

Biological Data Collection of pelagic fisheries in CECAF waters

Manual for scientific observers on board EU pelagic trawlers in CECAF area

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1 Introduction

In most marine waters in the world, management of fisheries is based on information of the fisheries and information of the fish stocks. Information is needed on the number of vessels, the size of the vessels, the amount of fishing and the composition of the catch. Scientists need that information in order to be able to give advice to the managers on the potential exploitation of the fish stock and what the likely consequences of different management scenarios are. Managers need that information and scientific advice to regulate the fishing activity.

Statistics on the catch composition and fishing activity of the vessels are available from the fishery by log-books and documents from fish auctions. The fishing gear which was used in the fishing operation is also identified through the log-books. In addition, sometimes information on the fishing area of the vessels is available by satellite monitoring (VMS).

Biological information of the catches and the fish stocks is collected by scientists through sampling programmes of the catch (landings and discards). This information is used to assess the dynamics of the stocks and its response to the fishery. Also surveys can provide information of the dynamics of the stock. The information from the surveys is fishery independent and is often used together with the information from the fishery in an assessment of the historical dynamics of the stock.

In 2001, the European Union (EU) introduced legislation which obliges EU Member States (MS) to collect data from the fisheries by EU fleets and the fish stocks they are fishing. This legislation consisted of a set of Data Collection Regulations, also called the DCR. The DCR was split in a Minimum Programme (MP) and an Extended Programme (EP). The collection of data in the MP was mandatory and the collection of data in the EP was optional. The sampling of the stocks and fishery in CECAF area (mainly the Moroccan and Mauritanian waters) was part of the optional programme. Therefore, the EU MS (with the exception of Spain) fishing in CECAF waters had not included the biological sampling of the catches in this area in their national sampling programmes.

The EU legislation on fisheries data collection has been revised twice. In the newest set of Regulation (Data Collection Framework, DCF) and Implementing Decisions (Multi-annual Programme, also called EU-MAP; National Work Plan template), the focus has again changed from sampling métiers rather than fish stocks to an overall regionalization. The sampling of catches in non-EU waters (including Moroccan and Mauritanian) has become mandatory. Since a large part of the catch is landed in non-EU countries, the access of MS to sample the catch is limited. Therefore, cooperation is sought with the countries which have access to the catches. This cooperation mainly takes place within the Regional Co-ordination Group (RCG; formerly RCM = Regional Co-ordination Meeting) for the Long-Distance Fisheries, established in 2010.

This document describes what kind and how much biological information is required from the pelagic fishery by EU vessels fishing in relevant waters based on the EU-MAP. In addition, Regional Fisheries Management Organisations may define data needs, for which the collection is also mandatory.

In this document, the relevant elements for the sampling of the pelagic stocks in CECAF waters are extracted from the EU-MAP, and a common sampling programme is proposed which defines the sampling needs on a regional basis supported by all EU MS operating a pelagic fishery in this area.

2 Member States fishing in CECAF waters (except Madeira fishing ground)

The fishery in Mauritanian, Moroccan and Guinea-Bissau waters is regulated through agreements between those countries and other parties including the EU. The first agreement with the EU dates from 1996. The recent fishery agreements contain conditions regarding logbooks and (scientific) observers.

Scientific advice is provided through CECAF, which is a regional science organization, under the FAO, without fisheries management responsibility but supporting sustainable use of the biological resources through e.g. providing advice and the support of assessment WG.

The pelagic fishery takes place all year round within the 200-miles zones. The fishery is carried out by The Netherlands, Germany, Poland, Lithuania and Latvia, besides non-EU fishing vessels. The main activity is from May to October directed to *Sardinella aurita*. During the rest of the year, there is a limited fishery on other species (sardines and horse mackerel). Parts of the catch are landed into the EU in Las Palmas (Canary Islands, Spain), however, these landings are limited under the current agreements as these stipulate that the primary locations for landing are to be found in the region. Landings in Las Palmas are in general limited to vessels returning to European waters.

The landings (in tonnes) for métier OTM_SPF_>40_0_0 are listed in the table below (source: RCM/RCG participants' data),

Member State	2014	2015	2016	average 2014-2016
Netherlands	64'661	14'898	21'722	33'760
Germany	8'282	18'283	20'689	15'751
Poland	19'934	4'496	30'488	18'306
Lithuania	102'129	26'226	75'788	68'048
Latvia	57'561	14'303	47'742	39'869
TOTAL	252'567	78'206	196'429	175'734

3 Legal Framework

The legal framework for the collection of fisheries data within the CECAF region consists of regulations adopted by the Council of Ministers of EU MS and regulations and decisions implemented by the European Commission (EC). The current regulation is *Regulation (EU) 2017/1004 of The European Parliament and of the Council of 17 May 2017 on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 and Commission Implementing Decision (EU) 2016/1251 of 12 July 2016 adopting a multiannual Union programme for the collection, management and use of data in the fisheries and aquaculture sectors for the period 2017-2019*.

Within the EU-MAP, it is laid down that biological and other data shall be collected. Those data are biological data on stocks caught by Union commercial fisheries in Union and outside Union waters and by recreational fisheries in Union waters as well as data to assess the impact of Union fisheries on marine ecosystems in Union water and outside Union waters.

Regarding the assessment on the impact of the fisheries on the ecosystems, it is stated that for all types of fisheries, the data should in addition to data on commercially caught species consist of incidental by-catch of all birds, mammals and reptiles and fish protected under Union legislation and international agreements, including absence in the catch, during scientific observer trips on fishing vessels or by the fishers themselves through logbooks.

Following EU regulation 1004/2017 and EU Implementing Decision 1251/2016 a "*Multi-lateral agreement between Germany, Latvia, Lithuania, The Netherlands and Poland for biological data collection of pelagic fisheries in CECAF waters 2018-2020*" (Multi-lateral agreement - CECAF) was set in 2017. According to this multi-lateral agreement, the National Marine Fisheries Research Institute (NMFRI) from Poland will coordinate the execution of biological data collection from the EU fisheries for small pelagics by freezer trawlers in the CECAF area and the Wageningen Marine Research (WMR) from The Netherlands will cooperate with NMFRI in data validation, data processing and data delivery to the relevant end-users. The relevant contact details can be found in Annex 5.

4 Sampling programme data requirements

The main reason for the fisheries data collection is to supply the scientific working groups with the necessary data to assess the state of the fish stocks. The following text is based on the data requirements of the FAO Working Group on the Assessment of Small Pelagic Fish in Northwest Africa. Additional requirements are laid down in the EU-MAP referring to incidental by-catch (see 4.3) and the collection of biological information for other species not handled within that working group (see 4.4).

The FAO Working Group on the Assessment of Small Pelagic Fish in Northwest Africa is an international group of scientists that meets each year to assess the state of the major pelagic fish stocks off the coast of West Africa from Morocco to The Gambia, and also around the Canary Islands. For this purpose, the group requires sampling data that are collected by the participating countries, both at sea and at the landing sites.

At the time of writing this manual (December 2017), the following species are assessed on an annual basis by the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa and therefore require sampling. For each species, the standard unit of length is given.

Table 1. Species assessed by the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa

Common name	Scientific name	FAO 3-alpha code	Length measurements
Anchovy	<i>Engraulis encrasicolus</i>	ANE	0.5 cm below
Sardine	<i>Sardina pilchardus</i>	PIL	0.5 cm below
Round sardinella	<i>Sardinella aurita</i>	SAA	1 cm below
Flat sardinella	<i>Sardinella maderensis</i>	SAE	1 cm below
Atlantic horse mackerel	<i>Trachurus trachurus</i>	HOM	1 cm below
Cunene horse mackerel	<i>Trachurus trecae</i>	HMZ	1 cm below
False scad	<i>Caranx rhonchus</i>	HMY	1 cm below
Chub mackerel	<i>Scomber colias</i>	MAS	1 cm below
Bonga	<i>Ethmalosa fimbriata</i>	BOA	1 cm below

A description is given of the data needed by the working group for its assessment, and the sampling procedures for collecting the data. It should be noted that the data described here are minimum requirements for stock assessment. It merely specifies the data that are needed by the FAO Working Group for its annual assessments. Sampling programmes may be divided into two categories: observer programmes onboard commercial vessels and sampling programmes at landing sites. The following table summarises the sampling recommendations from the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa (2015) and the 7th Session of the CECAF Scientific Subcommittee (2015). Regarding maturity and other studies, the tables refer to the Scientific Subcommittee recommendation to develop the knowledge on the biology and ecology of the fish stocks in order to better understand their spatial and temporal dynamics. However, this is not formally required within the sampling.

Table 2. Sampling recommendations from the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa (2015) and the 7th Session of the CECAF Scientific Subcommittee (2015).

Stock	Area	Sampling intensity	Length (including discards)	Age	Maturity	Other possible studies
<i>Sardina pilchardus</i>	Morocco		x	x		
	Mauritania		x	x		
<i>Sardinella</i> spp (<i>S. aurita</i> + <i>S. maderensis</i>)	Morocco	1 sampling per 1000 tonnes	x	x	Biological studies recommended	Species composition in <i>Sardinella</i> catches
	Mauritania	1 sampling per 1000 tonnes	x	x		
<i>Trachurus</i> spp (<i>T. trachurus</i> + <i>T. trecae</i>)	Morocco		x	x	Biological studies recommended	Species composition in <i>Trachurus</i> catches
	Mauritania					
<i>Scomber colias</i>	Morocco	x	x	x	Biological studies recommended	Spatial identity of the stock
	Mauritania	x	x	x		

Subject to the availability of place for scientific observers on board the EU fishing vessels operating in the area, in order to have sufficient observer coverage throughout the year, two observer trips per quarter are planned.

4.1 Sampling catches on board commercial vessels

4.1.1 Vessel and trip specifications

At the very basis of each sampling protocol lies the registration of platform (vessel), trip and haul characteristics.

For each trip the following parameters have to be registered:

- Name and registration number of the vessel
- Vessel flag
- Vessel power (in kW)
- Trip Number
- Harbour and date/time of departure
- Harbour and date/time of arrival
- Target species of the trip
- Fishing area (FAO Division)
- Type of gear
- Mesh size of the cod-end
- Observers name
- Comments

On haul level, a trawl list has to be used to register haul specific parameters:

- Haul number
- Date
- Time of start and end of haul (UTC)
- Haul duration (minutes)
- Haul position (deg.min, sec in decimal format)
- Temperature at the surface
- Depth (bottom, headline)
- Estimated catch by species, incidental bycatches

4.1.2 Sampling procedure on board

In principle, this sampling programme aims for comprehensive sampling of all catches during a trip. This implies that during a trip, and if time permits, all hauls have to be sampled for length distribution of landings and discards for all species, as well as estimates of the proportion of discards have to be made. In practice, the aim is to sample as many hauls as possible during the period when the observer is standby.

Sampling catches onboard commercial vessels is similar to sampling catches onboard research vessels. The purpose is to obtain an accurate picture of the species composition of the catch and the length distribution of the target species.

In general, the observer will take for each haul one or more random samples from the mixed catch before it is being sorted. As a rule, the sample should contain at least 100 fish of the main (target) species. Depending on the size of the fish, this corresponds to 1-3 baskets of about 30 kg or 100kg in total. The total weight of the sample is measured. The ratio between the total weight of the catch and the weight of the unsorted sample gives the raising factor for all species in the sample.

The sample is sorted by species, and the weight of each species in the sample is measured. Then the length composition for each species and each category is recorded (Annex 2).

When a part of the catch is discarded, a separate random sample of the discarded fraction should be taken, and the raising factor for the sample should be calculated as the ratio between the estimated total weight of the discards and the weight of the sample. As for landings, the length distribution of the discarded fraction has to be determined by species. A representative sample of 25-50kg is taken from the discarded catch. If some fish in the discards sample are badly damaged, their length is estimated by comparing them with undamaged fish.

For catches sampled at sea, the minimum sampling intensity is one sample per 1000 tons of fish caught. This applies to the catch of the whole fleet.

4.1.3 Measuring the length of the fish

The length of the fish is measured as total length, normally to the whole centimeter below. For instance: all fish between 20.0 and 20.9 cm are recorded as 20 cm. The exceptions are sardine and anchovy where the length is measured to the half cm below.

4.1.4 Sampling for biological parameters

The biological sampling should include species listed in Table 2 above. Fish for biological sampling are taken at random from the catch or from the length sample.

Individual weight

If possible, individual weights are collected for 50 fish in the sample representing as many length classes as possible (measured to the nearest gram). Weights of individual fish should only be measured if the observer has an electronic scale which compensates for the motion of the vessel. Otherwise weight measurements for individual fish cannot be taken at sea.

Sampling of otoliths

For all species listed in Table 2, being either the target species or a by-catch species in the observed fishing trip, the minimum sampling level is to collect otoliths from 5 fish per length class per fishing ground per trip.

Other biological parameters

If possible, information on the gonad maturity stage (according to an eight-degree Maier's scale) and degree of stomach fullness (a five-degree scale, from 0 - empty to 4 - completely full) will be recorded during age sampling (otoliths collection) for the species listed in Table 2 except *Sardina pilchardus*.

4.2 Raising sampling data to catches in absolute numbers

For stock assessment purposes, length or age data have to be reported in absolute numbers. This allows the combination of catches from different fleets or countries into one total length distribution. The length composition in absolute numbers is calculated by raising each sample with the weight of the corresponding catch. The procedure is basically the same for sampling at sea and ashore. Both situations will be considered below. **It is essential that the weight of the sample is always recorded. When the sample weight is unknown, it will be impossible to extrapolate the sample to the total catch, and the data cannot be used for assessment purposes.**

For each sampled haul, the length distribution is multiplied by a raising factor which is calculated as:

$$\text{Raising factor} = \text{total weight of haul} / \text{weight of sample}$$

The total length composition for all sampled hauls is calculated by summing the length distributions of individual hauls expressed in absolute numbers. The length composition for the entire trip is estimated by raising the sum of all sampled hauls with the ratio:

$$\text{Raising factor} = \text{total weight of all hauls} / \text{weight of sampled hauls}$$

The proportion of discards has to be estimated on a haul level for all species combined based on the proportion of the weight discarded in relation to the catch. Distinguish between discarding and slipping. Slipping is the part of the catch which is released directly from the net and does not come on board. Also, it is possible that part of the catch is kept on board in a tank and released into the sea afterwards. Therefore, no catch composition or length measurements are available from this part of the catch. It is acknowledged that estimates of slipping and tank releases are less precise than discard estimates. It is important to allocate the part of the catch released back into the sea to the right haul.

4.3 Incidental by-catch of birds, mammals and reptiles and fish protected under Union legislation and international agreements

Incidental catches of less frequent or rare fish species (e.g. sharks, swordfish, tuna etc.), species are listed in Tables 1C and 1D of the Commission Implementing Decision (EU) 2016/1251, are collected and measured from a larger part of the catch or the whole catch. A multiplier for these measurements must be estimated and provided in order to raise the measurements to the total catch.

Incidental by-catch of birds, mammals, reptiles and all protected fish must be noted together with the haul information. Whenever possible, lengths and weights should be taken and notified.

5 Data formats, transfer and reporting

5.1 Aggregation of data

Chapter 4 describes the parameters needed to address the requests as laid down in the EU-MAP. Data must be available in a database at the sampling (haul) level. This means that no aggregation must be applied for data stored in the database.

For the purpose of analyses, e.g. in working groups, data must be made available in an aggregated format as required by the data user.

5.2 Data use

Data will be used:

- for mandatory reporting on achieved sampling in DCF Annual Reports
- to conduct statistical analysis by MS or the RCG
- to be made available to end users in aggregated format as defined by the end user

5.3 Data formats for exchange and data storage

To facilitate easy data exchange in an international context, an unified data exchange format will be applied by the observers through the use of data entry software provided to the observers. This will be done through the cooperation between NMFRI (Poland) responsible for data-entry and storage of the sampling data and WMR (The Netherlands) responsible for data validation, data processing and data delivery.

Data will be stored at national databases of Poland and The Netherlands and will be distributed to Partners to the Multi-lateral agreement – CECAF upon request.

The main formats to be used by observers are:

- a) **Trawl station data.** An example of this is given in Annex 1. This form is used for each trip to record information on a haul by haul basis, including heading containing trip parameters (as indicated in section 4.1.1);
- b) **Catch composition and length data** – the format of recording these data will be automatically determined by the data entry software provided to the observers. In case the use of the data entry software is not possible for any reason, the observer shall use the format given in an Annex 2
- c) **Biological data** - the format of recording these data will be automatically determined by the data entry software provided to the observers. In case the use of the data entry software is not possible for any reason, the observer shall use the format given in an Annex 3. This form contains one line per fish, with data on haul number, catching time and position, length, weight, sex, maturity and stomach content.

6 Annexes

Annex 1. Format for trawl station data

Vessel flag	Poland
Name and registr. no of the vessel	Alina POL 035202244
Vessel power [kW]	5920
Trip No	1/2017
Harbour and data/time of departure	
Harbour and data/time of arrival	
Target species of the trip	HOM, PIL, SAE
Fishing area (FAO Division)	34.3.1
Type of gear	OTB
Mesh size of the cod-end	45
Observer name	Jan Nowak
Comments	

Haul no.	Date	Time UTC		Haul duration (min)	Position start		Position end		Temp surface °C	Depth (m)		Total catch (tons)	Estimated catch by species (kgs)									Comments	
		Start	End		Latitude	Longitude	Latitude	Longitude		headline	bottom		Sardine PIL	Round sardinella SAA	Flat sardinella SAE	Horse mackerel HOM	Cunene horse mackerel HMZ	False scad HMY	Chub mackerel MAS	Anchovy ANE	Bonga BOA		Others
1	03/02/2017	0:55	8:10	435	18 11,555	-16 20,654	18 11,945	-16 18,344	19,6	60	120	28,6		448		6080		19072				3048	

Date: DD/MM/YYYY (e.g. 23/02/2018)

Time: in 24 hrs format (e.g. 18:52)

Position: deg min and seconds in decimals:

Northern latitudes and eastern longitudes should be indicated by the use of positive decimal degree values (e.g. 18 11,555)

Southern latitudes and western longitudes should be indicated by the use of negative decimal degree values (e.g. -16 20,654)

Species name: FAO 3-alpha code

Fishing area:

FAO Division - FAO Major Fishing Areas - ATLANTIC, EASTERN CENTRAL (Major Fishing Area 34) - <http://www.fao.org/fishery/area/Area34/en>

Common name	Scientific name	FAO 3-alpha code
Sardine	Sardina pilchardus	PIL
Round sardinella	Sardinella aurita	SAA
Flat sardinella	Sardinella maderensis	SAE
Atlantic horse mackerel	Trachurus trachurus	HOM
Cunene horse mackerel	Trachurus trecae	HMZ
False scad	Caranx rhonchus	HMY
Chub mackerel	Scomber colias	MAS
Anchovy	Engraulis encrasicolus	ANE
Bonga	Ethmalosa fimbriata	BOA

Annex 2. Format for catch composition and length data

Name and registr. no of the vessel				Alina POL 035202244																						
Trip No				1/2017																						
Observer name				Jan Nowak																						

Haul number	Date	FAO 3-alpha cod	Conserved/ discarded	Weight of sample [kg]	Raising factor	Total catch [kg] conserved	Total catch [kg] discarded	Number of fish in length classes (in sample)																			Total in sample
								10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27....	100	
1	03/02/2017		Conserved	111	258,1	28648																					
		MAS	Conserved	74		19099																				21	
		HOM	Conserved	25		6452																1	3	8	9		
		SAA	Conserved	12		3097																					
1	03/02/2017		Discarded	45	7,8		350																			0	
		ANE	Discarded	30			233				3					5	3	15								32	
		POP	Discarded	8			62										1	5	8							17	
		DEM	Discarded	7			54												4							25	
2	04/02/2017		Conserved																							0	

For each species and each category (conserved or discarded) a separate line is used.

The raising factor allows the extrapolation of the numbers measured in the sample to absolute numbers in the haul

For fish larger than 100 cm and incidental catch of protected species use a separate form

Annex 3. Format for biological data

Name and registr. no of the vessel				Alina POL 035202244									
Trip No				1/2017									
Observer name				Jan Nowak									
Name and registration number of the vessel	Haul No	Date	Hour	Longitude [deg.min]	Latitude [deg.min]	Species	Length [mm]	Weight [g]	Sex [M/F/I]	Maturity [Maier scale]	Stomach contents	Comments	
Alina POL 321	1	03/02/2017	0:55	18 11,555	-16 20,654	MAS	350	420	F	5	4		
Alina POL 321	1	03/02/2017	0:55	18 11,555	-16 20,654	MAS	330	380	F	5	3		
Alina POL 321	1	03/02/2017	0:55	18 11,555	-16 20,654	MAS	410	710	M	4	2		
Alina POL 321	1	03/02/2017	0:55	18 11,555	-16 20,654	MAS	450	910	M	4	0		
Alina POL 321	1	03/02/2017	0:55	18 11,555	-16 20,654	MAS	350	410	M	3	4		
For each individual fish a separate line is used						Species subject to biological sampling:							
Date, time longitude and latitude refer to the start of the haul													
Species name in FAO 3-alpha code						Common name		Scientific name		FAO 3-alpha code			
Length in mm						Sardine		Sardina pilchardus		PIL (no maturity and stomach data)			
Weight in grams						Round sardinella		Sardinella aurita		SAA			
Sex in 3 categories: male (M), female (F) and Immature (I)						Flat sardinella		Sardinella maderensis		SAE			
Maturity in eight-degree Maier's scale						Atlantic horse mackerel		Trachurus trachurus		HOM			
Stomach content in five-degree scale, from 0 = empty to 4 = completely full						Cunene horse mackerel		Trachurus trecae		HMZ			
						Chub mackerel		Scomber colias		MAS			

Annex 4. Acronyms used in this document

CECAF	Fishery Committee for the Eastern Central Atlantic
DCF	Data Collection Framework. A set of Regulations and Decisions by the European Council and European Commission which describes the data collection
DCR	Data Collection programme before the DCF
EC	European Commission
EEZ	Exclusive Economic Zone
EU	European Union
EU MAP	EU multiannual programme
FAO	Food and Agriculture Organization of the United Nations
MS	Member States of the European Union
NMFRI	National Marine Fisheries Research Institute, Poland
RCG / RCM	Regional Coordination Groups / formerly Regional Coordination Meetings
WMR	Wageningen Marine Research, The Netherlands
VMS	Vessel (satellite) Monitoring System
UTC	Coordinated Universal Time

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