capital value (20.9% in 2014).

The valuation of the amortized or net capital is requested in Commission Decision, both from the reposition value and historical capital value. In the spread sheet both variables are obtained as the capital costs (annual amortization), also requested in the Regulation. The amortization method is not specified, therefore Spain uses the lineal method and takes, by applying this method the replacement of amortized capital value and historical amortized value as a result of this spread sheet.

Nevertheless, in the annual amortization is preferred to consider the resulting value of the Economic Survey instead of taking the data obtained with the spread sheet, which doesn’t provide with the information with the stratification as requested in the legislation.

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On the other side, the ratio that measures the financial situation, also requested by the Regulation, is obtained from the gross replacement value according to PIM method.

III.B.2 Data quality: Results and deviation from NP proposal.

Following the instructions given for the completion of the attached tables, in table III.B.3, it is requested as precision index, the response rate and not the CV, as in previous years

In any case, for our study, each strata of the population was assigned with a sample. The variables obtained in the sample are analyzed measuring its variability. To do so, it is calculated the variation coefficient (CV) of each of the variables measures on each strata. This CV is presented in one unit, adding four decimal ciphers to the CV.

The CV obtained shows us, in general terms, small variations in the measured variables. This means that the results are representative in each stratum.

There are variables that have no information of CV. We can differentiate the following situations:

- NA “Not Applicable”, non applicable variable to the strata and therefore, CV is not applicable.
- “CV in blank” there´s no information, no response for that variable.
- .- CV=0” referring to one of the following cases:

  .- No variability = there is value for this variable but values are unique or the same for each of the units.

  .- All the values of the strata are= 0.

Amongst the variables under study a few of them are derivative indexes, meaning that they come from another variable in the study and of constant value. Therefore, when it comes to the CV calculation, it is made by the variable CV.

In our case, this happens in national and harmonized EDP variables, which are obtained from the variable “number of hours of work for the crew”, divided by a fixed value of 1.800 for the national EDP and by 2.000 for harmonized EDP.

Therefore, CV values calculated for these variables are the same for CV of the variable “number of hours of work for the crew”.

The variable “Income from the value of quota and other fishing rights” it is considered as NA variable (non applicable) in certain stratum due to the fact that fishing rights cannot be sold or rented, except the trawlers in North Atlantic.

Calculation of the “Value of Non- paid work”

Spain calculated the non paid hours according to the average value of paid hours. For this, the procedure was as follows:

- Difference was made between the paid and non paid worker, being the last one the ship owners and members of his/her family involved in the exploitation of the vessel, for the case of individual companies, with no legal entity.
- After this, working hours have been calculated of the two types of workers, paid and unpaid.
- On the other hand, having the value of the incomes of paid staff, data known from the survey and which is reflected in the variable “salaries and incomes of the crew.
- Lastly, it is calculated the average value of per paid worker hour and it is multiplied by the number of unpaid work:

  Crew salaries and incomes / Paid workers hours X hours worked by unpaid

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This calculation is made from data obtained in the Economic Survey of Maritime Fisheries, referred to the sample vessels by segments and, applying to them the elevation coefficient we get its population value.

III.B.3 Actions to avoid shortfalls.

The entry into force of EU Regulation 199/2008 and Decision of 5th November of 2008, established new framework regarding the Regulations 1543/2000, 1639/2001 and 1581/2004. During 2014, the project of modification of Economic Survey continued. The schedule of collecting and presentation of results finishes its deadlines before ends of year n+1, being n the year of reference which the data belongs to.

III. C. Métier-related variables.

Baltic Sea (ICES areas III b-d).

Spain has no fisheries in this area.

North Sea (areas ICES IIIa, IV y VIId) y Eastern Arctic (areas ICES I y II)

Spain has only fisheries in the ICES Subareas I and II.

III.C.1 Achievements: Results and deviation from NP proposal.

Table III.C.1 shows the identified métiers for sampling according to the ranking system procedures established in Commission Decision. The ranking of the métiers was done using, as reference, the logbook data from 2012 and 2013.

In this area operated two métiers: OTB_DEF_> = 120_0_0 targeting Cod and OTM_DEF_100-119_0_0 targeting Redfish. Sampling is carried out by observers who remain on board throughout the period of the fishing trip. In 2015 trips lasted from few days to 3 months.

Table III.C.4 shows the number of trips planned for sampling during 2015 according to the national sampling scheme.

Table III.C.3 shows the details of the number of sampled trips by métier in 2015.

The commercial fleet performed 13 trips in the Cod fishery carried out by 5 trawlers. Currently the fleet continues landing mostly in Norwegian and German ports. For this reason the average number of days at sea by trip has decreased but the final number of trips has increased.

3 vessels have carried out 3 trips in the Redfish fishery.

Deviations between tables III.C.4 and III.C.3

Métier OTB_DEF_>=120_0_0. (**code L1**): One sampling trip more than planned has been carried out. The trip's lasting has decreased in this fishery. Thus the observer remained two consecutive trips on board the same vessel.

Table III.C.6 shows the number of individuals sampled for length on the total catch and discards during 2015 for all species in each métier

The data obtained from length sampling, refers to the total catch (unsorted catches) and in some cases from the retained catch.

Discards:

Discards estimation in these fisheries was obtained from sampling performed by observers on board. Such estimates are mainly carried out by quantification and weighing of samples and its extrapolation haul by haul.

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Discard is forbidden in some areas. Besides, the fisheries are monospecific therefore the discards level is very low.

III.C.2 Data quality issues.

The data collected by observers on board are checked later on, at the laboratory. Data have been used for carrying out the assessment at AFWG. Both, sampling levels and data quality, are considered adequate.

Data of each trip are collected and recorded on board. Data are checked during and after the trip in order to detect errors and inconsistencies (outliers, trends, range of variables, dispersion).

After the trip, the observer debugs all data, haul by haul and sampling by sampling. Finally, a random check of about 15% of the data is carried out to validate the quality of the results. Annually, and for each fishery, all sets of data are checked previously to be used for assessment and other scientific tasks.

III.C.3 Actions to avoid deviations.

The main cause of the deviation is the lasting of the trips in these fisheries and the unpredictability of the permanence of observers in fishing areas due to the decisions taken by vessels' owners in the way of moving vessels among areas. Although the behavior of the fleet is impossible to change, the Institutes involved in sampling will continue in improving coordination with the sectors involved: owners and administration authorities.

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

ICES VI, VII (excl. VIId), VIII, IX

III.C.1 Achievements: Results and deviation from NP proposal.

Table III.C.1 shows the identified métiers for sampling according to the ranking system procedures established in Commission Decision. The ranking of the métiers was done based in logbook and sales notes data from 2012 and 2013.

Table III.C.4 shows the number of trips planned for sampling during 2015 according to the national sampling scheme.

Table III.C.3 shows the details of the number of sampled trips by métier and fishing ground in 2015.

The update of the reference period (2012-2013) used to rank and select métiers was done in 2015 after Commission asked for Spain to update table III.C.1. Therefore some activities appear in the updated rankings although they were not included in the 2015 sampling plan.

This is the case of 4 métiers:

1) GNS_DEF_40-59_0_0, a small scale gillnet which targets *Argyrosomus regius* (classified as a G2 species in the Commission Decision).

2) DRB_MOL_0_0_0 targeting bivalbes (*Cerastoderma edule, Venerupis pullastra, Ruditapes phillippinarum, Polititapes romboides, Ruditapes decussatus, Donax trunculus*) that doesn't appear in Appendix VII of the Commission Decision.

3) HMD_MOL_0_0_0 targeting *Chamelea gallina* that doesn't appear in Appendix VII of the Commission Decision.

4) FPO_CRU_0_0_0 targeting decapods *Necora puber* and *Palaemon serratus.*

These mollusc and crustacean species do not appear in the Appendix VII of the Commission Decision where sampling obligations are established.

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Deviations between tables III.C.4 and III.C.3

In general, the majority of the planned sampling targets (III.C.4) were achieved.

By métier, final results show that original objectives from the National Program were not achieved in 6 cases, where less than 90% of the originally planned trips were sampled. At the same time, for 7 métiers the original objectives in the Program were largely surpassed with more than 150% of trips sampled.

This is mainly the result of the fleet activity and adjustments in the sampling program of both scientific institutions involved, IEO and AZTI, to integrate the guidelines and recommendations of expert groups to move towards a sampling scheme more statistically robust.

AZTI is moving towards a Statistically Sound Sampling Scheme design and implementation for its on-shore and at-sea sampling programs. As part of this movement, in 2015 the artisanal fleet started to be sampled on-shore through a dedicated sampling scheme. This sampling was not planned but is reported in the present Annual Report. The new métiers included in this scheme are: GNS_DEF_>=100_0_0, GNS_DEF_60-79_0_0, GTR_DEF_60-79_0_0, and LLS_DEF_0_0_0.

IEO is sampling according to the métier sampling desing stablished in the Regulation. Nevertheless, recommendations from expert groups such as WKPICS and WGCATCH are being integrated step by step to improve current sampling scheme and allow a better transition towards a fully statistically sound approach. At the end of 2014, a revision of the sampling scheme to incorporate some of these changes led to minor modifications in the sampling trips' planification for 2015 in some métiers.

1-Market sampling

1.1-Iberian fishing ground

a) Results achieved below to what was planned

FPO_MOL_0_0_0 **(code I31):** 45 sampling trips were achieved in 2015. The revision of the sampling design of this métier in 2014 showed that all the effort was being concentrated on landings from Division IXa. One sampling location was changed in order to cover the activity in Division VIIIc and a slight reduction of the sampling effort was established. Considering this change only 3 trips were missing in 2015.

GNS_DEF_>=100_0_0 **(code I34):** 56 sampling trips out of the 72 originally planned (78% compliance) were completed in 2015. Nevertheless, a reduction was established by IEO in this métier for 2015 setting the final target in 60 trips. The reasons, similar to FPO_MOL_0_0_0, were to allow an increase of the sampling effort in other métiers. A target of 60 is in line with historical data provision, proves to provide a well coverage of the activity and no impact in the data provision is expected. This métier operates along the northern Spanish coast and their landings are very distributed among several ports. The sampling of this activity covers the most relevant ports (Cedeira, San Vicente de la Barquera and Santoña) with the addition of Bermeo (Basque Country) for the first time in 2015 due to changes of the sampling scheme by AZTI.

LHM_DWS_0_0_0 **(code I36):** There is not any problem concerning the sampling of this métier. As explained every year this is the only case in the Spanish National Program where the number achieved in table III.C.4 refers to the number of sampling days (not to the number of trips). Every sampling day (2 per month) the sampling team measures all fishes (*P. bogaraveo*) landed in 4 market categories by all boats. Sampling objectives are considered covered. The aim of this sampling scheme is to get enough information about this species because of its very wide length range and the complexity of this small scale métier.

LLS_DWS_0_0_0 **(code I39):** Two sampling trips per month of *L. caudatus* were planned. The achieved number of sampled fishing trips (18 trips) is explained because: 1) a biological closure was established for one month and 2) during four months only one sample per month was performed because the sampler

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couldn't find the activity at port in different visits (this is small scale fleet with only 600 trips in 2015 distributed among different ports).

b) Results achieved above to what was planned

As a consequence of the changes in AZTI towards a Statistically Sound Sampling Scheme design for its on-shore sampling program artisanal fleet started to be sampled through a dedicated sampling scheme in 2015. This sampling, not originally planned, is reported in the present Annual Report. This led to surpass the original objectives in three small scale métiers in the Iberian fishing ground:

1) GNS_DEF_60-79_0_0 (code I32) 184% compliance;

2) GTR_DEF_60-79_0_0 (code I35) 36 trips were achieved while none trip were planned;

3) LLS_DEF_0_0_0 (code I38) 130 trips achieved and 84 planned (155% compliance)

1.2 Bay of Biscay fishing ground

a) Results achieved below to what was planned: there were no results below to what was planned in this fishing ground.

b) Results achieved above to what was planned

LLS_DEF_0_0_0 **(code I44):** 47 'concurrent at the market' samplings were achieved out of the 24 planned, thus achieving a 196% of compliance. There is a need to evaluate the monitoring of this fleet in this fishing ground together with its activity in Western Ireland, Celtic Sea and West of Scotland (see LLS_DEF_0_0_0 –code I49).

In 2015, IEO sampled the three most relevant ports (Celeiro, Aviles, A Coruña) for LLS_DEF_0_0_0 operating in non-Spanish European waters (with the exception of Burela due to practical reasons). This design was established to cover 24 trips in Bay of Biscay (code I44) and 36 trips in Western Ireland, Celtic Sea and West of Scotland (code I49). Fleet landing in Celeiro and Aviles behave according to the expected geographical area, but 10 out of the 11 trips sampled in A Coruña had operated in Bay of Biscay causing a deviation under 90% of the planification in Subarea VII.

Apart from this deviation, the already mentioned changes in AZTI's sampling program led to sample 14 trips not originally planned in Bay of Biscay, increasing the percentage of compliance to reach 196%.

Both codes (I44 and I49) should be evaluated together, achieving only a 121% of compliance.

GNS_DEF_60-79_0_0 – (**No** sampling frame **code**): 11 trips were accomplished. This métier showed no activity in Bay of Biscay before 2015, therefore it was not under the current ranking used for the National Program (reference years 2012-2013) and had not a sampling code assigned in tables III.C.3 nor III.C.4. It appeared within the sampled trips due to the changes in AZTI to move towards a more statistically sound sampling program following WKPICKS and WGCATH guidelines.

PS_SPF_0_0_0 **(code I42):** 154 trips were sampled, although only 30 were planned. Equally to last year, this deviation is explained mainly through the monitoring AZTI did on the anchovy fishery. Basque purse-seiners operate in area VIIIc and VIIIb depending on the availability of the resource. It is difficult to plan the exact number of trips to sample in each area. Besides, this métier has increased its effort in this area after the recovery of the anchovy stock and, thus, the number of trips sampled from VIIIb has increased.

The most appropriate sampling frame both for AZTI and IEO should include purse-seiner trips for both areas (VIIIc and VIIIb) to solve this problem. If the sampling performed in both areas is added (Sampling frame code I42 + Sampling frame code I46), the deviation is 140%. The plannification will be changed for the new EU-MAP period.

1.3 West of Ireland and West of Scotland fishing grounds

a) Results achieved below to what was planned

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LLS_DEF_0_0_0 **(code I49):** 26 'concurrent at the market' samplings were achieved out of the 36 planned. One of them in Celtic Sea (VIIh), which is an adjacent Division (it is not possible for the samplers at port determine in which exact ICES Division the boat operated).

Nevertheless objectives are covered, please take note of explanations above in Bay of Biscay fishing ground related to LLS_DEF_0_0_0 (code I44).

OTB_DEF_70-99_0_0 **(code I50):** Only 25 'concurrent at the market' samplings out of the 36 planned could be accomplished. This was due to a steady decrease of the Spanish fleet. Spanish effort was reduced 35% between the reference period (2012-2013) and 2015. This seems to be a stable situation therefore and we will have to modify our sampling effort accordingly for 2016, assigning 24 concurrent samplings.

OTB_DEF_100-119_0_0 **(code I51**): 67% of planned trips accomplished. High reduction levels of the fleet effort during last years explain this results (60% of reduction compared to reference period 2012-2013). Sampling teams sampled more than one third of all the trips of this métier, which proves the sampling effort deployed and the difficulties to maintain these levels.

b) Results achieved above to what was planned: there were no results above to what was planned in this fishing ground.

2. On board sampling for discards

In the on board sampling for discards there is a general improvement compared to previous year. In Iberian fishing ground, objetives for OTB_DEF_>=55_0_0 and OTB_MPD_>=55_0_0 (code I41) and for GNS_DEF_60-79_0_0, GNS_DEF_80-99_0_0 and GNS_DEF_>=100_0_0 (codes I32, I33 and I34) were even slightly surpassed for the first time in some years.

a) Results achieved below to what was planned:

PTB_MPD_>=55_0_0 **(code I43):** 28 trips out of 40 were sampled on board for discards. Both institutes were able to complete their on shore requirements for this métier, but both institutions have had difficulties during last year to fulfill the planned on board targets. Main problems concentrated in 2015 in the Basque Country where on-board sampling targets could not been fulfilled by AZTI. The reasons for the deviation are that during 2015 only two Basque pairs (4 vessels) operated in this métier, and that we have difficulties to have samplers on board due to limited space in the vessels. Corresponding sampling effort was redistributed among the other Basque PTB métiers (allowing to even slightly surpass original planification for PTB_DEF_>=70_0_0 (code I45) in Bay of Biscay fishing ground).

OTB_DEF_70-99_0_0 and OTB_DEF_100-119_0_0 **(code I50, I51 and I52)**: 12 trips out of 17 were sampled. The fleet effort sharp reduction in recent years explain this results–explained above, please see on shore sampling justification-.

b) Results achieved above to what was planned

PS_SPF_0_0_0 **(code I42):** 52 on board trips were sampled in Iberian fishing ground. Concurrent sampling on shore was changed in the south area, Division IXa (Gulf of Cadiz) and most of this information is collected through an on board sampling scheme. With this modification, which is considered an improvement, we surpass the initial on board sampling trips planned in the Spanish National Program.

Table III.C.6 shows the number of individuals sampled for length on the total catch and discards during 2015 for all species in each métier.

III.C.2 Data quality issues.

Sampling levels and quality of the data obtained are, in general, considered adequate.

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In 2015, with a concurrent sampling scheme in place, Spain has obtained length information from more than 200 species, with 603156 individuals from the retained catches and 134288 from the discards.

The provision of length distributions of the main species subject to regulation remains in line with the data provision to groups assessed by ICES for the last years.

The quality of the length distributions, sampled on-shore has been tested through a joint exploration of all lengths by species and by métier for the detection of outliers. In the IEO this analysis was conducted through tools from the COST package. This methodology takes into account the sampling design and the different stratifications (geographic and temporal). This quality process was satisfactory for selected species, invalidating only a few samples whose distributions were considered not suitable in the statistical analysis. In AZTI, length distributions were analyzed and checked by stock coordinators to detect outliers and anomalous registers.

The actions undertaken to strengthen the quality of the data also covered the changes in the database and the cross-checking of the sampled trips with logbooks and sales notes provided by the national authorities. This allowed, following recommendations of RCM NA, an analysis of the landings profiles available from the different sources thus allowing a reduction of errors. During this process a revision of the métier assigned to each trip is also made. The exact geographical allocation of the trip is also provided by this cross-checking process which implies a greater capacity for analysis of the spatial coverage of the sampling.

III.C.3 Actions to avoid deviations.

At market, deviations from the planning correspond generally to the variability of fishing activities and the new sampling procedures established to be aligned with a more statistical sound sampling approach.

Regarding the variability in the behavior of the fleet, some planifications have been changed in 2016 to adapt the sampling effort to more realistic achievements. This is especially the case of the trawlers in Subarea VII, where the reduction of fishing effort has been considerable. Other changes in the planification are not possible immediately as all the sampling work is carried out by a sub-contracted firm, whose contract lasts for more than one year (two or more), and any modifications of the planned sampling established in the contract cannot be done immediately.

Regarding the new sampling procedures, we do expect that deviations from the former planification will persist if, in 2016, sampling achievements have to be checked against planifications made in the old National Program.

At the same time, difficulties to access the fish persist. This is a relevant factor especially for on board sampling. The degree of cooperation with the fisheries sector is variable among fleets and among ports, but it should improve. These difficulties increase year after year, despite the continuous effort from the sampling teams to achieve the objectives and we are not sure about how it will evolve with the “landing obligation” during next years.

NAFO and ICES XII, XIV

III.C.1 Achievements: Results and deviation from NP proposal.

Table III.C.1 shows the identified métiers for sampling according to the ranking system procedures established in Commission Decision. The ranking of the métiers was done using, as reference, the following:

- In ICES Subareas XII, XIV, data obtained from 2012 and 2013 logbooks.
- In NAFO Regulatory Area, data from NAFO observers (100 % mandatory on board commercial fleet) for 2012 and 2013.

In **ICES Subareas XII, XIV** two métiers operated in 2015:

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OTB_DWS_100-129_0_0 (Hatton Bank): trawlers targeting deep-sea species in ICES Division XIIb and VIb.

OTM_DEF_100-129_0_0: trawlers targeting Redfish (*Sebastes mentella*) and, since 2010, targeting also Roundnose grenadier (*Coryphaenoides rupestris*). Both are monospecific fisheries located in ICES Subareas XII and XIV (Irminger Sea). The effort is shared between the two fisheries using pelagic trawls.

In **NAFO** Regulatory Area (NRA), 3 métiers operated in 2015:

OTB_MDD_130-219_0_0: Greenland halibut fisheries- (*Reinhardtius hippoglossoides*)

OTB_MDD_>=220_0_0: Thorny skate fisheries- (*Raja radiata*)

OTM_DEF_130-135_0_0: Alfonsino fishery (*Beryx splendens*). In 2014, NAFO SC requested to carry out the monitoring of Alfonsino stock. For this reason sampling on board was planned for a new métier named OTM_DEF_130-135_0_0 from 2014 onwards. It is a very marginal métier because there is a single fishing vessel targeting Alfonsino for only a few days a year.

In both, ICES Subareas XII and XIV and NAFO Regulatory Area, sampling is carried out by scientific observers in all métiers. The observers remain on board the whole trip, which can last about 2-3 months or even a few days; depending on fishing strategies and decisions the owners.

Table III.C.4 shows the number of trips planned for sampling during 2015 according to the national sampling scheme.

Table III.C.3 shows the details of the number of sampled trips by métier and fishing ground in 2015.

Deviations between tables III.C.4 and III.C.3

OTM_DEF_100-129_0_0. (**code L2**). Two trips had been planned for sampling but it was no possible sampling in the fishery. The vessel (out of three) chosen for the placement of observer, finally did not fish in this area because of a decision taken by the owner. The effort was very low. The three trips peformed by the three vessels were carried out at the same time, and thus there was no oportunity to place another observer.

Sampling frame code L3

Except in the métiers targeting Shrimp and Alfonsino, deviations from planned sampled at sea are considered positive.

In 2015 there has been a higher number of observer trips than those initially planned due to the fleet tendency to shorten the trips which means a greatest number of observed trips although this not means an increase in the number of observation days at sea per year.

Usually vessels operating in this area have licences to use several fishing gears in the same voyage, thus, they can operate in several métiers. Observers are allocated to vessels when they leave the port and there is no accurate information about the vessel activity plan (fishing gear to use, fishing areas to fish,) for the months that the trip lasts. Thus, it is difficult to predict in advance which métiers are going to be sampled during a same voyage. Therefore, each time the vessel operates with different métier, it is considered that it is a different observed trip.

8 voyages with scientific observers on board were carried out. These 8 observers collected data from 15 different observed trips obtaining the following coverage by métier.

-OTB_DWS_100-129_0_0: These observers collected data from 2 observed trips in this métier.

-OTB_MDD_130-219_0_0: These observers collected data from 8 observed trips in this métier targeting *R. hippoglossoides*

-OTB_MDD _> = 220_0_0: These observers collected data from 5 observed trips in this métier targeting *Raja radiata*

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-OTB_CRU_40-59_0_0 targeting Shrimp: The Shrimp stocks of NAFO Regulatory Area Division 3L and 3M are under moratorium, and there was no fishing effort in this métier in 2015.

-OTM_DEF_130-135_0_0 targeting Alfonsino in NRA Division 6G: Only one vessel operated with few days of effort. No one of the 8 observers was allocated to the vessel carried out this fishery, so this métier could not be sampled.

Table III.C.6 shows the number of individuals sampled for length on the total catch and discards during 2015 for all species in each métier.

As it was explained before, observers in these areas, remain on board the vessels for the whole trip and the vessels can operate with several fishing gears and in different areas within the same trip. Fishing gears and fishing areas depend on the decisions taken by the owners and captains, so it is difficult to achieve the planned sampling.

In NAFO regulatory area, species as American plaice (*Hippoglossoides platessoides*), Witch flounder (*Glyptocephalus cynoglossus*), Cod (*Gadus morhua*) stock 3NO and stock 3L, and Yellowtail flounder (*Limanda ferruginea*) have TAC = 0. Therefore the number of individuals sampled at the national level was not planned a priori.

The Shrimp fishery (Pandalus borealis) in NAFO Regulatory Area Division 3M and 3L are under moratorium.

In these cases, the individuals sampled are by-catch, that makes its sampling very difficult, however, scientific observers carry out length sampling of unsorted catches and discards of several of these species whenever possible.

The data obtained from length sampling, refers to the total catch (unsorted catches) and NOT to the retained catch.

Discards:

Discards estimation in these fisheries was obtained from sampling performed by observers on board. Such estimates are mainly carried out by quantification and weighing of samples and its extrapolation haul by haul.

The length samplings are carried out on samples of the total catch taken randomly before being sorting out by the crew. In addition length distributions of discards in most of the target species were also obtained.

In the NAFO Regulatory Area, the fishery trend is to reduce discards and the sampling possibilities are also reduced, so there are few hauls with significant quantities discarded where sampling can be performed.

III.C.2 Data quality issues.

The data collected by observers on board are checked later on, at the laboratory. Data have been used for carrying out the assessment at ICES-WGDEEP and ICES-NWWG and at NAFO Scientific Council. Both, sampling levels and data quality, are considered adequate.

Data of each trip are collected and recorded on board. Data are checked during and after the trip in order to detect errors and inconsistencies (outliers, trends, range of variables, dispersion).

After the trip, the observer debugs all data, haul by haul and sampling by sampling. Finally, a random check of about 15% of the data is carried out to validate the quality of the results. Annually, for each fishery, all sets of data are checked previously to be used for assessment and other scientific tasks.

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III.C.3 Actions to avoid deviations.

The main cause of the deviation is the lasting of the trips in these fisheries and the unpredictability of the permanence of observers in fishing areas due to the decisions taken by vessels' owners in the way of moving vessels among areas. Although the behavior of the fleet is impossible to change, IEO will continue in improving coordination with the sectors involved: owners and administration authorities.

In NAFO Regulatory Area, some species are under moratorium, and this causes deviations in sampling that are impossible to avoid. However, we are trying to increase the number of samplings of these species and the samplings of discards through a better training and a monitoring of the observers' tasks. In addition, we prioritize the placement of experienced observers whenever possible.

Mediterranean and Black Sea.

Spain has no fisheries in the Black Sea.

As in tables, text explanations are divided by RFMO.

GFCM (Fisheries targeting small pelagics, demersal, crustaceans and cephalopods)

III.C.1 Achievements: Results and deviation from NP proposal.

The collection and analysis of métier related variables has been performed at Geographical Sub Area (GSA) level. The Spanish Mediterranean comprises 5 GSAs.

-GSA01, Northern Alboran Sea

-GSA02, Alboran Island

-GSA05, Balearic Islands

-GSA06, Northern Mediterranean

-GSA07, Gulf of Lion

The main métiers were selected in each GSA following the Ranking System rules. The sampling strategy to carry out the concurrent sampling depends on the fishery and the market. Length sampling in trawlers and trammel nets is performed by observers on board in all GSAs, while length sampling in purse seiners, set longliners, pots and lampara nets is performed at the market. The selected sampling scheme was the scheme 1: comprehensive sampling of all species.

The total number of species sampled was 103 species in the GSA01, 14 species in the GSA02, 123 species in the GSA05, 147 species in the GSA06 and 87 species in the GSA07.

Although in most of the areas there are not problems to access the vessels, the rate of refusals is occasionally high, which causes failures of sampling coverage. Additionally, the bad weather conditions limit the presence of observers on board in many cases, due to safety restraints. The enforcement on temporary/seasonal biological closures, decided at national or regional level on a short-term basis, often prevent a correct planning one year ahead. Finally, as all the sampling work is carried out by a sub-contracted firm, whose contract lasts for more than one year (two or more), any modifications of the planned sampling established in the contract cannot be done immediately.

Table III.C.1 reflects the métier identified in each GSA: the highlighted métiers are the métiers selected to sampling following the Ranking System described in the Commission Decision. To perform the ranking, the most recent sale notes have been taken into account (years 2012 and 2013).

Table III.C.4 shows the sampling design at national level and the number of trips planned for 2015.

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Table III.C.3 shows the number of fishing days/trips sampled by métier and GSA.

Deviations between tables III.C.4 and III.C.3

In both tables (III.C.4 and III.C.3), some new métiers selected for the first time when performing the ranking with the most recent data (2012 and 2013), were added. This modification of the NP was done during 2015 after Commission asked for Spain to update table III.C.1, so it was not possible to start the sampling of these métiers during 2015, due to the technical and burocratical difficulties of starting new contracts in the middle of the year, and it had to be postpone to 2016.

Among the new métiers selected for sampling, DRB_MOL_0_0_0 appears in the GSA01. The target species of hydraulic dredges (*Callista chione, Chamaelea gallina, Donax trunculus y Acantocardia tuberculata*) are not considered important to be sampled in the western Mediterranean because these species do not appear in Appendix VII of the Commission Decision where sampling obligations are established. We therefore ask for exemption of sampling this métier.

Results achieved below to what was planned:

In some cases, it was not possible to reach the number of trips planned to sample during 2015 due to the following reasons:

GSA01

- OTB_DEF_>=40_0_0, concurrent at sea (**code M1C**). Observers experienced problems in finding vessels to sample, being the main reasons of refusals to access to vessels, the safety measures or the high number of people already on board.

- GTR_DEF_>=16_0_0, concurrent on shore (**code M3C**). The artisanal fleet has not fished in this métier in three months along 2015.

- OTB_DWS_>=40_0_0, concurrent at sea (**code M5C**). OTB_DWS is sampled in the ports of Almería and Águilas. During the summer period, this fleet modifies its behavior, changing the fishing grounds from the Alboran Sea (GSA01) to the Alboran Island (GSA02), and thus the sampling of this métier in the GSA01 was not possible during that period.

GSA02

- OTB_DWS_>=40_0_0, concurrent at sea (**code M6C**). The métiers OTB_DWS_>=40_0_0 and OTB_MDD_>=40_0_0 were merged for sampling purposes in the modification of NP made in 2015. During 2015, it has not been possible to start the sampling of OTB_MDD_>=40_0_0 due to the technical and burocratical difficulties as explained above.

GSA05

- OTB_DEF_>=40_0_0, concurrent at sea (**code M8C**). Part of the sampling has been done in OTB_DWS because the skippers of the vessels decided to change the target species once the observer was already on board.

- GTR_DEF_>=16_0_0, market stock specific sampling of *Mullus surmuletus* (**code M7S**). This is a seasonal fishery and thus the sampling scheme cannot cover all the year long.

- LA_SLP_14_0_0, concurrent at sea (**code M10C**). This métier was selected in the modification of NP made in 2015. During 2015 it has been impossible to start the sampling due to the technical and burocratical difficulties as explained above.

- PS_SPF_>=14_0_0, concurrent on shore (**code M11C**). This métier selected in the modification of NP made in 2015. During 2015 it was not possible to start the sampling of this métier due to the technical and burocratical difficulties as explained above.

GSA06

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- OTB_DEF_>=40_0_0, concurrent at sea (**code M12C**). The planned number of trips to be sampled at sea (144) was calculated in the modification of NP made in 2015, and it represents an increase of the sampling effort. Along 2015 it was not possible to increase the number of trips sampled due to the technical and burocratical difficulties as explained above.

- PS_SPF_>=14_0_0, concurrent on shore (**code M14C**). There were not any landings at all of purse seine for four months in one of the ports of sampling (Altea).

- PS_SPF_>=14_0_0, market stock specific sampling (**code M14S**). There were not any landings of *Sardina pilchardus* for six months in the ports of sampling (Altea and Tarragona).

- GNS_DEF_>=16_0_0, concurrent at sea (**code M15C**). The artisanal fleet has not fished in this métier in two months.

- FPO_DEF_0_0_0, concurrent on shore (**code M16C**). Métier selected in the modification of NP made in 2015. During 2015 it has been impossible to start the sampling of this métier due to the technical and burocratical difficulties as explained above.

- OTB_DWS_>=40_0_0, concurrent at sea (**code M17C**). The métiers OTB_DWS_>=40_0_0 and OTB_MDD_>=40_0_0 have been merged for sampling purposes in the modification of NP made in 2015. During 2015 has been impossible to start the sampling of OTB_MDD_>=40_0_0 métier due to the technical and burocratical difficulties as explained above.

Results achieved above to what was planned:

They were performed more samplings than planned in some métiers (PS_SPF_>=14_0_0, concurrent sampling in the GSA01 (**code M4C**), GTR_DEF_>=16_0_0, concurrent sampling in the GSA06 (**code M13C**), and LLS_DEF_0_0_0, stock specific sampling in the GSA07 (**code M20S**) with the purpose of achieving a higher quality in the calculation of length distributions of main species. The improving of length data will be used in the assessment of small pelagic of GSA1, *Mullus* sp of GSA6 and *Merluccius merluccius* of GSA07, respectively.

Table III.C.6 shows the sampling level (number of individuals sampled by species) in 2015. The number of individuals sampled is presented by métier for all species.

Discards

Discards have been sampling in the OTB métiers, following the exception rules of Commission Decision and the Regional Coordination Meeting of the Mediterranean and Black Sea 2009 (Table 3.3.4 – Priorities for sampling effort for discards).

In general, the volume of discards in the area 1.1 (Spanish Mediterranean) does not exceed a 10% in weight or 15% in number, so length sampling of the discarded fraction was not carried out. This estimate is based on pilot experiences in different ports. The discards of the target species in 2015 have not exceeded the 10% of the weight of the catch, except in the case of *Octopus vulgaris* in the GSA1.

% % Discards in the GSAs of the Spanish Mediterranean (2015)					
Species	**GSA1**	**GSA2**	**GSA5**	**GSA6**	**GSA7**
A.antennatus	0.02	0.09	0.12	0.05	0.11
E. encrasicholus	-	-	-	-	-
L. budegassa	3.42	0.00	0.44	6.80	0.00
L. piscatorius	4.50	0.00	3.31	0.24	0.82
M. merluccius	9.27	0.00	1.23	3.12	0.59
M. poutassou	3.78	10.83	1.28	1.28	1.59
M. barbatus	1.41	-	0.00	3.61	4.22

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M. surmuletus	0.05	-	0.07	2.64	0.00
N. norvegicus	0.00	0.00	0.04	2.16	0.64
O. vulgaris	14.45	-	0.49	9.48	0.00
P. longirostris	0.54	-	0.38	1.72	0.55
S. pilchardus	-	-	-	-	-
S. colias	-	-	-	-	-
S. scomber	-	-	-	-	-
T. mediterraneus	-	-	-	-	-
T. trachurus	-	-	-	-	-

III.C.2 Data quality issues.

Length data are collected by cm, ½ cm or mm, according to species. Detailed length classes are:

Specie	**Length measure**	**Length class range (cm or g)**
Aristeus antennatus	Caparace length	0.2
Engraulis encrasicholus	Total length	0.5
Lophius budegassa	Total length	2.0
Merluccius merluccius	Total length	1.0
Micromesistius poutassou	Total length	1.0
Mullus barbatus	Total length	1.0
Mullus surmuletus	Total length	1.0
Nephrops norvegicus	Caparace length	0.1
Octopus vulgaris	Weight	100
Parapenaeus longirostris	Caparace length	0.1
Sardina pilchardus	Total length	0.5
Scomber colias	Total length	1.0
Trachurus mediterraneus	Total length	1.0
Trachurus trachurus	Total length	1.0

In general, although some métiers suffered from under-sampling in some areas, the sampling level of the main stocks can be considered successful and these data is the basis of the annual assessments to be presented in the framework of the different stock assessment working groups (WGSADEM and WGSASP of the GFCM).

Discards.

Quarterly estimate of the length distribution of discards is not compulsory when discards represent, on an annual basis, less than 10% of the total catches by weight or less than 15% of the catches in numbers for the Group 1 and Group 2 species (Decision of the Commission).

III.C.3 Actions to avoid deviations.

Big efforts are put every year in order to avoid deviations, but it is necessary to note that unexpected events can alter the planning and these unexpected events (refusals, bad weather conditions, unexpected biological closures) can not be avoided or envisaged.

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ICCAT (Fisheries targeting large pelagics)

III.C.1 Achievements: Results and deviation from NP proposal.

Table III.C.1 shows the Métiers identified to be sampled following the ranking system established by Commission Decision. The ranking system was made using public data of ICCAT database and information of SGP (electronic fishing logbooks and sales notes) for the period 2012-2013.

Table III.C.4 shows the number of trips planned to be sampled at national level in 2015 and **table III.C.3** shows the number of fishing trips sampled during 2015.

Deviations between tables III.C.4 and III.C.3

Drifting longlines targeting Bluefin tuna **(codes T1 and T4)**: There was no fishing activity during 2015. Longliners targeting Bluefin tuna sold their quotas to vessels of other longline Métiers, mainly to longliners targeting Albacore, who use their quotas to land the Bluefin tuna fished as by-catch.

Purse Seine Cartagena and Tarragona **(code T3)**: Length data from this Métier are not currently available. All the catches of PS in 2015 went to fattening cages; as a consequence the length sampling from PS will take place later, after slaughtering. This data are annually submitted to ICCAT with a delay of one year, for this reason data on this métier are not included in Table III.C.3. The fishing operations and subsequent caging operations of Bluefin tuna are monitored by Spanish observers of SGP, and also by independent observers of ICCAT.

Stationary uncovered pound nets Atlantic **(code T8)**: The fishing strategy has changed in the Atlantic traps. The fishing trips do not depend on the catches in the trap, but depend on commercial strategies. So we carried out the sampling of more trips than planned but with few fishes by trip.

Table III.C.6 summarizes the length sampling of catches, landings and discards with the number of fish measured by species, fishing ground and Métier during 2015. The sampling scheme used was the concurrent sampling (Scheme 1) as defined in Commission Decision. The methodology for collecting data and the data type is made according to the ICCAT manual.

(http://www.iccat.int/en/ICCATManual.htm).

Deviations of table III_C_6

The number of fish measured was greater than the number of fish planned due to the fact that the number of fish planned to be measured at national level in the National Program is a minimum. The aim is to reaching the precision level established by Commission Decision.

III.C.2 Data quality issues.

The main problems in large pelagic fisheries are the wide range of length distributions and the huge weight range of the individuals. There are trips with landings of kg. and trips with landings of tons. The data quality of sampling is considered satisfactory.

III.C.3 Actions to avoid deviations.

Deviations are due to problems inherent to the large pelagic fisheries. The objectives are considered achieved and no additional measures are proposed.

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Other Regions where fisheries are operated by EU vessels and managed by RFMO's to which the Community is contracting party or observer.

CECAF

The Spanish fisheries in the CECAF area are developed both in national waters (in the Canary Islands) and in external waters of West Africa. The geographical fishing zones in the CECAF area were revised in the last Regional Coordination Meeting on Long Distance Fisheries (RCM-LDF) held in Cádiz (Spain) in June 2015. The RCM-LDF proposed the inclusion of a new fishing ground ("Canary"). In this way, EU and non EU waters were separated at RCM level without modification of the RCM coverage, and without changes in sampling obligations or sampling patterns. Following this proposal, three fishing grounds are considered for CECAF: "Madeira", "Canary" (both being the EU waters) and "From Morocco to Guinea Bissau" (as a non EU waters) (RCM-LDF, Cádiz, Spain, June 2015).

The fishery carried out targeting cephalopods had traditionally been called "OTB_CEP_>=70_0_0". However, after discussion at the RCM-LDF, held in Cádiz (Spain) in June 2015, this métier was renamed as "OTB_MCF_>=70_0_0", considering that currently it targets both cephalopods and finfish and the fishing category of the FPA Protocol is for "cephalopods and finfish".

A new métier from the Canaries was included for sampling, following the ranking carried out in 2014 for the CECAF area to update the 2015 NP. This is an artisanal polyvalent and multi-specific fleet fishing with small gears (traps, hooks, nets) targeting demersal species. The sampling of this new métier (named MIS_DES_0_0_0) started in 2015.

III.C.1 Achievements: Results and deviation from NP proposal.

Table III.C.1 includes the métiers selected for sampling by using the ranking system established by Commission Decision, in this case based of landings (or catch) and effort data. Different sources were used to compile this fishery information: sale notes in the landing ports, logbooks from the SGP, data from the IEO Information and Sampling Network, and information provided by the National Association of Crustacean Freezer Shipowners (ANAMAR). The reference year period considered was 2011-2013, instead of 2012-2013 (preferred for other fisheries), as it better reflects the most regular situation of the fisheries carried out in the West African fishing grounds of CECAF. The closure/changes of some fisheries in 2012-2013, as explained in Section III.A, provided lower catch and effort values than the usual values obtained in periods with normal fishing activity. Economic ranking could not be performed as economic data are not available for all métiers.

As in previous years, the coverage of achieved samplings during 2015 in CECAF- West African waters (from Morocco to Guinea-Bissau) was directly affected by the different circumstances of the FPAs between the EU and these third countries, some involving the closure of certain fisheries during certain periods or changes in the fisheries conditions. As a consequence, some of the planned objectives for 2015 could not be adequately accomplished.

Table III.C.4 shows the number of planned trips to be sampled during 2015, as established by sampling schemes at national level. **Table III.C.3** shows the number of sampled trips during 2015.

Deviations between tables III.C.4 and III.C.3

From Morocco to Guinea-Bissau:

-.PS_SPF_0_0_0. (targeting anchovy). (**code C1**): after the new FPA between the EU and Morocco signed in July 2014, the purse seiner fleet from Barbate has had a discontinuous activity in North Morocco during 2015, mainly related to the low abundance of anchovies in this fishing ground (*Faraj et al*., 2015).

For this reason, it was decide to postpone the scientific observations onboard until the fleet showed a regular activity pattern (0 achieved no. of sampled fishing trips at sea vs. 9 planned). It should be noted

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that samplings onboard this fleet were planned in order to estimate discards produced by this fleet in case it would reach levels that involve its regular sampling under the DCF, although in principle this is not expected for purse seine fisheries due to its highly selective character. On the other hand, stock-specific sampling was not planned in the original proposal for 2015 but added afterwards in order to complete the sampling requirement of this métier (**code C1-ss**), having allowed to sample 21 fishing trips on shore.

-.OTB_DEF_>=70_0_0 (targeting black hake) (**code C3**): During 2015, 6 trawlers targeting black hake operated from Morocco to Senegal, performing a total of 98 fishing trips. As the new Protocol of the FPA between the EU and Mauritania was not fully effective until December, only 3 fishing trips were carried out in these waters in 2015. The conditions of habitability and safety onboard have not been improved, since the FPA establishes the obligation of having a certain proportion of local fishermen from Morocco, Mauritania or Senegal. Therefore, observations onboard were not possible to be carried out and concurrent and discard samplings could not be conducted.

- OTB_CEP_>=70_0_0 (targeting cephalopods) (**code C4**): Industrial fleet of freezer trawlers targeting cephalopods. This métier has been renamed during the RCM 2015 as OTB_MCF_>=70_0_0 targeting mix cephalopods and finfish. After the closure of the cepahlopod fishery in Mauritania, in 2015 this fleet only operated in Guinea-Bissau. After decades with no possibilities of having scientific observers onboard, the IEO started in 2015 a new program of observations onboard this fleet, with the cooperation of the National Association of Cephalopod Freezer Shipowners (ANACEF). The first fishing trip was sampled in August-September 2015, allowing the sampling at sea of this métier for the first time. The sampling of a second trip, for the end of 2015, could not be achieved due to operational problems of the assigned vessel in Guinea-Bissau.

- OTM_SPF_>=40_0_0 (targeting small pelagics) (**code C5**): The current Protocol of the FPA forces the European fleet to land in the coastal States: 25% of the catches per journey (in the FPA EU-Morocco) and all catches except those from the last trip preceding the vessel's departure from Mauritanian fishing zones for a period lasting not less than three months (in the FPA EU-Mauritania). In the last case, the last trip could be probably landed in the Canary Islands (usually in Puerto de La Luz, Gran Canaria Island). However, no samples of the vessels landing in Las Palmas could be obtained by the IEO in 2015, mainly due to the important decrease of the landing frequency in this port.

Canary:

- PS_SPF_10_0_0 (targeting small pelagics) (**code C6**): Fleet of artisanal purse seiners operating in the Canary Islands and conducting daily trips at night. Landings are spread in several ports, depending on the weather conditions and the resources location. In 2015, the number of concurrent samplings (14) carried out exceeded the planned sampling because of the changes in the landing and marketing places used by the fleet. Thus, during some months, more than one port was covered in order to avoid losing information until the new work scheme of the fleet is established. Moreover, generally, due to the high selectivity of this fishery not all the target species are landed in each fishing trip. For this reason, data of stock specific sampling on-shore from the “IEO Information and Sampling Network” (RIM) in the main landing ports of Tenerife were included in Table III_C_3 (**code C6-ss**).

- MIS_DES_0_0_0 (artisanal targeting demersal species) (**code C7**): Polyvalent and multi-species artisanal fleet fishing demersal species with small gears (traps, hooks, nets) and conducting daily trips in the Canary Islands. Concurrent sampling at sea was planned for Tenerife Island. The beginning of this métier sampling was delayed until July 2015, after all the fishermen’s associations (a total of 10) had been visited and meetings with the fishermen had been held in order to ensure their support and collaboration before starting the sampling at sea. Finally, more than 40 boats cooperated and they are hosting scientific observers on board. After getting the permissions from local authorities, one monthly trip was sampled since July 2015.

Table III.C.6 shows the number of individuals measured from total catch and discards, by species and by métier in 2015.

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Discards:

From Morocco to Guinea-Bissau:

As previously explained, discard samplings on board vessels from the métier PS_SPF_0_0_0 could not be carried out as planned for 2015, due to its irregular fishing activity in the Moroccan fishing ground after the renewal on the FPA between the EU and Morocco in 2014.

As it happened for concurrent samplings, discards sampling from OTB_DEF_> = 70_0_0 could not be conducted 2015, due to the impossibility of having scientific observers onboard this fleet.

Discards of the métier OTB_CEP_>=70_0_0 (renamed as OTB_MCF_>=70_0_0) were sampled for the first time during one fishing trip in the third quarter of 2015, this being the starting of a program of observers on board this fleet, newly developed by the IEO.

Canary:

Although discard samplings of the métier MIS_DES_0_0_0 are not planned (multispecific fishery where many species are commercialized), the observations onboard this fleet in order to carry out concurrent samplings, allowed collecting information on the discards produced by this fleet.

III.C.2 Data quality issues.

From Morocco to Guinea-Bissau:

PS_SPF_0_0_0: *Engraulis encrasicolus*: the number of measured individuals was higher than the planned at national level (2474 vs 1600), due to the inclusion of data from stock-specific sampling on-shore, which provides complementary information for a more comprehensive coverage of the species length distribution

OTB_CRU_>=40_0_0: *Parapenaeus longirostris*: the number of measured individuals was considerably higher than the number planned (19427 vs 5000). It seems that the abundance (estimated as a CPUE index) of this species in Guinea-Bissau was higher than usual, and then the majority of the hauls targeted during the observations conducted in 2015. In the total number of 19427 specimens are included data from biological sampling and length sampling because the sex identification is immediate in this species by external characters. Weight and maturity are not planned in 2015.

Penaeus notialis (*Farfantepenaeus notialis*): the number of individuals sampled for maturity and sex ratio was lower than planned (1383 vs 6400) because the majority of sampled hauls targeted deep water shrimp species as *P. longirostris* and *Aristeus varidens*.

OTB_DEF_>=70_0_0: *Merluccius* spp.: the number of measured individuals was higher than the planned for sampling (15040 vs 10000). On one hand, it is necessary to measure a high number of specimens to reach the standard precision levels. On the other hand, the high level of catches by vessel and fishing trip (an average of 40 tons), the existence of four different commercial categories, and the presence of two mixed species (commercialized as *Merluccius* spp.), involves eventually a exhaustive sampling.

OTB_CEP_>=70_0_0 (renamed as OTB_MCF_>=70_0_0): *Octopus vulgaris*, *Loligo vulgaris*, *Sepia officinalis* and *Sepia hierredda*: One trip was sampled at sea in Guinea Bissau in 2015. Finfish, mostly black hakes (*Merluccius* spp.) were targeted during the sampled fishing trip. Thus, none of these species of cephalopods could be measured as they are not common in the deep fishing grounds where black hakes are fished.

OTM_SPF_>=40_0_0: None of the target species of this métier in West Africa (*Sardina pilchardus*, *Sardinella aurita*, *Sardinella*, *maderensis Scomber japonicus* and *Trachurus* spp) were sampled due to the reasons explained above.

Canary:

PS_SPF_10_0_0: *Sardina pilchardus*, *Sardinella aurita*, *Scomber colias* and *Trachurus* spp: Numbers of measured individuals were higher (>200%) than planned for these species due to the inclusion of data from stock-specific sampling on-shore, which provides complementary information for a more comprehensive coverage of the species length distributions.

MIS_DES_0_0_0: *Octopus vulgaris*, *Loligo vulgaris*, *Sepia officinalis* are commercial bycatch species for this métier. As indicated and approved in the proposal (table III_C_5), the number of individuals sampled at national level could not be planned a priori. Only 6 individuals of *O. vulgaris* were measured, as it is a bycach species and only 6 trips were sampled in 2015. Number of individuals sampled in 2015 for target species of this métier will provide an indication for future proposals.

III.C.3 Actions to avoid deviations.

The reasons preventing to reaching 100 % of the planned objectives for 2015 were mainly related to the conditions imposed by the new Fishery Partnership Agreements (FPAs) or protocols between the EU and the West African coastal States. These reasons, detailed throughout the report and unrelated to the sampling plan, prevented the successful execution of many of the planned targets.

Actions to remedy specific deficits not related to the conditions of the FPAs must be carried out at different levels. It should be noted, for example, the starting of two new programs of scientific observations onboard for the métiers OTB_CEP_>=70_0_0 (renamed as OTB_MCF_>=70_0_0) and MIS_DES_0_0_0. The organization of the new progams required a long time until their implementation, delaying the sampling until September (OTB_CEP_>=70_0_0_0) and July (MIS_DES_0_0_0). This prevents the fulfillment of the planned objectives; however both métiers started 2016 with the planned sampling schedule.

ICCAT (Atlantic), IOTC, IATTC, WCPFC, etc. (Fisheries targeting large pelagics)

III.C.1 Achievements: Results and deviation from NP proposal.

Table III.C.1 shows the Métiers identified to be sampled following the ranking system established by Commission Decision. The ranking system was made using public data of ICCAT database and information of SGP (electronic fishing logbooks and sales notes) for the period 2012-2013.

Table III.C.4 shows the number of trips planned to be sampled at national level in 2015 and **table III.C.3** shows the number of fishing trips sampled during 2015.

Deviations between tables III.C.4 and III.C.3

Baitboat Cantabrian Sea targeting BFT **(codeT9):** there was no fishing activity during 2015. The fishing opportunities of baitboat fleet of Bay of Biscay were transmitted to Atlantic Trap and Mediterranean purse seine fisheries.

Baitboat Dakar **(code T16)**: during 2015, the number of trips sampled was smaller than the number of trips planned to be sampled at port in the National Program. The sampling depends on sampling accessibility and it is difficult to plan a figure in advance. It is considered that the objectives have been achieved.

Baitboat targeting ALB **(code T12)**: the number of trips sampled was less than the number of trips planned due to decreasing of baitboat fishing activity in 2015. It is considered that the objectives have been achieved.

Drifting longline **(code T5):** the planned number of trips to be sampled was not achieved due to the fact that trips have lasted longer than espected. However, the number of planned days has been covered and the intensity and the quality of the sampling have been kept.

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Purse Seine (**codes T6** and **T17)**: in late May of 2015, the boarding of scientific observers in Spanish purse seiners operating in Indian Ocean was restarted by IEO, so the planned number of trips to be sampled at sea for this Métier has been closely reached.

Table III.C.6 summarizes the length sampling of catches, landings and discards with the number of fish measured by species, fishing ground and Métier during 2015. The sampling scheme used was the concurrent sampling (Scheme 1) as defined in Commission Decision. The methodology for collecting data and the data type is made according to the ICCAT manual (http://www.iccat.int/en/ICCATManual.htm).

The landing samplings of purse seine fleets targeting tropical tuna in the Atlantic and Indian Oceans are collected directly in port following a stratified and multispecies sampling scheme. Both, proportions of species in the catch and length distributions (by type of boat or association) are obtained jointly in the same sampling.

Concerning to the Pacific Ocean, length sampling of species caught by purse seiners in the waters of the WCPFC is required in order to achieve the statistical requirements of this RFMO. Currently, in the western Pacific the type of sampling in port required (multispecies) could not be carried out by Spanish staff, considering that, on one hand the landing ports of this fleet are not always the same and there are no Spanish Fisheries Offices in the area, on the other hand, the number of vessels is very small (two at present) and they are not operating in this area throughout the whole year, so there is no economic compensation in sustaining a Spanish Fisheries Office. Moreover, landing ports are variable and distant from each other, so it would be really difficult to establish sampling staff in each port. Due to this, there are no length samplings of catches carried out on purse seiners in the western central Pacific. In any case, it is supposed that observers on board form WCPFC (100% of coverage) collect these data, but up to now, this information it is not accessible to European scientists.

In the eastern Pacific Ocean, area managed by the IATTC, length data of target species are registered in port, when landings take place, by IATTC staff. This type of sampling (multispecies and stratified) is common to all purse seine fleets operating in the area. The ports where IATTC staff perform sampling are: Manta and Las Playas (Ecuador), Mazatlan and Manzanillo (Mexico), Panama City (Panama) and Cumana (Venezuela), ports on which the IATTC has regional offices.

Regarding bycatch, mostly discarded, length data are taken by observers on board. The coverage of this fleet, under the rules of AIDCP, is 100%, the observers on 50% of the trips are covered by IATTC and the other 50% are covered by National observers (PNOT-National Program of Tuna Observers) that follow the AIDCP protocols. All data are available annually for both entities through a data exchange process.

When the vessel works in the WCPFC and has on board observers from IATTC or PNOT, observers collected the same information. If the purse seiner exclusively labours in WCPFC waters, an observer of this Commission that collects this information must be on board although this information is not accessible to European scientists, as in the case of length data.

Deviations of table III_C_6

Atlantic Ocean:

Katsuwonus pelamis: the number of fish sampled did not reach the planned number of fish to be measured at national level due to the inherent characteristics of purse seine fisheries with a stratified and multispecies sampling scheme. The objective of this type of sampling is not only obtaining the length distribution of the catch, but also determines its specific composition.

Thunnus alalunga: the number of fish measured was greater than the number of fish planned due to the number of fish planned to be measured at national level in the national program is a minimum.

Thunnus thynnus: the objective planned at national level was not achieved because the fishing opportunities of baitboat fleet in the Bay of Biscay were transferred to Atlantic Traps and Mediterranean purse seine fisheries.

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Xiphias gladius: the planned number of fish to be measured at national level in 2015 for Other Regions-ICCAT is 6,000. The number of fish showed in the table III.C.5 (16,000) of the National Program 2014-2016 for Other Regions-ICCAT- fising ground BIL 94 A+B, BIL 96, BIL 97 is a typographical error.

Indian Ocean:

Thunnus albacares, Thunnus obesus: the number of fish sampled did not reach the planned number of fish to be measured at national level due to the inherent characteristics of purse seine fisheries with a stratified and multispecies sampling scheme. The objective of this type of sampling is not only obtaining the length distribution of the catch, but also determines its specific composition.

III.C.2 Data quality issues.

The main problems in large pelagic fisheries are the wide range of length distributions and the huge weight range of the individuals. There are trips with landings of kg and trips with landings of tons. The data quality of sampling is considered satisfactory.

III.C.3 Actions to avoid deviations.

Deviations are due to problems inherent to the large pelagic fisheries. The objectives are considered achieved and no additional measures are proposed.

III. D.Recreational fisheries

Baltic Sea (ICES áreas III b-d).

Spain has no fisheries in this area.

North Sea (areas ICES IIIa, IV y VIId) y Eastern Arctic (areas ICES I y II)

Spain has no recreational fisheries in this area.

North Atlantic (areas ICES V-XIV y areas NAFO).

Eel: Both, the management of recreational fishing and commercial fishing for eel in inner waters (inner rivers and inner maritime waters) fall under the jurisdiction of the Autonomous Regions. In outer waters, the competence fall under the SGP (Central Government), although in these waters there is no specific fishing directed to eel.

With the implementation of management plans of eel specific for each Autonomous Region, pursuant to Council Regulation (EC) 1100/2007 establishing measures for the recovery of the European eel, fishing effort mitigation measures have been proposed, in many cases involving the prohibition of recreational fishing of this species, both in the phase of glass eel (under 12 cm) and adult eel.

The Spanish SGP presented the eel management plan (CE nº 1100/2007 regulation) to the European Commission on December 2008, and this plan was approved on October 2010. Similarly, following the regulation requirements, the evaluation of the plan implementation was presented to the Commission on July 2012, and that corresponding to 2015 is under review now.

The only autonomous regions in the Atlantic side where recreational fishing for eels is allowed are Cantabria (only in some transitional waters and with maximum quotas, prohibited in rivers) and the Basque Country (only glass eel, with maximum quotas and only in inner waters up to the tidal limit). In the rest of the regions of the Atlantic side, recreational eel fishing is prohibited, including the international section of the River Miño (border with Portugal). The Basque Country is one of the Spanish eel Management units of the Spanish eel management plan.

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Regarding the other species for which we must provide data from the Atlantic side (salmon, sea bass and sharks) also indicates that outer waters fall under the competence of SGP, while fishing in inner and continental waters is competence of the autonomous regions, which, in addition, are in charge of issuing licenses for recreational fishing. As a rule, and for species not subject to special protection measures regulated by national legislation, there is a maximum capture in outer maritime waters established in 5 kg per person per day.

Salmon: Recreational fishing for salmon only takes place in inland waters (rivers and lakes), so its regulation corresponds to the autonomous regions. In Galicia and Asturias salmon fishing in marine waters is prohibited by law. The status of the species is of general decrease in all distribution area, keeping a highly regulated and limited exploitation with management measures such as extraction quotas by river, seasonal closures and areas closed.

Sea bass: Recreational fishing of sea bass has some importance, obtaining as a rule, general information of catches from authorized competitions. In the Basque Country, a dedicated sampling of European Sea bass started in 2011 and 2012, when a “Pilot study to estimate sea bass catches made by the recreational fishery in the Basque Country“ took place. During 2013, AZTI carried out a sampling to estimate the catches of the main species targeted by the recreational fishers in the Basque Country. After these two studies, it was decided to incorporate the sampling to the national program on a routinary basis.

Sharks: Both autonomous regions as well as recreational fishing associations consulted said the catch of sharks is "sporadic and anecdotal ", which usually are released in case of accidental catch as they are not a target species of recreational fishermen and commonly the fishing techniques used do not attract these species.

The species affected, if any, correspond to a few coastal species such as dogfish, spotted dogfish, etc. In Spain the fishery of all species from Alopiidae and Sphyrnidae families (thresher and hammer sharks respectively) is prohibited by Order ARM 2689/2009, and RD 347/2011 of 11 March, that regulates the recreational marine fishing in outer waters, this decree allows only recreational fishing of four Elasmobranchii species (*Galeorhinus galeus*, *Isurus* spp, spp *Mustelus* and *Prionace glauca*). On the other hand, data collection is performed on the authorized fishing contests. As a rule, there are no records of shark catches in these contests.

III.D.1 Achievements: Results and deviation from NP proposal.

Eel:

Basque County: According to the Basque glass eel fishery regulation, there must be only one license per person and fishing basin and it is mandatory to fill in a Daily Catches report. Every fishing night, fishermen must fill in information regarding fishing modality, fishing starting and finishing hour, sieve diameter, fishing area and catches data. In this way, it is possible to determine total catches, Catches per Unit Effort (CPUE) in the different fishing modalities and river basins. After the Management plan was implemented, the fishing season was shortened. Nowadays it starts on the 15 of November and finishes on the 31 of January and there is a quota of 2 kg per fishermen and night.

979 glass eel fishing licenses were issued in the 2014-2015 fishing season and most of them (937) for land fishing. The number of land licenses has notably increased because the Basque Government decided that all those fishermen who had ever had an ell fishing license, were allowed to have the license again. During the 2014-2015 season there was a catch of 2,316.4 kg, and 42.6% of the catches belonged to the Oria River. Although total catches have been higher than those of the previous season (2,406 kg), the increase in the license number must be taken into account. In this way, this slightly decrease in catches, together with an increase in the effort, point to a decrease in glass ell recruitment.

Cantabria: is the other Autonomous Community where recreational fishing is allowed .In the region. 16.4 kg of glass eel were captured in 2015, during the authorized three months (January to March) period. To

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fish eels in Cantabria is necessary to have a specific authorization from the Autonomous Region's authorities, which can be only for sport fishing and which implies having a common licence for maritime recreational fishing. In this case a maximum number of catches by angler per day (250 grs) must be respected and its commercialization is forbidden. The unique fishing gear permitted is the strainer, which can not exceed 1.2 m in diameter and only one strainer per angler is allowed.

Salmon

Annual statistical series are available and there is also an obligation to issue a traffic guide for all specimens caught. Also various biological data are obtained as well as the weight of the specimens. Thus, the data of recent years shows the amount of 9058 kg in 2008, 1931 kg in 2009, 1592 kg in 2010, 6555 kg in 2011, 7524 kg in 2012, 5115 kg in 2013, 6907 kg in 2014.

In 2015 the catches of salmon from recreational fisheries were 7263.4 kg broken down as follows:

-Navarra (Bidasoa river): 173.1 kg

-Cantabria: 542.194 kg

-Asturias (including Eo river): 6188 kg

-Galicia (except Eo river): 357.6 kg

-Río Miño (spanish part): 2.5 kg

Sea bass:

During 2015, a Pilot study was also carried out: “Sea bass (*Dircentrarchus labrax*) catch and release mortality in recreational fisheries“. The results of this study are presented in Annex IV.

The sampling was designed to estimate the catches of sea bass for the recreational fishers in the Basque Country. Apart from sea bass, that is mandatory in the current DCF, other species, highligthed as relevant species by the studies menctioned above, were included. The cost of making a survey for one or some species was the same, and the WGRFS recomends that when possible, recreational fisheries surveys should get an overview of the main species in the area. For sea bass, catch and release was recorded. Species included in the survey depended on the type of recreational fishing, as it is shown in the following table:

	Species
Shore fishing	Sea bass (both caught and released) and squids
Boat fishing	Sea bass (both caught and released), squids and albacore
Spear fishing	Sea bass

Table 1: Species for which data were collected

Data collection was done during July 2015. Information about the fishing performed from January to June 2015 was gathered. Two different off-site methods were used: e-mail and phone. Information related to the second semester of 2015 will be gathered in January 2016.

A company was subcontracted to carry out the telephone surveys. The e-mail surveys were directly done by AZTI using SurveyMonkey (www.surveymonkey.com). All surveys fall in the category of recall surveys, in which interviewers are asked about an event performed in the past. To minimize the non-response during the survey, 300€ were raffled among all participants. Questionnaires were exactly the same among survey methods (e-mail and, phone,) and fishing techniques (fishers from shore, boat, and spearfishing).

Sampling frames were constructed with the contact information found in the corresponding license census. The surface licence census was used to interview shore and boat fishers and the spearfishing license census was used to build the sampling frame for spearfish. The sampling frames for the surveys were constructed with the available contact information in the census, which was not complete. When no

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phone answer was obtained in a household, several attempts were done at different times of the day before considering that sample as a non-response. In email surveys, no follow-up contacts were performed. Table 2 summarizes the available number of surveys sent and the number of surveys completed for each type of recreational fishing and sampling method.

			N surveys sent		**N surveys completed**	
	Date of the survey (month)	**Period of time covered by the survey**	**Telephone**	**Email**	**Telephone**	**Email**
Shore fishing	July	From January to June 2015	634	9636	430	1583
Boat fishing	July	From January to June 2015	548	459	401	118
Spear fishing	July	From January to June 2015	266	406	230	118

Table 2: Number of surveys sent and number of surveys completed for each type of recreational fishing and sampling method

Deviations: As explained before, this sampling was incorporated to the national sampling program after the “Pilot study to estimate sea bass catches made by the recreational fishery in the Basque Country“. Therefore, the sampling was not planned in the National Plan presented for 2011-2013 and following roll-overs.

III.D.2 Data quality issues.

Eel: Collected data were transmitted to the ICES/EIFAC/GCFM eel group (WGEEL) 2015, to the Departamento de Medio Ambiente, Planificación Territorial, Agricultura y Pesca of the Basque Government, and to the Spanish Governments’ SGP.

Data from the data base for fishery do not come from an ad hoc biological survey but from a census.

Among the 979 fishermen with license in the 2014-2015 season, 894 have sent the catches report, and 91.3% of them were correctly filled. In the previous season, the percentage of correctly filled reports was 98%, this decrease is probably caused by the lack of habitude to fill in the report for those fishermen with a new license compared to those that have owned one before. Anyway, it is considered that the volume of data is enough for a proper data analysis.

Salmon: Data collection is exhaustive because of the obligation to issue a traffic guide for all specimens caught.

Sea bass: Some of the recommendations pointed out in the pilot study have been followed, such as the performance of several survey methods simultaneously (email and phone were carried out), and the analysis of catch and release and survival rates (included in the present year surveys, and in the pilot study presented in Annex II: “Sea bass (Dircentrarchus labrax) catch and release mortality in recreational fisheries“). However, some others actions are still pending. Probably the main drawback of this study is that the sampling frames are not complete for email and telephone contact information. Post information was complete, but post surveys were not performed due to the low answer rate observed in previous studies. We are trying to solve this issue in collaboration with the competent Regional Administration, but progress is slow.

Once the data related to the second semester is collected and analysed, we will be able to identify further improvements. It is important to note that this is a new sampling and adjustments need to be made.

III.D.3 Actions to avoid deviations.

Eel: The Basque eel management plan foresees that only those fishermen that have submitted the catches report in time and correctly filled would be allowed to ask for a new license. Also, there is an annual meeting with glass eel fishermen to make them aware of the importance of fill in the catches report to permit a correct assessment and management of the eel population.

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Sea bass: Sampling of recreational fisheries is not included in the 2015 National Plan, as it was a roll-over of the previous 2011-2013 national Plan. However, this sampling will be included in the National Plan which will be planed and presented when the EU-MAP enters into force.

In relation with the undercoverage of the sampling frames, steps have been made done in collaboration with the competent Regional Administration, in order to obtain better contact information. However, progress is slow.

Once the data related to the second semester is collected and analysed, we will be able to identify further improvements. It is important to note that this is a new sampling and adjustments need to be made.

Mediterranean and Black Sea.

Spain has no fisheries in the Black Sea.

Eel: Both, the management of recreational fishing and commercial fishing for eel in inner waters (inner rivers and inner maritime waters) fall under the jurisdiction of the Autonomous Regions. In outer waters, the competence fall under the SGP (Central Government), although in these waters there is no specific fishing directed to eel.

With the implementation of management plans of eel specific for each Autonomous Region, pursuant to Council Regulation (EC) 1100/2007 establishing measures for the recovery of the European eel, fishing effort mitigation measures have been proposed, in many cases involving the prohibition of recreational fishing of this species, both in the phase of glass eel (under 12 cm) and adult eel.

In the Mediterranean Basin, recreational fishing of adult eel is authorized only in Valencia and the Balearic Islands (in this with low incidence). In Catalonia the only authorized fishing modality is catch and release alive, of eel greater than 35 cm. is and it is considered a little bit rooted and widespread activity among anglers. In Valencia, in the framework of management plan, a reduction in effort by defining maximum fishing quotas has been chosen

Thunnus thynnus: Current regulations on recreational fisheries only permit Bluefin tuna fishing under a "catch and released" scheme. In the case of incidental catch of a dead Bluefin tuna in recreational fishery, only one fish by trip is allowed to be landed, and this catch has to be communicated to the SGP to the end of the quota.

Sharks: are only sporadically caught in recreational fisheries, and usually are released alive. The main contests of sport fisheries do not allow the landing of sharks. The Spanish legislation (order ARM 2689/2009), prohibited the landing of species of families Alopiidae and Sphyrnidae (thresher shark and hammerhead shark). In adition, the RD 347/2011, only permit to catch four species of sharks: (*Galeorhinus galeus*, *Isurus* spp, *Mustelus* spp y *Prionace glauca*) in recreational fisheries

III.D.1 Achievements: Results and deviation from NP proposal.

Eel: As explained, recreational fishing catches of eel in the Balearic Islands are considered slim. In Valencia catch data from sports associations, are recorded in numbers caught, not in kilograms as in professional fishing.

Thunnus thynnus: As mentioned above, the capture is under a "catch and released" scheme and, in the case of accidental catches of some dead tuna (maximum one per trip) is mandatory to submit a catch declaration to the SGP. There are also campaigns of cooperation between the Spanish Federation of Responsible Recreational Fishing with various organisms (IEO, WWF) for to carry out studies by observers on board and electronic tuna tagging in order to improve knowledge of this species and their migration patterns.

Sharks: once the "pilot study to evaluate the recreational fishing pressure in the Balearic Islands" carried out in 2013 had finished, during 2014 and 2015 anecdotal capture of elasmobranchs has been noted.

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III.D.2 Data quality issues.

Eel: In the Autonomous Community of Valencia, as noted, catch records are recorded in numbers caught, not in kilograms and an estimation of weight is done. A total catch of 170 kg. has been estimated in 2015.

Also in the Balearic Islands, 48 kg of recreational catch have been declared in 2015.

Thunnus thynnus: The catch composition and the effort per day are collected exhaustively ("census") based on the catch declarations (regulated by RD 347/2011). In 2015 the catch was 6620 kg.

Sharks: once the "pilot study to evaluate the recreational fishing pressure in the Balearic Islands" in 2013, budget constraints make it difficult to increase the sampling effort. Catchability of these species is very low so the results of the sampling should be studied in parallel with data on catches by other fleets.

III.D.3 Actions to avoid deviations.

No additional measures are proposed.

Other Regions where fisheries are operated by EU vessels and managed by RFMO's to which the Community is contracting party or observer.

Spain has no recreational fisheries in this area targeting the species required in apendix IV of Commission Decision 93/2010.

III. E. Stock related variables.

Baltic Sea (ICES áreas III b-d).

Spain has no fisheries in this area.

North Sea (areas ICES IIIa, IV y VIId) y Eastern Arctic (areas ICES I y II)

Spain has only fisheries in the ICES Subareas I and II.

III.E.1 Achievements: Results and deviation from NP proposal.

Table III.E.1 and **table III.E.2** has been kept from the last update of 2015 National Program Proposal ("España_Propuesta PN 2015 para_2014-2016_Tablas_31-marzo-2015") where section of biological stock-related variables did not change since the first NP 2011-2013.

Table III.E.3 shows the number of samples taken for each of the variables. Sampling requirements were established as set by the Commission Decision.

Biological parameters of Weight, Age and Maturity come from a sampling design stratified by length class. Data came from the biological samplings carried out by observers on board. The Sex-ratio index is achieved at the same time of sampling the length distributions that are randomly collected and not stratified by length class.

Deviations table III.E.3:

Sampling more than planned

The reason for sampling more than planned is that we can not predict in advance the lasting of the trips in these fisheries, because they varies depending on the owner decisions. When the trips last more than expected, like in this cases, it causes a higher number of individuals sampled by the observer on board.

The sampling design is established to ensure the sampling quality and to ensure a minimum number of individuals by sampling for subsequent use in the assesment. To get this target, the observer is training to

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intensify as much as possible the length sampling (also used to get the sex ratio) since the beginning of the trip.

Sampling was carried out by scientific observers who remain on board throughout the period of the fishing trip until the vessel's arrival to port, so the whole trip is sampled.

Because of this reason, sampling more than planned does not mean adittional costs.

III.E.2 Data quality issues.

The data collected by observers on board are checked later on, at the laboratory. Data have been used for carrying out the assessment at AFWG. Both, sampling levels and data quality, are considered adequate.

In general, to check the quality of the biological parameters, the tool INBIO 2.0 ("Estimation of biological parameters and their uncertainties through simulation techniques"), developed in R environment by the IEO, was used. In this tool the following methodologies are applied:

- Growth at age (vs. Length & Weight): von Bertalanffy. Non-linear estimation w. minimum least squares (Gauss-Newton estimation).
- Maturity (Length & Age): GLM. Logistic function. Binomial errors w. maximum log-likelihood fit.
- Length – Weight Relationship: Standard. Non-linear estimation w. minimum least squares (Gauss-Newton estimation).
- Sex-ratio (Length & Age): No Model. Percentage of females by length.

In addition, quality controls are also performed:

-Implementation of sampling protocols for each species where the methodologies of sampling, processing and storage of samples are described.

-Processing, debugging and periodic checking of data.

-Standardization of the common criteria in assigning maturity and age of each species, in order to improve the accuracy

-Attendance to workshops and/or exchanges between different scientific teams

Data of each trip are collected and recorded on board. Data are checked during and after the trip in order to detect errors and inconsistencies (outliers, trends, range of variables, dispersion).

After the trip, the observer debugs all data, haul by haul and sampling by sampling. Finally, a random check of about 15% of the data is carried out to validate the quality of the results. Annually all sets of data for each fishery are checked previously to be used for assessment and other scientific tasks.

In recent years an important effort is carried out to follow the recommendations of Planning Group on Data Needs for Assessment and Advice (PGDATA), Working Group on Commercial Catches (WGCATCH) and Working Group on Biological Parameters (WGBIOP).

III.E.3 Actions to avoid deviations.

The main cause of the deviation is the lasting of the trips in these fisheries due to the decisions taken by vessels' owners which are independent of sampling planned, so that no specific measures are proposed for this deviation.

Although the behavior of the fleet is impossible to change, the Institutes involved in sampling will continue in improving coordination with the sectors involved: owners and administration authorities.

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Deviations caused by the data collection and sampling by the scientific observers on board can be improved widely through a better training and monitoring of the observers' tasks. In addition, place experienced observers on board whenever possible will be tried to.

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

ICES VI, VII (excl. VIId), VIII, IX

III.E.1 Achievements: Results and deviation from NP proposal.

Table III.E.1 and **table III.E.2** has been kept from the last update of 2015 National Program Proposal ("España_Propuesta PN 2015 para_2014-2016_Tablas_31-marzo-2015") where section of biological stock-realted variables did not change since the first NP 2011-2013.

Table III.E.3 shows the number of samples taken for each of the variables. Sampling requirements were established as set by the Decision Commission.

The biological samplings of the species listed in these ICES areas were carried out in 2015 to obtain the data to calculate the parameters of growth, length-weight relationships, maturity and sex-ratio, as indicated by the regulations in force. These biological samples were carried out, using samplings from the commercial catches and from research surveys.

Deviations table III.E.3:

Sampling more than planned

A large number of species / stocks had been sampled at a higher level than planned (exceeding 150% of planned). This is because the design of sampling is not focused on the total number of individuals to be sampled in a year, but in the distribution of several samplings throughout the year, reaching a minimum number of fishes in each sampling to ensure the quality for each of them.

It must carry out a large number of samplings to cover adequately all strata, because there are a large number of fisheries (target species vs. gears) in the ICES area and the sampling design is random stratified. This sampling strategy does not correspond to the one developed in the Regulations, which establishes a minimum number of specimens sampled per landed ton, where National Program Proposal is based on. However, the samplings needed by ICES assessment groups to carry out the relevant assessments require sampling an important part of the fisheries affecting the target species.

Some parameters such as the length@age, need a larger number of samples for obtaining the length-age keys, to be representative of the target stocks. This increase in the sample number do not involve additional cost, since planning work in laboratories is carried out according to the requirements of the working groups to which data must be provided.

I n most of the cases, part of the samples come from scientific research surveys at sea that, added to those coming from biological sampling in the laboratory, made that the required number of samples were exceeded, but this increase in the number of samples do not represent an additional cost.

Moreover, sometimes there are observers working on board of the commercial fishing fleet, from whose activity a large number of samples can be obtained without additional cost.

In other cases, when the initially planned sample size was not enough to ensure the quality of data, the sample size was increased when it was possible, to improve quality levels.

Sampling less than planned

The number of samples was lower than planned in the following cases:

Dicologoglossa cuneata (VIIIc,IXa) & ***Lepidopus caudatus (IXa)***: As the plannings in table III_E_1 was not changed since the first submission of NP, the planification of species to be sampled was calculated

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based on the reported landings of the period 2006-2008. The situation in 2015 was considerably different for some species. This is the caseof *D. Cuneata* and *L. Caudatus*. For both of them, the volume of average landings in the most recent period (2012-2014) does not reach the minimum amount required for sampling (200 tons) being 34.7 tons and 15.7 tons respectively. So, actually, the sampling of these species was not required in 2015.

***Lepidorhombus whiffiagonis* VII, VIIIabd**: the number of sampled individuals was less than planned to obtaining the variable weight @ length, because individuals from surveys were not weighed on board, due to the lack of precision found for the variable weight in these species. Also, most of the individuals from the commercial landings are landed gutted and we don´t have the live weight. In the column "Achieved No of Individuals at a national level" appears only the number of individuals with live weight.

***Lophius piscatorius* VIIIc, IXa**: The number of individuals achieved is less than planned for variables weight, sex and maturity, mainly because this stock is landed and marketed as *Lophius* spp. jointly with *L.budegassa*, so it is always difficult to fit properly the number of individuals planned in both species. So, in 2015, the number of individuals of *L.budegassa* sampled was greater than expected.

***Nephrops norvegicus* (only Cádiz):** All data of *N. norvegicus* were obtained on board research surveys at sea.The distribution of quotas by vessel made impossible to obtain biological samples to be weighted in laboratory. For this reason, weights were zero. On board was impossible to obtain individual weights with sufficient accuracy. Regarding the number variable maturity@length, only maturity for females of the species was sampled.

Octopus vulgaris (Gulf of Cádiz): The individuals for the weight&length variable was less than planned for 2015. This number of achieved individual weights will be completed in 2016, since this species has a triennial requirement.

***Trachurus trachurus*: VIIIabde:** Although the number of individuals achieved is less than planned in all variables, the reality is that the two horse mackerel stocks have been adequately sampled (see Table 3)

The discrepancy comes from the fact that the number of individuals are planned based on the allocation of stocks of the species according to Commission Decision, and this does not match with the number of individuals obtained which is based on the actual definition of these stocks according to the Working Group on Widely Distributed Stocks (WGWIDE).

It is necessary to specify that the stock divisions of horse mackerel (Atlantic horse mackerel) which appears in the National Program (VIIIc- IXa on one side and IIa, IVa, Vb, VIa, VIIa-c, ek, VIIIabde / X on the other) does not correspond with the stock divisions used in the WGWIDE since 2004 (ICES 2005), defined as Southern stock = division IXa and Western stock = Divisions IIa, IVa, Vb, VIa , VIIa-c, ek, VIIIabcde / X

Until these stock level allocations are not corrected, we can not establish appropriate sampling level adjustments and therefore appear that there is a mismatch between the number of planned and obtained individuals.

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Table III.E.3.- Sampling intensity for stock-based variables

MS	MS participating in sampling	Sampling year	Species	Species Group	Region	RFMO	Fishing ground	Area / Stock	Variable (*)	Data sources	Planned minimum No of individuals to be measured at a national level	Achieved No of individuals at national level	% achievement (100*L/K)
ESP	ESP	2015	*Trachurus trachurus*	2	North Atlantic	ICES	Western Ireland, Celtic Sea, Bay of Biscay	Iia, Iva, Vb, VIa, VIIac,e-k, VIIIabde, VIIIc	length @age	Commercial + surveys	1300	3494	269
ESP	ESP	2015	*Trachurus trachurus*	2	North Atlantic	ICES	Western Ireland, Celtic Sea, Bay of Biscay	Iia, Iva, Vb, VIa, VIIac,e-k, VIIIabde, VIIIc	weigth @length	Commercial + surveys	1300	3901	300
ESP	ESP	2015	*Trachurus trachurus*	2	North Atlantic	ICES	Western Ireland, Celtic Sea, Bay of Biscay	Iia, Iva, Vb, VIa, VIIac,e-k, VIIIabde, VIIIc	sex-ratio @length	Commercial + surveys	1300	3897	300
ESP	ESP	2015	*Trachurus trachurus*	2	North Atlantic	ICES	Western Ireland, Celtic Sea, Bay of Biscay	Iia, Iva, Vb, VIa, VIIac,e-k, VIIIabde, VIIIc	maturity @length	Commercial + surveys	1300	3212	247
ESP	ESP	2015	*Trachurus trachurus*	2	North Atlantic	ICES	Iberian Peninsula	IXa	length @age	Commercial + surveys	1300	1591	122
ESP	ESP	2015	*Trachurus trachurus*	2	North Atlantic	ICES	Iberian Peninsula	IXa	weigth @length	Commercial + surveys	1300	2457	189
ESP	ESP	2015	*Trachurus trachurus*	2	North Atlantic	ICES	Iberian Peninsula	IXa	sex-ratio @length	Commercial + surveys	1300	2445	188
ESP	ESP	2015	*Trachurus trachurus*	2	North Atlantic	ICES	Iberian Peninsula	IXa	maturity @length	Commercial + surveys	1300	2317	178

Table 3: Number of achieved individuals according to the division of stocks / area for horse mackerel (Trachurus trachurus) as is applied in the assessment working group of the species since 2004 (ICES 2005)

Special case of age in Merluccius merluccius (both stocks):

Since 2011 the age of hake is not interpreted, however, otoliths continue to be collected in order to build the annual collections and to interpret their age in the future. In the WKAEH held in 2009 it was concluded that the interpretation of the hake growth based on the criterion applied until 2008, was not accurate or precise (based on the analysis of the readings performed during the WK and on the information obtained from the surveys on tagging and recapture carried out by IFREMER and IEO). Therefore, following the BENCHMARK that took place in February 2010, the ICES working group responsible for the assessment of hake (WGHMM) decided the application of models that do not require age-length keys (ALK) until a new criterion of interpretation of age (standardized and validated, that fits the reality of the growth of this species) will be available.

III.E.2 Data quality issues.

The reached number of samples for obtaining biological parameters is widely covered in most species. The cases where the number of individuals obtained is less than the planned have been explained in the previous section.

In general, to check the quality of biological parameters, a tool INBIO 2.0 [1] (Estimation of biological parameters and their uncertainties by simulation techniques) developed by the IEO in R has been used. In this tool the following methodologies are used:

- Growth at age: von Bertalanffy, least squares nonlinear estimation (Gauss-Newton algorithm).

[1] Update of "Sampedro, P., Sainza, M. and Trujillo, V., 2005.A simple tool to calculate biological parameters'uncertainty. Working Document, In: Workshop on Sampling Desing for Fisheries Data (WKSDFD), Pasajes, Spain

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- Maturity (length and age): Generalized linear model (GLM) with binomial errors and logistic link function. Maximum log-likelihood.
- Lenght / weight relationship: least squares nonlinear estimation (Gauss-Newton algorithm).
- Sex ratio: No model.Estimation of the global sex-ratio as percentage of females by length.

In adition, several quality controls are performed.

- Applying a sampling protocol for each species where the methodologies used in sampling, the storage and processing of data, and the processing and observation of skeletal parts (EP) for the allocation of age are described. (http://www.repositorio.ieo.es/e-ieo/handle/10508/1755)
- Standardization of the common criteria in assigning age of each species, in order to improve the accuracy in readings.
- In the particular case of *Conger conger*, the age readings are performed on two different bony parts (both otoliths and vertebrae), for a greater assurance in the age assignations.
- As established by the Workshop of National Age Readings Coordinators (WKNARC) in 2011, some actions are being performing, such as the accuracy analysis of readings inter and intra readers; measure the distances from each annual ring to the core; identification of the edge of each bony part observed; development of annual collections of images that help the correct interpretation of the bony parts; and the use of a numerical scale to estimate the degree of confidence that the reader assigned to each one of their readings. To carry out these tasks, it is using the WebGR (http://webgr.azti.es/ce/search/myce/), tool that facilitates the exchange and analysis of results of bony parts readings using calibrated images.
- The institutes responsible for data collection are part of the "The European Age Readers Forum" (EARF) (http://groupnet.ices.dk/AgeForum/default.aspx)The purpose of the EARF is to establish a "one-stop shop" or "single window" for all teams who are involved in the interpretation of age. The EARF provides a resource for training new readers as well as the opportunity to share and discuss current allocation protocols ages, establish standard operating procedures and standardize methods of preparation and interpretation of bony parts.

III.E.3 Actions to avoid deviations.

One of the biggest difficulties for many of these species has been the inability to cover the whole range of length properly. In most cases, this difficulty is due to the spatial distribution of the species itself in the areas where the samples came from and to the inability of the fishery to access the tails of the length distribution.

Another difficulty found in the process of obtaining biological parameters is the absence of validation of growth for some species (*Trisopterus luscus, Molva molva, Conger conger, Helicolenus dactylopterus, Pollachius pollachius*)

To remedy these deficits several actions are being implemented.

- Updating and improving sampling protocols

- Optimization of the processing techniques of bony parts for better interpretation of them.

- Improving standardization of common criteria, both technical and interpretation.

- Maintenance and improvement of the WebGR (http://webgr.azti.es/ce/search/myce/) tool that facilitates the exchange and analysis of results.

- Continued participation in international forums such as “The European Age Readers Forum” (EARF) (http://groupnet.ices.dk/AgeForum/default.aspx).

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NAFO and ICES XII, XIV

III.E.1 Achievements: Results and deviation from NP proposal.

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Table III.E.3 shows the number of samples taken for each of the variables. Sampling requirements were established as set by the Commission Decision.

Biological parameters of Weight, Age and Maturity come from a sampling design stratified by length class. Data came from the biological samplings carried out both by on board observers and on surveys. The Sex-ratio index is achieved at the same time of sampling the length distributions that are randomly collected and not stratified by length class.

In NAFO regulatory area, species like American plaice (*Hippoglossoides platessoides*), Witch flounder (*Glyptocephalus cynoglossus*), Cod (*Gadus morhua*) 3NO, 3L and Yellowtail flounder (*Limanda ferruginea*) have TAC=0. Therefore the number of individuals sampled at the national level was not calculated a priori.

Northern Shrimp (*Pandalus borealis*) 3M and 3L stocks are under moratorium and sampling could not be performed.

Deviations table III.E.3:

Sampling more than planned

Sampling more than planned is mainly due to two different causes depending on the data source.

Data from research surveys at sea: Length sampling is carried out systematically by haul with the purpose of covering all depth strata. Biological sampling is carried out in most hauls, following a sampling methodology stratified by sex and length throughout the survey. Both methodological issues can lead to sampling more than planned.

Data from scientific observers at sea: The reason for sampling more than planned is that we can not predict in advance the lasting of the trips in these fisheries, because they vary depending on the owner decisions. When the trips last more than expected, like in this cases, it causes a higher number of individuals (vs. planned) sampled by the observer on board.

The sampling design is established to ensure the sampling quality and to ensure a minimum number of individuals by sampling for subsequent use in the assesment. To get this target, the observer is training to intensify as much as possible the length sampling (also used to get the Sex ratio) since the beginning of the trip.

Sampling was carried out by scientific observers who remain on board throughout the period of the fishing trip until the vessel's arrival to port, so the whole trip is sampled.

Because of these reasons, sampling more than planned does not mean adittional costs.

Sampling less tan planned

***Sebastes mentella* (ICES XII-XIV) stock**: Two trips had been planned for sampling but it was no possible sampling in the fishery. The vessel (out of three) chosen for the placement of observer, finally did not fish in this area because of a decision taken by the owner. The effort was very low. The three trips performed by the three vessels were carried out at the same time, and thus there was no oportunity to place another observer and no sampling of this species could be performed.

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Alepocephalus bairdii and ***Coryphaenoides rupestris***: For the two variables Weigth@Length and Maturity@Length. The number of sampled individuals is less than planned due to the lasting of one of the two observed trips and a deficient quality of data on the other.

III.E.2 Data quality issues.

The data collected by observers on board and surveys are checked later on, at the laboratory. Data have been used for carrying out the assessment at ICES WGDEEP and ICES NWWG and NAFO SC. Both, sampling levels and data quality, are considered adequate

In general, to check the quality of the biological parameters, the tool INBIO 2.0 [2] ("Estimation of biological parameters and their uncertainties through simulation techniques"), developed in R environment by the IEO, was used. In this tool the following methodologies are applied:

- Growth at age (vs. Length & Weight): von Bertalanffy. Non-linear estimation w. minimum least squares (Gauss-Newton estimation).
- Maturity (Length & Age): GLM. Logistic function. Binomial errors w. maximum log-likelihood fit.
- Length – Weight Relationship: Standard. Non-linear estimation w. minimum least squares (Gauss-Newton estimation).
- Sex-ratio (Length & Age): No Model. Percentage of females by length.

In addition, quality controls are also performed:

-Implementation of sampling protocols for each species where the methodologies of sampling, processing and storage of samples are described.

-Processing, debugging and periodic checking of data.

-Standardization of the common criteria in assigning maturity and age of each species, in order to improve the accuracy

-Attendance to workshops and/or exchanges between different scientific teams

Data of each trip are collected and recorded on board. Data are checked during and after the trip in order to detect errors and inconsistencies (outliers, trends, range of variables, dispersion).

After the trip, the observer debugs all data, haul by haul and sampling by sampling. Finally, a random check of about 15% of the data is carried out to validate the quality of the results. Annually all sets of data for each fishery are checked previously to be used for assessment and other scientific tasks.

The quality indicator of Maturity was calculated only with female data and macroscopic Maturity data are used for all species. In addition histological Maturity data of the following species are also obtained: *Gadus morhua*, *Hippoglossoides platessoides*, *Macrourus berglax*, *Reindhardtius hippoglossoides* and the three species of *Sebastes* in DIvision 3M. These data help to contrast the quality of macroscopic data obtained from this variable.

[2] Update of "Sampedro, P., Sainza, M. and Trujillo, V., 2005.A simple tool to calculate biological parameters'uncertainty. Working Document, In: Workshop on Sampling Desing for Fisheries Data (WKSDFD), Pasajes, Spain

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In recent years an important effort is carried out to follow the recommendations of Planning Group on Data Needs for Assessment and Advice (PGDATA) Working Group on Commercial Catches (WGCATCH), Working Group on Biological Parameters (WGBIOP) and NAFO SC.

III.E.3 Actions to avoid deviations.

The main cause of the deviation is the lasting of the trips in these fisheries due to the decisions taken by vessels' owners which are independent of sampling planned, so that no specific measures are proposed for this deviation.

Although the behavior of the fleet is impossible to change, the IEO will continue in improving coordination with the sectors involved: owners and administration authorities.

Another cause of deviations is due to the methodology used in research surveys that it must be kept uniform along the the time series. The data collected in surveys can lead to oversampling. However, these data are needed for other purposes such as stock assessment and to measure environmental indicators. The adaptation of the surveys protocols to cover both targets will be tried as far as possible.

Another kind of deviations is caused by by the data collection and the sampling by the scientific observers on board can be improved widely through a better training and monitoring of the observers' tasks. In addition, it will try to place experienced observers whenever possible.

and sampling by the scientific observers on board can be improved widely through a better training and monitoring of the observers' tasks. In addition, the placement of experienced observers on board will be tried to, whenever possible

Mediterranean and Black Sea.

Spain has no fisheries in the Black Sea.

As in tables, text explanations are divided by RFMO.

GFCM (Fisheries targeting small pelagics, demersal, crustaceans and cephalopods)

III.E.1 Achievements: Results and deviation from NP proposal.

Table III.E.1 and **table III.E.2** has been kept from the last update of 2015 National Program Proposal ("España_Propuesta PN 2015 para_2014-2016_Tablas_31-marzo-2015") where section of biological stock-realted variables did not change since the first NP 2011-2013.

Table III.E.1 shows the selected species to collect the stock-related variables. Stocks whose landings in weight are less than 200 tons or corresponding to less than 10% of the total Community landings from the Mediterranean have been excluded.

Table III.E.3 shows the number of individuals sampled in order to obtain the biological variables (individual information on age, length, weight, sex and maturity) of the main species in 2015. At the end of the table, data collected from the new species selected in 2015 are shown. This species (*Eledone cirhosa*, *Illex* spp. – *Todarodes* spp., *Loligo vulgaris*, *Lophius piscatorius*, *Pagellus erythrinus* y *Scyliorhinus canicula)* was not in the original plan made based on 2006-2008 reference period. Since then, landings of these species had increased and in the period 2012-2014 these species reached the minimum evarage landings to be selected for sampling.

Deviations in the table III.E.3

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Lophius piscatorius. Sampling less than planned in all variables (length-at-age, weight-at-length, maturity-at-length, sex-ratio-at-length). The sampling has been performed during the MEDITS survey, where only 37 individuals were caught.

Scomber spp. Sampling less than planned in all variables (length-at-age, weight-at-length, maturity-at-length, sex-ratio-at-length). Last years the landings of *Scomber* spp., and particularly of *Scomber colias*, are decreasing. In 2015, it was not possible to sample all the individuals of *Scomber colias* planned.

Some especies (*Lophius budegassa*, *Merluccius merluccius*, *Mullus surmuletus*, *Nephrops norvegicus*, *Octopus vulgaris* and *Parapenaeus longirostris*) have been over sampled to achieve a better quality in the calculation of biological parameters.

III.E.2 Data quality issues.

The estimatation of the biological parameters and their uncertainties has been carried out using the tool INBIO 2.0[3] ("Estimation of biological parameters and their uncertainties through simulation techniques"), developed in R environment by the IEO. INBIO makes possible to fit the most usual models and to estimate the coefficient of variation for parameters by using the non-parametric bootstrap methodology.

Models and fit adopted were:

- Growth at age (vs. Length & Weight): von Bertalanffy. Non-linear estimation w. minimum least squares (Gauss-Newton estimation).
- Maturity (Length & Age): GLM. Logistic function. Binomial errors w. maximum log-likelihood fit.
- Length – Weight Relationship: Standard. Non-linear estimation w. minimum least squares (Gauss-Newton estimation).
- Sex-ratio (Length & Age): No Model. Percentage by length and age. Cubic spline to plot

On the other hand, participation in workshops and exchanges of standardization criteria of maturity and age of different target species improves accuracy and allows the comparison of results with other European countries.

III.E.3 Actions to avoid deviations.

The deviations could be avoided by increasing the number of individuals in the sampling of *Lophius piscatorius* and *Scomber colias* in 2016. However, this point depends on the availability of catches for these species. The biological parameters of these G2 species could be calculated every three years, therefore this under sampling could be corrected.

[3] Update of "Sampedro, P., Sainza, M. and Trujillo, V., 2005.A simple tool to calculate biological parameters'uncertainty. Working Document, In: Workshop on Sampling Desing for Fisheries Data (WKSDFD), Pasajes, Spain

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ICCAT (Fisheries targeting large pelagics)

III.E.1 Achievements: Results and deviation from NP proposal.

Table III.E.1 and **table III.E.2** has been kept from the last update of 2015 National Program Proposal ("España_Propuesta PN 2015 para_2014-2016_Tablas_31-marzo-2015") where section of biological stock-realted variables did not change since the first NP 2011-2013.

Table III.E.3 shows the number of fish planned and measured at national level during 2015. On commercial fleets whose landings takes place in national ports, the biological variables data are collected from market samples as well as from observers on board. In many cases, it was necessary the purchase of specimens to carry out the sampling. In 2015 we have lowest sampling levels of stock related variables than planned for swordfish and Bluefin tuna mainly due to changes in the commercialization of these species.

Deviations in the table III.E.3

The number of fish measured was greater than the number of fish planned to reaching the precision level established by Commission Decision.

Thunnus thynnus. The number of individuals measured came from the BFT-E stock (Eastern Atlantic and Mediterranean Sea). All individuals were measured and weighted individually at the market (census), so it is not possible to making a good fit with the planned minimum number of fish to be measured at national level.

III.E.2 Data quality issues.

In most of the species, the number of individuals is difficult to plan in advance. It will depend on access to the samples. In the case of by-catch species (usually low prevalence), the number of individuals sampled at national level cannot be planned in advance.

In general, to check the quality and to carry out the estimation of the biological parameters and their uncertainties, the tool INBIO 2.0[4] ("Estimation of biological parameters and their uncertainties through simulation techniques"), developed in R environment by the IEO, was used. INBIO makes possible to fit the most usual models and to estimate the coefficient of variation for parameters by using the non-parametric bootstrap methodology.

Models and fit adopted were:

- Growth at age (vs. Length & Weight): von Bertalanffy. Non-linear estimation w. minimum least squares (Gauss-Newton estimation).
- Maturity (Length & Age): GLM. Logistic function. Binomial errors w. maximum log-likelihood fit.
- Length – Weight Relationship: Standard. Non-linear estimation w. minimum least squares (Gauss-Newton estimation).
- Sex-ratio (Length & Age): No Model. Percentage by length and age. Cubic spline to plot

[4] Update of "Sampedro, P., Sainza, M. and Trujillo, V., 2005.A simple tool to calculate biological parameters'uncertainty. Working Document, In: Workshop on Sampling Desing for Fisheries Data (WKSDFD), Pasajes, Spain

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III.E.3 Actions to avoid deviations.

Deviations are due to problems inherent to the large pelagic fisheries. The objectives are considered achieved and no additional measures are proposed.

Other Regions where fisheries are operated by EU vessels and managed by RFMO's to which the Community is contracting party or observer.

CECAF

III.E.1 Achievements: Results and deviation from NP proposal..

Table III.E.1 and table III.E.2 has been kept from the last update of 2015 National Program Proposal ("España_Propuesta PN 2015 para_2014-2016_Tablas_31-marzo-2015") where section of biological stock-realted variables did not change since the first NP 2011-2013.

It should be noted that although Spanish catches are by far the most important European demersal fisheries in the area, the total share in the EU landings may be in some cases lower than the 100% indicated. This is due to the fact that some other member States also conducting demersal fisheries in the area did not report their landings to the RCM.

Oppositely, although the small pelagic fisheries are mainly carried out by fleets of small pelagic trawlers from other EU countries, the share of the Spanish fisheries in the EU countries, although very limited, is not exactly "None" as some small pelagic species can be fished as bycatch of some fisheries targeting demersal species. It is the case of *Trachurus* spp., for which catches has been reported by the cephalopod-finfish trawlers operating in Guinea-Bissau.

Table III.E.3 shows the numbers of sampled fish to estimate the biological parameters length-weight, sex-ratio and sexual maturity, for 2015.

Deviation from Table III.E.3

Engraulis encrasicolus (from métier PS_SPF_0_0_0): Not planned in 2015.

Parapenaeus longirostris and ***Penaeus notialis*** (*Farfantepenaeus notialis*) (from métier OTB_CRU_>=40_0_0): the number of sampled individuals of *P. longirostris* to obtain the sex-ratio parameter was considerably higher than planned (19427 vs 5000, 389% achievement). On the contrary, the measured individuals in the case of *P. notialis* for maturity and sex-ratio variables were lower than the number planned (1383 vs 3000, 46% achievement). These deviations from the planned sampling are related to the fishing strategy followed by the fleet. In 2015, most sampled fishing trawls targeted *P. longirostris* and a low number of them targeted *P. notialis*. For both species, the sex-ratio parameter included data from biological sampling and length sampling because the sex identification can be easily made by external characters and therefore, length samplings are made by sex. It is not possible to give the values of the weight parameter (0 vs 3000). This is due to the fact that the small size of individuals of *P. notialis* requires that weight measurement are made with a precision balance onboard, which cannot be used due to the instability of this kind of vessels.

Merluccius polli and ***M. senegalensis***: both black hake species are marketed together as *Merluccius* spp and commercialized by size categories. As individuals are gutted in some of the commercial categories, biological samplings on shore are not possible. Consistently, the biological information only can be obtained from onboard observations, which, as mentioned above, were not achieved for the métier OTB_DEF_>=70_0_0. At present, these species are also targeted by the métier OTB_MCF_>=70_0_0 (previously named as OTB_CEP_>=70_0_0). *Merluccius polli* is the main hake species present in Guinea Bissau, where this métier operated in 2015, and therefore it was sampled on board. As mentioned above, only one fishing trip was sampled in 2015 for this métier, and consequently

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the number of sampled individuals was lower than planned for all the hake species (216 vs 2500, 9% achievement, weight, maturity and sex-ratio).

Octopus vulgaris, ***Loligo vulgaris***, ***Sepia hierredda*** and ***S. officinalis*** (from métier OTB_CEP_>=70_0_0 (renamed as OTB_MCF_>=70_0_0): Number of sampled individuals for weight, maturity and sex-ratio variables is lower than planned for *O. vulgaris* (26 vs 500, 5% of achievement) and also for *S. hierredda* (12 vs 400 for weight and sex-ratio, and 5 vs 400 for maturity). This is because only one fishing trip was sampled for the métier. Moreover, the trip was targeting finfish (mostly *M. polli*), fishing in deeper waters where the presence of these cephalopod species is less common. *L. vulgaris* and *S. officinalis* were not caught during the trip because these species are highly unusual in Guinea Bissau waters.

Small pelagic species from **West African** fishing grounds (from Morocco to Guinea Bissau) of métier OTM_SPF_>=40_0_0 (*Sardina pilchardus*, *Sardinella aurita*, *Sardinella maderensis* and *Trachurus* spp.) were not sampled due to the reasons explained above for the métier. Moreover, data from foreign landings are very incomplete because only the last trip before leaving the African fishing grounds can be landed in a Spanish port. Sampling of *Scomber colias* in this fishing ground was not planned in 2015.

Regarding **small pelagic species** from **Canary** fishing ground of métier PS_SPF_10_0_0 (*Sardina pilchardus*, *Sardinella aurita*, *Scomber colias* and *Trachurus* spp.), the sampling intensity for all of them was higher than planned (>180% of achievement), because the samples are taken on a monthly basis (not according to the number of individuals) and a minimum number of individuals is analyzed to ensure quality, as well as the coverage of the reproductive cycle and temporary biological variations of these species.

III.E.2 Data quality issues.

Not all species have been sampled as expected for reasons mainly related with the instability of Fishery Partnership Agreements (FPAs) with West African countries in the CECAF area. Nonetheless, the data quality of the sampled species was the best possible under these circumstances throughout 2015 and the achieved information is considered satisfactory enough to be supplied to the relevant CECAF assessment working groups.

In general to check the quality and to carry out the estimation of the biological parameters and their uncertainties, the tool INBIO 2.0[5] ("Estimation of biological parameters and their uncertainties through simulation techniques"), developed in R environment by the IEO, was used. INBIO makes possible to fit the most usual models and to estimate the coefficient of variation for parameters by using the non-parametric bootstrap methodology.

Models and fit adopted were:

- Growth at age (vs. Length & Weight): von Bertalanffy. Non-linear estimation w. minimum least squares (Gauss-Newton estimation).
- Maturity (Length & Age): GLM. Logistic function. Binomial errors w. maximum log-likelihood fit.

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[5] Update of "Sampedro, P., Sainza, M. and Trujillo, V., 2005.A simple tool to calculate biological parameters'uncertainty. Working Document, In: Workshop on Sampling Desing for Fisheries Data (WKSDFD), Pasajes, Spain

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- Length – Weight Relationship: Standard. Non-linear estimation w. minimum least squares (Gauss-Newton estimation).
- Sex-ratio (Length & Age): No Model. Percentage by length and age. Cubic spline to plot

III.E.3 Actions to avoid deviations.

The conditions imposed by the new Fishing Partnership Agreements or new protocols of the FPAs to the different European fleets operating in West African coastal States of the CECAF area involved in many cases deviations of the planned sampling schemes. Some FPAs were renewed (Morocco and Senegal) and others are regulated by new protocols (Mauritania, Guinea-Bissau), these involving more restrictive fishing conditions for some fishing fleets (shrimpers and hake trawlers in Mauritania) and even the closure of other ones (e.g. cephalopod trawlers fleet in Mauritania). All these reasons, detailed throughout the report hampered the successful execution of some objectives. In other cases, deviations are related to changes in the resources abundance that involves changes in the strategy followed by the fleet (i.e: targeting one species or another). These are all external circumstances related to the fishing activity and no actions can be taken by us to avoid deviation.

Deviations related to sampling more than planned are due to ensure good quality and enough coverage. The objectives are considered achieved and no measures are proposed.

ICCAT (Atlantic), IOTC, IATTC, WCPFC, etc. (Fisheries targeting large pelagics)

III.E.1 Achievements: Results and deviation from NP proposal.

Table III.E.1 and **table III.E.2** has been kept from the last update of 2015 National Program Proposal ("España_Propuesta PN 2015 para_2014-2016_Tablas_31-marzo-2015") where section of biological stock-realted variables did not change since the first NP 2011-2013.

Table III.E.3 shows the number of fish planned and measured at national level during 2015. On commercial fleets whose landings are in national ports, the biological variables data are collected from market samples and observers on board. In many cases, it was necessary the purchase of specimens to carry out the sampling.

Thunnus albacares, Thunnus obesus y ***Katsuwonus pelamis***, in the Atlantic and Indian Oceans, where landings take place in distant countries, samplings are carried out by sampling staff hired to collect and handle these data and they are supervised by the Spanish expert in the area in cooperation with processing industries in landing countries. Since 2013 there is no Spanish Fisheries Office in Dakar although data have been collected in cooperation with IRD and CRODT and the procedures to reestablish this important position are being processed.

Several reasons make the access to landings very difficult, highlighting the remoteness of the landing ports, the freezing of the fish on board, the difficulties in handling the fish (big individuals), mechanization of handling, etc. The sampling by observers on board is very difficult due to the handling of fish, because the fishes are frozen entirely and they are not processed on board. The purchase of individuals for biological sampling is complex and requires a very high financing due to the high weight and the high economic value of the species.

In the Pacific Ocean it is impossible to carry out the biological sampling of the target species, owing to the lack of a Spanish Fisheries Office, or staff in the area for its performance. The number of vessels is very small and they are not operating in the area throughout the year, so there is no economic compensation in supporting forementioned office or staff. It is necessary to add that the landing ports are variable and very far one from another and it would not be possible to have samplers in each port.

Thunnus thynnus, in the Atlantic Ocean, the Spanish fisheries act on the spawning fraction (over six years) and on the juvenile fraction of the stock. This circumstance makes that several length classes are

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outside the geographical area where the Spanish fisheries work and cannot be covered, so studies of sex ratio and maturity are not conducted.

Thunnus alalunga, in the Atlantic Ocean, trolling and baitboats fisheries catch in a high percentage, the immature fraction of the population (<90 cm FL) and, in a lower percentage, the adult fraction of Albacore tuna (> 90 cm FL). The adults are captured in the resting phase, because the spawning area is located in tropical waters of the western Atlantic. Thus, it is unlikely take samples from spawners in northeast Atlantic to perform sex ratio and maturity studies.

In the Indian Ocean all the *Thunnus alalunga* capture is bycatch in other fisheries. The size of individuals and the fact that catches are very distant in space and time implies difficulties in conducting biological sampling.

Deviations in the table III.E.3

Atlantic Ocean:

Thunnus alalunga: there is not weight sampling, since there are not recommendation by ICCAT to analyze length-weight relationship for the northern Albacore stock.

Thunnus thynnus: the number of individuals measured came from the BFT-E stock (Eastern Atlantic and Mediterranean). All individuals were measured and weighted individually at the market (census), so it is not possible to making a good fit with the planned minimum number of fish to be measured at national level.

Indian Ocean:

Katsuwonus pelamis, Thunnus albacares and ***Thunnus obesus***: due to the closure of the Spanish Fishery Office in Victoria (Seychelles), the sampling data depends on third parts managed by the Seychelles Fishing Authority(SFA) and the Institut de Recherche pour le Developpment (IRD). Biological sampling of weight-length, sex-ratio and maturity is based in the cannery placed outside the port of Victoria and requires additional funds to be supported. In recent years, biological information was transferred by IRD sampling team to IEO.

III.E.2 Data quality issues.

In most of the species, the number of individuals is difficult to plan in advance. It will depend on access to the samples. In the case of bycatch species (usually low prevalence), the number of individuals sampled at national level cannot be planned in advance.

In general, to check the quality and to carry out the estimation of the biological parameters and their uncertainties, the tool INBIO 2.0[6] ("Estimation of biological parameters and their uncertainties through simulation techniques"), developed in R environment by the IEO, was used. INBIO makes possible to fit the most usual models and to estimate the coefficient of variation for parameters by using the non-parametric bootstrap methodology.

Models and fit adopted were:

[6] Update of "Sampedro, P., Sainza, M. and Trujillo, V., 2005.A simple tool to calculate biological parameters'uncertainty. Working Document, In: Workshop on Sampling Desing for Fisheries Data (WKSDFD), Pasajes, Spain

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- Growth at age (vs. Length & Weight): von Bertalanffy. Non-linear estimation w. minimum least squares (Gauss-Newton estimation).
- Maturity (Length & Age): GLM. Logistic function. Binomial errors w. maximum log-likelihood fit.
- Length – Weight Relationship: Standard. Non-linear estimation w. minimum least squares (Gauss-Newton estimation).
- Sex-ratio (Length & Age): No Model. Percentage by length and age. Cubic spline to plot

III.E.3 Actions to avoid deviations.

Deviations are due to problems inherent to the large pelagic fisheries. The objectives are considered achieved and no additional measures are proposed.

III. F Transversal Variables

III.F.1 Capacity

III.F.1.1 Achievements: Results and deviation from NP proposal.

The data regarding capacity are obtained from operating Spanish fleet Register which is part of Community vessel Register, in which all vessels are registered and is registered in the database of the SGP.

From a software application, the parameters of the vessels according to the disaggregation level required by the Regulations can be checked. In this sense, regarding gear data, they are obtained from national censuses where vessels are included or, alternatively, from data of issued fishing licences.

III.F.1.2 Data quality: Results and deviation from NP proposal.

These censuses are updated whenever a change occurs, so that the annual update of the data is guaranteed. This gives a total coverage of Spanish fleet vessels, including those less than 10 m.

III.F.1.3 Actions to avoid deviations.

Automatic filters are being implemented in the database to check possible inconsistencies

III.F.2 Effort

III.F.2.1 Achievements: Results and deviation from NP proposal.

For vessels of more than 10 meters, data relating to fleet segments and fishing gear are obtained from Fleet register, data of stocks of particular interest are obtained from the logbooks and data of fishing areas are obtained from positions provided by the VMS data (vessels exceeding 15 m.) and from the logbooks (vessels between 10 and 15 m.). All this information is integrated into the centralized database of the SGP and can be found with precision levels settled by the regulation.

For vessels less than 10 meters, the data for fleet segments and fishing gear are obtained from Fleet register and data related to populations of special interest and fishing areas are derived from sale notes given that each note corresponds to a day of fishing in the fishing ground to which the vessel is attached.

The parameter on fuel consumption is taken up within the module of economic data.

III.F.2.2 Data quality: Results and deviation from NP proposal.

The fleet census is updated whenever a change occurs, so that the annual update of the data is guaranteed. This gives a total coverage of the Spanish fleet vessels, including those less than 10 m length.

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Sales notes are collected daily on all auctions by the autonomous regions authorities that process and integrate them into their databases so that there is a full coverage. Whith established frequency, the sales notes are forwarded to the SGP that incorporate the information into its central database, which guarantee the full coverage in all national territory.

III.F.2.3 Actions to avoid deviations.

Improvements are being made in the centralized database in order to develop consistency filters and query with data matching in order to detect errors or inconsistencies, as established by Community law and as approved by the European Commission.

III.F.3 Landings

III.F.3.1 Achievements: Results and deviation from NP proposal.

Information on landings by vessels over 10 meters comes from the landing declarations.

In 2012 it began the gradual implementation of the system of "electronic logbook". With this system, incorporating data on catches and landing declarations to the database is immediate, thus speeding up the incorporoation of information. This system has been a major advance over manual recording of data done in ports. This manual recording has been relegated to those vessels that are not required to have this electronic logbook, although a logbook in paper format is mandatory.

In the latter cases, the data are received and entered into the database by personnel specifically hired by the SGP through entrustment management with the public company TRAGSATEC, and are responsible to receive and record information from more than 300 ports the Spanish coast.

These recordings represent just 5% of the total catches of the Spanish fleet.

For vessels less than 10 meters, these data are collected from sales notes which are collected by the regional authorities (autonomous communities) based on their skills and forwarded to the SGP, which are also integrated into the centralized database. In the sales notes the specific composition of the catch of each vessel and the geographical area is detailed, but not the gear used.

The latter information, if necessary, can be obtained through the crossings of sales notes against the tables of fleet census where the fishing mode is recorded for each vessel.

III.F.3.2 Data quality: Results and deviation from NP proposal.

The precision and disaggregation levels under the Regulation have been reached, however, the information of disaggregation level required by the regulations concerning the value of species landed obtained from surveys to collect economic data. These surveys are processed in the year following their collection and also the data obtained are not yet integrated into the SGP central database, so it cannot be done automatically with a cross-checking like other parameters required for this module.

III.F.3.3 Actions to avoid deviations.

Improvements are being made in the centralized database in order to develop consistency filters and query with data matching in order to detect errors or inconsistencies as established by Community law and as approved by the European Commission.

III. G Research surveys at Sea

From 2014 (include), the activities undertaken within the EMFF are selected by the Member State, provided they meet the criteria set out in EMFF itself and contribute to the better implementation of the Common Fisheries Policy (CFP).

The activities to be undertaken were clearly defined by the COM Decisions, so there was no room in the NP Proposal for activities that were not mentioned in the Decision, although these activities were used for the evaluation of fisheries resources.

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So, Annex III shows the outcomes of a number of research surveys at sea that Spain had been conducting at national expenses, which are coordinated internationally, and are used for the assessment of fishery resources in the working groups of the area ICES and thus they contribute to the better implementation of the CFP.

The information about these surveys was also included at the end of the table III.G.1.

Currently, the abundance indices by age in research surveys are not obtained for *Merluccius* spp. or *Lophius* spp. because the age interpretation using otoliths or illicia is not possible due to the existing problems in the reading criteria for both species.

IBTS 4th. Quarter (VIIIc y IXa north)

III.G.1 Achievements: Results and deviation from NP proposal.

Objectives:

- 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* y *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.
- Perform hauls in the buffer zone of the Marine Protected Area Cachucho (Proyecto 4ESMAREC

Sampling area: ICES Areas VIIIc and IXa North: continental shelf and continental slope of north Spanish coast (Figure 1), sampling the bottom at depths between 70 y 500 m, with additional hauls for depths under 70 m and over 500 m.

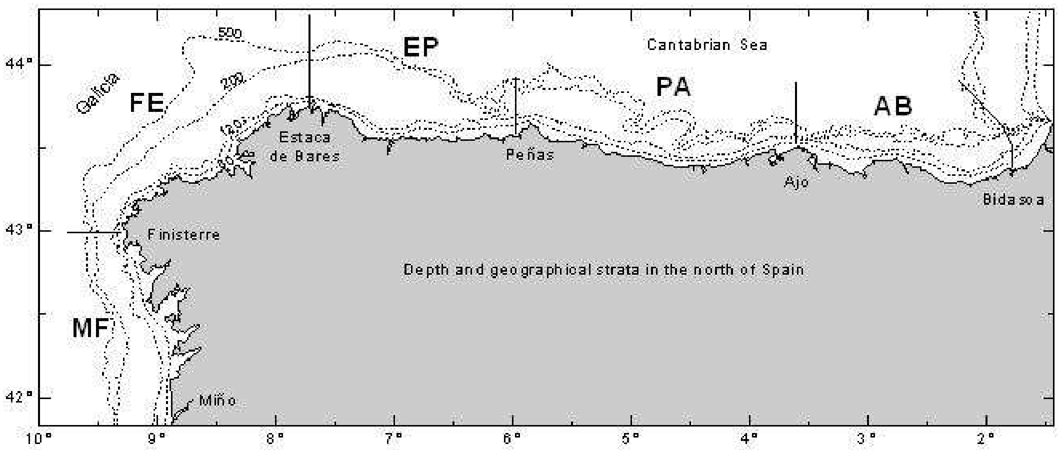

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Figure **1**: Map of stratification used in the survey IBTSVIIIcIXa 2015 (North Spanish coast)

Dates: From September 17th to October 23th, 2015.

Duration: The survey lasted for 37 days.

Methodology: random stratified 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 strata.

Research Vessel: R/V Miguel Oliver, otter trawler 70 meters length, 14.40 m. breadth, 2495 GT and 2 * 1000kW.

Equipment and Sampling gear: Baca trawl 44/60 (60.3 m ground rope with single coat y 43.8 m float rope) with 20 mm mesh size in the codend.

Number of hauls: 136 valid fishing:

115 standard hauls

21 special hauls:

- 2 hauls in shallow areas, at 30-70 m depth, not covered by the stratification of the survey as there were not enough trawlable areas at these depths. but carried out yearly to monitor the resources and the ecosystem at these depths.
- 12 hauls deeper than 500 m, between 500-800 m, performed annually to track the status of resources and ecosystem in the area.
- 3 hauls near 800 m depth in the buffer area of "El Cachucho" Marine Protected Area.
- 4 calibration hauls in French Waters

Sampling:

Hydrographic sampling: 143 CTD stations were performed (CTD Seabird-25), covering most of the fishing stations in the survey whenever the weather permited. (Figure **2**)

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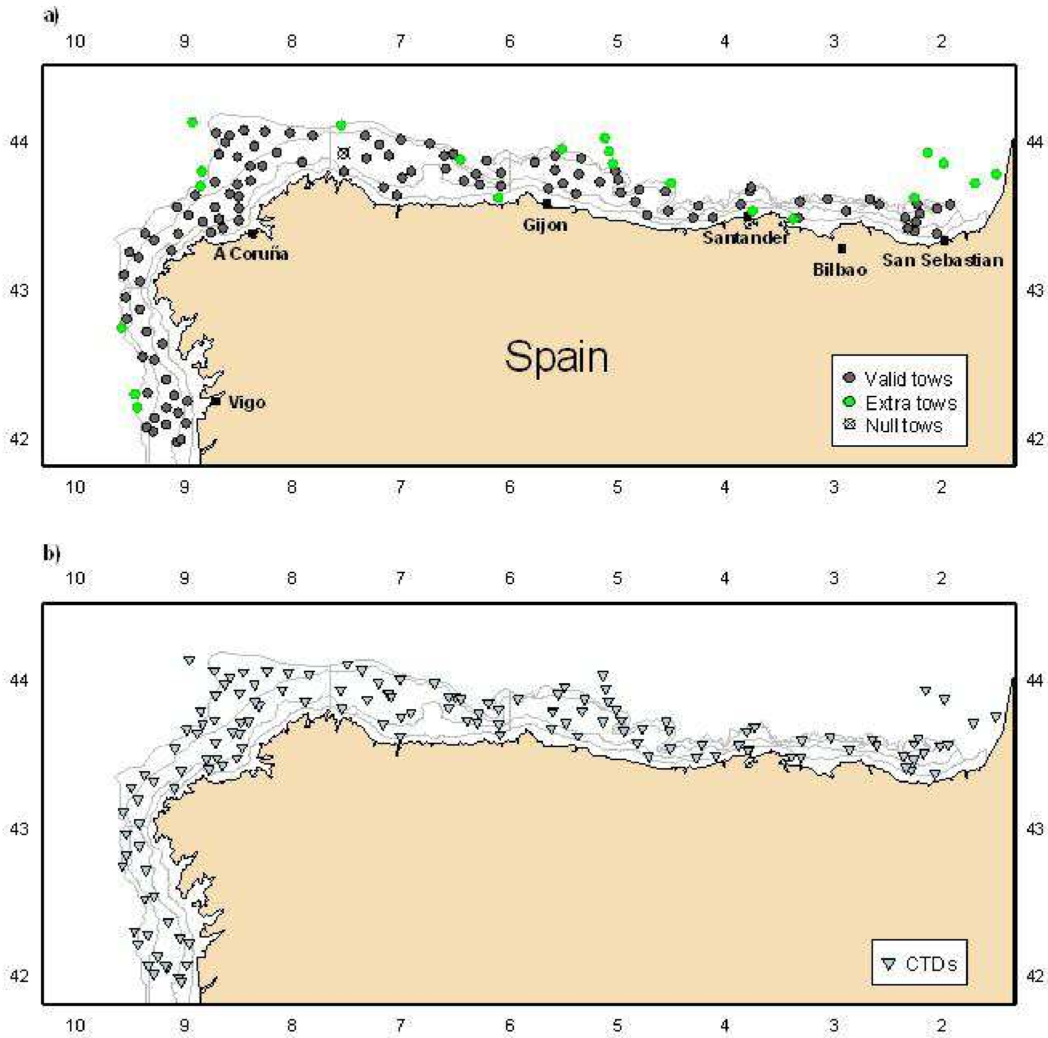

Figure **2**: a) Map of the hauls of sampling carried out during the survey IBTS VIIIc IXa 2015 (North Spanish shelf) and b) CTD stations performed).

Faunistic lists: They were a total of 241 species: 86 fish, 50 crustaceans, 37 molluscs, 30 echinoderms and also 38 species of other invertebrate groups.

Specimens sampled: Length distributions of all fish and Norway lobster were obtained. The number of specimens sampled for the main species are shown in the following tables.

Scientific name	**Total**
Merluccius merluccius	12037
Lepidorhombus whiffiagonis	3367
L. boscii	8849
Lophius budegassa	48
L. piscatorius	73
Micromesistius poutassou	12501
Phycis blennoides	914

Scientific name	**Total**
Helicolenus dactylopterus	1846
Trisopterus luscus	1965
Conger conger	1447
Zeus faber	133
Trachurus trachurus	12463
Scomber scombrus	1193
Nephrops norvegicus	120

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Otholits and illicia:

Species	Otholits/illicia
Merluccius merluccius	950
Lepidorhombus whiffiagonis	486
Lepidorhombus boscii	562
Lophius budegassa	47
Lophius piscatorius	71
Micromesistius poutassou	1056
Phycis blennoides	155
Helicolenus dactylopterus	181

Species	Otholits/illicia
Trisopterus luscus	251
Conger conger	201
Zeus faber	63
Trachurus trachurus	843
Scomber scombrus	605
Scomber colias	216
Engraulis encrasicolus	301

Data storage: survey data are stored by the IEO in its ad-hoc fishery data base SIRENO and also in DATRAS from 2001.

Environmental indicators:

In the survey "IBTS 4th. Quarter (VIIIc y IXa north)"-IBTS SP-NGFS- data are collected to calculate indicators 1 to 3, although no data on individual weights are taken as weather conditions should make results less reliable than using length-weight regressions to estimate the indicators to be calculated by weight, specifically indicator 2 "Proportion of large fish by weight".

Regarding indicator 4 on the "size of maturation of exploited species", this is an indicator that has to be calculated during the spawning season of the species, as advised in the workshops on fertility and maturity of various commercial species. The time when the survey is carried out, between the third and fourth quarter, it is not within the spawning season for most species, since it is in fact a survey to estimate recruitment strength.

Deviations: There were no deviations from the Proposal.

III.G.2 Data quality: Results and deviation from NP proposal.

Data obtained are used for calibration models of groundfish assessment of the South Platform ICES evaluated within the framework of WGBIE, especially the southern stock of hake (*M. merluccius*) and megrims (*L. whiffiagonis* y *L. boscii*), anglers (*L. budegqassa*, and *L. piscatorius*), and Norway lobster (*N. norvegicus*) in the Iberian continental shelf. They are also used in the calibration of assessments of the southern stock of horse mackerel (*Trachurus* spp.), and annual results for blue whiting (*M. poutassou*) are reported to WGWIDE and those of mackerel (*Scomber* spp.) to WGHANSA.

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

Deviations: There were no deviations from the Proposal.

III.G.3 Actions to avoid deviations.

Not applicable.

IBTS 4th. Quarter (IXa sur)

III.G.1 Achievements: Results and deviation from NP proposal.

Objectives:

- -Estimate distribution and relative abundance the main commercial species and provide recruitment indices.

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- -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.

Sampling area: The Southern Spanish Groundfish Survey on the Gulf of Cadiz (SP-GCGFS) is conducted in the southern part of ICES Division IXa, the Gulf of Cádiz. The covered area extends from 15 m to 800 m depth, during spring (March) and autumn (November) (Figure **3**).

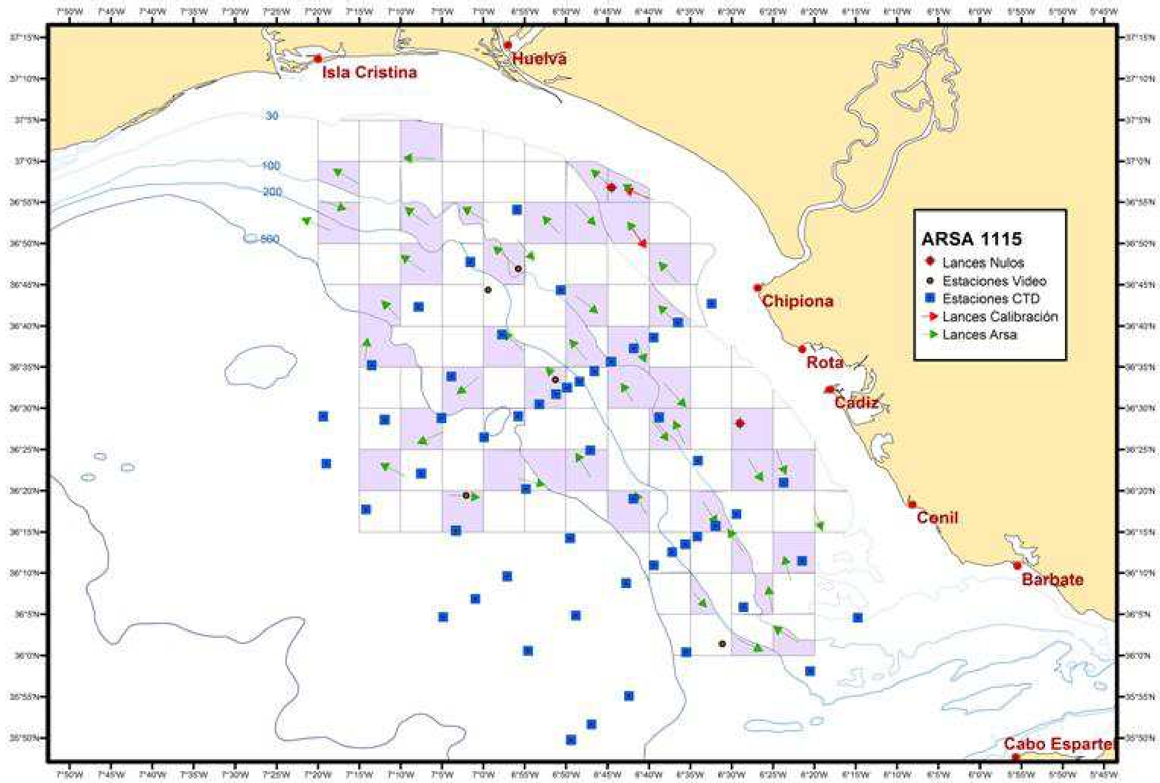

Figure **3**: Sampling area with haul and CTD stations carry out during a survey IBTS IXa South in 4th Quarter. (ARSA 1115).

Dates: 30th October – 12th November 2015.

Duration: 14 days.

Methodology: 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.

Research Vessel: R/V Miguel Oliver, otter trawler 70 meters length, 14.40 m. breadth, 2495 GT and 2 * 1000kW.

Equipment and Sampling gear: Baka trawl 44/60 with a 43.6 m footrope and a 60.1 m headline.

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Number of hauls: 43 valid haul.

Sampling:

Hydrographical Sampling: Temperature and salinity data were also collected during each tow with a CTD attached to the gear. Additionally 54 CTD casts were carried out in the survey area.

Biological sampling: A total of 350 species were captured, 155 fish species, 59 crustaceans, 56 molluscs, 27 echinoderms and 53 other invertebrates.

Number of biological samples: Length distribution of all fish and main species of crustacean and cephalopods.

Scientific name	Number of biological samples(maturity and age material, *maturity only)
Merluccius merluccius	371
*Merluccius merluccius**	1148*
*Parapenaus longirostris**	927*
*Nephrops norvegicus**	198*
*Octopus vulgaris**	308*
*Loligo vulgaris**	1169*
*Sepia officialis**	552*

Data storage: survey data are stored by the IEO in its ad-hoc fishery data base SIRENO (Seguimiento Informático de los Recursos Naturales Oceánicos).

Deviations: There were no deviations from the Proposal.

III.G.2 Data quality: Results and deviation from NP proposal.

The data obtained are used for calibrating assessment models of demersal species in the ICES Southern area within the group of WGBIE (formerly WGHMM).

Recommendations given by the Expert Group for the planning of these surveys (ICES IBTSWG) are adopted in the survey protocols.

Deviations: There were no deviations from the Proposal.

III.G.3 Actions to avoid deviations.

Not applicable.

IBTS 4th. Quarter. Porcupine groundfish survey

III.G.1 Achievements: Results and deviation from NP proposal.

Objectives:

- To estimate stratified abundances indices by age of hake, megrims (*L. whiffiagonis*, *L boscii*), and monkfishes (*Lophius budegassa* y *L. piscatorius*) 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 (*Nephrops norvergicus*, *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

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- To collect data for the determination of biological parameters for the demersal species selected by DCF.
- To collect hydrographic data.

Sampling area: VIIb-k ICES Division: Porcupine area extends from longitude 12° W to 15° W and from latitude 51° N to 54° N, from 185 to 800 m. (Figure **4**)

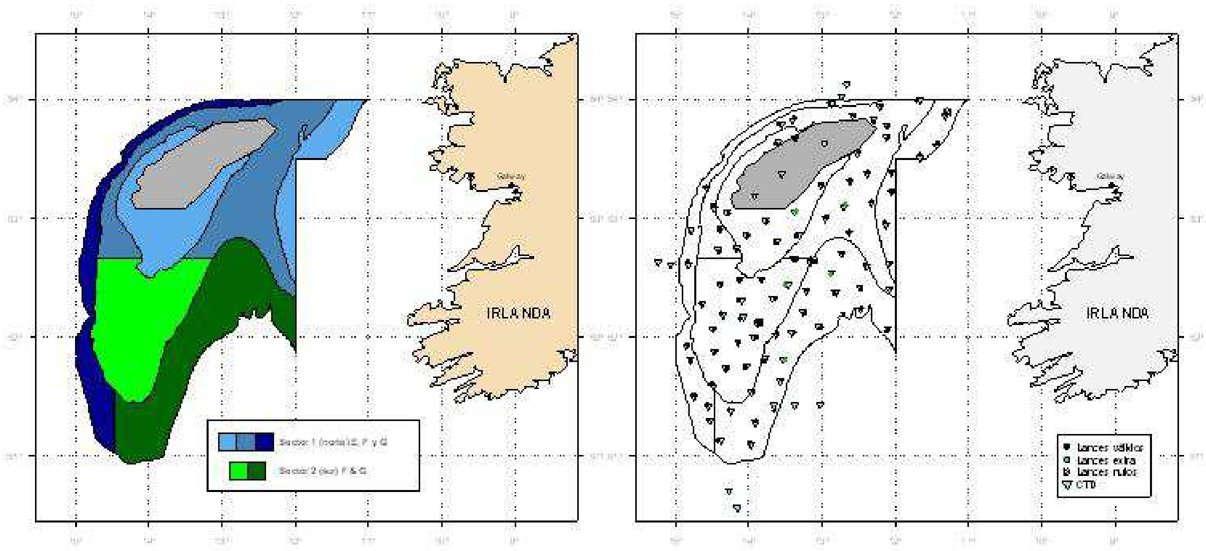

Figure **4**: Geographic sectors used in the survey and hauls carried out in Porcupine Spanish ground fish survey in 2015).

Dates: 3th of September - 2th of October of 2015.

Duration: The surveys lasted for 30 days.

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

Research vessel: R/V Vizconde de Eza.

Equipment and Sampling gear: Porcupine Baca – GAV 39/52 (52 m ground rope double coat, 39 m float rope), 20 mm mesh size in the codend. CTD SeaBird 25.

Number of hauls: 80 standard hauls, 5 additional hauls and 3 not valid hauls.

Sampling:

Hydrographic sampling: 96 hydrographic stations carried out using a CTD SeaBird 25 At the end or the beginning of each haul. Moreover, to complete the area coverage, some CTD casts will be performed in the central mound not trawlable (the shallowest part of the bank), and four radials, southwards, west and north to the bank, in order to get information about hydrographic conditions around the area.

Species list: A total of 250 species were found: 105 fish species, 50 crustaceans, 33 mollusks, 26 echinoderms and 36 of other invertebrates.

Lenght sampling: All fish species and Norway lobster (*Nephrops norvegicus*) were measured. The number of the main species sampled are shown in the following table.

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Species	Total
Merluccius merluccius	5937
Lepidorhombus whiffiagonis	8402
L. boscii	8826
Lophius budegassa	71
L. piscatorius	445
Micromesistius poutassou	27236
Phycis blennoides	2602
Trachurus trachurus	1551

Species	Total
Molva macrophtalma	1613
Molva molva	92
Glyptocephalus cynoglossus	1451
Melanogrammus aeglefinus	425
Merlangius merlangus	64
Helicolenus dactylopterus	5190
Conger conger	31
Nephrops norvegicus	843

Otholits and illicia:

Species	Otholit/ illicia	Species	Otholit/ illicia
Merluccius merluccius	1012	*Phycis blennoides*	247
Lepidorhombus whiffiagonis	736	*Conger conger*	33
Lepidorhombus boscii	304	*Helicolenus dactylopterus*	183
Lophius budegassa	71	*Scomber scombrus*	1
Lophius piscatorius	442	*Molva molva*	93
Lophius sp.	27	*Nephrops norvegicus**	431

* Only sex, maturity and fecundity data (262 males, 169 females).

Data storage: survey data are stored by the IEO in its ad-hoc fishery data base SIRENO and also in DATRAS from 2001.

Environmental indicators:

Data of the survey are used to estimate index 1 and 3. However, length-weight regressions are used to estimate weight data specifically to get index 2, because that is more reliable than individual weight data obtained in the surveys which oscillate with meteorological conditions.

Regarding estimation of index 4 (maturity size of exploted species), the data of the surveys are not used because the Porcupine survey is carried out to estimate the recruitment (in the third and forth trimester of the year), but it is not conducted in the spawning season.

Deviations: There were no deviations from the Proposal.

III.G.2 Data quality: Results and deviation from NP proposal.

Data obtained are used to calibrate the demersal stocks assessment models of the ICES areas VII c-k in the working group WGBIE. Moreover, data of the survey are provided to working group WGCSE of assessment of the Norway lobster (*Nephrops norvegicus*), to working group WGDEEP of assessment of deep species (*Phycis blennoides, Argentina* sp., *Molva macrhophthalma* and *H. 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 (*M. poutassou*).

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

Deviations: There were no deviations from the Proposal.

III.G.3 Actions to avoid deviations.

Not applicable.

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Sardine DEPM (SAREVA)

This triennial survey was unplanned for 2015. The last one was carried out in 2014 and the next one is planned for 2017.

MACKEREL / H. MACKEREL EGGS SURVEY (trienal)

This triennial survey was unplanned for 2015. The last one was carried out in 2013 and the next one is planned for 2016.

SARDINE, ANCHOVY, H. MACKEREL ACOUSTIC SURVEY (PELACUS)

III.G.1 Achievements: Results and deviation from NP proposal.

Objectives:

- 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

Sampling area: ICES Divisions VIIIc and IXa along the Spanish coast and Spanish part of the Bay of Biscay (Figure **5**).

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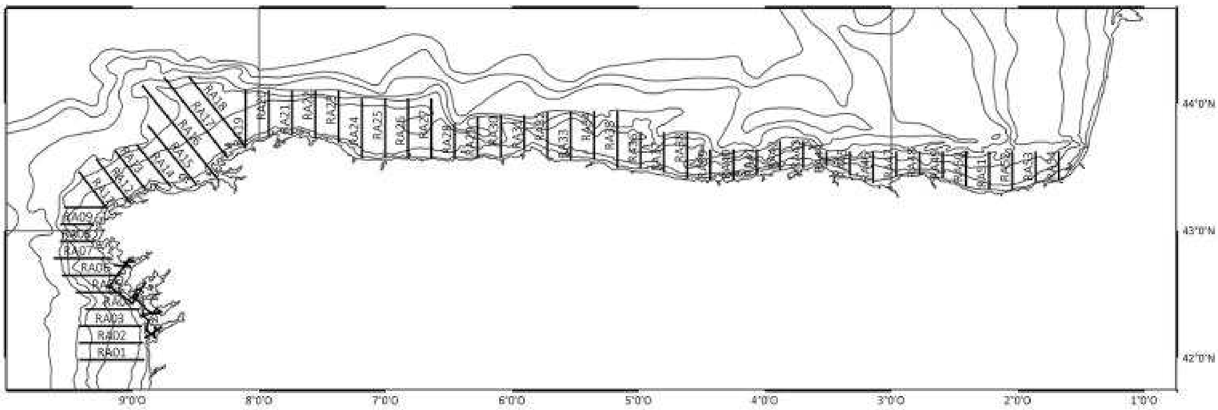

Figure **5**: Route carried out by the R/V “Miguel Oliver” during the survey PELACUS 0315 (North-West Spanish coast.

Dates: 13th march 2015 - 16th April 2015.

Duration: The surveys lasted for 33 days.

Methodology: 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.

Research Vessel: R/V Miguel Oliver, otter trawler 70 meters length, 14.40 m. breadth, 2495 GT and 2 * 1000kW.

Equipment and Sampling gear: An adaptation of a “grandes mailles”, with a vertical opening of about 20 m and horizontal one around 30 m. A rope-rounded footrope, a kind of rock-hopper with small rubber discs. A set of Apollo polyice doors (Thyborøn). Acoustic equipment consisted on a Simrad EK-60 scientific echo-sounder, operating at 18, 38, 120 and 200 kHz. SeaBird Thermosalinograph coupled with a Turner Flourometer. Nets: Bongo, WP2 and CalVet. CTD+bottle rosette carousel.

Number of hauls: 66 (Figure **6**).

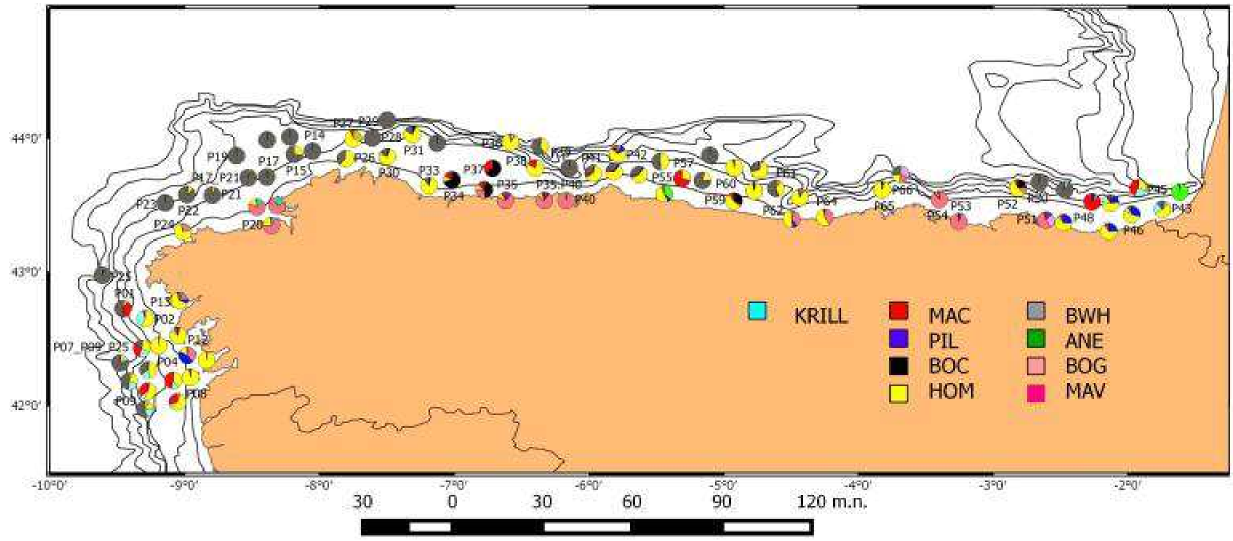

Figure **6**: Backscattering energy proportion allocated to each species at each fishing station. (KRILL -M. norvegica; MAC-mackerel; PIL-sardine; BOC-boarfish; HOM- horse mackerel; WHB-blue whiting; ANE- anchovy; BOG-bogue; and MAV-M. muelleri.

Sampling

Acoustic sampling: Using a Simrad EK-60 scientific echo-sounder, operating at 18, 38, 120 and 200 kHz. All frequencies were calibrated according to the standard procedures (Foote et al 1987). The elementary distance sampling unit (EDSU) was fixed at 1 nm. Acoustic data were obtained only during daytime at a survey speed of 8-10 knots. Data were stored in raw format and post-processed using Sonar-Data Echo-view software (Myriax Ltd.) (Higginbottom et al, 2000). All echograms were first scrutinized and also background noise was removed according to De Robertis and Higginbottom (2007). Fish abundance was calculated with the 38 kHz frequency as recommended at the PGAAM (ICES 2002), although echograms from 18, 120 and 200 kHz frequencies were used to visually discriminate between fish and other scatter-producing objects such as plankton or bubbles, and to distinguish different fish species according to the strength of their echo at each frequency. The 18, 120 and 200 kHz frequencies have been also used to create a mask allowing a better discrimination between fish species and plankton. The threshold used to scrutinize the echograms was –70 dB. The integration values were expressed as nautical area scattering coefficient (NASC) units or sA values (m2 nm -2) (MacLennan et al., 2002).

Fishing stations: Using both NASC allocation and length analysis. Therefore, they were located on account the results obtained during the acoustic prospection (i.e. oportunistic accounting the echotraces). Two fishing gears were used. An adaptation of a “grandes mailles”, with a vertical opening of about 20 m and around 30 m horizontal one, was used as main fishing gear. It has a rope-rounded footrope, a kind of rock-hopper with small rubber discs, which allows it to have a permanent contact with the sea bottom while preserving the net, making the demersal species be more available. As general rig, 400 kg of clump weight were put at each side of the set back (2 m lower wing). Bridles (wings) had 100 m and a set of 20 mm steel wire were used at the beginning of the survey which were substituted by dyneema in the upper wing and polystil in lower wing. Besides a set of Apollo polyice doors (Thyborøn) wer used. Gear performance was controlled using a cabled Simrad Sonar 25/20 net sounder. Summary of the trawl haul and catches by species is shown in Table 4

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	TOTAL CAP	No ind.	No fst	Samp weight	No meas. Ind.	Mean length	%PRES	% weight	% no
WHB	2467	67226	36	164	3286	18.83	54.55	4.30	17.97
MAC	40750	127269	60	2442	7638	36.14	90.91	71.11	34.02
HAK	205	2449	42	333	2029	21.61	63.64	0.36	0.65
HOM	9086	115866	62	668	6661	20.53	93.94	15.85	30.97
PIL	722	13992	19	110	1791	18.86	28.79	1.26	3.74
JAA	60	289	16	62	289	28.81	24.24	0.10	0.08
BOG	2190	13111	34	463	2280	25.55	51.52	3.82	3.50
MAS	489	1949	24	196	997	30.14	36.36	0.85	0.52
BOC	683	11181	13	44	786	14.24	19.70	1.19	2.99
SBR	171	454	8	172	455	28.33	12.12	0.30	0.12
ANE	372	16938	13	11	600	14.78	19.70	0.65	4.53
HMM	114	3367	4	46	1616	13.65	6.06	0.20	0.90
Total	57309	374091		4710	28428				

Table 4: Summary of the trawl haul and catches by species, indicating total catch in weight and number, the number of fishing station a particular species has been caught, the total weight and number of measured fish by specie, the overall mean length, the % of presence (number of fishing station with presence/total trawl hauls) and % in weight and number from the total catch in weight and number

CUFES system uses an internal pumping system with the intake located at 5 m depth. The sea water goes first to a tank of about 1m3 before to be pumped towards the concentrator. Samples from CUFES were collected every three nmi while acoustically prospecting the transects (Figura 7). Once the sample is taken it is fixed in a buffered 4% formaldehyde solution. Anchovy and sardine eggs are sorted out and counted before being preserved in the same solution. The remaining ichthyoplankton (other eggs and larvae) are also preserved in the same way. Information on horse mackerel and mackerel (qualitative) was also recorded

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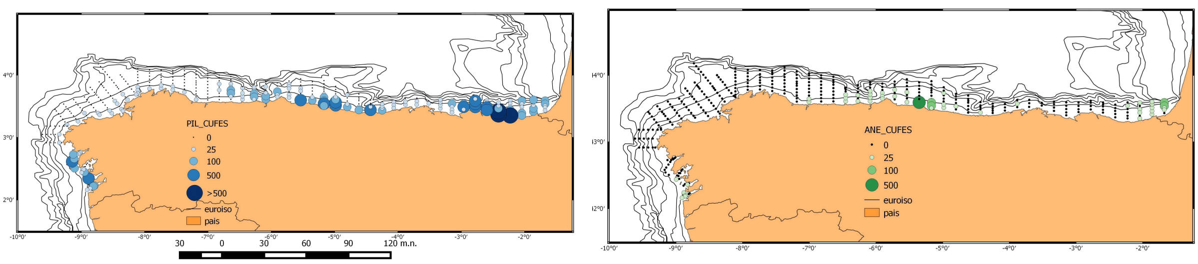

Figura 7: Sardine and anchovy egg spatial distribution

Continuous records of SSS, SST and flourometry are taken using a SeaBird Thermosalinograph coupled with a Turner Flourometer. Plankton and CTD and bottle rosette for water samples casts are performed at night (Figura 8). Five stations are placed over the transects, which are those of the acoustic prospection but that are extended onto open waters until the 1000-2000 m isobaths. The stations are evenly distributed over the surveyed area at a distance of 16-24 nmi. Plankton was sampled using several nets (Bongo, WP2 and CalVet). Fractionated dried biomass at 53-200, 200-500, 500-1000 and >2000 µm fractions was calculated together with species composition and groups at fixed strata from samples collected at the CTD+bottle rosette carousel (pico and nanoplankton, microplankton and mesozooplankton). For this purpose, FlowCAM, LOPC and Zoo-Image techniques were used. Water samples were stored at -20°C for further dissolved nutrients analysis (NO3, NO2, P, NH4+, SiO4)

Three observers placed above the bridge of the vessel at a height of 16 m above sea level work in turns of two prospecting an area of 180° (each observer cover a field of 90°). Observations are carried out with the naked eye although binoculars are used (7x50) to confirm species identification and determine predator behaviour. Observations are carried out during daylight while the vessel prospects the transects and while it covers the distance between transects at an average speed of 10 knots. Observers recorded species, number of individuals, behaviour, distance to the vessel and angle to the trackline and observation conditions (wind speed and direction, sea state, visibility, etc.). Observers also recorded presence, number and type of boats and type, size and number of floating litter. The same methodology is used on the PELGAS surveys and both observer teams shared a common database.

A “manta net neuston sampler” was used. This trawl device has a collector of 350µm. Tows were performed for 15 min at 4 knots speed. The samples were evenly distributed along the surveyed area

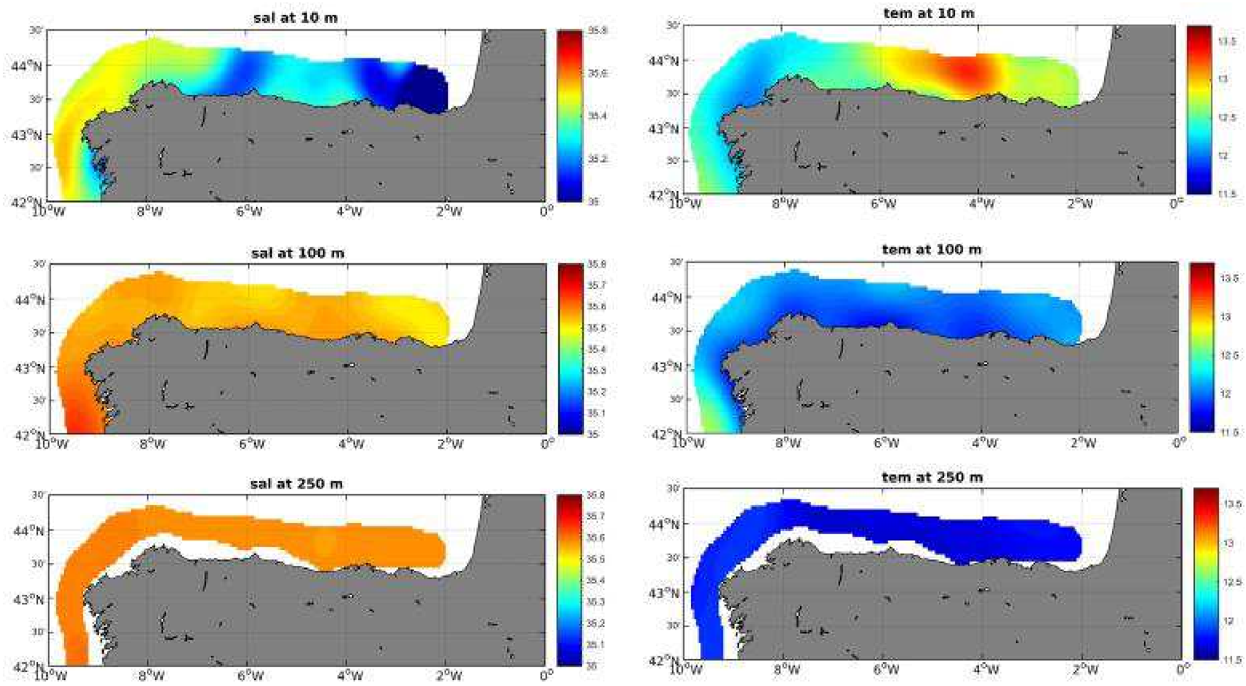

Figura **8**: Horizontal profiles of temperature and salinity at 10, 100 ad 250 m depth from CTD casts obtained at transect normal to the coastline along the surveyed area (salinity, central pictures, temperature, right figures; scales are different; above, 10 m, center; 100m; below, 250 m.

Data storage: survey data are stored by the IEO in its ad-hoc fishery data base SIRENO.

Environmental indicators: During PELACUS-0315 survey collected data are available to calculate indicators 1, 2 and 3 for all the fish species caught. Besides, for indicator 4, data are also available for hake, sardine, mackerel, horse mackerel and blue whiting

Deviations: There were no deviations from the Proposal.

III.G.2 Data quality: Results and deviation from NP proposal.

Data are available for the following ICES working groups: WGACEGG; WGWIDE; WGHANSA

Deviations: There were no deviations from the Proposal.

III.G.3 Actions to avoid deviations.

Noy applicable

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BIOMAN

III.G.1 Achievements: Results and deviation from NP proposal.

Objectives

- Estimate the 2015 anchovy biomass in the Bay of Biscay in spring applying the daily egg production method (MPDH).
- Obtain the numbers at age of the anchovy population.
- Continuous sampling of anchovy and sardine eggs with (CUFES)
- Biological characterization of the species: determine the spawning area of anchovy in the Bay of Biscay for this year, age and size structure, length / weight ratio from data from the biological sampling of the survey.
- Study of the hydrological conditions of the survey area: 1) Measure the vertical profiles of temperature and salinity; 2) acquisition of surface data at each station (thermosalinograph); 3) Continuous data acquisition at 3 meters depth (thermosalinograph).

Sampling area: ICES área VIII a, b, c and d. Between the Spanish and French coasts, south of 48 ° N and until 6ºW.

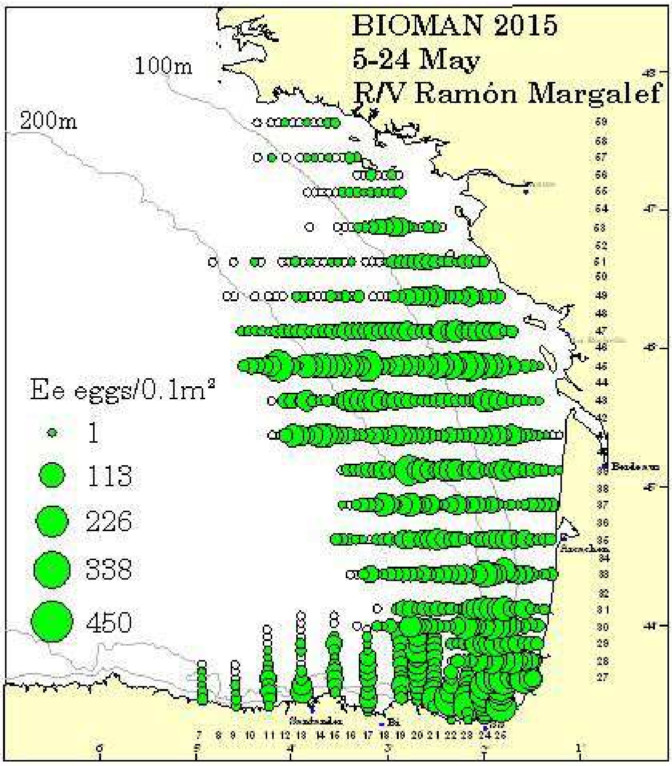

Figure 9**:** Ichthyoplankton stations from the survey and abundance (eggs/0.1m²) and distribution of anchovy eggs obtained in 2015 with the PairoVET net, on board the R/V Ramón Margalef

Dates:

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R/V Emma Bardan: From 7th to 29th of May 2015 to obtain adult samples. From those, 6 days on harbor due to rough seas.

R/V Ramón Margalef: from 5th to 24rd May 2015 to obtain plankton samples.1/2 day of acoustic calibration, the 4th of May, before the survey.

Duration:

R/V Emma Bardán: 17 effective days working at sea + 6 days on harbour due to rough seas + 2.5 days of shipment and move.

R/V Ramón Margalef: 20 effective days working at sea + 2.5 days of shipment and move

Methodology:

The area covered was the southeast of the Bay of Biscay (Figure 9), which corresponds to the main spawning area and spawning season of anchovy. The sampling strategy was adaptive. The survey started from the West (transect 11, at 4º14'W), but as there were found anchovy eggs in this transect two more transects were prospected to the west until 5ºW looking for the western limit of the spawning area and covered the Cantabric Coast eastwards up to Pasajes (transect 25, approx. 1º50'W) (Annex I. Fig. 1). Unfortunately the west limit was not found totally but the abundances in the last transect were low. Then, the survey continued to the North, in order to find the Northern limit of the spawning area. When the egg abundances found were relatively high, additional transects separated by 7.5 nm were completed. This occurred in the eastern part of the Cantabric coast and in the area of the Adour River. But due to the high abundances in all the French platform no more inter transects were performed in the Gironde estuary due to the lack of time. The sampling was stopped at R 39 at Bordeaux latitude for 60 hours due to bad weather and to refuel at La Rochelle port. Moreover one of the cufes stay was broken and the sampling was stopped for 5 hours to fix it.

The strategy of egg sampling was identical to that used in previous years, i.e. a systematic central sampling scheme with random origin and sampling intensity depending on the egg abundance found (Motos, 1994). Stations were situated at intervals of 3 nm along 15 nm apart transects perpendicular to the Cantabric and French coast.

At each station a vertical plankton haul was performed using a PairoVET net (Pair of Vertical Egg Tow, Smith et al., 1985 in Lasker, 1985) with a net mesh size of 150 µm for a total retention of the anchovy eggs under all likely conditions. The net was lowered to a maximum depth of 100 m or 5 m above the bottom in shallower waters. After allowing 10 seconds at the maximum depth for stabilization, the net was retrieved to the surface at a speed of 1 m s-1. A 45 kg depressor was used to allow for correctly deploying the net. "G.O. 2030" flowmeters were used to detect sequential clogging of the net during a series of tows.

Immediately after the haul, the nets were washed and the samples obtained were fixed in formaldehyde 4% buffered with sodium tetra borate in sea water, mixing the samples obtained in each of the nets that compound the PairoVET frame. After six hours of fixing, anchovy, sardine and other eggs species were identified, sorted out and counted on board (Figure 10).

The Continuous Underway Fish Egg Sampler (CUFES, Checkley et al., 1997) was used to record the eggs found at 3m depth with a net mesh size of 350µm not to lose eggs. The samples obtained were immediately checked under the microscope so that the presence/absence of anchovy eggs was detected in real time. When anchovy eggs were not found in six consecutive CUFES samples in the oceanic area transect was abandoned.

Adult samples were obtained on board R/V Emma Bardán (pelagic trawler) from the 7th to the 25th May coinciding in space and time with the plankton sampling. When the plankton vessel encountered areas with anchovy eggs, the R/V Emma Bardán was directed to those areas to fish. In each haul, immediately after fishing, anchovy were sorted from the bulk of the catch and a sample of two kg was selected at

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random. A minimum of one kg or 60 anchovies were weighted, measured and sexed and from the mature females the gonads of 25 non-hydrated females (NHF) were preserved. If the target of 25 NHF was not completed 10 more anchovies were taken at random and processed in the same manner. Sampling was stopped when 120 anchovies had to be sexed to achieve the target of 25 NHF. Otoliths from all individuals were extracted on-board and read in the laboratory to obtain the age composition per sample. In each haul 100 individuals of each species were measured.

This year 6 additional anchovy adult samples were obtained from the commercial Basque purse seine fleet. And two samples one offshore at 46ºN 4ºW and one in the influence of the Adour River were obtained from the French acoustic survey. The spatial distribution of the adult anchovy samples is shown in Figure 11.

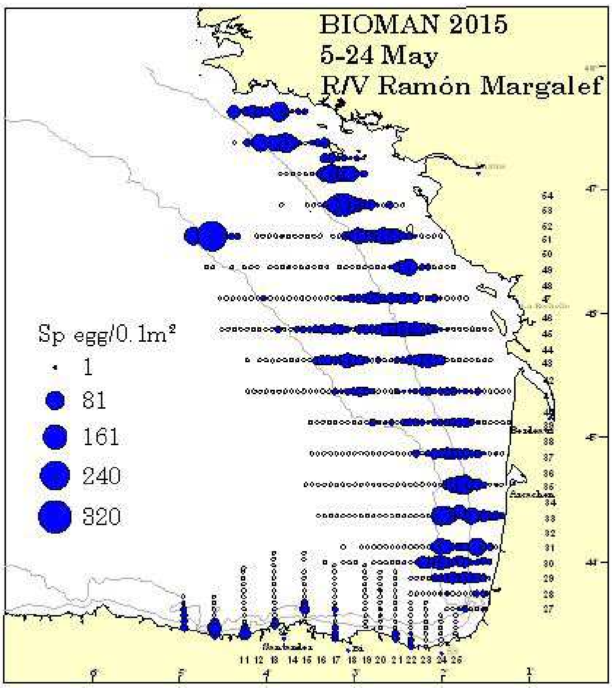

Figure 10: Ichthyoplankton stations from the survey and abundance (eggs/0.1m²) and distribution of sardine eggs obtained in 2015 with the PairoVET net, on board the R/V Ramón Margalef

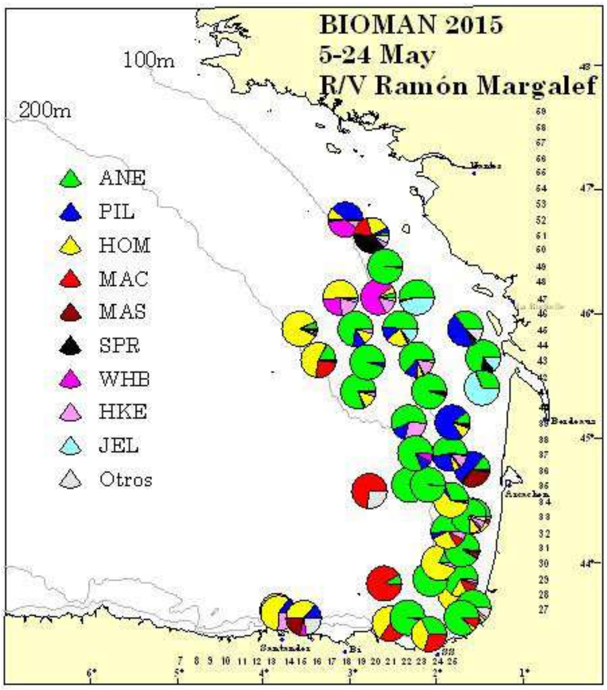

Figure 11: Spatial distribution and species composition of adult samples obtained during BIOMAN 2015 on board the pelagic trawler R/V Emma Bardán

Vessels:

R/V Ramón Margalef to obtain plankton samples. R/V Emma Bardán to obtain adult samples.

Equipment and Sampling gear:

To collect plankton samples: a PairoVET net (Pair of Vertical Egg Tow, Smith et al., 1985 in Lasker, 1985) with a net mesh size of 150 µm with a flowmeter (G.O. 2030)and a couple CTDRBR-XR420.

The Continuous Underway Fish Egg Sampler (CUFES, Checkley et al., 1997) at 3m depth with a mesh size of 335 µm and a CTD to record simultaneously temperature and salinity at 3 m depth, a flowmeter to measure the volume of the filtered water, a fluorimeter and a GPS (Geographical Position System) to provide sampling position and time.

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For the fishing hauls: pelagic trawler with a 15 m of vertical aperture was used.

Number of hauls:

Plankton stations: 629PairoVET and 1,390 CUFES

Adult samples: 46 pelagic trawls, from those 41 with anchovy and 39 were used for the analysis of the adult parameters. Moreover 6 hauls were obtained from the purse seine fleet and 2 from the Pelgas survey on board Thalassa.

Sampling

Hydrographic Sampling:

-Sample depth, temperature, salinity and fluorescence profiles were obtained at each sampling station using a CTD RBR-XR420 coupled to the PairoVET.

-At some points determinate before the survey, water was filtered from the surface to obtain chlorophyll samples to calibrate the data from the fluorimeter.

-The CUFES system had a CTD to record simultaneously temperature and salinity at 3 m depth, a flowmeter to measure the volume of the filtered water, a fluorimeter and a GPS (Geographical Position System) to provide sampling position and time. All these data were registered at real time using the integrated EDAS (Environmental Data Acquisition System) with custom software

Biological sampling:

-629 plankton samples (86% with anchovy eggs and 42% with sardine eggs) from those, anchovy eggs (18,833) and sardine eggs (3,505) were sorted and anchovy eggs were classified by stages (Annex I. Fig 1 & 2)

-46 pelagic trawls were performed, from those 41 with anchovy and 39 were used for the analysis of the adult parameters. Moreover 6 hauls were obtained from the purse seine fleet and 2 from the Pelgas survey on board Thalassa.

-In total 47 hauls were used for the analysis (3,069 anchovies). A complete biological sampling was completed (size, weight, age –read otoliths from 2,422 anchovies-, sex, and sexual maturity). From those anchovies 1,338 ovaries were analyzed with histology to estimate the spawning frequency of each female and finally of the population. The regression to calculate the batch fecundity was done with 81 hydrated females. Afterwards the batch fecundity of each female sampled and the batch fecundity of the population were estimated.

-Additionally, other species present in the hauls were measured:

Scientific name	**Number**
Sardinapilchardus	998
Sprattusspratus	268
Trachurustrachurus	1949
Trachurusmediterraneus	2
Scomberscombrus	492
Somber japonicus	164
Boopsboops	19
Micromesistiuspoutassou	366
SppMyctofids	55

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Capros aper	166
Trisopterusluscus	3

Data storage: The data are stored in the database SIRENO (IEO). And it is considering moving to a global database, comprising other surveys, oceanographic variables, biological, etc.

Deviations: The difference between the number of fishing hauls planned and performed is due to sampling is adaptive, i.e., the number of samples depends on the abundance of anchovy within each year. It is difficult to predict in advanced the precise number of samples.

III.G.2 Data quality: Results and deviation from NP proposal.

Data analysis: The total area surveyed was 94,774 km² and the anchovy spawning area was 81,956 Km (Figure **9**).

The final biomass obtained applying the DEPM was 181,063 tonnes with a CV of 10%. A unique stratum was considered to estimate the total biomass and for the numbers at age 4 strata were considered.

Parameter	estimate	S.e.	CV
Ptot	1.08E+13	8.81E+11	0.0817
R'	0.53	0.0044	0.0084
S	0.31	0.0123	0.0395
F	6,479	478	0.0738
Wf	17.91	1.07	0.0597
DF	59.74	3.50	0.0586
BIOMASS (Tons)	**181,063**	18,202	0.1005
Wt	14.43	1.00	0.0695
Population (millions)	12,589	1701	0.1351
Percentage at age 1	0.77	0.031	0.0406
Percentage at age 2	0.21	0.029	0.1378
Percentage at age 3	0.02	0.004	0.1860
Numbers at age 1	9,727	1,587.3	0.1632
Numbers at age 2	2,615	314.0	0.1201
Numbers at age 3	246	45.2	0.1832
Percent. at age 1 in mass	0.63	0.04	0.0639
Percent. at age 2 in mass	0.34	0.04	0.1065
Percent. at age 3in mass	0.03	0.01	0.2043
B at age 1 (Tons)	113,677	14,472	0.1273
B at age 2 (Tons)	61,339	8,192	0.1335
B at age 3 (Tons)	6,086	1,371	0.2252
Biological Features	**estimate**	**S.e.**	**CV**
Weight at age 1 (g)	11.73	0.83	0.0708
Weight at age 2 (g)	23.42	0.96	0.0411
Weight at age 3 (g)	24.70	2.10	0.0850
Length at age 1 (mm)	120.98	3.10	0.0256
Length at age 2 (mm)	151.10	1.77	0.0117
Length at age 3 (mm)	153.17	3.55	0.0231

Tabla **5**: Egg and adult parameters, total biomass and numbers at age, percentage at age, biomass at age, and length and weight at age of the anchovy population derived from BIOMAN 2015 survey.

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Ecosystem indicators: During the survey BIOMAN 2015 data were collected to calculate indicators 1, 2 and 3 for the following species. *Engraulis encrasicolus*, *Sardina pilchardus*, *Scomber scombrus*, *Scomber japónicus*, *Trachurus trachurus*, *Merluccius merluccius*, *Spratus spratus*. Likewise, data were collected to calculate the indicator 4 of anchovy

Desviations: There were no deviations from the Proposal.

III.G.3 Actions to avoid deviations.

Not applicable.

FLEMISH CAP GROUNDFISH SURVEY

III.G.1 Achievements: Results and deviation from NP proposal.

Objectives: The main objectives of the survey were 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 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.
- Observation of the oceanographic conditions on the Bank. The collection of oceanographic data (temperature and salinity) was 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.

Target species: Cod (*Gadus morhua*), Redfish. (*Sebastes marinus*, *S. mentella and S. fasciatus*), American plaice (*Hippoglossoides platessoides*), Greenland halibut (*Reinhardtius hippoglossoides*), Roughead grenadier (*Macrourus berglax*) and Northern shrimp (*Pandalus borealis*).

Sampling area: Flemish Cap area (NAFO Division 3M) up to depths of 1460 m.

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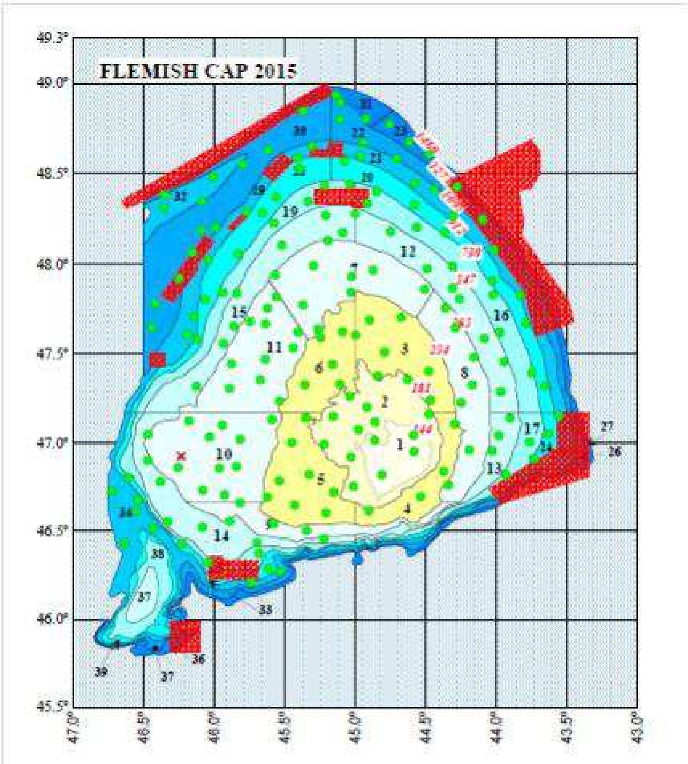

Figure **12**: Map of the Flemish Cap Bank (NAFO Division 3M) with hauls performed (valids in green and nulls in red) on "FLEMISH CAP GROUNDFISH SURVEY — 2015".

Dates:

20/06/2015: Departure from Spain (Scientific IEO&IIM staff).

22/06/2015: Departure to fishing ground.

23/06/2015: Arrival to fishing ground and starting fish hauls.

22/07/2015: End of fishing and departure to St. John´s.

23/07/2015: Arrival to St. John´s and end of Flemish Cap survey.

27/07/2015: Departure from St. John´s to Spain (Scientific staff)

28/07/2015: Arrival to Spain.

Duration: The survey lasted for 32 days at sea, out of which, 30 were effective fishing days and 2 days were used for sailing.

Methodology: Fishing hauls are distributed using a stratified random sampling scheme.

Research Vessel: R/V Vizconde de Eza.

Equipment and Sampling gear: The trawling gear used is the Lofoten (NAFO 1990). CTD SBE-25 SEALOGGER CTD.

Number of hauls: 182 hauls (181 valids and 1 null).

Sampling:

Hydrographic sampling: 68 hydrographic stations using a Seabird CTD system-25.

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Length and biological sampling: length sampling of the most fish species of the catch were made and *Reindhardtius hippoglossoides*, *Gadus morhua*, *Hippoglossoides platessoides*, *Macrourus berglax*, as well as three species of *Sebastes* otholits were collected. Gonad samples of the same species for subsequent histological analysis in the laboratory were also collected.

The following table shows the numbers of fish measured, otoliths and gonads collected of the main commercial species:

SPECIES	Length sampling (Nº Indiv)	Weight sampling (Nº Indiv.)	Collected samples	
			Otoliths	Gonads
Gadus morhua	9075	1578	1578	394
Hippoglossoides platessoides	729	718	714	152
Sebastes norvegicus	2952	1091	1091	584
Sebastes mentella	4149	690	688	353
Sebastes fasciatus	8075	911	908	483
Sebastes (juveniles)	2124	189	179	0
Reinhardtius hippoglossoides	6321	719	716	0
Macrourus berglax	795	661	676	113
Pandalus borealis	9638	3814	0	0

This year we also put special attention to the identification and sampling of benthic invertebrates present in the catches.

Data storage: Survey data are stored into SIRENO database: (Seguimiento Informático de los Recursos Naturales Oceánicos) which is managed by the IEO.

Environmental indicators: During Flemish Cap Groundfish Survey, data about species, lengths and abundances for the calculation of environmental indicators 1, 2 and 3 were collected. Furthermore, individual measurements (age, length, sex and maturity) were done for the calculation of the indicator number 4 on the main target species

Deviations: Lack of time prevented to carry out all planned CTD stations.

III.G.2 Data quality: Results and deviation from NP proposal.

All quality objectives were achieved. As in previous years, several papers were submitted to the NAFO Scientific Council in 2015 with the main results of the survey. (See Annex I)

III.G.3 Actions to avoid deviations.

It will seek to improve the time management along the survey to achieve the target of the CTD stations planned; although the priority is to reach the number of fish hauls planned.

3LNO GROUNDFISH SURVEY

III.G.1 Achievements: Results and deviation from NP proposal.

FIRST PART (Divisions 3NO)

Objectives: The main objectives of the survey were 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 Cap Bank (NAFO Division 3NO). To this end the following tasks were implemented.

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- 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 area using a CTD at the end of each fishing-haul.
- Collection of catch data (weight and number) of invertebrates in the most accurate way and continuing in the line of a higher taxonomic identification.

Target species: Cod (*Gadus morhua*), Roughead grenadier (*Macrourus berglax*), Redfish (*Sebastes* spp.), Skates (*Amblyraja radiata*), American plaice (*Hippoglossoides. platessoides*), Witch flounder (*Glyptocephalus cynoglossus*), Greenland halibut (*Reinhardtius hippoglossoides*), Black dogfish (*Centroscyllium fabricii*), Yellowtail flounder (*Limanda ferruginea*) and Northern Shrimp (*Pandalus borealis*).

Sampling area: Grand Bank of Newfoundland on NAFO Regulation Area (Div. 3NO), out of the Canadian EEZ, covering a depth range from 43 up to 1482 m.

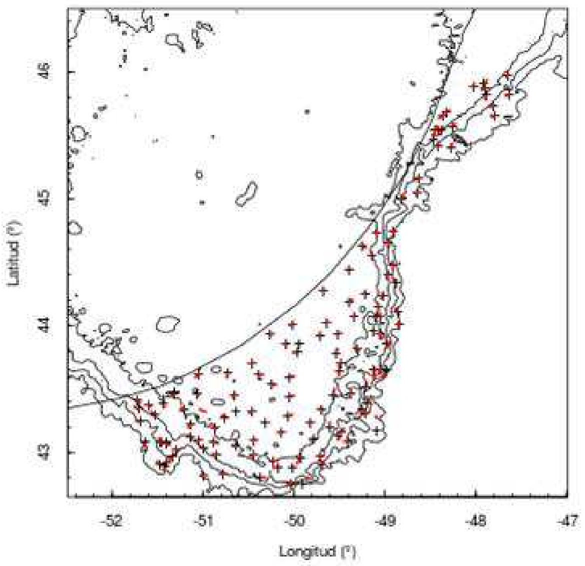

Figure 13: Map of the Grand Bank (NAFO Div. 3NO). Location of the 122 valid hauls (red) and the 127 hydrographic profiles (black) obtained during the 1st part of "3LNO GROUNDFISH SURVEY – 2015".

Dates:

25/05/2015: Departure from Vigo (Spain) on board R/V "Vizconde de Eza".

31/05/2015: Arrival to fishing ground and starting fish hauls.

19/06/2015: End of fishing and departure from fishing ground to St. John´s (Canadá).

20/06/2015: Arrival to St. John´s.

21/06/2015: Departure from St. John´s to Vigo.

22/06/2015: Arrival to Vigo (Scientific staff).

Duration: The survey lasted for 31 days, out of which 29 days at sea. From these 29 days, 20 were effective fishing days and 9 days were used for sailing.

Methodology: Stratified random sampling scheme, diurnal fish hauls from 6 am to 9.30 pm with an average hauling time of 30 minutes.

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Research vessel: R/V Vizconde de Eza.

Equipment and gear: The trawling gear used is the Campelen 1800. CTD SBE-25 SEALOGGER.

Number of hauls: 126 fish hauls (122 valids and 4 nulls) were carried out.

Sampling:

Hydrographic sampling: 127 hydrographic profiles using a Seabird CTD system-25 were carried out.

Length and biological sampling: 1469 length samplings from 78 species with a total of 73792 individuals sampled. 1322 biological samplings and length-weigth samplings were also carried out on 103 species; achieving in both samplings 19621 individuals sampled. 1387 pairs of otoliths and 465 gonads were collected for a posterior histological analysis at the lab.

The following table shows the sampling data of the main commercial species at the 1st part of the survey.

ESPECIES	Length sampling		Biological sampling		Collected samples	
	Nº Samp.	Nº Indv.	Nº Samp.	Nº Indv.	Otoliths	Gonads
Amblyraja radiata	74	658	75	663		
Centroscyllium fabricii	37	971	37	932		
Gadus morhua	61	4730	61	2733	677	315
Glyptocephalus cynoglossus	69	836	69	762		
Hippoglossoides platessoides	68	13188	68	1869	338	150
Limanda ferruginea	44	8669	40	1144		
Macrourus berglax	52	2310	52	1652		
Pandalus borealis	8	115	8	115		
Reinhardtius hippoglossoides	73	1572	73	1239	372	
Sebastes spp.	43	9154	33	1095		

As in the last year, we also put special attention to the identification and sampling of benthic invertebrates present in the catches; samples were collected for a posterior analysis in the laboratory.

Data storage: Survey data are stored into SIRENO (Seguimiento Informático de los Recursos Naturales Oceánicos) database which is managed by the IEO.

Environmental indicators:

During this part of the survey, (NAFO Division. 3NO) data about species, lengths and abundances for the calculation of environmental indicators 1, 2 and 3 were collected. Furthermore, individual measurements (age, length, sex and maturity) were carried out for the calculation of the indicator number 4 on the main target species.

Deviations: There were no deviations from the Proposal.

SECOND PART (Division 3L)

The 2nd part of the 3LNO Groundfish Survey (named in IEO as "Fletán Negro 3L" for internal organisation) has as main target, the exploration of the Division 3L in the NAFO Regulatory Area. This is an area of special interest for the Spanish Greenland halibut fishery where their maximum yields are recorded.

The partial exploration of this area began in 2003 and continued in 2004. From 2006 onwards the whole Division 3L has been prospected on board the R/V "Vizconde de Eza.

Objectives:

- Estimation of abundance indices, biomass and population structure of Greenland halibut and main commercial species.

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- Obtention of biological information of target species.
- Collection of oceanographic data from the area using a CTD at the end of each fishing-haul.

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

Sampling area: Flemish Pass (Div. 3L), out of the Canadian EEZ.

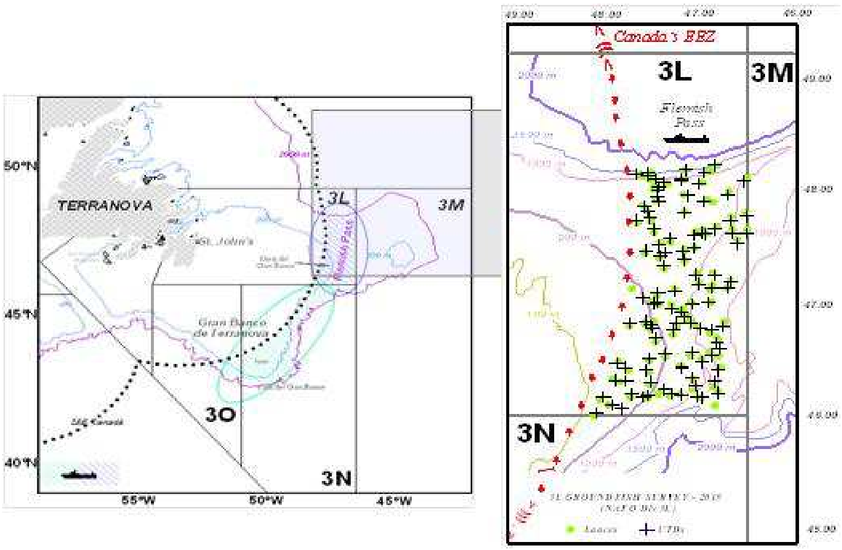

Figura 14: Map of Flemish Pass (NAFO Dividion. 3L). Location of depth isobaths, 200-mile boundary, hauls and CTD stations carried out on the 2nd part of the "3LNO GROUNDFISH SURVEY. 2015.

Dates:

25/07/2015: Departure from Vigo (Spain) (IEO staff).

27/07/2015: Departure from St. John´s (Canadá) to fishing ground.

28/07/2015: Arrival to fishing ground and starting fish hauls.

17/08/2015: End of fishing and departure from fishing ground to Spain.

23/08/2015: Arrival to Vigo (Spain).

Duration: The survey lasted for 28 days at sea out of which 20 were effective fishing days.

Methodology: Stratified random sampling scheme, diurnal fish hauls from 6 am to 9.30 pm with an average hauling time of 30 minutes.

Research vessel: R/V Vizconde de Eza.

Equipment and Samplin126 fish hauls (122 valids and 4 nulls) were carried out g gear: The trawling gear used is the Campelen 1800. CTD SBE-25 SEALOGGER.

Number of hauls: 104 fishing hauls (97 valids and 7 nulls) were carried out. All strata were sampled with at least two fishing hauls each

Sampling:

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Hydrographic sampling: 100 hydrographic stations using a Seabird CTD system-25 were carried out in a range from 104 to 1395 m. Bottom temperature values varied from -1.5921 to 3.7736 ºC and salinity from 33.0566 to 34.9192 USP.

Length and biological sampling: 1218 length samplings from 46 species with a total of 61020 individuals sampled. 1041 biological samplings and length-weigth were also carried out from 43 species; achieving in both samplings 19200 individuals sampled.

1308 pairs of otoliths and 627 gonads were collected for a posterior histological analysis at the lab

The following table shows the sampling data of the main commercial species at the 2nd part of the survey

ESPECIES	Length sampling		Biological sampling		Collected samples	
	Nº Samp.	Nº Indv.	Nº Samp.	Nº Indv.	Otoliths	Gonads
Amblyraja radiata	49	997	47	532		
Centroscyllium fabricii	35	954	34	578		
Gadus morhua	39	1688	37	867	343	168
Glyptocephalus cynoglossus	37	365	35	330		
Hippoglossoides platessoides	37	4586	32	1218	297	144
Macrourus berglax	82	5919	75	1832	314	137
Pandalus borealis	54	5917	36	3834		
Reinhardtius hippoglossoides	94	3069	38	1668	354	9
Sebastes spp.	57	8332	42	1088		

As in the last year, we also put special attention to the identification and sampling of benthic invertebrates present in the catches; samples were collected for a posterior analysis in the laboratory. Also, 111 stomach contents of the main deep-sea species were analyzed on board.

Data storage: Survey data are stored into SIRENO (Seguimiento Informático de los Recursos Naturales Oceánicos) database which is managed by the IEO.

Environmental indicators: During this part of the survey, (Div.3L) data about species, lengths and abundances for the calculation of environmental indicators 1, 2 and 3 were collected. Furthermore, individual measurements (age, length, sex and maturity) were carried out for the calculation of the indicator number 4 on the main target species

Deviations: There were no deviations from the Proposal.

III.G.2 Data quality: Results and deviation from NP proposal.

All quality objectives were achieved. As in previous years, several papers were submitted to the NAFO Scientific Council in 2015 with the main results of the survey. (See Annex I)

Deviations: There were no deviations from the Proposal.

III.G.3 Actions to avoid deviations.

Not applicable.

MEDITS (Mediterranean International bottom trawl survey)

III.G.1 Achievements: Results and deviation from NP proposal.

Objectives:

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- Evaluation of 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. The survey is carried out between 30 m to 800 m depth
- Recording of abundance and biomass of all the catches,
- Recording of lenght structure and biological information of the main target species of the fishery, including the collection of hard structures for age determination.
- Recording of oceanographic data (temperature and salinity) close to the bottom during each sampling station is also recorded

Sampling area: División 1.1 (GFCM Geographical Subareas: Northern Alboran Sea, Alboran Island, Northern Spain and Balearic Islands)

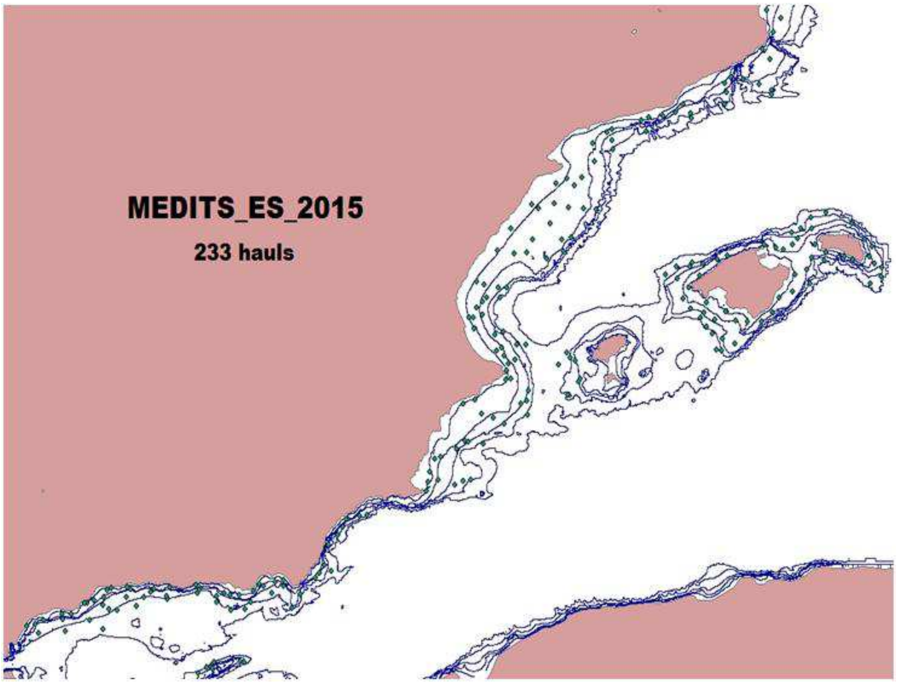

Figura 15: Map with the sampling positions during the MEDITS_ survey 2015.

Dates: From April 22nd to June 20th 2015.

Duration: The survey lasted for 60 days.

Methodology: The sampling stations are positioned following a depth stratified simple sampling scheme with random drawing of the positions within each stratum. The number of positions in each stratum is proportional to the surface of these strata. The whole area was stratified by depth range up to: 30, 50, 100, 200, 500 and 800 meters. Hauls were of 30 minutes for those at depth lower than 200 m and 1 hour for those deeper than 200 m. Catch per Km2 is used as relative abundance index.

Research Vessel: R/V Miguel Oliver, otter trawler of 70 m long, 14.40m wide, 2495 GT and 2 * 1000kW.

Equipment and Sampling gear: GOC 73 is an experimental fishing gear with a vertical opening slightly superior to the most common professional gears used in the Mediterranean when the MEDITS survey started. Its vertical opening during the tow is 2.4-2.6 m. It dimensions are: weighting chain of 40 m long, floats headline of 32.2 m long and 20 mm mesh size in the cod-end.

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Number of hauls: A total of 233 hauls were carried out

Sampling:

Hydrographic sampling: simultaneously to the fishing hauls oceanographic data were registered by means of a CTD SBE-37(conductivity, temperature and depth) attached to the floats head-line.

Faunal list: The species identified were 199 of fish, 114 of crustaceans, 124 of molluscs, and 233 species of invertebrates belonging to different taxonomic categories. All fishes and commercial invertebrates were measured. A summary of the biological sampling carried out is shown in the following table.

Species	Number
Dalatias licha	9
Dipturus oxyrhinchus	9
Etmopterus spinax	365
Galeorhinus galeus	0
Galeus melastomus	2504
Leucoraja naevus	120
Raja asterias	4
Raja clavata	216
Raja miraletus	43
Raja montagui	5
Raja spp	24
Scyliorhinus canicula	3383
Torpedo marmorata	32

Species	Number
Merluccius merluccius	3289
Mullus barbatus	1687
Mullus surmuletus	832
Aristeomorpha foliacea	42
Aristeus antennatus	1672
Nephrops norvegicus	1710
Parapenaeus longirostris	1609
Ilex coindetti	1181
Loligo vulgaris	238

Otoliths/Ilicios:

Especies	Otolitos/ilicios
Merluccius merluccius	728
Mullus barbatus	802
Mullus surmuletus	596
Lophius budegassa	327
Lophius piscatorius	27

Data storage: Biomass and abundance of each species, biological sampling of the species in the reference list and all the rest of the data collected, were computerized during the survey in a database specifically designed for it and stored in the fishery data base SIRENO (Seguimiento Informático de los Recursos Naturales Oceánicos). Data check up and calculations of abundance indices and length distributions were done after the survey using the tools created for it in SIRENO. Four types of files for storage and exchange format are defined.

Type 1. Characteristics of each haul.

Type 2. Catch of each haul in weight, number and number by sex.

Type 3. Biological parameters for the species in the reference list (length, sex, maturity).

Type 4. Temperature data

Environmental indicators: Data collected during the MEDITS 2015 survey can be used to calculate indicators 1, 2 and 3, for most of the species caught. Length measurements were collected for all the fish species in the catch. Collected otoliths of the species *Merluccius merluccius*, *Mullus barbatus* and *Mullus surmuletus* are useful for indicator 4. For some species, the low number of individuals caught will prevent the calculation of indicators 2 and 3.

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Deviations: There were no deviations from the Proposal.

III.G.2 Data quality: Results and deviation from NP proposal.

The data obtained are used for calibrating assessment models in GFCM Working groups.

Recommendations given by the Expert Group for the planning of these surveys are adopted in the survey protocols.

Deviations: There were no deviations from the Proposal.

III.G.3 Actions to avoid deviations.

Not applicable.

MEDIAS (Pan-Mediterranean pelagic survey)

III.G.1 Achievements: Results and deviation from NP proposal.

Objectives:

The objective of MEDIAS survey is to obtain the abundance indices of the main small pelagic species in the Spanish Mediterranean coast: anchovy (*Engraulis encrasicolus*) and sardine (*Sardina pilchardus*). The survey prospected the continental shelf (20 to 200 m depth) by means of a scientific echosounder EK60 (Simrad), equipped with 5 frequencies (18, 38, 70, 120 and 200 kHz).

Sampling area: Continental shelf of the Spanish Mediterranean, from the French border to Strait of Gibraltar that corresponds to GFCM Geographical Sub-Area covered are the GSA 06 (Northern Spain) and 01 (Northern Alboran Sea), between 20 and 200 m depth.

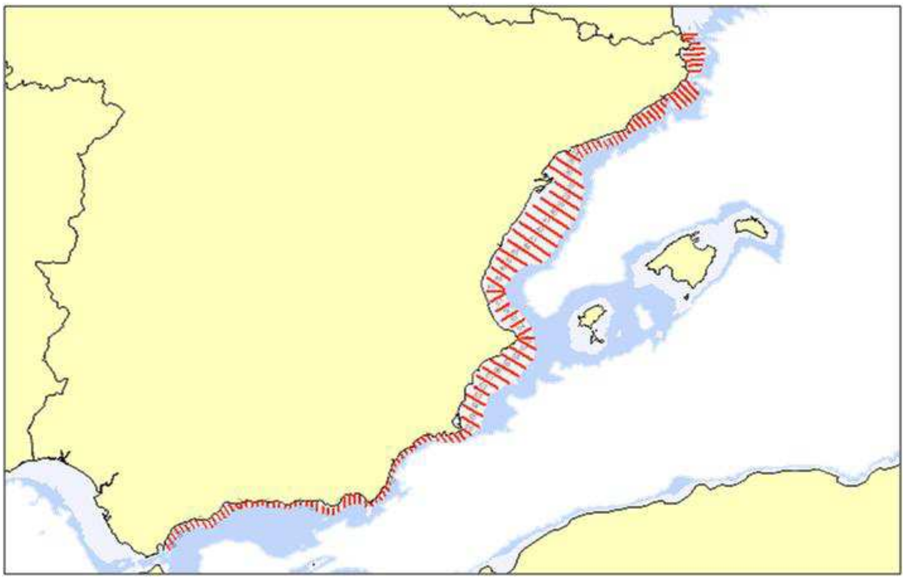

Figura 16: Situation of transects (128) done to recorded the acoustic data in the MEDIAS survey 2015.

Dates: From June 23rd to July 25th.

Duration: The survey lasted for 33 days.

Methodology: Prospection of the continental shelf (20 to 200 m depth) by means of a scientific echosounder EK60 (Simrad), equipped with 5 frequencies (18, 38, 70, 120 and 200 kHz). Acoustic data

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are recorded continuously at a constant ship speed of 10 knots from sunrise to sunset, along parallel equidistant transects lying perpendicular to the bathymetry. The echosounder is calibrated before each survey following standard techniques (Foote et al., 1987).

Midwater pelagic trawls were deployed to determine the species proportions present in the area. Acoustic data are processed using Echoview (Miryax Ltd.) software and PESMA (VisualBasic) software. Echo trace classification is based on echogram visual scrutinisation; usually the allocation is on account of a representative fishing station and very few times on direct allocation. Results of biomass (tons) and abundance (nº individuals) are presented by species, length and age.

Research vessel: R/V Miguel Oliver, of 70 m long, 14.40m wide, 2495 GT and 2 * 1000kW.

Equipment and Sampling gear: Scientific echosounder EK60, 3 midwater pelagic trawls of 16, 14 and 10 m of vertical opening

Number of hauls: 55 fishing hauls.

Sampling

MEDIAS 0715	**Nº**
Acoustic transects	128
Echo Nautical miles	1316
Fishing hauls wiht midwater pelagic trawl	55
Hydrographic sampling: number of CTD stations (CTD Seabird 19 plus)	118

Faunistic list: They were identified 60 species.

Individuals sampled. All pelagic fishes were measured. A summary of biological sampling carried out is shown in the next table:

Specie	**Individuals measured**	**Reproductive sampling**	**Otholits obtained**
Engraulis encrasicolus	6486	1144	**1058**
Sardina pilchardus	5684	1400	1322
Sardinella aurita	1204	45	-
Trachurus mediterraneus	1110	506	-
Trachurus trachurus	3414	749	-
Trachurus picturatus	1326	64	-
Boops boops	1985	77	-
Scomber colias	885	163	-
Spratus spratus	1538	295	-

Data storage: the species found, weight and number of each species, biological sampling of the main species and all the data are stored in fishery data base SIRENO (Seguimiento Informático de los Recursos Naturales Oceánicos).

Environmental indicators: During MEDIAS 2015 survey were collected data with the aim of calculate indicators 1, 2 and 3, out the major part of fish species in the catch. They were measured individuals of all the species of fish in the catch. Of some species will not calculate the indicators 2 and 3 due the scarce number of individuals. For indicator 4 calculation were collected the necessary data of the species *Engraulis encrasicholus* y *Sardina pilchardus.*

Deviations: There were no deviations from the Proposal.

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III.G.2 Data quality: Results and deviation from NP proposal.

Recommendations given by the Expert Group for the planning of these surveys are adopted in the survey protocols.

Deviations: This year 55 pelagic trawls were carried out to assess the prospected area instead of 70 planned. Midwater pelagic trawls were deployed to determine the species proportions present in the area and the number of hauls is variable between surveys. This number would not affect the accuracy of the results.

III.G.3 Actions to avoid deviations.

Not applicable.

BLUE WHITING and REDNOR

There was any Spanish participant in these surveys in 2015.

IV. Module of the evaluation of the economic situation of the aquaculture and processing industry

IV.A Collection of data concerning the aquaculture

IV.A.1 Achievements: Results and deviation from NP proposal

In Spain two surveys referred to aquaculture sector are carried out:

- Aquaculture Economic Survey, which collects the main economic data and means the main source of economic data as set out in EU Regulation 199/2008 of the Council.
- The Aquaculture Facilities Survey which collects technical and activity data. It is the source of data on productivity, in economics and physical terms, and employment, established in the REG 199/2008 of the Council. However, the main reason for this survey is to provide with information to comply with EU Regulation 762/2008 of the Parliament and the Council, on the aquaculture statistics presentation of the Member States.

Both surveys utilize the same frame population, and have as statistic unit the facility. Informers on both surveys are the companies, but the information is not always in a share point. The facilities survey is completed by the technicians responsible of the farming, who normally are in the farming facilities, and the economic survey is answered at the accounting facilities of the company.

The Aquaculture Facilities Survey is thoroughly investigated, with the exception of mussel rafts and farming parks for scallops located in Galicia.

The Aquaculture Economic Survey stratifies the population according to Appendix IX of EU Decision 93/2010.

Field work for both surveys is planned and implemented with a common working schedule to create economies of scale and use the synergies, as far as possible.

By the end of 2014, the results of surveys carried out for the period of 2013 were presented. The resulting target population, over which the inference was carried out, was the framework population for surveys in 2015, over 2014 data. The number of facilities of this framework was of 5,307, belonging to 3,036 companies. During the first three months of 2014, the stratification of this population was carried out, following instructions of Appendix XI previously cited, and the sample size was determined.

In the Economic Aquaculture Survey, those strata with less than 20 facilities were exhaustively investigated (according to census) and those of 20 and more were investigated under the sampling

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methodology. In these stratums, the sample size was calculated over the auxiliary variable "capacity of facilities", as requested in EU Regulation 762/2008 of the Parliament and the Council, on the submission by Member States of statistics on aquaculture. The information that has been used was:

Total sample size with expected error of 5% on 96% of confidence was calculated under the assumption of the population has a normal type distribution. The formula to calculate the sample size (n) was the following:

$$n = \frac{\left(\sum_{h=1}^{h=L} N_h S_h\right)^2}{\frac{N^2 e^2 \overline{X}^2}{z^2} + \sum_{h=1}^{h=L} N_h S_h^2} \qquad (1)$$

Being: h, the number of strata (from 1 to L), Nh the h strata size, N the population size, Sh the standard deviation for h strata, $\overline{X}$ average GT, e the error of estimated $\overline{X}$ and z the typified variable for the confidence level chosen.

The total sample was split among the strata by means of Neyman´s affixation, applying the following formula:

$$nh = n \frac{N_h S_h}{\sum_{h=1}^{h=L} N_h S_h} \qquad (2)$$

Being: n, h, Nh and Sh, same statistical indicators that in (1).

The sample size obtained, by applying the previous formula was of 412 facilities belonging to 343 companies. When calculating the sample size, some of the strata offered a size that covers all its population, reason why belonging to B type are investigated exhaustively, as if they were type A.

When in field work, 279 companies replied satisfactorily all questionnaires and 64 didn't provide with the economics information requested. The information obtained confirmed that the target population in 2015, over 2014 data, was the same that the one in the framework population, 5,307 facilities belonging to 3,036 companies. Besides, this population became the survey framework population for 2016, regarding 2015 data

IV.A.2 Data quality: Results and deviation from NP proposal

Data belonging to each of the variables have been collected using the census or by sample, depending the strata to which they belong, as shown in table IV.A.2.

The variability index included in this table is the CV, calculated for all the strata, both the ones that were collected by sampling method or by the census.

The coefficients of variation obtained show that in general terms, small variations in the variables considered. This means that the results obtained are representatives for each of the strata.

There are variables with no CV information. We can differentiate the following cases:

- NA "Not Applicable", non applicable variable to the strata and therefore, CV is not applicable.
- "CV blank" there is no information, with no response for that variable.
- .- CV=0" referring to one of the following cases:

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.- No variability = there is value for this variable but values are unique or the same for each of the units.

- All the values of the strata are= 0.

Unpaid work valuation

Spain chose to measure the total hours of unpaid work with the average value of hour of paid work. The procedure was as follows:

- Differentiation between the paid and the unpaid worker, being the last one the owner of the facility and the family members involved in the exploitation, for cases of individual companies with no legal entity.
- Following to this, it is needed the value of paid and unpaid workers remuneration.
- On the other hand, hours of work for both workers were calculated data already known from surveys and reflected in the variable “salaries and incomes”.
- Lastly, we calculate the average value for worked hour for the paid and unpaid, multiplying it by the unpaid worked hours:

  Paid workers salaries and incomes/Paid workers hours X unpaid worked hours

This calculation has been made from data obtained in the Economic Aquaculture Survey and Facilities Aquaculture Survey.

Conversion factors

The following conversion factors were used to transform the species used, in kilograms and per harvesting phase.

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Factores de conversión del número de unidades a peso en Kg. Año 2014

ESPECIE		FASES				
		1	2	3	4	5
AFJ	Fartet				0,005	
AMB	Pez de limón			0,05		
AUP	Cangrejo a pinzas blancas		0,001	0,008		0,08
BSS	Lubina			0,01		
CLJ	Almeja japonesa		0,0003	0,001		
COC	Berberecho común			0,001		
CTG	Almeja fina			0,001		
CTS	Almeja babosa		0,0003	0,001		
ELE	Anguila europea			0,05	1	
FCP	Carpa común			0,01	0,385	
FCY	Ciprínidos			0,01	0,385	
FRX	Rutilos nep			0,06		
FTE	Tenca			0,1	0,38	0,5
GTA	Espinoso				0,005	
HUC	Hucho				1	1
MGR	Corvina			0,1		1
OAL	Lenguado senegalés		0,0014	0,1		0,5
OYF	Ostra Plana			0,003		
OYG	Ostra rizada			0,003		
SAL	Salmón	0,00005	0,01	0,03		
SBG	Dorada			0,015		0,5
SBR	Besugo			0,008		
TRR	Trucha arco iris	0,00005	0,0015	0,006	0,168	0,25
TRS	Trucha común	0,00005	0,0015	0,006	0,16875	0,15
TUR	Rodaballo		0,002	0,016		
URM	Erizo de mar			0,008		
VHS	Samarugo				0,02	

Valores en Kg

Fases de cultivo:
1. Puesta
2. Incubación y/o cría (Hatchery)
3. Preengorde- semillero (Nursery)
4. Engorde a talla comercial
5. Engorde a madurez sexual

IV.A.3 Actions to avoid deviations

The Economic Aquaculture Survey has been put in place recently. In the near future, the analysis of the results and the field work to get the information will be used to introduce improvements in the survey.

The harvest of crustacean and algae is already comprised in table IV.A.1 within the mollusk group. Spain has a production of both, and in the classification shown in Appendix XI there is no specific space to include them, so it was decided its inclusion within this group, although it is a mistake such a consideration (as mollusk).

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IV.B. Collection of data concerning the processing industry

IV.B.1 Achievements: Results and deviation from NP proposal

The source of information is the Industries Companies Survey which develops the Spanish National Statistical Institute (“INE”). The reference period for the work in 2015 is the year 2014.

During the year 2009, some changes were undertaken in the National Activities Classification (“CNAE”), as foreseen in the community legislation. The fisheries products under point 15.2 of NACE rev1 were redefined moving to group 10.2 of NACE-2009.

The results of data collection didn’t have representative variations.

The source of information doesn’t collect data on the following variables:

- Capital amortization.
- Total active value.
- Indebtedness

From year 2013, data on the number of employed persons are calculated disaggregating by sex from another source (Active Population Survey, “EPA”).

From this source were obtained percentages by sex, and worked hours.

Another variable that could be calculated from this same source was the unpaid work value, since they have data of worked hours for both the paid and unpaid.

IV.B.2 Data quality: Results and deviation from NP proposal

The methodology applied to the research had modifications that had effect from 2009. Until the year 2008, over 2007 data and before, the investigation was exhaustively for companies of 20 employees or more, and by sampling for those with less than 20. From the 2009 survey, over 2008 data, the limit of 20 employees became 50. All the companies with less than 50 employees are investigated by sampling. Companies with 50 o more employees are exhaustively investigated.

The companies’ directory for the field work comprised 666 companies, 358 with less or equal to 10, 229 with 11-49, 70 with 50-249 and 9 with more than 250 employees. When performing the field work over the final population, over which it is needed to infer was of 356 with less or equal to 10, 203 with 11-49 72 with 50-249 and 9 with more than 250.

From all the strata covered by sampling, the INE produces CV only for two variables: turnover and number of people employed. The rest of variables are not calculated.

Unpaid work valuation

Spain chose to measure the total hours of unpaid work with the average value of hour of paid work. The procedure was as follows:

- Differentiation between the paid and the unpaid worker, being the last one the owner of the facility and the family members involved in the exploitation, for cases of individual companies with no legal entity.
- Following to this, it is needed the value of paid and unpaid workers remuneration.
- On the other hand, hours of work for both workers were calculated data already known from surveys and reflected in the variable “salaries and incomes”.
- Lastly, we calculate the average value for worked hour for the paid and unpaid, multiplying it by the unpaid worked hours:

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Paid workers salaries and incomes/Paid workers hours X unpaid worked hours

This calculation has been made from data obtained in the Industrial Companies Survey and the Active Population Survey, “EPA

IV.B.3 Actions to avoid deviations

Enterprises comprised in 10.2 of NACE-2009, included in the Industries Enterprises Survey that the INE carries out in Spain will continue as the source of information for this section of the DCP. Eurostat and DGMARE launched several collaborative procedures in the field of structural statistics in order to establish common procedures that don’t duplicate the collection of information. We believe that the information deficiencies should been solved in this collaboration framework and not independently in every country.

During the year 2014, data to produce the employment by sex and FTE by sex were achieved. And also the data needed to produce the variable “Value of unpaid work attributed”.

There are still some variables missing, “total active value”, and “capital amortization” waiting for the procedures of collaboration between EUROSTAT and DGMARE. Nevertheless, we are working on the possibility of gathering the information from the Commercial Register, where are compiled the economic accountancy of the enterprises.

V. Module of evaluation of the effects of the fishing sector on the marine ecosystem

V.1 Achievements: Results and deviation from NP proposal.

The data needed to calculate these indicators have been collected.

Indicators 1 - 4: Conservation status of fish species, Proportion of large fish, Mean maximum length of fishes and Size at maturation of the exploited fish species.

Data to calculate indicators 1, 2, 3 and 4 have been collected during the surveys.

Indicators 5, 6, y 7:

The VMS data needed to calculate these indicators are collected regularly on all vessels over 15 meters. These data are available within two months of receipt. Data are collected in each haul and it is possible to link the classification of métiers level 6 according to Appendix IV of the Commission Decision.

Indicator 8: Discarding rates of commercially exploited species

The percentage of discards of commercial species is used to assess the selectivity degree of a gear and its impact on the ecosystem. Data obtained by sampling discards have allowed the calculation of this indicator.

Indicator 9: Fuel efficiency of fish capture

The calculation of energy efficiency by species was made by dividing the income by species by fuel costs. The cost of fuel is one of the most important items within fleet operating costs, factor increased by continued growth in the price of oil. Their calculation provides a relevant indicator for comparing both the different energy efficiencies of different species (catches), and the various gears to compare the same species.

IV.2 Actions to avoid deviations.

No deviations have been detected.

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VI. Module for management and use of the data

VI.1 Achievements: Results and deviation from NP proposal.

The entry into force of the sampling scheme based on métiers and concurrent sampling oblige us to make a series of adaptations in the databases, such as introducing the concept of métier in the trip, adaptation of the processes of extrapolation and calculation of the length distributions, identification of the species that are landed mixed, extension of the processes of distribution of species, etc.

The actions undertaken to strengthen the data quality, also covered the database modifications and the cross-checking of the trips sampled with the electronic logbooks and sales notes.

In the first case, the process has involved the addition of a field to confirm the checking of sampling and the limitation of allocable vessels in the database according to their status in the Spanish Census of Operational Fishing Fleet.

In the second case, we proceeded to the identification of the sampled trips in the logbooks and the analysis of catch profiles available to reduce error sources. This latter process allows checking assignments of trips to métier and corrects any erroneous assignments, mainly in the allocation of the geographical area.

During 2015, a special effort has been made to adapt these databases to the international formats for regional cooperation. In particular, the ICES Fisheries data base has been developed to generate FishFrame and InterCatch files.

Also The Tropical Tuna data base has also been adapted to the OBSTUNA format, in order to improve regional cooperation with IEO and IRD. Althoug all these tasks are already advanced, it is necesary to continue working on them in the future. To facilitate the regional cooperation IEO-IRD, the format of tuna databases is being constantly monitored, checked and implemented.

Extensive work has also been done during this year to improve the integration of offcial data (logbooks and salesnotes) with sampling data.

Due to the large volume of information stored in our databases, the complexity of it (landings, biological sampling, lengths, research surveys, etc), and the behavior variability of the fleet from one year to another, a continuous effort of adaptation and improvement is necessary, which allows us to maintain a data management effective and appropriate to latest international recommendations .

Use of data:

Table III.E.3 presents the number of individuals collected for each varable and stock and Table III.C.6 shows the number of individuals measured. The data collected are depurated and used to estimate fishing parameters, such as catch per unit effort, length distributions, age-length keys and catch estimates by age. Studies of biological parameters such as growth, maturity, fecundity, stock-recruitment relationships to study the dynamics of populations, etc. are also conducted.

These ones allow the data analysis and the generation of assessment documents, as well as the testing of alternative assessment methods, presented in scientific advisory groups attended by Spanish repreesntatives in different RFMOs or International Organisations (NEAFC, NAFO, ICCAT, IOTC, GFCM, IATTC, WCPFC, ICES and STECF).

Table II.B.1 shows the coordination meetings, working groups and scientific assessement groups with attendance of Spanish representatives.

Table VI.1 shows the details of data that were transmitted to each group of scientific advice.

VI.2 Actions to avoid deviations.

No major shortfalls.

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VII. List of acronyms and abbreviations

AFWG: Arctic Fisheries Working Group.

ANACEF (O.P.): Asociación Nacional de Armadores de Buques Congeladores de Cefalópodos (Organización de Productores Pesqueros)

AIDCP: Agreement on the International Dolphin Conservation

AZTI: Instituto Tecnológico, Pesquero y Alimentario

CECAF: Committee for Eastern Central Atlantic Fisheries.

COST: Common Open Source Tool for raising and estimating properties of statistical estimates derived from the Data Collection Regulation.

CPUE: Catch per Unit Effort.

CRODT: Centre de Recherches Océanographiques de Dakar-Thiaroye**.**

CSIC: Consejo Superior de Investigaciones Científicas.

IATTC: Inter-American Tropical Tuna Commission.

IBTSWG: International Bottom Trawl Survey Working Group.

ICCAT: International Commission for the Conservation of Atlantic Tunas

ICES: International Council for the Exploration of the Sea

IEO: Instituto Español de Oceanografía.

IFREMER: Institut français de recherche pour l'exploitation de la mer.

IIM: Instituto de Investigaciones Marinas.

IOTC: Indian Ocean Tuna Commission.

IRD: Institut de Recherche pour le Développement.

MAGRAMA: Ministerio de Agricultura, Alimentación y Medio Ambiente

MEDITS: Campañas de arrastre en el Mediterráneo.

NEAFC: North East Atlantic Fisheries Commission

NAFO: North Atlantic Fisheries Organization.

NAFO-SC: North Atlantic Fisheries Organization-Scientific Council.

NAFO-SF: North Atlantic Fisheries Organization-Fisheries Council.

NWWG: North-Western Working Group.

RFMO: Regional Fisheries Management Organization

PGDATA: Planning Group on Data Needs for Assesment and Advice

PNDB: National Data Collection Programme.

PNOT: Plan Nacional de Observadores de Túnidos.

RCM: Regional Coordination Meeting.

SCRS: Standing Committee on Research and Statistics.

SCSA-GFCM: Subcommittee Stock Assessment – General Fisheries Commission for the Mediterranean.

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SFA: Seychelles Fishing Authority.

SGP: Secretaría General de Pesca (Ministerio de Agricultura Alimentación y Medio Ambiente)

SWO: Swordfish (*Xiphias gladius*)

TR: Troll.

USTA: Unidad Estadística Atunera de Antisarana.

VME: Vulnerable Marine Ecosistem.

WCPFC: Western Central Pacific Fisheries Commission.

WG Bay of Biscay: Working Group of Bay of Biscay.

WGACEGGS: Working Group on Acoustic and Egg Surveys for Sardine and Anchovy in ICES Areas VIII and IX.

WGBIOP: Working Group on Biological Parameters.

WGCATCH: Working Group on Commercial Catches.

WGCEPH: Working Group on Cephalopod Fisheries and Life History.

WGDEC: ICES/NAFO Joint Working group on Deep.water Ecology.

WGDEEP: Working Group on the Biology and Assessment of Deep Sea Fisheries Resources.

WGEF: Working Group on Elasmobranch Fishes.

WGFE: Working Group on Fish Ecology.

WGFMS-CPRS: Working Group of Fishery Managers and Scientists on Conservation Plans and Rebuilding Strategies (Fisheries Council NAFO).

WGFMS-VME: Working Group of Fishery Managers and Scientists on Vulnerable Marine Ecosystems (Fisheries Council NAFO)

WGHMM: Working Group on the Assessment of Southern Shelf Stocks of Hake, Monk and Megrim.

WGMEGS: Working Group on Mackerel and Horse Mackerel Egg Surveys.

WGMHSA: Working Group on the Assessment of Mackerel, Horse Mackerel, Sardine and Anchovy.

WGMSE: Working Group on Greenland Halibut Management Strategy Evaluation (Fisheries Council NAFO).

WGNEPH: Workshop on Nephrops Stocks.

WGNEW: Working Group on Assessment of New MoU Species.

WGNPBW: Northern Pelagic and Blue Whiting Fisheries Working Group.

WGNSSK: Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak.

SGSBSA: Study Group on the Estimation of Spawning Stock Biomass of Sardine and Anchovy.

WHB: Blue whiting.

WIT: Witch flounder.

IX. Comments, suggestions and reflections

None.

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X. References

ICCAT. 2006-2016. ICCAT Manual. International Commission for the Conservation of Atlantic Tuna. In: ICCAT Publications [on-line]. Updated 2016. [Cited 01/27/]. http://www.iccat.int/en/ICCATManual.asp, ISBN (Electronic Edition): 978-92-990055-0-7.

Report of the 12th Liaison Meeting. Brussels, Belgium, 06/10/2015 - 09/10/2015

Report of the Regional Co-ordination Meeting for the North Sea and Eastern Arctic (RCM NS&EA) 2015. Den Haag, The Netherlands. 31 August – 4 September, 2015.

Report of the 11th Regional Coordination Meeting for the Mediterranean and Black Sea and Large Pelagics Fisheries. Rome, Italy. 09/09/2015 - 11/09/2015

Report of the Regional Co-ordination Meeting for the Long Distance Fisheries (RCM LDF), 2015. Thünen Institute [TI]), Hamburg, Germany, 21/04/2015 – 22/04/2015 and Instituto Español de Oceanografía (IEO), Centro Oceanográfico de Cádiz, Cádiz, Spain, 9/06/2015 - 12/06/2015. 49 pp.

Report of the Regional Co-ordination Meeting for the North Atlantic (RCM NA) 2015. Hamburg, Germany. 14 – 18 September 2015

Update of “Sampedro, P., Sainza, M. and Trujillo, V., 2005.A simple tool to calculate biological parameters’uncertainty. Working Document, In: Workshop on Sampling Desing for Fisheries Data (WKSDFD), Pasajes, Spain

Vigneau, J., and Mahevas, S. 2007. Detecting sampling outliers and sampling heterogeneity when catch-at-length is estimated using the ratio estimator. – ICES Journal of Marine Science, 64: 1028–1032.

Faraj A., García Isarch, E., Daniel, P., 2015. Rapport de la Réunion Scientifique Conjointe annuelle relative à l'Accord de pêche signé entre le Royaume du Maroc et l'Union européenne. Casablanca, Maroc, 04 et 05 juin et 14 et 15 septembre 2015. Rapports des Comités Scientifiques Conjoints. Bruxelles, 59 p. + Annexes.

EU DATA COLLECTION FRAMEWORK (DCF), REG. 199/2008, 665/2008 and DECISION 2010/93/EU

XI. Anexes

ANEX I: Papers submitted to different RFMO and fora

Papers submitted to NAFO

Scientific Council Summary (SCS):

González-Costas, F.; Ramilo-Rivero, G.; Gago-Fernández, A.; Román-Marcote, E.; González-Troncoso, D.M.; Casas- Sánchez, J.M.; Sacau-Cuadrado, M.M.; Guijarro-García, E.; Lorenzo-González, J. 2015. Spanish Research Report for 2014. NAFO SCS Doc. 15/05 Serial No. N6423.

Scientific Council Research (SCR):

Ávila de Melo, A., R. Dominguez-Petit, M. Casas, D. González Troncoso, F. González-Costas , K. Fromin N. Brites, R. Alpoim and F. Saborido-Rey. 2015. An Assessment of Beaked Redfish (S. mentella and S. fasciatus) in NAFO Division 3M (at times when natural mortality is driven stock dynamics and fishing mortality reference points are useless to scientific advice). NAFO SCR Doc.15/028 Serial No. N64524

Casas-Sánchez, J.M. 2015. Northern Shrimp (*Pandalus borealis*) on Flemish Cap Surveys 2015. NAFO SCR Doc 15/047 Serial No.N6482.

Casas-Sánchez, J.M.; González-Troncoso, D.M. 2015. Results from Bottom Trawl Survey on Flemish Cap of June-July 2014. NAFO SCR Doc. 15/017 Serial No.N6438.

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Casas-Sánchez, J.M.; Román-Marcote, E.; Teruel-Gómez, J. 2015. Northern Shrimp (*Pandalus borealis*, Krøyer) from EU-Spain Bottom Trawl Survey 2015 in NAFO Div. 3LNO. NAFO SCR Doc. 15/048 Serial No.N6483.

Colbourne, E. and A. Perez-Rodriguez 2015. Physical Oceanographic Conditions on the Flemish Cap in NAFO Subdivision 3M during 2014. NAFO SCR Doc. 15/013 Serial No. N6434.

González-Costas, F. 2015. Assessment of Splendid alfonsino (*Beryx splendens*) in NAFO Subarea 6. NAFO SCR Doc. 15/018 Serial No. N6439.

González-Costas, F.; Iriondo, A.; González-Troncoso, D.M.; Urtizberea, A. 2015.Possible technical measures that could be applied in NAFO 3M Cod. NAFO SCR Doc. 15/021 Serial No. N6442.

González-Troncoso, D.M. 2015. Assessment of the Cod Stock in NAFO Division 3M. NAFO SCR Doc. 15/033 Serial No. N6458.

González-Troncoso, D.M.; Nogueira-Gassent, A.; Vilas, N. 2015. Yellowtail flounder, redfish (*Sebastes* spp.) and Witch flounder indices from the Spanish Survey conducted in Divisions 3NO of the NAFO Regulatory Area. NAFO SCR Doc 15/008 Serial No. N6428

González-Troncoso, D.M.; Román-Marcote, E.; Vilas, N; Nogueira-Gassent, A. 2015. Results for Greenland halibut, American plaice and Atlantic cod of the Spanish survey in NAFO Div. 3NO for the period 1997-2014. NAFO SCR Doc 15/007 Serial No.N6427

González-Troncoso, D.M.; Urtizberea, A.; González-Costas, F.; Miller, D.; Iriondo, A.; García, D. 2015. Results of the 3M Cod MSE. NAFO SCR Doc. 15/036 Serial No. N6463.

González-Troncoso, D.M.; Vilas, N.; Nogueira-Gassent, A. 2015. Biomass and length distribution for Roughhead grenadier, Thorny skate and White hake from the surveys conducted by Spain in NAFO 3NO. NAFO SCR Doc 15/009 Serial No.N6429

Román-Marcote, E.; Armesto-López, M.Á.; González-Troncoso, D.M. 2015. Results for the Atlantic cod, Roughhead grenadier, Redfish, Thorny skate and Black dogfish of the Spanish Survey in the NAFO Div. 3L for the period 2003-2014. NAFO SCR Doc. 15/020 Serial No. N6441.

Román-Marcote, E.; González-Iglesias, M.C.; González-Troncoso, D.M. 2015. Results for the Spanish Survey in the NAFO Reglatory Area of Division 3L for the period 2003-2014. NAFO SCR Doc. 15/019 Serial No. N6440.

Papers submitted to ICES

Aranburu, A., Díaz, E., & Briand, C. (2016). Glass eel recruitment and exploitation in a South European estuary (Oria, Bay of Biscay). ICES Journal of Marine Science: Journal du Conseil, 73(1), 111-121.

Casas-Sánchez, J.M. 2015. The Spanish NE Arctic Cod Fishery in 2014. ICES AFWG 2015, WD-11

Casas-Sánchez, J.M. 2015. The Spanish Pelagic Redfish Fishery in 2014. ICES AFWG 2015, WD-09

Deroba J.J. et al; Ibaibarriaga Contreras Leire. Simulation testing the robustness of stock assessment models to error: some results from the ICES strategic initiative on stock assessment methods. ICES Journal of Marine Science, 72: 19-30.(2015)

Duque, V., M.N. Carrasco, A. Jurado-Ruzafa and C. Perales-Raya. 2015. Cephalopod studies by the IEO-Tenerife team in Central-East Atlantic waters, past and present. Oral presentation at ICES Working Group on Cephalopod Biology and Life History. Tenerife (Spain), 8-11 June 2015.

Duque, V., M.N. Carrasco, A. Jurado-Ruzafa and C. Perales-Raya. 2015. Cephalopod studies by the IEO-Tenerife team in Central-East Atlantic waters, past and present. Working Document in ICES WGCEPH Report 2015 (ICES CM 2015/SSGEDP:2): 115-122.

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Garcia Rodriguez Dorleta; Prellezo Iguaran Raul; Paz Sampedro; Jose Maria Da Rocha; Jose Castro; Santiago CerviñoBio-economic multistock reference points as a tool to overcome the drawbacks of landing obligation. ICES Journal of Marine Science (2016).

GIL, J., C. FARIAS, J. CANOURA, J.J. ACOSTA, M. SORIANO and C. BURGOS, 2015. Updating the available information from Spanish Red seabream fishery in the Strait of Gibraltar. Work. Doc. to the 2015 Report of the ICES Working Group on the Biology and Assessement of Deep-Sea Fisheries Resources (WGDEEP).

Guijarro-García, E.; Gil, J. 2015. Report of the Working Group on Biology and Assessment of Deep-sea Fisheries Resources ICES WGDEEP REPORT 2015.

ICES. 2015. Report of the Workshop on Age reading of Horse Mackerel, Mediterranean Horse Mackerel and Blue Jack Mackerel (*Trachurus trachurus*, *T. mediterraneus* and *T. picturatus*) (WKARHOM2), 26–30 October 2015, Santa Cruz de Tenerife (Canary Islands, Spain). ICES CM 2015 / SSGIEOM:14. 93 pp.

Jurado-Ruzafa, A. and M.T.G. Santamaría. 2015. Review on Trachurus picturatus (Bowdich, 1825). Oral presentation at ICES Workshop on Age reading of Horse Mackerel, Mediterranean Horse Mackerel and Blue Jack Mackerel (WKARHOM 2). Santa Cruz de Tenerife (Spain), 26-30 October 2015.

Jurado-Ruzafa, A., E. Hernández and M.T.G. Santamaría. 2015. Ageing criteria validation of Scomber colias Gmelin, 1789 from NW Africa. Oral presentation at ICES Workshop on Age Reading of Chub Mackerel (*Scomber colias*) (WKARCM). Lisbon (Portugal), 2-6 November 2015.

Ibaibarriaga Contreras Leire; Iriondo Arrillaga Ane; Robin Jean-Paul; Santurtun Mazquiaran Marina. Estimating the abundance of squid (*Loligo vulgaris*) in the Bay of Biscay. WD in the WGCEPH Tenerife 8-11 June 2015

Iriondo Arrillaga Ane; Santurtun Mazquiaran Marina; Mugerza Gojenola Estanis; Ruiz Gondra Jon. UPDATE OF THE BASQUE CEPHALOPOD FISHERY IN THE NORTHEASTERN ATLANTIC WATERS DURING THE PERIOD 1994-2014

Mugerza Gojenola Estanis; Zarauz Goyoaga Lucia; Murillas Maza María Aránzazu; Arregi Errazkin Luis; *Nekane Alzorriz; Artetxe Irueta Iñaki. Monitoring artisanal fisheries in the Basque Country. WD presented at ICES WGCATCH, 9–13 November 2015, Lisbon (Portugal)

Navarro, M.R, A. Silva, B. Villamor, A. Silva and E. Soares. 2015. Small Exchange of *Scomber colias* Otoliths Program from Atlantic and Mediterranean areas. In WebGR. In Repositorio IEO http://hdl.handle.net/10508/9491

Navarro, M.R, A. Silva, B. Villamor, A. Silva and E. Soares. 2015. Report of the Small Exchange of Scomber colias Otoliths from Atlantic and Mediterranean Areas. Working Document to ICES Workshop on Age Reading of Chub Mackerel (*Scomber colias*) [WKARCM], 2-6 November, Lisbon (Portugal). ICES CM 2015/ SSGIEOM: 14

Navarro, M.R., Silva, A., Villamor, B. Silva, A. 2015. Results of Small Exchange of Scomber colias Otoliths from Atlantic and Mediterranean Areas (2013 and 2015). Presentation to ICES Workshop on Age Reading Of Chub Mackerel (*Scomber colias*) (WKARCM), Lisbon, 02-06 November 2015. ICES CM 2015/ SSGIEOM: 14

Navarro, M.R., Silva, A.V., Villamor, B. 2015. Review information on age estimation, otolith exchanges and validation techniques of Chub mackerel. Presentation to ICES Workshop on Age Reading Of Chub Mackerel (*Scomber colias*) (WKARCM), Lisbon, 02-06 November 2015. ICES CM 2015/ SSGIEOM: 14

Navarro, M.R., Villamor, B., Landa, J., Hernández, C. 2015. Annual growth pattern and age validation trials of *Scomber colias* in the Bay of Biscay using otoliths. Presentation to ICES Workshop on Age Reading Of Chub Mackerel (*Scomber colias*) (WKARCM), Lisbon, 02-06 November 2015. ICES CM 2015/ SSGIEOM: 14

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Rodríguez-Gutierrez Jose; Zarauz Goyoaga Lucia; Mugerza Gojenola Estanis; Artetxe Irueta Iñaki; Cebrían Jose Luis. Spanish onshore sampling of *Lepidorhombus* spp. WD presented at ICES WGCATCH, 9–13 November 2015, Lisbon (Portugal)

Ruiz Gondra Jon; Zarauz Goyoaga Lucia; Iriondo Arrillaga Ane; Mugerza Gojenola Estanis; Nelida Perez; José Castro; *Hortensia Araujo. Spanish discards estimates of megrim (*Lepidorhombus whiffiagonis*) in Subarea VII and Divisions VIIIabd. WD presented at ICES WGCATCH, 9–13 November 2015, Lisbon (Portugal)

Santos Mocoroa Maria; Ibaibarriaga Contreras Leire; Uriarte Seminario AndresWorking Document to WGHANSA, 24-29 June 2015, Lisbon (Portugal). Preliminary index of biomass of Bay of Biscay anchovy (*Engraulis encrasicolus*, L.) in 2015 applying the DEPM"

Santos Mocoroa Maria; Ibaibarriaga Contreras Leire; Uriarte Seminario Andres. Working Document to WGACEGG, Noviembre 2015, Lowestof. Index of biomass of Bay of Biscay anchovy (*Engraulis encrasicolus*, L.) in 2013 applying the DEPM and sardine total egg abundance"

Silva, A.V., Navarro, M.R., Villamor, B., Soares, E., Silva, A. 2015. Problem identification in ageing of otoliths of chub mackerel (*Scomber colias*). Presentation to ICES Workshop on Age Reading Of Chub Mackerel (*Scomber colias*) (WKARCM), Lisbon, 02-06 November 2015. ICES CM 2015/ SSGIEOM: 14

Silva, A.V., Navarro, M.R., Villamor, B., Soares, E., Silva, A. 2015. Summary of the different techniques of chub mackerel otoliths preparation by laboratory. Presentation to ICES Workshop on Age Reading Of Chub Mackerel (*Scomber colias*) (WKARCM), Lisbon, 02-06 November 2015. ICES CM 2015/ SSGIEOM: 14

Villamor, B. and Uriarte, A. 2015. Otolith Exchange Results of European Anchovy (*Engraulis encrasicolus*) 2014. Working Document to ICES WGBIOP, 7-11 September, Malaga, Spain. ICES CM 2015/SSGIEOM:08. Repositorio IEO http://hdl.handle.net/10508/9490.

Zarauz, Lucía, et al. "Comparing different survey methods to estimate European sea bass recreational catches in the Basque Country." ICES Journal of Marine Science: Journal du Conseil 72.4 (2015): 1181-1191.

Papers submitted to GFCM

Working Group on Stock Assessment of Demersal species (WGSAD)

Pérez-Gil, J.L., González, M., García. T., García, C., Serna, J.M., Meléndez, M.J., Acosta, J. and Ciércoles, C., 2015. Assessment of the european hake Merlucius merluccius from the trawl fishery off the GSA Northern Alboran Sea - 1

Pérez-Gil, J.L., Benchoucha, S., Elouamari, N., Ainouche, N. and Hernández, P., 2015. Assessment of the red mullet Mullus barbatus from the trawl fishery off the Alborán Sea: GSAs 1 and 3.

Guijarro B., González, N., Rubio V., Ordines F. and Quetglas A., 2015. Assessment of the stripped mullet Mullus surmuletus from the trawl fishery off the GSA Balearic Island - 5

Jadaud A., Guijarro B. and Massutí E., 2015. Assessment of the european hake Merlucius merluccius from the trawl fishery off the GSA Gulf of Lions – 7

Jadaud A., Guijarro B. and Massutí E., 2015. Assessment of the red mullet Mullus barbatus from the trawl fishery off the GSA Gulf of Lions - 7

Carbonell A., Guijarro B., Gazá M. and Ordines, F., 2015. Assessment of the red shrimp Aristeus antennatus from the trawl fishery off the GSA Balearic Island - 5

Pérez Gil, J.L., Herrera, E. and Vivas, M., 2015. Assessment of the deep-water rose shrimp Aristeus antennatus from the trawl fishery off the GSA Northern Spain - 6

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Guijarro B., Rubio V., González, N., Ordines F. and Massutí E., 2015. Assessment of the european hake Merlucius merluccius from the trawl fishery off the GSA Balearic Island - 5

Working Group on Stock Assessment of Small Pelagic species (WGSASP)

Giráldez A., Torres, P., Iglesias, M., González, M., Díaz, N., Meléndez, M.J. and Ventero, A., 2015. Assessment of the anchovy Engraulis encrasicholus from the purse seine fishery off the GSA Northern Alboran Sea – 1.

Giráldez A., Torres, P., Iglesias, M., González, M., Díaz, N., Meléndez, M.J. and Ventero, A., 2015. Assessment of the anchovy Engraulis encrasicholus from the purse seine fishery off the GSA Northern Spain – 6.

Torres, P., Giráldez, A., Iglesias, M., González, M., Díaz, N., Meléndez, M.J. and Ventero, A., 2015. Assessment of the sardine Sardina pilchardus from the purse seine fishery off the GSA Northern Alboran Sea – 1.

Torres, P., Giráldez, A., Iglesias, M., González, M., Díaz, N., Meléndez, M.J. and Ventero, A., 2015. Assessment of the sardine Sardina pilchardus from the purse seine fishery off the GSA Northern Spain – 6

Torres, P., Idrissi, M.H., Settih, J., Giráldez, A., González, M., Díaz, N., Meléndez, M.J., Ventero, A., Ben Smail, S. and Hernández, P., 2015. Assessment of the sardine Sardina pilchardus from the purse seine fishery off the Alboran Sea – GSA1 and 3 combined.

Papers submitted to CECAF

FAO, 2015b. Report of the FAO/CECAF Working Group on the Assessment of Demersal Resources – Subgroup North. Fuengirola, Spain, 18–27 November 2013. CECAF/ECAF SERIES 15/77. FAO, Rome. 336 pp.

FAO, 2015c. Report of the FAO/CECAF Working Group on the Assessment of Demersal resources-Subgroup South. Freetown, Sierra Leona, 8-14 October 2008. CECAF/ECAF Series 11/73. FAO. Rome, 2012. 311 pp.

Papers submitted to FAO

FAO, 2015a. Report of the FAO Working Group on the Assessment of Small pelagic Fish off Northwest Africa. Dakar, Senegal, 21-25 May 2012. FAO Fisheries and Aquaculture Report No.1036. FIRF/R1036 (Bi). ISSN 2070-6987. ISBN 978-92-5-007750-5 (print). E-ISBN 978-92-5-007751-2 (PDF). FAO, Rome. 245 pp.

García-Isarch and IEO-CECAF team. 2015. Report of the work of the Instituto Español de Oceanografía (Spanish Institute of Oceanography, IEO) during the period 2011-2015. In: FAO. Fishery Committee for the Eastern Central Atlantic. Report of the sixth session of the Fisheries Committee for the Eastern Central Atlantic (CECAF)-Scientific Sub-Committee. Tenerife (Spain), 14–16 October 2015. FAO Fisheries and Aquaculture Report. No. 1128-XX. FIRF/R1128 (Bi). Rome, FAO. 2015. Appendix G (pp 98-101).

García-Isarch, E., P. Pascual, L. Fernández y Santamaría, M.T.G. 2015. Marine resource and fisheries inventories of the Spanish fisheries in the CECAF. In: FAO, 2015. Report of the CECAF-FIRMS Workshop on resources and fisheries inventories, Accra, Ghana, 7–9 December 2009. FAO Fisheries and Aquaculture Report. No. 1082. Rome, Italy. Pp: 63-113.

Jurado-Ruzafa, A., E. Hernández, V. Duque, M.N. Carrasco and M.T.G. Santamaría. 2015. Age and growth of Scomber colias Gmelin, 1789 off Mauritania (NW Africa). Oral presentation at FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa. Casablanca (Morocco), 20-25 July 2015.

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Papers submitted to Committees of Fisheries Partnership Agreements

Comité Científico entre a República da Guiné-Bissau e a União Europeia. 2015. Relatorio 4ª Reunião do Comité Científico entre a República da Guiné-Bissau e a União Europeia. 28 e 30 de Abril 2015, Bissau, Guinea-Bissau. 37 pp.

Faraj, A., E. García-Isarch and P. Daniel. 2015. Rapport de la Réunion Scientifique Conjointe annuelle relative à l'Accord de pêche signé entre le Royaume du Maroc et l'Union européenne. Casablanca, Maroc, 04 et 05 juin et 14 et 15 septembre 2015. Rapports des Comités Scientifiques Conjoints. Bruxelles, 59 p. + Annexes.

Fernández-Peralta, L. 2015 Análisis del impacto de la reglamentación marroquí "Arrêté nº 4195-14" (25 noviembre 2014) sobre las flotas españolas que faenan según el Acuerdo de Pesca UE-Marruecos. Dirección General de Recursos Pesqueros y Acuicultura MAGRAMA, 10 pp.

Fernández-Peralta, L. 2015. Analyse du métier au chalut de fond développé par la flotte de l'Union européenne (Catégorie 4 du protocole 2014-2018) et évaluation de l'impact produit par l'Arrêté du Ministre de l'Agriculture et de la Pêche maritime n° 4195-14 du 25 novembre 2014 règlementant la pêche de certaines espèces de merlu. Rapport de la Réunion Scientifique Conjointe annuelle relative à l'Accord de pêche signé entre le Royaume du Maroc et l'Union européenne. Rapports des Comités Scientifiques Conjoints. Bruxelles, pp 73-75. Annexe 5.

Fernández-Peralta, L. 2015. Impact de la "Arrêté nº 4195-14" sur la pêche de merlu dans l'activité des flottes espagnoles sous l'Accord de pêche UE-Maroc. Réunion Comité Scientifique Conjointe de l'Accord de Pêche UE-Maroc. Casablanca 4-5 juin 2015 (Presentación oral).

García-Isarch, E., Gascuel, D., Guijarro, E., Gaertner, D., Merino, G., Coelho, R., Rosa, D., Murua, H., Wakeford, R., Jouffre, D., Figueiredo, I., and Abaunza, P. 2016. Scientific advice on the estimation of surplus for Sustainable Fisheries Partnership Agreements. Specific Contract No. 10 under Framework Contract No. MARE/2012/21. Final Report. April 2016. 133 pp.

Papers submitted to ICCAT

Arregi Alcorta I; Galuardi, B; Goñi N; Arrizabalaga De Mingo H; Lam, C.H.; Fraile Ugalde I; Santiago Burrutxaga J; Lutcavage, M. Movements and geographic distribution of juvenile bluefin tunas in the North Atlantic, described through electronic tags. SCRS/2015/044

Arrizabalaga De Mingo H; Fraile Ugalde I; Goñi N. Biological samples collected within the GBYP program. SCRS/P/2015/005

Bessigneul G., Floch L., Dewals P., Damiano A., Cauquil P., Delgado de Molina A. and Chassot E. (2016). Variability in size and species composition of tropical tuna schools caught by purse seiners in the Atlantic Ocean. Collet. Vol. Sci. Pap. ICCAT in Press SCRS/2015/194.

Brophy, D; Haynes, P; Arrizabalaga De Mingo H; Fraile Ugalde I; Fromentin, JM; Garibaldi, F; Katavic, I. Otolith shape variation in blue fin tuna from different regions of the North Atlantic: a possible marker of stock originSCRS/P/2015/004

Carroceda A., and Colmenero C. (2016). Size-weight relationship of the bigeye tuna (*Thunnus obesus*) from North Atlantic areas using linear and non-linear fits. Collet. Vol. Sci. Pap. ICCAT in Press SCRS/2015/138.

Cort J.L., Estruch V.D., Santos M.N., Di Natale A., Abid N. and de la Serna J.M. (2016). On the variability of the length-weight relationship for Atlantic bluefin tuna, *Thunnus thynnus* (L.). Collet. Vol. Sci. Pap. ICCAT in Press SCRS/2015/026.

Cort, J. L. and Estruch V.D. (2016). Analysis of the length weight relationships for the western Atlantic bluefin tuna, *Thunnus thynnus* (L.). Collet. Vol. Sci. Pap. ICCAT in Press SCRS/2015/156.

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Cort, J.L. and Abuanza P. (2016). The fall of the tuna traps and the collapse of the Atlantic bluefin tuna, *Thunnus thynnus* (L.), fisheries of northern Europe from the 1960s. Collet. Vol. Sci. Pap. ICCAT in Press SCRS/2015/157.

Delgado de Molina A., Delgado de Molina R., Santana J.C. and Ariz J. (2016). Datos estadísticos de la pesquería de túnidos de las Islas Canarias durante el periodo 1975 a 2014. Collet. Vol. Sci. Pap. ICCAT in Press SCRS/2015/136.

Delgado de Molina A., Delgado de Molina R., Santana J.C. and Ariz J. (2016). Estadísticas españolas de la pesquería atunera tropical, en el Océano Atlántico, hasta 2014. Collet. Vol. Sci. Pap. ICCAT in Press SCRS/2015/131.

Druon JN; Hanke, A; MacKenzie, BR; Damalas, D; Tserpes, G; Arrizabalaga De Mingo H; Arregi Alcorta I; Fromentin, JM. Preferred habitats of the juvenile and adult Atlantic bluefin tuna: from ecology to management SCRS/P/2015/002

Fraile Ugalde I; Rooker, J; Arrizabalaga De Mingo H. Bluefin otolith chemistry: what we learnt with the GBYP program SCRS/P/2015/006

Juan Jorda MJ; Arrizabalaga De Mingo H; Restrepo, V; Dulvy, N; Cooper, A; Murua Auricenea H. Preliminary review of ICCAT and WCPFC progress in applying Ecosystem Based Fisheries Management SCRS/2015/123

Puncher, GN; Cariani, A; Maes; Van Houdt, J; Herten, K; Albaina, A; Estonba, A; Cannas, R; Rodriguez Ezpeleta N; Arrizabalaga De Mingo H; Tinti, F. Population structure and genetic management unit delineation in the bluefin tuna using a genotyping-by-sequencing approach SCRS/2015/048

Merino Cabrera, G; Arrizabalaga De Mingo H; Restrepo, V; Murua Auricenea, H; Santiago Burrutxaga, J; Ortiz de Urbina, G.P. ScottEstimation of Mediterranean albacore fisheries' productivity using a catch based method SCRS/2015/159

Merino Cabrera, G; Murua Auricenea H; Arrizabalaga De Mingo H; Santiago Burrutxaga J. Preliminary assessment of Harvest Control Rules for North Atlantic albacore SCRS/P/2015/032

Muñoz P., Macias D. and Báez J.C. (2016). Length-weight relationship of bullet tuna from western Mediterranean Sea. Collet. Vol. Sci. Pap. ICCAT in Press SCRS/2015/125.

Ortiz de Zárate V. and Perez B. (2016). Bigeye (*Thunnus obesus*) by-catch estimates from the albacore Spanish surface fishery in the North East Atlantic, 2014. Collet. Vol. Sci. Pap. ICCAT in Press SCRS/2015/060.

Ortiz de Zárate V., Perez B. and Ruiz M. (2016). Statistics from the Spanish albacore (*Thunnus alalunga*) surface fishery in the north eastern Atlantic in 2014. Collet. Vol. Sci. Pap. ICCAT in Press SCRS/2015/155.

Rodríguez-Marín E., Quelle P., Ruiz M. and Luque P.L. (2016). Standardized age-length key for East Atlantic and Mediterranean bluefin tuna based on otoliths readings. Collet. Vol. Sci. Pap. ICCAT in Press SCRS/2015/040.

Rodríguez-Marín E., Quelle P., Ruiz M., Busawon D. and Golet W. (2016). Comparison of age estimates from paired calcified structures from Atlantic bluefin tuna. Collet. Vol. Sci. Pap. ICCAT in Press SCRS/2015/173.

Rodriguez Ezpeleta Naiara; Arrizabalaga De Mingo Haritz. Inference of genetic population structure of Atlantic Bluefin tuna using RAD-seq derived SNP markers. SCRS/P/2015/007 BFT data preparatory meeting. ICCAT Madrid

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Papers submitted to IOTC

Chassot E., Assan C., Soto M., Damiano A., Delgado de Molina A., Joachim L.D., Cauquil P., Lesperance F., Curpen M., Lucas J. and Floch L. (2015). Statistics of the European Union and associated flags purse seine fishing fleet targeting tropical tunas in the Indian Ocean during 1981-2014. IOTC–2015–WPTT17–12 Rev_1.

Soto M. and Fernandez F. (2015) Statistics of the purse seine Spanish fleet in the Indian Ocean (1990-2014). IOTC–2015–WPTT17–13.

Others:

Aldanondo Aristizabal Naroa; Cotano Basabe Unai; Alvarez Jorna Paula; Uriarte Seminario Andres. Publicación del artículo científico: Validation of the first annual increment deposition in the otoliths of European anchovy in the Bay of Biscay based on otolith microstructure analysis. Marine & Freshwater Research (2015).

Aranda, M., & Murillas, A. (2015). Allocation of fishing possibilities, incentives and outcomes: Insights from Basque fishermen's organisations in Spain. Marine Policy, 61, 171-178.

Cosgrove, R; Arregi Alcorta I; Arrizabalaga De Mingo H; Goñi N; Neilson, JD. Predation of pop-up satellite archival tagged albacore (*Thunnus alalunga*). Fisheries Research, 2015, 162: 48-52

Costa, E. F., Dias, J. F., & Murua, H. (2015). Reproductive strategy and fecundity of the keystone species *Paralonchurus brasiliensis* (Teleostei, Sciaenidae): an image processing techniques application. Environmental Biology of Fishes, 98(10), 2093-2108.

Dragon AC; *Senina I; Titaud O; Calmettes B; Conchon A; Arrizabalaga De Mingo H; Lehodey P; Jacobson L. An ecosystem-driven model for spatial dynamics and stock assessment of North Atlantic albacore. Canadian Journal of Fisheries and Aquatic Sciences 2015. 72: 1-15

Duque-Nogal, V., A. Jurado-Ruzafa and C. Perales-Raya. 2015. Cephalopods in Central East Atlantic: past and current studies by the IEO-Tenerife team. Poster presented at Cephalopod International Advisory Council (CIAC) Symposium. Hakodate (Japan), 10-14 November 2015.

Escalle, L., Capietto, A., Chavance, P., Dubroca, L., De Molina, A. D., Murua, H., ... & Floch, L. (2015). Cetaceans and tuna purse seine fisheries in the Atlantic and Indian Oceans: interactions but few mortalities. Marine Ecology Progress Series, 522, 255.

Fernandes Jose A; Irigoien Xabier; Lozano Jose A.; Inza Iñaki; Goikoetxea Bilbao Nerea; Perez Aritz. Evaluating machine-learning techniques for recruitment forecasting in seven North East Atlantic fish species. Ecological Informatics 2015, 25: 35-42

Fraile Ugalde I; Arrizabalaga De Mingo H; Rooker, J. Origin of Atlantic bluefin tuna (*Thunnus thynnus*) in the Bay of Biscay. ICES Journal of Marine Science, 2015, 72 (2): 625-634.

Graves JE; Wozniak AS; Dickhut RM; Cochran MA; Macdonald EH; Bush E; Arrizabalaga De Mingo H; Goñi N. Transatlantic movements of juvenile Atlantic bluefin tuna inferred from analyses of organochlorine tracers. Canadian Journal of Fisheries and Aquatic Sciences (2015) 72: 625-633

Hernández, C., Landa, J., Barrado, J., Antolínez, A. and Santos, B. 2015. First estimates of age and growth of juvenile black anglerfish (*Lophius budegassa*), in north-eastern Atlantic waters. Fisheries Research, 161, 269-272.

Korta, M., García, D., Santurtún, M., Goikoetxea, N., Andonegi, E., Murua, H., Álvarez, P., Cerviño, S., Castro, J. and Murillas, A. 2015. European hake (*Merluccius merluccius*) in the Northeast Atlantic Ocean. In: Hakes, Biology and Exploitation (H. Arancibia ed.), pp. 1-37. Chichester, UK: Wiley Blackwell.

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Landa, J., Antolínez, A., Ámez, M., Barrado, J., Castro, B., Cañás, L., Autón, U., Fariña, A.C. and Hernández, C. 2014. Preliminary observation on sexual maturity of black anglerfish (*Lophius budegassa*) in north-eastern Atlantic waters. Deep-Sea Research II, 106, 225-231.

Le Floc'h, P., Murillas, A., Aranda, M., Daurès, F., Fitzpatrick, M., Guyader, O., & Marchal, P. (2015). The regional management of fisheries in European Western Waters. Marine Policy, 51, 375-384.

Mahé, K., A. Jurado, A. Garcia Guerreiro, A. Massaro, C. Dueñas, E. Lopez, E. Mullins, L. Lanteri, M.J. Ferreira, R. Elleboode, A. Mannini, A. Antolinez, G. Delfs, L. Casciaro, M. O'Cuaig, P. Torres, A. Dijkman, E. Bellamy, K. Eriksen and P. Carbonara. 2015. Report of the Horse Mackerel, Mediterranean Horse Mackerel and Blue Jack Mackerel (Trachurus trachurus, T. mediterraneus and T. picturatus) Otolith Exchange 2015. Ifremer: 30 pp.

Murillas Maza María Aránzazu; Naomi S. Foley; Rebeca Corless; Marta Escapa; Javier Fernández Macho; Frances Fahy; Susana Gabriel; Pilar Gozález; Stephen Hynes; Regis Kalaydjian; Susana Moreira; Kieran Moylan; Katherine Simpson; Dugald Tinch; Michael Obrien. Developing a Comparative Marine Socio-Economic Framework for the European Atlantic Area. Journal of Ocean and Coastal Economics (2015) .

Perales-Raya, C. and A. Jurado-Ruzafa. 2015. Informe ejecutivo de la campaña de observación científica realizada a bordo de los buques Curbeiro y Praia de Areamilla (agosto-septiembre 2015). Informe del Instituto Español de Oceanografía (Centro Oceanográfico de Canarias) presentado a la Asociación Nacional de Armadores de Buques Cefalopoderos (ANACEF).

Prellezo Iguaran Raul; Curtin Richard. Confronting the implementation of marine ecosystem-based management within the European Common Fisheries Policy Reform. Ocean and Coastal Management (2015) 117:43-51

Puncher PN; Alemany F; Arrizabalaga De Mingo Haritz; Cariani A; Tinti F. Misidentification of bluefin tuna larvae: a call for caution and taxonomic reformReviews in Fish Biology and Fisheries 2015. 25: 485-502

RCM LDF, 2015. Report of the Regional Co-ordination Meeting for the Long Distance Fisheries (RCM LDF), 2014. EU DATA COLLECTION FRAMEWORK (DCF), REG. 199/2008, 665/2008 and DECISION 2010/93/EU. Thünen Institute [TI]), Hamburg, Germany, 21/04/2015 – 22/04/2015 and Instituto Español de Oceanografía (IEO), Centro Oceanográfico de Cádiz, Cádiz, Spain, 9/06/2015 - 12/06/2015. 49 pp.

Rey, J., Fernández-Peralta, L., Quintanilla, L.F., Hidalgo, M., Presas, C., Salmerón, F. and Puerto, M.A., 2015. Contrasting energy allocation strategies of two sympatric Merluccius species in an upwelling scenario. Journal of Fish Biology, 86: 1078-1097.

Uranga Aizpurua Jon; Arrizabalaga De Mingo Haritz; Boyra Eizagirre Guillermo; M.C. Hernandez. Counting and sizing of bluefin tuna schools by automated analysis of long-range sonars in fishing vessels. ICES Acoustic Symposium. Nantes, Mayo 2015

Uriarte, A., Rico, I., Villamor, B., Duhamel, E., Dueñas, C., Aldanondo, N., Cotano, U. (in press)Validation of age determination from otoliths for the European Anchovy (*Engraulis encrasicolus* L.) in the Bay of Biscay. Australian Journal of Marine and Freshwater Research (in press)

Villamor, B. and Carbonara, P. 2015. Small and Medium Pelagic Species. In ICES Cooperative Research Report (CRR) on fish ageing. Charpter 5. Lotte Worsoe Clausen, Francesca Vitale and Grainne Ni Chonchuir (eds.). September 2015 (submitted).

Villamor, B., Landa, J., Antolínez, A., Barrado, J., Dueñas, C., Hernández, C., Meijide, M., Navarro, M.R., Riveiro, I. 2015. Age determination procedures for pelagic and benthic species from ICES area in Spanish Institute of Oceanography (IEO). IEO internal Document. Repositorio IEO http://hdl.handle.net/10508/9095

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ANEX II: Agreements

MoU IEO Dakar

See attached pdf. file.

MoU IEO IRD

See attached pdf. file.

MoU IEO Seychelles

See attached pdf. file.

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ANEX III

From 1 January 2014 the activities carried out under the program of collection, management and use of data in the fisheries sector Spanish happen to be funded by the EU through the European Maritime and Fisheries Fund (EMFF).

The Spanish National Program for the period 2014-2016 is an extension of the previous 2011-2013 Program, developed in 2010 based on the Commission Decision 949/2008, and subsequent minor amendments based on Commission Decision.

In both COM Decisions, the areas and the activities to be undertaken were clearly defined, so there was no room for activities that were not mentioned in them, although these activities were used for the evaluation of fisheries resources.

However from 2014 (inclusive), the activities undertaken within the EMFF are selected by the Member State, provided they meet the criteria set out in EMFF itself and contribute to the better implementation of the Common Fisheries Policy (CFP). These activities were included in Spanish Operational Programme.

Therefore, below we reflect a number of activities which were not foreseen in that Spanish Program because of the immobility of the lists in Annex IX of Commission Decision.

This is the case of a number of research surveys at sea that Spain had been conducting at national expenses, which are coordinated internationally, and are used for the assessment of fishery resources in the working groups of the area ICES and thus they contribute to the better implementation of the CFP.

These research surveys at sea are:

BOCADEVA

This triennial survey was unplanned for 2015. The last one was carried out in 2014 and the next one is planned for 2017.

ECOCADIZ

III.G.1 Achievements: Results and deviation from NP proposal

Objectives:

Main:

- -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 the Gulf of Cadiz anchovy spawning stock (MSFD Descriptor 1, Indicators 1.1.1, 1.1.2, 1.2.1, 1.4.1, 1.5.1, 1.6.1, 1.6.2, 1.7.1; MSFD Descriptor 3, Indicators 3.1.2, 3.2.2; MSFD Descriptor 4, Indicators 4.3.1).
- -To characterize the biology of the above species in relation to their main habitats (either feeding, spawning, nursery or recruitment habitat depending on the species), especially according to the size composition and/or age structure, and to the maturity (including the mapping of anchovy egg distribution and density as sub-superficially sampled by CUFES), repletion and condition status (MSFD Descriptor 1, Indicators 1.3.1, 1.6.1, 1.7.1; MSFD Descriptor 3, Indicators 3.3.1, 3.3.2, 3.3.3, 3.3.4; MSFD Descriptor 4, Indicators 4.2.1).
- -To map the distribution and abundance of the apical predators within the surveyed pelagic community (cetaceans, sea turtles and sea birds) and their relation to oceanographic and biological factors (e.g. potential prey species). To study the importance and utilization of discards by scavenger sea birds (MSFD Descriptor 1, Indicators 1.1.1, 1.1.2, 1.2.1, 1.3.1, 1.4.1, 1.5.1, 1.6.1, 1.6.2, 1.7.1; MSFD Descriptor 4, Indicators 4.2.1, 4.3.1).

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- -To oceanographically characterize the surveyed area: thermo-haline properties, dissolved oxygen, fluorescence and transmissivity of the shelf waters by continuous (surface layer) and discrete (vertical casts) sampling; patterns of distribution and circulation of the water masses; weather conditions (MSFD Descriptor 1, Indicators 1.6.3; MSDF Descriptor 5, Indicators 5.2.1, 5.2.2, 5.3.2; MSFD Descriptor 7, Indicators 7.1.1, 7.2.1, 7.2.2).
- -To map the abundance and biomass of floating macro-litter (MSFD Descriptor 10, Indicator 10.1.2).

secondary:

- -To describe the diurnal component of the nictemeral behavior of the small and mid-size pelagic fish species in relation to their respective aggregation and schooling patterns.
- -To collect additional biological samples (anchovy larvae) to satisfy specific requirements from different research projects related to the survey's species.

Sampled Area: Portuguese and Spanish waters off the Gulf of Cadiz (Cape Trafalgar-Cape San Vicente). ICES Subdivision IXa South.

Dates: 28th July – 10th August 2015

Duration: total duration of 14 days, with 12 effective days of survey (working at sea) and 2 days for embarkment/disembarkment of equipment and personnel

Methodology: estimation of the abundance and biomass of the survey target species by vertical echo-integration, 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 echo-sounder working in a multi-frequency fashion (18, 38, 120 and 200 kHz). The echo-traces identification and determination of the size and age composition and other biological aspects of the assessed species was carried out from the results from opportunistic ground-truthing fishing hauls. Hydrographic characterization of the surveyed area was carried out by night through the sampling of a systematic grid of discrete CTD (with coupled multisensors)-LADCP casts (coupled to an oceanographic rosette) and along-transect sub-superficial continuous sampling with VMADCP and ThermoSal-F. The climatic characterization of the surveyed area was obtained from the analysis of continuous records of weather variables by an *Aanderaa* weather station. The ichthyoplankton (anchovy eggs) distribution and sub-superficial density was recorded by a Continuous Underway Fish Egg Sampler (CUFES™) along transects during the acoustic sampling. Anchovy larvae were collected with a Bongo 90 net at dusk in opportunistic stations located in waters close to the Guadiana and Guadalquivir river mouths. Information on the distribution and abundance of apical predators was collated by direct observation (census techniques) by an observer during the acoustic sampling.

Research vessel: R/V Miguel Oliver, 70 meters length, 14.40 m. breadth, 2495 GT and 2 * 1000kW.

Equipment and Sampling gears: “Tuneado” pelagic gear (formerly onboard B/O Cornide de Saavedra). EK-60 scientific echo-sounder. CTD (with coupled multisensors)-LADCP casts (coupled to an oceanographic rosette). VMADCP and ThermoSal-F. *Aanderaa* weather station. Continuous Underway Fish Egg Sampler. Bongo 90 net.

Number of hauls: opportunistic. Not based on a sampling scheme previously designed.

Samplings

Acoustics: the acoustic sampling was carried out by day, at an approximate speed of 10 knots, over a sampling grid based on a systematic sampling design composed by 21 parallel transects, normal to the shoreline, 8 nm equally-spaced, which extend between the 20 and 200 m isobaths (Figura 17). The whole 21-transect sampling grid was sampled.

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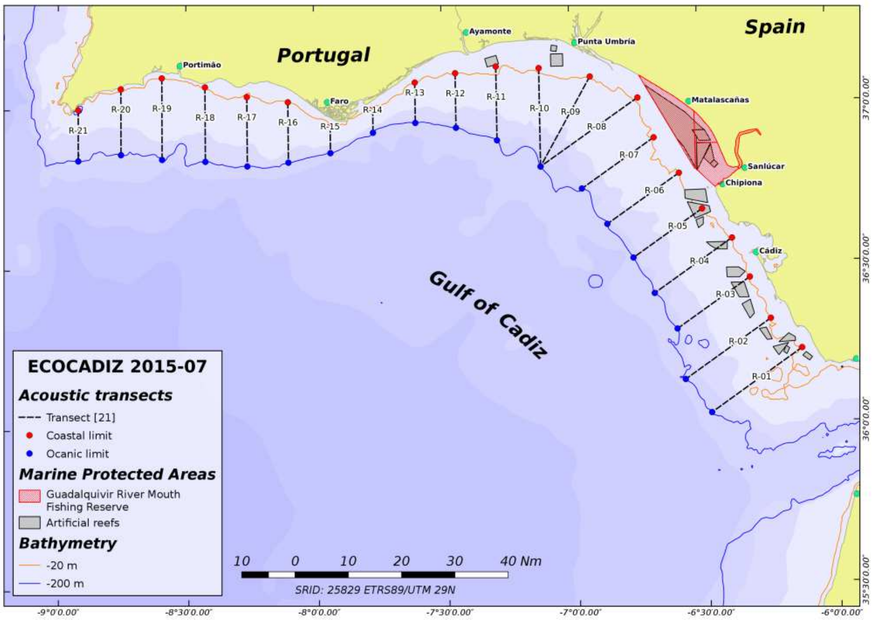

Figura 17: Campaña ECOCADIZ 2015-07. Location of the acoustic transects sampled during the survey.

Groundtruthing hauls: groundtruthing hauls were carried out by day at a speed of 4 knots with a double objective: 1) to enable the echo-trace identification and further allocation of the total backscattering energy to species and sizes; 2) to provide the required samples for biologically characterizing the assessed species (anchovy, sardine, horse mackerel, Mediterranean horse mackerel, Blue jack mackerel, mackerel, chub mackerel and bogue). Location and number of these hauls was therefore opportunistic, although they are attempted to be carried out all over the sampled bathymetric range in order to obtain a better characterization of the pelagic fish assemblage. Performance and behaviour of the gear during the haul was monitored with a Simrad™ FS 20/25 trawl sonar system. The number of valid hauls was of 19 from a total of 22 (Figura 18 y Figura 19)

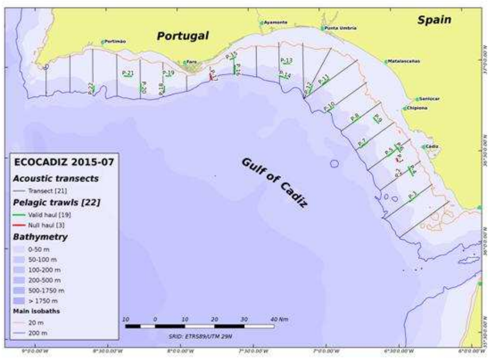

Figura 18: ECOCADIZ 2015-07. Location of ground-truthing fishing hauls. Null hauls in red.

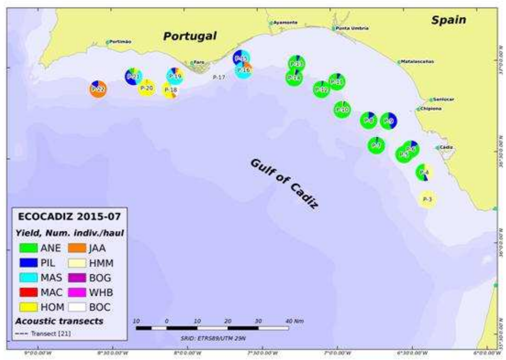

Figura 19: ECOCADIZ 2015-07. . Species composition (percentages in number) in fishing hauls.

Ichthyoplankton sampling:

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CUFES™ sampling was carried by day during the acoustic tracking to continuously monitor the anchovy egg abundance. The minimum number of stations is about 120, but the final number of sampled stations may vary according to the extension of the anchovy spawning area each year. A total of 117 CUFES™ stations were finally sampled (Figure 20). Four (4) Bongo 90 coastal stations were also carried out at sunset in the surroundings of the Guadiana (2 stations) and Guadalquivir (2 stations) river mouths to collect anchovy larvae for genetics studies (Figure 21).

Census of top predators: information on presence and abundance of sea birds, turtles and cetaceans was also recorded during the acoustic sampling by one onboard observer.

Sampling of Oceanographic and Climatic variables: The sampling grids sampled in summer and autumn acoustic surveys are different according to the respective surveys' objectives. The final number of sampled stations is adaptatively defined each survey according to the observed processes in real time. 157 stations are considered as a achieved target for the oceanographic characterization of the surveyed area in this survey. A Sea-bird Electronics™ SBE 21 SEACAT thermosalinograph and a Turner™ 10 AU 005 CE Field fluorometer were used during the acoustic tracking to continuously collect some hydrographical variables (sub-surface sea temperature, salinity, and in vivo fluorescence). Vertical profiles of hydrographical variables were also recorded by night from 157 CTDO2-LADCP casts distributed into 12 transects by using Sea-bird Electronics™ SBE 911+ SEACAT (with coupled Datasonics™ altimeter, SBE 43 oximeter, WetLabs™ ECO-FL-NTU fluorimeter and WetLabs™ C-Star 25 cm transmissometer sensors) and LADCP T-RDI™ WHS 300 kHz profilers coupled to a oceanographic rosette without bottles (Figure 24). The maximum sampling depth was 1446 m. VMADCP RDI™ 150 kHz records were also continuously recorded by night between CTD stations. Weather variables were also continuously recorded by an Aanderaa™ weather station.

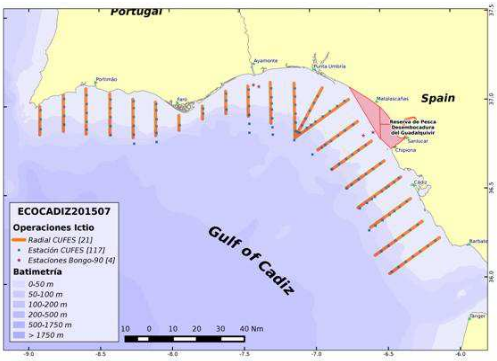

Figure 20: ECOCADIZ 2015-07. Location of CUFES and Bongo-90 sampling stations.

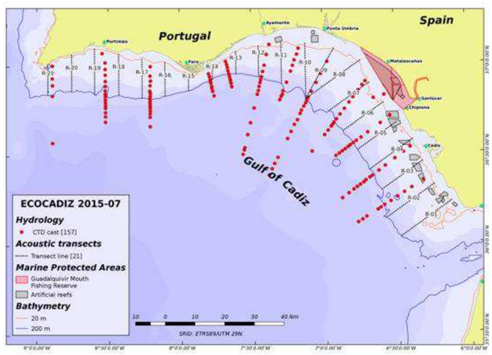

Figure 21: ECOCADIZ 2015-07. Location of CTD-LADCP stations.

Species:

The occurrence frequency, total weight and number of the most frequent captured species during the survey as well as the number of otoliths collected are described in the following text tables below.

Species	# of fishing stations	Occurrence (%)	Total weight (kg)	Total number
Merluccius merluccius	19	100	169,218	2745
Sardina pilchardus	18	95	1956,451	45055
Loligo spp	17	89	5,409	1809
Trachurus trachurus	16	84	1399,624	26394
Scomber colias	15	79	1914,333	17822

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Engraulis encrasicolus	15	79	1401,372	155790
Scomber scombrus	14	74	38,035	183
Boops boops	11	58	22,575	188
Trachurus picturatus	10	53	2956,827	50765
Alosa fallax	8	42	3,519	14
Spondyliosoma cantharus	8	42	14,108	78
Diplodus annularis	6	32	2,638	52
Eledone moschata	6	32	1,442	10
Aphia minuta	6	32	0,346	164
Pagellus erythrinus	6	32	94,348	568
Pagellus bellottii bellottii	5	26	7,978	56
Diplodus bellottii	5	26	3,668	67
Chelidonichthys lucerna	5	26	0,426	5

Species	**# otoliths**
Engraulis encrasicolus	937
Sardina pilchardus	814

Data storage: survey data are stored by the IEO in its ad-hoc fishery data base SIRENO ((Seguimiento Informático de los Recursos Naturales Oceánicos)).

Deviations:

in general terms, no departure from the Proposal is noteworthy. Regarding acoustic sampling all the foreseen objectives were achieved. The number of valid ground-truthing hauls (19) was considered sufficient and representative for the purposes of acoustic assessment and biological characterization of the assessed species. Nevertheless, problems still persist with the conduction of fishing hauls in waters comprised between the 20 and 35-40 m isobaths because of the size of the fishing gear, but mainly by the fact that this coastal fringe used to be full of fixed artisanal gears (octopus pots, hooks, nets, etc.), from the Guadalquivir river mouth area to Cape San Vicente, a problem which makes very difficult the pelagic/bottom trawl fishing. Furthermore, in the western Algarve, fishing hauls are even harder to be conducted because the occurrence of very hard and irregular bottoms, which threaten the integrity of the fishing gear, since this gear must be working in contact with the bottom in most cases. All the foreseen objectives of the ichthyoplankton sampling (CUFES & Bongo), as well as those ones of the census of apical predators were achieved. The sampling intensity in the collection of oceanographic variables was also very high (157 casts plus continuous TSG-F records), which has had a positive effect in the achievement of the foreseen objectives and the quality of the gathered information.

III.G.2 Data quality: Results and deviation from NP proposal.

Survey's data and estimates are utilized in the ICES expert groups of both stock assessment of pelagic fish species (WGHANSA, WGWIDE) and acoustic and egg surveys for anchovy and sardine in ICES areas VII, VIII and IX (WGACEGG). The latter expert group revises 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 the anchovy stock in Division IXa since the assessment is at present a qualitative one, based on the observed trends exhibited by the indices derived from both this survey series and from their counterparts conducted by other institutions in the same Division.

Recommendations given by the Expert Group for the planning of these surveys (ICES WGACEGG) are adopted in the survey protocols.

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Desviaciones: No departure from the Proposal is noteworthy.

III.G.3 Actions to avoid deviations.

Not applicable.

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ECOCADIZ-RECLUTAS

III.G.1 Achievements: Results and deviation from NP proposal

Objectives:

Main:

- -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 (MSFD Descriptor 1, Indicators 1.1.1, 1.1.2, 1.2.1, 1.4.1, 1.5.1, 1.6.1, 1.6.2, 1.7.1; MSFD Descriptor 3, Indicators 3.1.2, 3.2.2; MSFD Descriptor 4, Indicators 4.3.1).
- -To characterize the biology of the above species in relation to their main habitats (either feeding, spawning, nursery or recruitment habitat depending on the species), especially according to the size composition and/or age structure, and to the maturity, repletion and condition status (MSFD Descriptor 1, Indicators 1.3.1, 1.6.1, 1.7.1; MSFD Descriptor 3, Indicators 3.3.1, 3.3.2, 3.3.3, 3.3.4; MSFD Descriptor 4, Indicators 4.2.1).
- -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 identify those environmental and biological factors regulating the recruitment process of the small pelagic fish species in the recruitment areas from the oceanographic and environmental characterization of the surveyed area: thermo-haline properties, dissolved oxygen, fluorescence and transmissivity of the shelf waters by continuous (surface layer) and discrete (vertical casts) sampling; patterns of distribution and circulation of the water masses; weather conditions (MSFD Descriptor 1, Indicators 1.6.3; MSDF Descriptor 5, Indicators 5.2.1, 5.2.2, 5.3.2; MSFD Descriptor 7, Indicators 7.1.1, 7.2.1, 7.2.2).

Secondary:

- -To describe differential patterns by age group in the diurnal component of the nictemeral behavior of anchovy and sardine in relation to their respective aggregation and schooling patterns.
- -To map the abundance and biomass of floating macro-litter (MSFD Descriptor 10, Indicator 10.1.2).

Sampled area: Portuguese and Spanish waters off the Gulf of Cadiz (Cape Trafalgar-Cape San Vicente). ICES Subdivision IXa South

Dates: 10th – 29th October 2015.

Duration: total duration of 20 days, with 17 effective days of survey (working at sea), 2 days for embarkment/disembarkment of equipment and personnel, 1 day for refuelling and provisioning.

Methodology: estimation of the abundance and biomass of the survey target species by vertical echo-integration, 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 echo-sounder working in a multi-frequency fashion (18, 38, 70, 120, 200 and 333 kHz). The echo-traces identification and determination of the size and age composition and other biological aspects of the assessed species was carried out from the results from opportunistic ground-truthing fishing hauls. Hydrographic characterization of the surveyed area was carried out by night through the sampling of a systematic grid of discrete CTD (with coupled multisensors)-LADCP casts (coupled to an oceanographic

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rosette) 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.

Research vessel: R/V Ramón Margalef.

Equipment and Sampling gears: Gloria HOD 352 pelagic trawl gear. EK-60 scientific echo-sounder. CTD (with coupled multisensors)-LADCP casts (coupled to an oceanographic rosette). VMADCP and ThermoSal-F. *Aanderaa* weather station.

Number of hauls: opportunistic. Not based on a sampling scheme previously designed.

Number of transects: 21. (Figure 22).

Samplings

Acoustics: the acoustic sampling was carried out by day, at an approximate speed of 10 knots, over a sampling grid based on a systematic sampling design composed by 21 parallel transects, normal to the shoreline, 8 nm equally-spaced, which extend between the 20 and 200 m isobaths. The whole 21-transect sampling grid was sampled. (Figure 22).

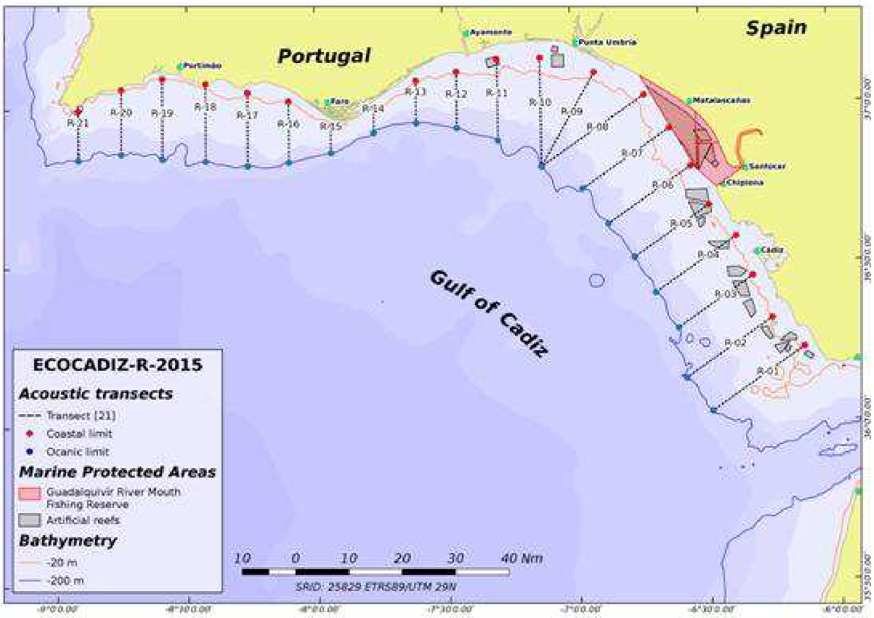

Figure 22: ECOCADIZ-RECLUTAS 2015-10. Location of the acoustic transects sampled during the survey.

Groundtruthing hauls: groundtruthing hauls were carried out by day at a mean speed of 4 knots with a double objective: 1) to enable the echo-trace identification and further allocation of the total backscattering energy to species and sizes; 2) to provide the required samples for biologically characterizing the assessed species (anchovy, sardine, horse mackerel, Mediterranean horse mackerel, Blue jack mackerel, mackerel, chub mackerel and bogue). Location and number of these hauls was therefore opportunistic, although they were attempted to be carried out all over the sampled bathymetric range in order to obtain a better characterization of the pelagic fish assemblage. Performance and behaviour of the gear during the haul was monitored with a Simrad™ FS 20/25 trawl sonar system. The conduction of groundtruthing fishing hauls is opportunistic and not subject to a predefined sampling scheme. 20 hauls is considered as an acceptable goal to be achieved in each survey. All of the 21 hauls carried out during the survey were valid (Figure 23 y Figure 24). . Four additional test hauls were carried out before the effective start of the survey to properly adjust the fishing gear, doors and sensors.

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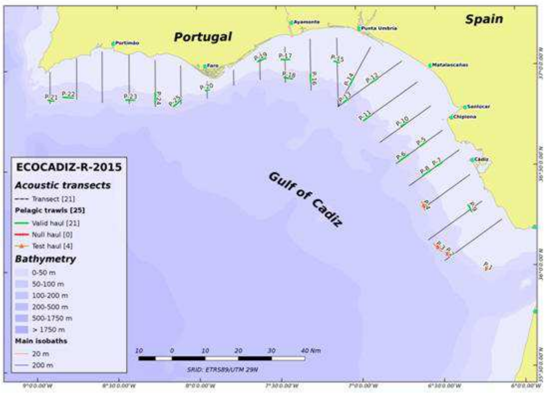

Figure 23: ECOCADIZ-RECLUTAS 2015-10. Location of ground-truthing fishing hauls. Null hauls in red. Test hauls in orange.

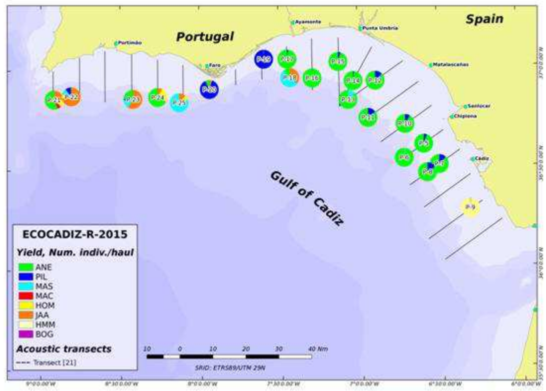

Figure 24: ECOCADIZ-RECLUTAS 2015-10. Species composition (percentages in number) in fishing hauls.

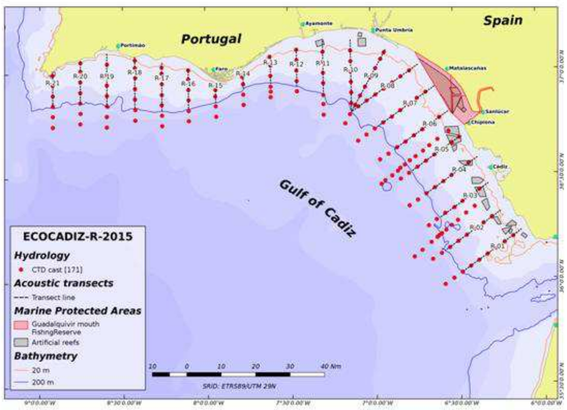

Figure 25: ECOCADIZ-RECLUTAS 2015-10. Location of CTD-LADCP stations

Ichthyoplankton sampling: given the dates and objectives of the survey no CUFES sampling was planned to be carried out.

Census of top predators: information on presence and abundance of sea birds, turtles and cetaceans was not recorded during the present survey because of the R/V's reduced accommodation capacity.

Sampling of Oceanographic and Climatic variables: The sampling grids sampled in summer and autumn acoustic surveys are different according to the respective surveys' objectives. The final number of sampled stations is adaptatively defined each survey according to the observed processes in real tiem. 171 stations are considered as a achieved target for the oceanographic characterization of the surveyed area in this survey. A Sea-bird Electronics™ SBE 21 SEACAT thermosalinograph and a Turner™ 10 AU 005 CE Field fluorometer were used during the acoustic tracking to continuously collect some hydrographical variables (sub-surface sea temperature, salinity, and in vivo fluorescence). Vertical profiles of hydrographical variables were also recorded by night from 171 CTDO2-LADCP casts distributed into 23 transects by using Sea-bird Electronics™ SBE 911+ SEACAT (with coupled Datasonics™ altimeter, SBE 43 oximeter, WetLabs™ ECO-FL-NTU fluorimeter and WetLabs™ C-Star 25 cm transmissometer sensors) and LADCP T-RDI™ WHS 300 kHz profilers coupled to a oceanographic rosette without bottles (Figure 25). The maximum sampling depth was 731 m. VMADCP RDI™ 150 kHz

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records were also continuously recorded by night between CTD stations. Weather variables were also continuously recorded by an Aanderaa™ weather station.

Species:

The occurrence frequency, total weight and number of the most frequent captured species during the survey as well as the number of otoliths collected are described in the following text tables below:

Species	# of fishing stations	Occurrence (%)	Total weight (kg)	Total number
Engraulis encrasicolus	20	95	1145,293	191529
Merluccius merluccius	19	90	25,617	273
Sardina pilchardus	15	71	7653,437	99986
Scomber colias	14	67	1230,73	10530
Trachurus trachurus	13	62	143,033	1221
Scomber scombrus	12	57	18,756	108
Lepidopus caudatus	11	52	2,641	151
Trachurus picturatus	8	38	282,636	4526
Boops boops	7	33	4,844	33
Trachurus mediterraneus	5	24	38,07	185

Species	# otoliths
Engraulis encrasicolus	888
Sardina pilchardus	738

Data storage: survey data are stored by the IEO in its ad-hoc fishery data base SIRENO ((Seguimiento Informático de los Recursos Naturales Oceánicos)).

Deviations: the complete grid (21 transects) was sampled. However, the sampling scheme followed to accomplish this grid was highly conditioned by two events of different nature: the realization of joint NATO naval exercises in the Spanish waters during a great part of the survey and the entry of a persistent system of low pressure threatening with strong storms in the westernmost part of the surveyed area during the last days of the survey. As described above, the consecutive implementation of different naval exercises' polygons conditioned the order of realization of the acoustic transects during the survey's first leg. Thus, the acoustic sampling started by the coastal end of the transect R05 on 15th October and proceeded eastward up to the R01 on 17th. The acoustic sampling stopped on 18th-19th October in order to satisfy the R/V's refuelling and victualling needs. Transects from R06 to R15 were carried out in the usual way (in the westward direction) between 20th and 24th. In order to avoid the abovementioned incoming system of low pressure, the westernmost section of the sampling grid (transects R16 – R21) was sampled in the W-E direction. Given the hardness and irregular nature of the Portuguese shelf bottoms and the relative fragility of the fishing gear used, almost all the hauls conducted in those waters were carried out over the isobath where the situation to be identified was located instead of over the transect itself, and after a previous exploration of the bottom nature. CUFES sampling to characterize the Gulf of Cadiz anchovy spawning area was not planned to be carried out in the present survey because of the survey dates. Reduced accommodation capacities of the R/V prevented from the embarkment of an observer onboard for the census of top predators.

III.G.2 Data quality: Results and deviation from NP proposal.

Survey's data and estimates are utilized in the ICES expert groups of both stock assessment of pelagic fish species (WGHANSA, WGWIDE) and acoustic and egg surveys for anchovy and sardine in ICES areas VII, VIII and IX (WGACEGG). The latter expert group revises the results and establishes standardized protocols to properly conduct both this survey and other ones of similar methodology in the

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above ICES areas. The acoustic estimates from this series are of a special importance for the anchovy stock in Division IXa since the assessment is at present a qualitative one, based on the observed trends exhibited by the indices derived from both this survey series and from their counterparts conducted by other institutions in the same Division.

Recommendations given by the Expert Group for the planning of these surveys (ICES WGACEGG) are adopted in the survey protocols.

Deviations: No departure from the Proposal is noteworthy.

III.G.4 Actions to avoid deviations.

Not applicable.

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IBTS 1th. Quarter (IXa sur)

III.G.1 Achievements: Results and deviation from NP proposal

Objectives:

- 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.

Sampling area: The Southern Spanish Groundfish Survey on the Gulf of Cadiz (SP-GCGFS) is conducted in the southern part of ICES Division IXa, the Gulf of Cádiz. The covered area extends from 15 m to 800 m depth, during spring (March) and autumn (November). (Figure 26).

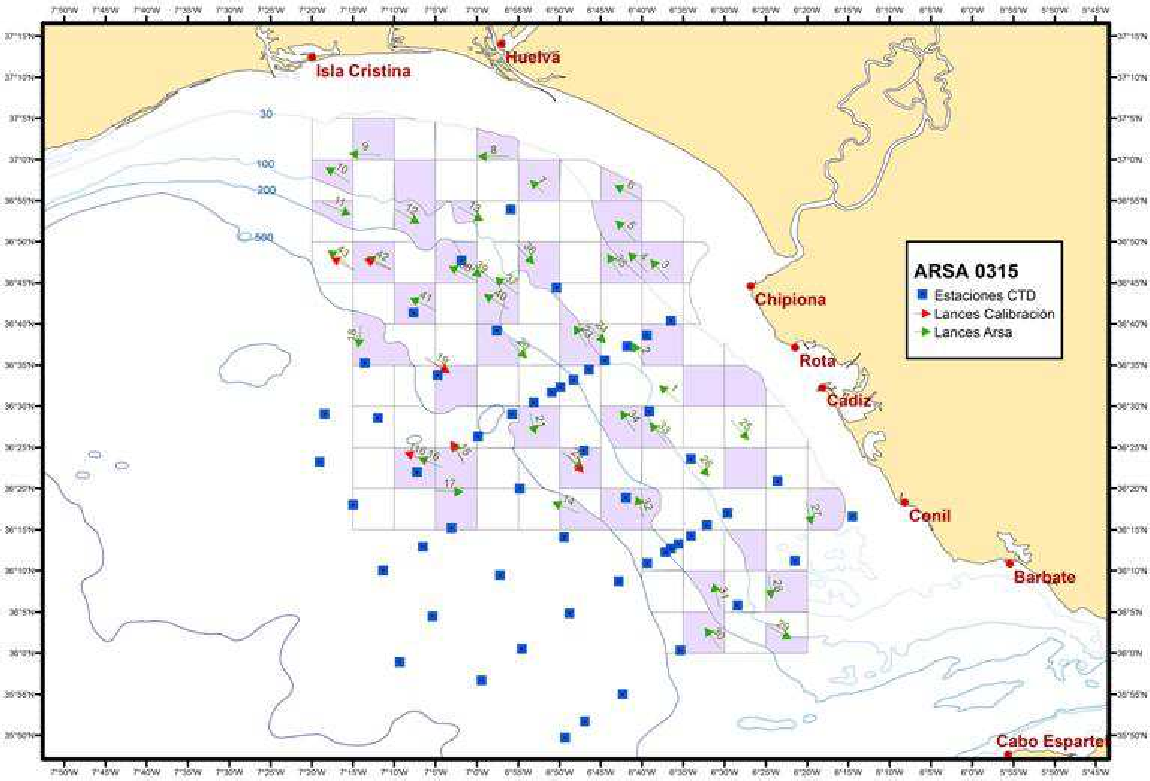

Figure 26: Sampling area with haul and CTD station carry out during a survey IBTS IXa South in 1th Quarter. (ARSA 0315.

Dates: 24th February -08th March 2015.

Duration: 13 days.

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Methodology: 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.

Research Vessel: R/V Miguel Oliver, otter trawler 70 meters length, 14.40 m. breadth, 2495 GT and 2 * 1000kW

Equipment and Sampling gears: Baka trawl 44/60 with a 43,6 m footrope and a 60,1 m headline. CTD Seabird-37.

Number of Hauls: 40 valid haul.

Samplings

Hydrographical Sampling: Temperature and salinity data were also collected during each tow with a CTD attached to the gear. Additionally 54 CTD casts were carried out in the survey area (Figure 26)

Biological sampling: A total of 323 species were captured, 134 fish species, 56 crustaceans, 62 molluscs, 23 echinoderms and 45 other invertebrates.

Number of biological samples: Length distribution of all Fish and main species of crustacean and cephalopods.

Scientific name	**Number of biological samples(maturity and age material, *maturity only)**
Merluccius merluccius	345
*Merluccius merluccius**	2726*
*Parapenaus longirostris**	578*
*Nephrops norvegicus**	517*
*Octopus vulgaris**	90*
*Sepia officialis**	49*

Data storage: survey data are stored by the IEO in its ad-hoc fishery data base SIRENO ((Seguimiento Informático de los Recursos Naturales Oceánicos)).

Deviations: There were no deviations from the Proposal.

III.G.2 Data quality: Results and deviation from NP proposal.

The data obtained are used for calibrating assessment models of demersal species in the ICES Southern area within the group of WGBIE (formerly WGHMM).

Recommendations given by the Expert Group for the planning of these surveys (ICES IBTSWG) are adopted in the survey protocols.

Deviations: There were no deviations from the Proposal.

III.G.3 Actions to avoid deviations.

Not applicable.

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JUVENA

III.G.1 Achievements: Results and deviation from NP proposal

Objectives:

Obtaining an index abundance of juvenile anchovy to predict the recruitment of anchovy (Engraulis encrasicolus) in the Bay of Biscay.

The specific objectives of the survey are:

The estimation of abundance of juvenile anchovy in Autumn in the Bay of Biscay based of acoustic-trawl methodology. Use the biomass of juvenile anchovy as a prediction of next year recruitmetn. Estudio del estado de condición biológica de la anchoa juvenil y su comportamiento en la medida en que puedan afectar al proceso de reclutamiento.

Characterization of the hidrographyadn abundance and distribution of the components of the pelagic ecosystem,relevants to understand the dynamics of the recruitment process.

Study of the trophic interactions between large sub-surface predators (cetaceans and tunas) and their preys in the Bay of Biscay as well as the inter-specific iteractions between marine birds and sub-surface predators.

Acoustic identification and vertical distribution of mesopelagic species in the bay of Biscay.

Sampling area: The sampling area covered the waters of the Bay of Biscay in ICES VIII zone (being 8º40' W and 47º30' N the limits.

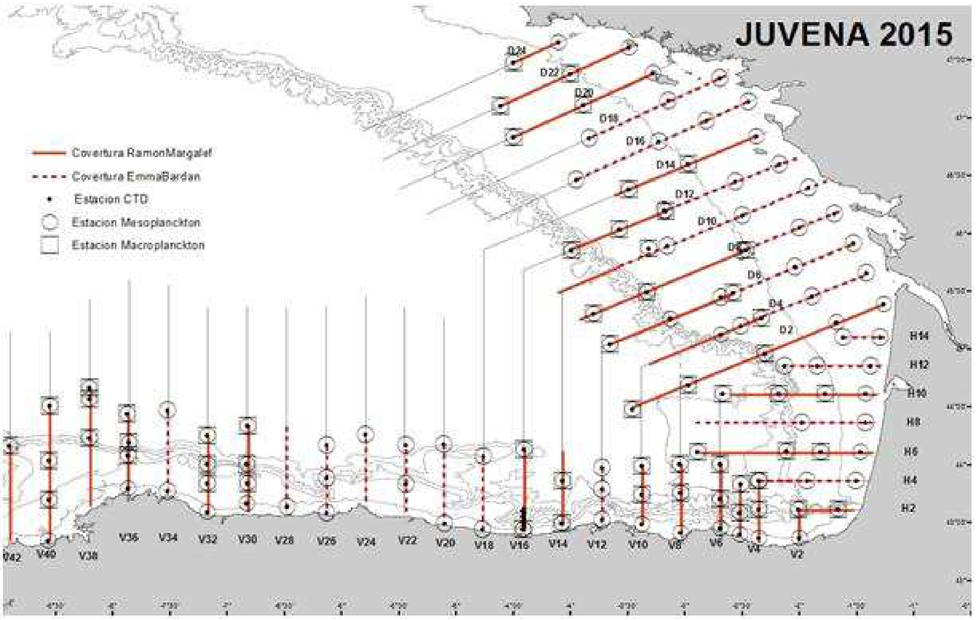

Figure 27: Plankton and hydrography stations done along the survey.

Dates: 1st-30th September 2015.

Duration: 30 days.

Methodology:

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The water column was sampled to depths of 200 m. Acoustic back-scattered energy by surface unit (SA, MacLennan et al. 2002) was recorded for each geo-referenced ESDU (Echointegration Sampling Distance Unit) of 0.1 nautical mile (185.2 m). Fish identity and population size structure was obtained from fishing hauls and echotrace characteristic using a pelagic trawl. Acoustic data, thresholded to -60 dB, was processed using Movies+ software (Ifremer) for biomass estimation and the processed data was represented in maps using ArcGIS. Hydrographic recording was made with CTD casts.

The sampling area covered the waters of the Bay of Biscay (being 8º40' W and 47º30' N the limits, Figure 27). Sampling was started from the Southern part of the sampling area, the Cantabrian Sea, moving gradually to the North to cover the waters in front of the French Coast. The acoustic sampling was performed during the daytime, when the juveniles are supposed to aggregate in schools (Uriarte 2002 FAIR CT 97-3374) and can be distinguished from plankton structures (Figura 28).

The vessels followed parallel transects, spaced 15 n.mi., perpendicular to the coast along the sampling area, taking into account the expected spatial distribution of anchovy juveniles for these dates, that is, crossing the continental shelf in their way to the coast from offshore waters (Uriarte et al. 2001).

During the summer, information from the commercial live bait tuna fishery was collected, in order to have knowledge about the spatial distribution and relative abundance of anchovy previous to the beginning of the survey.

In order to characterize the hydrography and plankton distributions, CTDs and WP2 vertical plankton hauls (40 cm diameter of mouth opening and 200 µm of mesh size) are carried out in both vessels. The stations are done in altern transects distanced around 12 nautical miles yielding around 5 stations per transect. Some of the stations will include also Bongo oblique hauls of 80 cm of mouth opening and 500 µm of mesh size to characterize the community of macro-zooplankton.

Onboard R/V RM, along the acoustic samping transects it is obtained also standardized observational information about abundance of large top predators (birds and marine mammals

Research vessel:

R/V Ramón Margalef: acoustics-trawling, plankton-hidrography, top predators.

R/V Emma Bardán: acoustics-trawling, plankton-hidrography.

Equipment and Sampling gear: Both vessels are equipped with scientific echosounders. The acoustic equipment included three split beam echo sounders Simrad EK60 (Kongsberg Simrad AS, Kongsberg, Norway; Table 1) calibrated using Standard procedures (Foote et al. 1987). In the Ramon Margalef, the 38 kHz, 120 kHz and 200Khz transducers were installed looking vertically downwards, 3 m deep, at the end of a tube attached to the side of the boat, where as at the R/V Emma Bardan the same transducers were installed at the hull. For acoustic data processing the IFREMER Movies+ software was used.

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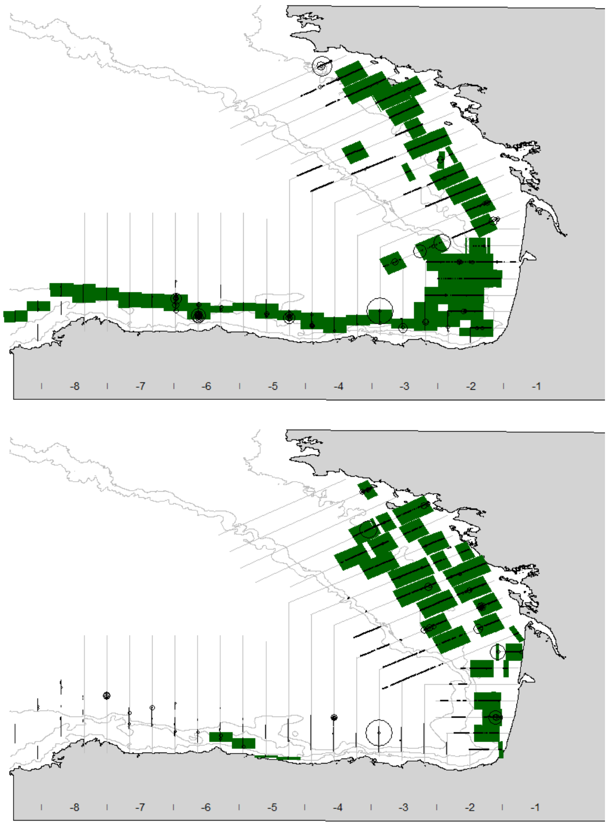

Figura 28: Distribution of acoustic backscattering echointegrated during the JUVENA 2105 survey. The green rectangles represent the positive area strata of anchovy Top: near-surface strata. Bottom: Deep strata. The diameter of the circumferences represents the index of acoustic abundance of all the identified species

Number of hauls:

Plankton: WP2 (40 cm mouth diameter and 200 µm mesh size).

Pelagic trawls: Hampidjan Gloria 15 m vertical opening with Apollo doors of 350 kg.

Plankton stations: 137 stations (Figure 27)

Hydrography: 137 stations (Figure 27)

Pelagic trawls: 79 trawls, 58 positive of anchovy (Figura 29)

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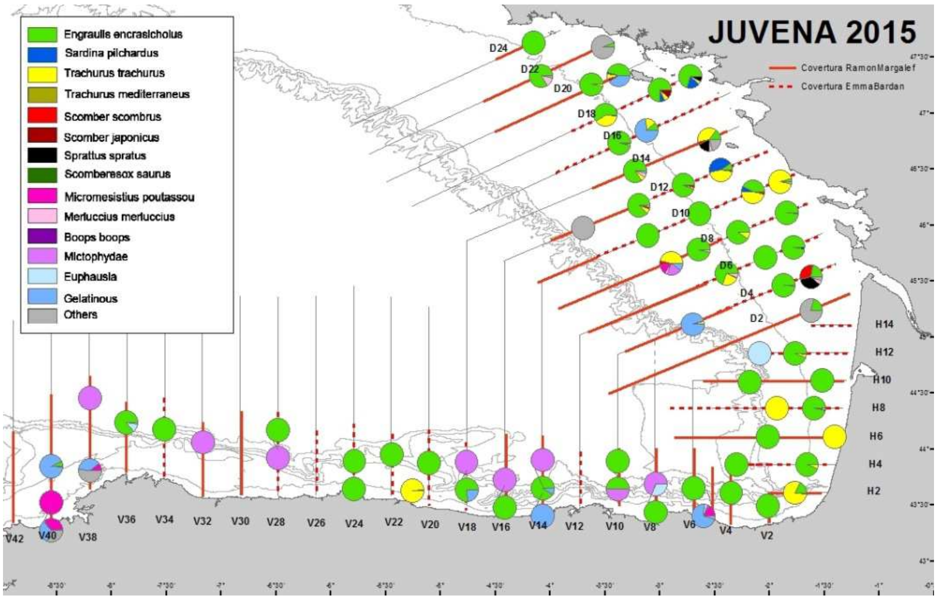

Figura 29: Spatial location and species composition of the pelagic trawl hauls

Sampling

Hydrographic sampling.

-A systematic sampling was done in each plankton station

-CTD cast to obtain temperature, salinity and cholophile in the wáter column down to 200 m depth.

-Water samples for the calibation of the fluorimeter in several pre-defined stations.

-In addition, there was a continuous recording of near surface temperatura, salinity, conductivity and fluorescence onboard R/V Ramón Margalef

Biological sampling:

-Each fishing haul was classified to species and a random sample of each species was measured to produce size frequencies of the communities under study. A complete biological sampling of the anchovy juveniles collected is performed in order to analyze biological parameters of the anchovy juvenile population, as the age, size or size-weight ratio. Using these and other environmental parameters we will try to obtain, in a long term, indexes of the state of condition of the juvenile population, in order to be able to improve the prediction of the strength of the recruitment.

-Biological sampling was performed on the species described in the following table

Species	**N ind**	**Type of sampling**
Engraulis encrasicolus	6111	Length, weight, gutted weigth, age
Sardina pilchardus	544	Length
Sprattu sprattus	389	Length
Trachurus trachurus	2406	Length
Scomber scombrus	809	Length
Somber japonicus	49	Length
Sarda Sarda	2	Length
Micromesistius poutassou	271	Length
Trisopterus luscus	2	Length

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Merluccius merluccius	140	Length
Capros aper	137	Length
Dicentrarchus labrax	1	Length
Maurolicus muelleri	1157	Length
Loligo Vulgaris	1	Length

Plankton sampling:

-Plankton samples are analyzed using semi-automatic methods (FlowCAM, ZooScan and ZooHD) and image analysis techniques.

Data storage: The data are stored in AZTI –Tecnalia. We are considering the feasibility of allowing transference of the data to a global database containing data from other surveys and oceanographic and biologic variables.

Ecosystem indicators: During the survey JUVENA 2015 data were collected to calculate indicators 1, 2 and 3 for the following species: *Engraulis encrasicolus, Sardina pilchardus, Scomber scombrus, Scomeber japónicus, Trachurus trachurus, Merluccius merluccius, Spratus spratus*.

Deviations: There were no deviations from the Proposal.

III.G.2 Data quality: Results and deviation from NP proposal.

Survey's data and estimates are used in the ICES expert groups of both stock assessment of pelagic fish species (WGHANSA) and ICES expert group of acoustic and egg surveys for anchovy in ICES areas VII, VIII and IX (WGACEGG).

Recommendations given by the Expert Group for the planning of these surveys (ICES WGACEGG) are adopted in the survey protocols.

Deviations: There were no deviations from the Proposal.

III.G.3 Actions to avoid deviations.

Not applicable.

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PALPROF

III.G.1 Achievements: Results and deviation from NP proposal

Objectives:

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.

To obtain preliminary data on biodiversity and biomass estimates.

To obtain biological samples (tissues) of the most representative species

Sampling area: Inshore and offshore waters of the Spanish National in eastern Biscay (Division VIIIc east, off the coast of Bermeo, from 400 m to 2500 m deep). Sampling began at a point located 10.5 km north of Cape Matxitxako (43º 33.86 'N, 2 ° 44.19' W) and followed a path of successive hauls northwards following the bottom of the canyon until the 43º43'N and between the latitudes 2º42'W and 2º50'W.

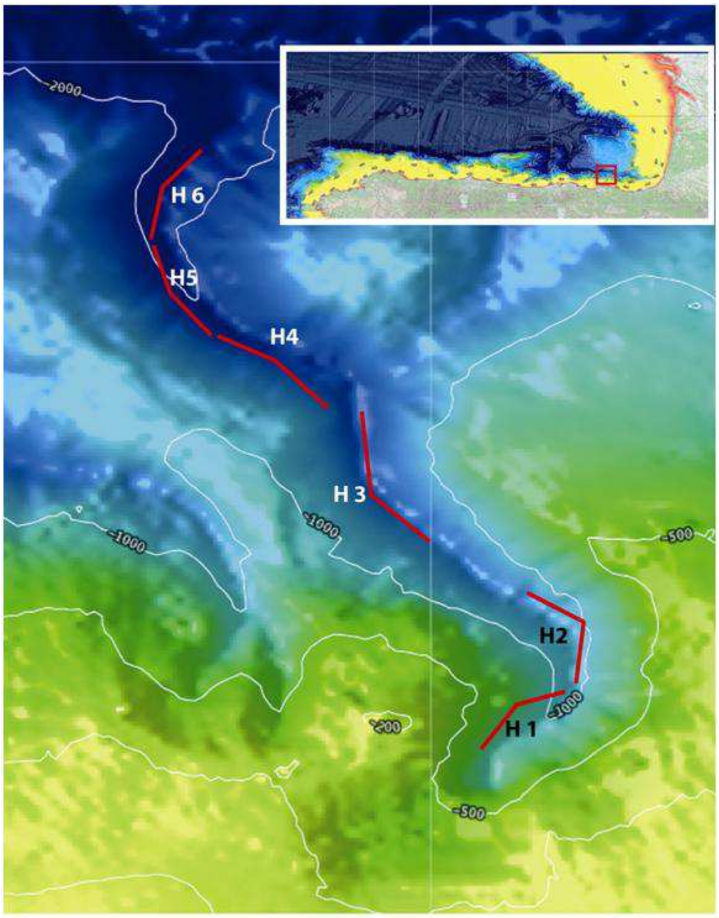

Figure 30: Area covered in the Survey Palprof.

Dates: From October 6 to 19 (2015). During this dates, the survey was carried out in 8 non-consecutive days of effective work at sea.

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Duration: 8 non-consecutive days of effective work at sea.

Methodology:

It was used a modified commercial deep-water fishing gear adapted for the survey. Several modifications of the fishing gear were tried during the survey, and finally it was selected a double gear divided into two equal horizontal line sections of 1750 m +1750 m, each with 150 hooks (300 in total). Each hook was baited with1/3 of mackerel (Scomber scombrus).

The horizontal line was attached to the bottom by means of 1.5 kg stone each five hooks. In order 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 (without hooks) 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 (www.star-oddi.com) able to withstand 2500 m depth. The five DST sensors were attached in the beginning, mid-point and end of the main rope, and also in the center/top of each “floating” section .

The survey areas was 10.5 km north of the Cape Matxitxako in a narrow canyon of about 28 km length that decreases progressively in depth from 500 to 2.500 m .

The survey lasted eight days, from the 8th to 19th of October. Each day one haul was accomplished; the vessel left the port at 8:00 a.m. and came back the same day after recovering the fishing gear. The gear was hauled soon in the morning and recovered 2 hours (soak time/effective fishing time) after the deployment of the boy in the end of the line. In order to compare the horizontal line speed to reach the bottom, the fishing gear was deployed in hauls 2, 4 and 6 with the boat moving forward in a straight trajectory and in hauls 1, 3 and 4 in zig-zag and with one or two vertical lines.

The average duration of the haul (from the start of the deployment until the last hook recovery) was 7:30 hours. Of the eight hauls, the first one was considered as testing haul, and other was considered as no valid due to difficulties in positioning the vessels over the planed position. The survey started the first day at 650 m of depth until the whole length of the line was deployed over the bottom, and annotating the final position that coincided with the starting position for the next day haul.

For the calculation of the fishing effort several categories of the hook status were recorded, both during the deployment and the recovering of the long line:

Null (N)-Lost of bait during the hauling

In the recovering of the line

Entire (E)-Hook with bait

Eaten (C)-Hook with bait partially eaten

Broken (R)-Tangled-broken hook

Empty (V)-Empty hook (no catch, no bait)

With catch (P)-Hook with catch

The specimens were identified individually on board, measured (cm), weighted (g), sexed and the condition (dead or alive) annotated.

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.

Catch per Unit Effort (CPUE1) was standardized to soak time (min) and to 300 hooks.

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CPUE 1 = kg (in 300 hooks)/min

A second CPUE (CPUE 2) was calculated removing from the 300 hooks the Null, Tangled and emptied hooks (FC).

CPUE 2 = CPUE 1 x FC*

*FC =(300-(R+N+V)/300:

Vessel: Commercial vessel ITOITZ 3-BI 4-1-02 (bottom longliner: code: 25490):

Equipment and Sampling gear:

It was used a modified commercial deep-water fishing gear adapted for the survey. Several modifications of the fishing gear were tried during the survey, and finally it was selected a double gear divided into two equal horizontal line sections of 1750 m +1750 m, with 300 hooks in total. The horizontal line was attached to the bottom by means of 1.5 kg stone each five hooks. In order 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 (see figure 1).The fishing gear was linked to the surface by two vertical lines (without hooks) and two buoys placed at the beginning and end of the horizontal line

Number of hauls:

The 6 six valid haul deployed a total of 1795 hooks (average de 299,2 hooks/haul), with a total length of 19.195 m of the horizontal line over the bottom. The range of depths was from 647 m to 2.244 m.

The number of specimens measured (cm), weighted (g), sexed on board is shown in Table 3

Sampling

-Biological sampling was performed on the species described in the following table

Species	**N indiv**
Centroscymnus coelolepis	31
Mora moro	24
Etmopterus princeps	21
Deania calcea	14
Galeus melastomus	9
Antimora rostrata	8
Aphanopus carbo	8
Centrophorus granulosus	3
Pseudotriakis microdon	3
Centrophorus squamosus	2
Hydrolagus pallidus	2
Phycis blennoides	2
Synaphobranchus kaupii	2
Centroscymnus crepidater	1
Conger conger	1
Deania hystricosa	1
Hexanchus griseus	1
Hydrolagus affinis	1
Lophius piscatorius	1
Prionace glauca	1
Scymnodon ringens	1

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Data storage: The data are stored in the database of AZTI Tecnalia, and is considering moving to a global database, comprising other surveys, oceanographic variables, biological, etc

Ecosystem indicators: In the survey PALPROF 2015 data fort the indicators 1, 2 and 3, were collected for 11 deep-water sharks, 2 chimaera and de teleost species

Deviations: There were no deviations from the Proposal.

III.G.2 Data quality: Results and deviation from NP proposal.

Survey's data and estimates are utilized in the ICES expert groups WGDEEP and WGEF.

The total length sampled in the 6 valid hauls was 19,195 m + 6095 m of the two hauls not counted in the analysis.

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

Deviations: There were no deviations from the Proposal.

III.G.3 Actions to avoid deviations.

Not applicable.

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Annex IV

Pilot Study Report

Sea bass (Dircentrarchus labrax) catch and release mortality in recreational fisheries

by

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BACKGROUND

Boat and shore fishing are socially rooted recreational activities in the Basque Country, which have significantly increased their number of participants in recent years. This increasing trend can also be seen in the rest of the Spanish state and in other parts of the world (Pawson et al, 2008).

The European framework for fisheries data collection defines recreational fishing as "an activity of non-commercial fisheries exploiting water resources for leisure or sport" (EC 199/2008). To date, in the majority of exploited stocks in European waters, the commercial fishing mortality has been the only source of data on which the scientific advice for management has been based. However, some species are widely exploited by recreational anglers, as it is the case of sea bass. As pointed out by the ICES group "Planning group for Recreational Fisheries Surveys", including recreational fleet data during the evaluation of this species could make improvements in its management (ICES, 2013).

During 2012/2013, and for the first time, data from recreational fishing were included in two ICES stock assessment groups. These were the cases of Baltic cod (Baltic Workshop on Multispecies assessment) and seabass in the Atlantic, for the stock comprising the Celtic Sea, English Channel and North Sea (IBP-NEW). In this sense, there is still some uncertainty about the proportion of recreational catches on the total catch, however in the case of European seabass these estimates are around 25% (ICES, 2014b). On the other hand, the catch and release is an increasingly used option among recreational fishermen, either by legislative reasons such as minimum size, either by further consciousness. According to a study recently published by Ferter et al., (2013), the rate of sea bass Catch and Release (C & S) in Europe is between 19% in Portugal and 77% in England. Thus, knowing the number of individuals that survive after the C & S becomes crucial for the estimation of the total mortality conducted by anglers. In the case of seabass, today there are no studies in this regard, so the lack of knowledge about post-release mortality in recreational fisheries has been identified as an obstacle to the correct assessment of the stocks of European seabass (ICES, 2014b).

Since 2011, AZTI has conducted several pilot studies on recreational fisheries (Zarauz, 2015; Ruiz, 2014). Sea bass catch estimates exceed 100 tonnes per year, demonstrating that this species is one of the main target species for the recreational sector. However, the survival rate of the so-called "catch and release" remains completely unknown.

The main objective of this pilot study was to estimate the survival rate of post-release sea bass captured by the typical recreational fishing techniques. This research will therefore provide information estimate the real recreational fishing mortality of sea bass, thus improving its assessment and management.

INTRODUCTION

European sea bass is a widely distributed species in shelf waters of the northeast Atlantic with a distribution ranging from southern Norway, through the North Sea, the Irish Sea, the Bay of Biscay, the Mediterranean and the Black sea to northwest Africa (ICES, 2006).

Based on the most recent studies of ICES, there are four different stocks or management units (Figure 31). The stock which lies further south is situated in Iberian waters, in ICES subarea IX and division VIIIc. Regarding its regulation, the bass is not subject to TACs and quotas. However it has a minimum catch size of 36 cm for the stock in Iberian waters, affecting this measure both professional and recreational sectors. The recreational sector also has various restrictions at the local level; anglers must be in possession of a fishing license issued by the Basque Government, there is a bag limit of 5 kilos per license, and gear type and number of hooks are limited (Zarauz et al., 2013 shows a detailed description of the current regulations in the Basque Country regarding recreational fishing).

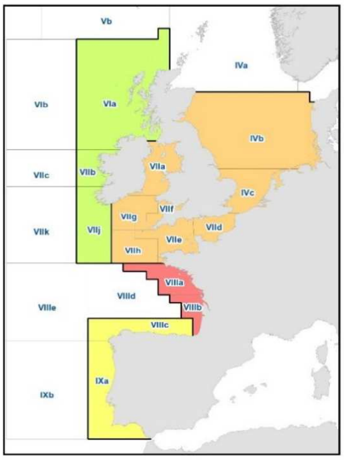

Figure 31:.Sea bass stocks as defined by ICESS (IBP new 2012)

In recent years, it has been estimated that in the stock located in the Channel between Britain and France and North Sea (divisions IVbc and VIIa, d-h), recreational catches account for 25% of the total (ICES, 2014b). Thus, they are included in the assessment and management. Similarly, sea bass recreational catches in Cantabrian waters appear to be significant (Zarauz, 2015; Ruiz, 2014), thus, even if still remain uncertain, cannot be ignored.

The sea bass is one of the fish most prized by recreational fishermen who catch both the coast and from a boat. Recent studies by AZTI (Ruiz et al., 2014) estimate that the total sea bass catches in the Basque Country come mainly from the professional trawling fleet. However, most of these commercial catches occur in waters in front of the French coast (ICES divisions VIIIabd). If we consider only catches in the Basque coastal strip (ICES division VIIIc), the importance of recreational fishing far exceed the professional, and the impact on the Iberian waters stock could be significant.

The fishing techniques and baits used by recreational fishermen, whether from shore or boat, are very diverse; trolling, casting, spinning, jigging, etc. These fishing techniques are divided into two large groups; active and passive. In the first case, the bait (artificial in most cases) is moving by fisherman's action, simulating a live prey trying to escape. In the second case, the bait (natural in most cases, either living or dead) is still, waiting to be swallowed by a sea bass.

It is important to mention that the practice of "catch and release" is an increasingly used option among recreational fishermen, either by legislative reasons such as minimum size, either by further consciousness. The survivability of these individuals is

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assumed high, although it is necessary to study as it will vary depending on many factors such as the type of hook, release time, fight time or depth of capture (ICES, 2014b).

Outside Europe, in the United States, NOAA Fisheries (US National Marine Fisheries Service) has estimated a post release mortality rate of 9% for the Atlantic striped bass (*Morone saxatilis*) (Diodati and Richards, 1996). This species is morphologically similar to European sea bass and its habitat and recreational fishing techniques are also comparable. A literature review conducted by the Division of Marine Fisheries Massachusetts on mortality caused by hooking wounds in various species, wich included a total of 40 experiments from 16 different authors, estimated the post release mortality rate of striped bass in 19% (standard deviation 0.19) (Gary A. Nelson, Massachusetts Division of marine fisheries, pers. comm.).

In Europe the rate of post release survival of marine species is virtually unknown (Ferter, 2013). In the case of seabass, today there are no studies in this regard, so European scientists have been forced to use values of other species such as the striped bass (ICES, 2014b). The lack of knowledge about post-release mortality in recreational fisheries has been identified as an obstacle to the correct assessment of fishery resources in general, and especially bass. This project will therefore to provide information in this regard and to know what the real recreational fishing mortality of this species, thus improving their assessment and management.

MATERIAL AND METHODS
Experimental survey
During the experimental phase it was tried to capture the largest number of wild sea bass using fishing techniques typically used by recreational anglers, to keep then under controlled conditions later, and to study their survivability rate.

All catches took place in the dock ramp located at Bilbao Superport in Santurce (43 ° 19'54.66 "N, 3 ° 1'46.21" W) (Figura 32), preferably during the predawn hours on which the probabilities of bass fishing were higher.

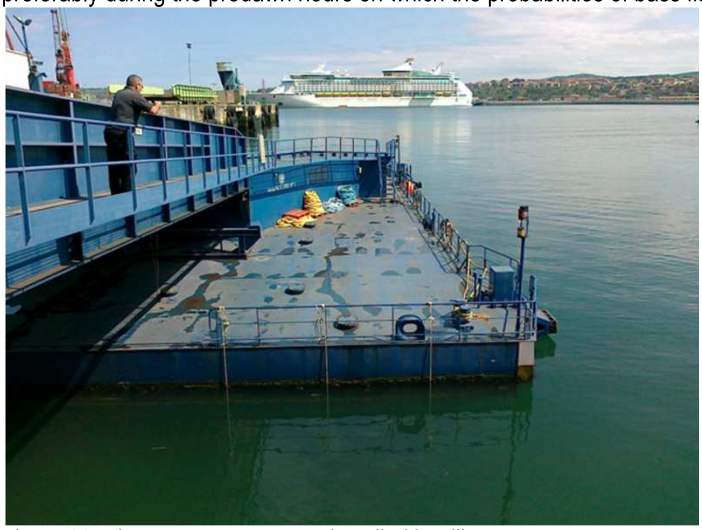

Figura 32: Place were cages were installed in Bilbao Port.

Catches were done with the most common techniques used by angler and using the following hooks/lures (Figure 3):

- Simple hook with live bait (SCV).

Two MUSTAD models were used:
- "Chinu" 10001Np-BN "beak point, no ring, 20 mm
- "Chinu" 10019Np-BN "beak point, with ring, 22 mm

- Simple hook with artificial bait (SA):

FIIISH, model Black Minnow 70 mm, head of 3 and 5 g
Unbranded, 70 mm, head of 3 g

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- Triple hook with artificial bait (TA)

TETRA WORKS DUO, model Bivi 40 mm, head of 3.8g

As live bait grass prawn (*Palaemon elegans*) (Figura 33) and sometimes bogue (*Boops boops*) was used. When SCV is used, fishing technique is passive, that is, the bait is still waiting to be swallowed. On the contrary, in cases where SA or TA is used, the fisherman has constant control of the rod, constantly moving the artificial lure to simulate a fleeing prey.

Figura 33: Hooks/lures used during the experiment .Triple hook with artificial bait (TA), Simple hook with artificial bait (SA) and Simple hook with live bait (SCV).


Figura 34: .Simple hook with live grass prawn.

Catch and release of each sea bass was done by a sequential protocol in which the following data were recorded

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- hook types
    - SCV
    - SA
    - TA
- Fighting time (min): estimated time from the bite of the specimen to the unhooking.
- Injury Type: Up to 8 different types of wounds based on the body area in which the hooks may get embed (Figura 35):
    - Outer Operculum / jaws (M)
    - Exterior mouth (BE)
    - Interior mouth / palate / oesophagus (BI)
    - Eye (O)
    - Internal Gill (A)
    - Belly (V)
    - Back (L)
    - Tail (C)

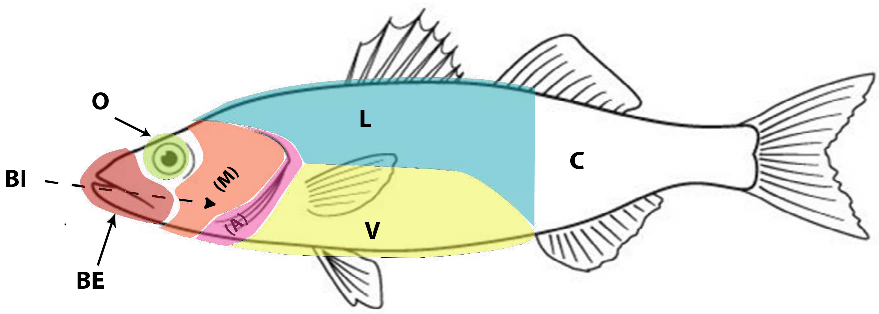

Figura 35:. Different areas where the hook can cause injuries.

- Photographs: Each caught sea bass was photographed before being unhooked to keep track of the type of injury
- Unhooking mode: It was noted if the unhooking was manual (M), forceps were used to release the hook (P) or if the line was cut and hook was leaved inside (CH).
- Day and time of capture
- Length in cm

After unhooking, sea bass were transferred as soon as possible in a bathtub and tagged with a "FD-94 anchor tag" (Floy Tag & Manufacturing, Inc. USA) (Figura 36).

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Figura 36. Specimen tagged with "FD-94 anchor tag".

In addition to post release mortality, RAMP index (Reflex Action Mortality Predictor) (Davis 2007) was also studied to evaluate the deterioration of vitality and injuries of specimens. The deterioration of the reflexes would be produced by the catch and release process, and would relate to the fishing technique, as well as subsequent handling. The RAMP index, once calculated, can be used to estimate post release survival rate after being caught by different gears. Thus, in this particular case RAMP index was used to estimate the post release mortality of the sea bass caught with rod and reel.

The methodology is to measure the deterioration of the reflexes of fishes on a scale of categories (and injuries if any) and to relate the observed mortality later. In the case of this study, once measured the deterioration of the reflexes, individuals are kept in cages to test the mortality, after a certain time (7 days).

After being unhooked and submerged in the bathtub, the presence / absence of the following reflections descriptors deterioration in vitality (RAMP reflexes) were recorded, obtaining a score for each fish:

- BF (Body Flex): body movement during unhooking
- Eye (Eye-Roll): eye movement
- HC (Head Complex): mouth/operculum movement
- FE (Fin Erection): bristling dorsal fin
- T (Tail Grab): move when touching her tail
- (Orientation): Body Orientation, if submerged in the bathtub returns to its natural position
- Es (Startle Response): Escapes, active swimming when released to the environment

Finally, if any, different injuries during capture and unhooking were recorded; mainly the presence of bleeding or loss of scales.

For the survivability estimation, released sea bass were kept on cages under controlled conditions during 7 days. The period of 7 days was established according to the data published by Aalberts *et al*. (2004) in which they observed that 100% of striped bass mortality captured by hook was before the first 5 days. After this 7 days period sea bass were released. For the experiment 3 one m^3 volume cylindrical cages were used (Figure 7), with stainless steel structure covered with a seine net. Cages were installed on the same dock where fishing occurred. One cage was equipped with a probe SBE37 RS232 (Sea-Bird Electronics Inc., USA) for recording continuous temperature, conductivity, salinity and depth. O^2 concentration in the water was monitored periodically with a portable probe YSI 556 MPS (YSI Environmental).

Caged seabass were fed with specific feed for juveniles (Efico YM 857). Cages were reviewed in intermediate times before to the day of release, to monitor and to recover dead specimens, if any. Dead individuals were taken to AZTI laboratories for the particular analysis of the location and the consequences of the injuries caused by the hooking.

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Figura 37. Cages used during the experiment.

RESULTS

A total of 103 sea bass were caught. Size range was between 23 and 43.5 cm length (Table 1).

Tabla 6: Biometric data of caught sea bass

n	Mean long (cm)	Long max (cm)	Long min (cm)
103	32.9	43.5	23.0

Catchability by fishing technique and

82% of the catches were done using (SCV) simple hook and live bait (Tabla 7). The catchability using artificial lures was lower, even if different attempts were done every day.

Tabla 7: Catchability by hook (fishing technique) type.

Hook type	% catches
SA	11%
SCV	82%
TA	7%

Injury type frequencies

With the SVC hook, the most common type of injury (62%) was in the interior of the mouth / palate / esophagus (BI), 36% outside of the mouth (BE) and only 2% in the gill (A) (Tabla 8). No wounds were appreciated in the rest of the locations.

Tabla 8. Location of the injuries caused by the simple hook with live bait (SVC).

Injury type	Frequency
A	2%
BE	36%
BI	62%

Mortality by injury type

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Overall 16 sea bass (15.5%) died after being catch and release. 15 died inmediatelly after capture (between 15 and 146 minutes after being captured). One was found in an advanced state of decomposition on the third day of confinement in one of the cages, which was supposed to die on the same day that was caught and caged. Of these 16 dead sea bass, 81% of the mortality was recorded as a result of BI-type wounds, 13% due to wounds BE and 6% due to wounds type A (Tabla 9). If we analyze separately the mortality rates for each of the different types of injury, we observe how 20% of seabass who suffered internal injuries died. 5% of individuals with wounds BE died and 50% of the injuries on gills were fatal (Tabla 10).It is true that in the latter case only two catches present injuries on gills, so the result is not conclusive.

Tabla 9. Total mortality by injury type

Injury type	Mortality rate
A	6%
BE	13%
BI	81%

Tabla 10. Specific mortality rate by injury type

Injury type	Number of dead individuals	Number of survivals	Specific mortality rate
A	1	1	50%
BE	2	35	5%
BI	13	51	20%

Mortality by hook type

18 % (caught: 85, died: 15) of the individuals caught with SCV died. 11 sea bass were caught with SA, and only one (9%) died. No mortality was recorded within the 7 individuals caught with TA hooks (Tabla 11).

Tabla 11. Mortality by hook type

Hook type	M
SA	9%
SCV	18%
TA	0%

Within the 15 dead sea bass that were caught with SCV, 87% of the mortality was due to BI injuries (13 individuals), while the other two individuals presented BE and A injuries respectively (Tabla 12). The only dead sea bass caught with SA presented a BE injury.

Tabla 12. Mortality by injury type with SVC hooks

Hook	Injury	M
SCV	A	7%
	BE	7%
	BI	87%

Mortality by unhooking type

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Unhooking of caught individuals was done in three different ways; Manually (M), with pincers (P) and no-unhooking (CH) for those cases where the hook was deep hooked into the esophagus. In this last case the line was cut leaving the hook inside the animal. Unhooking was done manually in 61 cases, pincers were used 22 times, and the line was cut in 19 cases.

Tabla 13 shows the mortality rate by unhooking type and injury type. Within individuals that presented BI injuries, the highest mortality rate (30%) was observed on the individuals unhooked with pincers (P), secondly on individuals that were not unhooked (21%), and lowest mortality rate was appreciated on manually unhooked sea bass (12 %).

Tabla 13. Mortality by unhooking type and injury

Unhooking type	Injury type	Numbers caught	Mortality rate (n = 16)
CH	BI	18	21%
	A	1	0%
M	BE	35	6%
	BI	26	12%
P	A	1	100%
	BE	1	0%
	BI	20	30%

RAMP analysis

Within the 16 dead sea bass, reflexes with lower presence were; Orientation (O) in 63% of the individuals, Tail Grab (T) in 69%, and Escape (Es) in 75% of the cases (Table 8). Within survivals, presence of reflexes was generally higher compared to dead individuals. Head complex (HC) and Orientation (O) were the reflexes that were observed in the lower number of survivals (97%) (Tabla 14).

Tabla 14. Presence (percentage) of RAMP reflexes after catch.

	n	BF	Eye	HC	FE	T	O	Es
Dead	16	94%	100%	94%	100%	69%	63%	75%
Survival	87	100%	99%	97%	99%	100%	97%	99%

Tabla 15s hows the presence of the RAMP reflexes according to the wound type for sea bass that do not survive.

Tabla 15. Presence (in percentage) of the RAMP reflexes according to the wound type for sea bass that do not survive

Injury type	n	BF	Eye	HC	FE	T	O	Es
A	1	100%	100%	100%	100%	0%	0%	100%
BE	2	50%	100%	50%	100%	50%	50%	100%
BI	13	100%	100%	100%	100%	77%	69%	69%

For the specimens that survive, presence/absence of the RAMP reflexes was also recorded at the time of the release. All reflexes were present in 86 of the 87 survivors after the period of 7 days seabass. Most of the released seabass showed great vitality during the release, the exception occurred in a single 28 cm individual, caught with SVC that presented a wound BI, in which all reflections of the list were observed but they were very weak, so their presence was considered as doubtful.

Lesions caused by the different type of wound

The 16 dead sea bass were immediately transported to AZTI laboratories for conducting an autopsy in order to detect and locate more precisely the injuries and lesions caused by the hooking. 13 presented BI type injuries, 2 presented BE wounds and a single sea bass presented wound type A. Within the dead sea bass with wounds BI, dominant lesions were internal bleeding, wounds in the heart and blood clots in the visceral cavity. Within the group of sea bass with wounds BE, external bleeding

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injuries (outside the mouth) and mouth sores were predominant. The sea bass with wound on gills (A) died quickly after being unhooked as result of heavy bleeding (Tabla 16).

Tabla 16. Lesions caused by the different type of wound

Wound type	Hook type	Internal bleeding	External bleeding	Blood Clot	head injury	gill lesion	heart injury	Esophagus injury	Lip injury	Other
BI	SCV							X		
BI	SCV									X
BI	SCV	X								
BI	SCV	X								
BI	SCV	X		X	X					
BI	SCV	X					X	X		
BI	SCV	X					X	X		
BI	SCV	X					X	X		
BI	SCV				X					
BI	SCV			X			X	X		
BI	SCV	X								
BI	SCV		X	X						
BI	SCV	X				X				
BE	SA		X						X	X
BE	SCV		X							
A	SCV		X			X				

References

Aalberts, S., Stutzer, G., Drawbridge, M., 2004. The Effects of Catch-and-Release Angling on the Growth and Survival of Juvenile White Seabass Captured on Offset Circle and J-Type Hooks. North American Journal of Fisheries Management 24:793–800.

Davis, M.W. 2007. Simulated fishing experiments for predicting delayed mortality rates using reflex impairment in restrained fish. ICES J. Mar. Sci. 64:1535-1542.

Diodati, P. and R.A. Richards. 1996. Mortality of striped bass hooked and released in salt water. Transactions of the American Fisheries Society. 125: 300–307.

EC. 2008a. Council Regulation (EC) No. 199/2008 of 25 February 2008 concerning the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy

Ferter, K., Weltersbach, M. S., Strehlow, H. V., Vølstad, J. H., Alo´ s, J., Arlinghaus, R., Armstrong, M., 2013. Unexpectedly high catch-and-release rates in European marine recreational fisheries: implications for science and management. ICES Journal of Marine Science: Journal du Conseil, 70: 1319–1329.

ICES. 2013. Report of the ICES Working Group on Recreational Fisheries Surveys 2013 (WGRFS), 22-26 April 2013, Esporles, Spain. ICES CM 2013/ACOM:23. 49 pp.

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ICES. 2014. Report of the Working Group on Recreational Fisheries Surveys (WGRFS), 2-6 June 2014, Sukarrieta, Spain. ICES CM 2014\ACOM:37. 662 pp.

ICES. 2014b. Report of the Inter-Benchmark Protocol for Sea Bass in the Irish Sea, Celtic Sea, English Channel and Southern North Sea (IBP Bass), 1 January–30 April 2014, By correspondence. ICES CM 2014/ACOM:45. 218 pp.

ICES. 2006. Report of the Working Group on the Assessment of New MOU Species (WGNEW), 13–15 December 2005, ICES Headquarters. ICES Advisory Committee onFishery Management. 234 pp.

Pawson M.G., Glenn, H., Padda, G. (2008). The definition of marine recreational fishing in Europe. Marine Policy, 32: 339-350.

Ruiz, J., Zarauz, L., Andonegi, E., Urtizberea, A., Mugerza, E., Artetxe, I., 2014. Establecimiento de un sistema de recogida sistemática de datos sobre pesca recreativa. Informe AZTI para Gobierno Vasco-Eusko Jaurlaritza

Zarauz, L., Prellezo, R., Mugerza, E., Artetxe, I., Roa, R., Ibaibarriaga, L. y Arregi, L., 2013.Análisis dela flota recreativa y de su impacto socioeconómico y pesquero en Euskadi.Revista de Investigación Marina, AZTI-Tecnalia, 20(4): 37-70

Zarauz, L., Ruiz, J., Urtizberea, A., Andonegi, E., Mugerza, E., and Artetxe, I. ,2015. Comparing different survey methods to estimate European sea bass recreational catches in the Basque Country. – ICES Journal of Marine Science, doi: 10.1093/icesjms/fsv054.

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