

ANNUAL REPORT

On the Greek National Fisheries Data Collection Programme for 2015

(IN COMPLIANCE WITH COUNCIL REGULATION (EC) 199/2008, COMMISSION
REGULATION (EC) 665/2008, COMMISSION DECISION 2010/93 EU)

MINISTRY OF RURAL DEVELOPMENT AND FOOD

DIRECTORATE GENERAL FOR FISHERIES

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I. GENERAL FRAMEWORK

The current document is an Annual Report (AR) of the work which was carried out in Greece for the year 2015 with reference to the aims described in the Greek National Programme (NP) and the requirements listed in the DCF. The programme has been carried out following the rules of the:

Commission Regulation No 199/2008 establishing 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

Commission Regulation No 665/2008 laying down detailed rules for the application of Council Regulation (EC) No 199/2008 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.

Commission Decision 2010/93/EU adopting a multiannual Community programme for the collection, management and use of data in the fisheries sector for the period 2011-2013.

Commission Implementing Decision 2013/5568/EU extending the national programs for the collection of primary biological, technical, environmental and socio-economic data in the fisheries sector for the period 2011-2013 to the period 2014-2016.

The format of the document follows the most recent guidelines from the Commission (DCF_Guidance_AR_2015.doc and DCF_Standard-Tables_AR_2015.xlsx).

During 2015, most of the modules have been implemented, however to a different degree. Serious financial constraints have caused delays in the start of 2015 NP or even cancellation of some actions. The implementation of 2015 NP was launched on 14.10.2015 with the signing of the concession contract between the Department of Fisheries of the Ministry of Rural Development and Food (MRDF) and the Greek Agricultural Organization (ELGO)-DEMETER. There were no major methodological changes in approach compared to previous year.

The updated list of all the derogations requested by Greece and are still valid is presented in **standard table I.A.1**. Regarding the derogations requested on 2009 for eel fisheries sampling and eel biological sampling and variables, they are not valid any more. After the realization of pilot study on eel on 2012, data on eel fisheries and eel biological sampling are collected yearly.

Concerning bilateral and multilateral agreements regarding data collection, MS has not sign such an agreement, therefore the **standard table I.A.2**. is not filled.

II. NATIONAL DATA COLLECTION ORGANIZATION

II. A. National correspondent and participating institutes

The Data Collection Programme is co-ordinated by the General Directorate of Fisheries, Ministry of Rural Development and Food, under the national correspondent Apostolos Karagiannakos, whose contact details are:

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The Data Collection Programme for Greece is carried out by two partners, the **Hellenic Agricultural Organization – Demeter** (ELGO-DEMETER) that is the project's Scientific Co-ordinator and the **Hellenic Centre for Marine Research** (H.C.M.R.). Two institutes from each partner contribute to the realization of the NP. Specifically, from the ELGO-DEMETER participates the **Fisheries Research Institute** (F.R.I) and the **Agricultural Economics Research Institute** (AGR.E.R.I). The FRI is a semi state marine research organisation responsible for collection of scientific data on the fisheries sector in North and Central Aegean Sea, on eel and on processing industry. The AGR.E.R.I is also a semi state research organisation responsible for collection and evaluation of economic data on the fisheries sector. From **H.C.M.R** participates the **Institute of Marine Biological Resources & Inland Waters of Athens** (I.M.B.R-Athens) and the **Institute of Marine Biological Resources of Crete** (I.M.B.R-Crete). The I.M.B.R is a semi state marine research organisation responsible for the collection of scientific data on the fisheries sector in South Aegean Sea, Ionian Sea and Cretan Sea. It also has the management of the database and GIS Fisheries Information System called IMAS-Fish which supports the Data Collection programme.

The contact details of the participating institutes are:

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The national DCF website is under construction. Till its finalization, all the basic information and references concerning Greek data collection programme is hosted in the website of FRI which is the scientific co-ordinator (web-site: <http://www.inale.gr>).

One national coordination meeting was held in Athens on 6/10/2015. The main issues discussed by the representatives of the involved institutes were i) the problems caused in the implementation of 2015 NP by the late start of the programme and ways to overcome them in 2016 ii) new data collection framework for the period 2016-2020 iii) financial issues.

II B Regional and International coordination

II B 1 ATTENDANCE OF INTERNATIONAL MEETINGS

The Standard **Table II.B.1** indicates the international meetings that have been attended by Greek scientists.

The Greek scientists participated in 5 international meetings. The limited participation was due to the difficult financial situation of the country in 2015.

II B 2 FOLLOW-UP OF REGIONAL AND INTERNATIONAL RECOMMENDATIONS AND AGREEMENTS

There were no recommendations launched to MSs in the 11th LM report. Also, no recommendation from 12th LM report was published on the JRC Data Collection website, in order to be included in Member States Annual Report for 2015. Therefore, the Standard **Table II.B.2** is not filled.

III MODULE OF THE EVALUATION OF THE FISHING SECTOR

III A General description of the fishing sector

The Greek fishing fleet consists of a large number of vessels. According to the National Fleet Register of 31/12/2014 the fleet consists of 14755 registered fishing vessels with a total tonnage of 72.843 GT, total power of 431.166 KW and average age of 28,3 years. From 2012 onwards till 2014 the size of the Greek fleet decreased by 8.1% in the number of vessels, by 8.6% in tonnage and by 6.8% in engine power (Table III.A.1.1.).

Table III.A.1.1 The change in fleet size from 2012 to 2014

Year	2012	2013	2014
Number of vessels	15950	15785	14755
Tonnage (GT)	79560.4	78033.6	72843
Engine power (KW)	460825.0	455400.2	431166
Average Age (years)	27.6	28.3	28.3
Average Length (m)	7.4	7.5	7.5

The great majority of the fleet consists of small vessels -average length 7.5 m- exploiting the extensive coastline of the mainland, and the shoreline of the numerous Greek islands targeting the coastal fishing stocks.

The Greek fishing fleet is categorized in the following three (3) major categories depending on the fishing activity

Demersal fisheries

The demersal fishery in Greece is the otter trawl fishery that consists of 283 vessels with total capacity 27.394 GT and engine power 82.830 KW. Although it represents a small part of the Greek fishing fleet (1.8%), its production represents approximately the 25% of total fisheries production. It is a mixed fishery that targets demersal species and is only one metier (OTB_DES_>=40_0_0). It is a common fishery in the Aegean, Ionian and in a lower extent in Cretan sea and exploits mainly fishing grounds covering the continental shelf and the first part of the slope (depths up to 300 meters) in the national and international waters of the Mediterranean Sea.

Pelagic fisheries

The pelagic fishery in Greece is the purse seine fishery that consists of 254 vessels with total capacity 11.414 GT and engine power 48260 KW.

Purse seine fishery targets mainly small pelagic species (anchovy and sardine), mackerel and horse mackerel as well. It performs fishing trips of short duration (rarely more than 24 hours), because of the vulnerability of the main target species. It is a common fishery in the Aegean, Ionian and in a lower extent in Cretan sea. It is only one metier (PS_SPF_>=14_0_0).

Coastal fisheries

The coastal fishery in Greece represents the largest part of the Greek fishing fleet. It consists of 14218 vessels which according to their overall length are divided into:

A) Vessels with an overall length of less than 12 meters. This category consists of 13844 vessels with a total capacity 30173 GT and total power 284798 KW.

B) Vessels with an overall length equal to or greater than 12 meters. This category consists of 374 coastal fishing vessels with a total tonnage 6.220 GT and total power 34128 KW.

The Greece coastal fishery is the largest among all EU countries both in number of vessels and fishermen causing difficulties in the monitoring of fishing activity and production. It has a multi-gear and multi-species character. The most common metiers that have been recorded in coastal fishery are the following:

Set gillnet for demersal fish	GNS_DEF_>=16_0_0,
Set trammelnet for demersal fish	GTR_DEF_>=16_0_0,
Set longlines for demersal fish	LLS_DEF_0_0_0,
Drifting longlines	LLD_LPF_0_0_0,
Pots and traps for demersal species	FPO_DEF_0_0_0,
Beach and boat seine for demersal species	SB_SV_DEF_0_0_0
Hand and pole lines for finfish	LHP_LHM_FIF_0_0_0,
Trolling lines for large pelagic fish	LTL_LPF_0_0_0

However, the first five of them have been selected for sampling purposes according to ranking system as described in the EU Dec. 93/2010. The last three were not selected by the ranking system.

A general description of the Greek fishing sector is given in the **Table III.A.1**

III B Economic variables

Supra region: Mediterranean Sea and Black Sea

III B 1 ACHIEVEMENTS: RESULTS AND DEVIATION FROM NP PROPOSAL

This section focuses on the estimation of economic variables of the fishing sector in Greece. The economic data collected refers to the year 2014 (reference year).

A sample survey was conducted in order to estimate the economic parameters of the fishing sector, while data required for the estimation of the value of fixed assets and annual depreciation costs were calculated by processing records derived from the National Fleet Register.

The target population was the Fleet Register. However, it should be noted that for year 2014, part of the population was excluded from the data collection scheme. This was necessary so that the economic variables collection scheme and the transversal variables collection scheme can be aligned, as was advised to the MS during the evaluation process of 2012 and 2013. Specifically, the segments used in the transversal variables scheme were adopted. Therefore, the “polyvalent passive gears” segments were split to “pots and traps”, “hooks” and “nets” and some gears of minor significance were excluded from the data collection.

Furthermore, there are some differences in the composition of the target population, compared to what was described in the 2011-2013 NP proposal, as indicated in table III.B.1. These changes can be explained by the fact that for the 2011-2013 NP proposal the National Fleet Register of the year 2008 was used. However, from 2008 till 2014 the Greek fishing fleet has significantly decreased (about 15%), while the reduction was not equi-proportionate among segments.

Another deviation from the NP proposal concerns the clustering of two fleet segments. In the NP proposal no clustering of the fleet segments was considered necessary. But due to changes in the composition of the fleet, as already mentioned, one clustering was considered necessary for confidentiality reasons in 2014, as explained in more detail in the paragraph “Clustering of fleet segments”.

To carry out the sample survey the statistical methods (sample design, sample size, strata allocation, raising factors, variance estimators) described in the 2011-2013 NP proposal have been applied.

Data were collected through face-to-face interviews using a structured questionnaire specifically designed for the survey.

It should be emphasized that no deviations from the NP proposal are listed regarding the methods used for collecting the data and for the estimation of the economic parameters.

The number of sample units per stratum and the planned sample rate is reported in table III.B.1. Standard tables III.B.1 and III.B.3 have been updated with the information collected during the sampling year.

The number of inactive vessels for each length category is presented in table III.B.1. It should be noted that the National Fleet Register does not include any information regarding inactivity of fishing vessels. The number of inactive vessels in Table III.B.1 has been estimated through the data collection survey (random sampling survey).

Clustering of fleet segments

In this section, all the information regarding the clustering of the fleet segments is provided as required by the DCF and following STECF recommendations. Standard Table III.B.2 reports the segments that have been clustered. Clusters are named after the segment that contains the larger population of vessels.

The information regarding clustering is provided for separately “Important segments with distinct characteristics”, “Segments similar to other segments” and “Non-important segments with distinct characteristics” as required.

1. Important segments with distinct characteristics

No clustering was necessary for important segments with distinct characteristics.

2. Segments similar to other segments

Two segments with similar characteristics were clustered together, for confidentiality and sampling reasons. Specifically, the segment “Vessels using hooks 18-24” contains only 8 vessels that were clustered together with the segment “Vessels using hooks 12-

18” which contains 110 vessels. Apart from the fact that the clustering of the two fleet segments was necessary for sampling and confidentiality reasons it should also be emphasized that the two fleet segments use similar fishing equipment and fishing patterns and it was also observed that the LOA of the larger vessels was close to 18. For the above reasons clustering was considered not only necessary but also fully justified.

3. Non-important segments with distinct characteristics

No clustering was necessary for non-important segments with distinct characteristics.

Estimation of Capital value and capital cost

For the estimation of the capital value and the capital costs data from the National Fleet Register were also used. The methodology suggested by the study on “evaluation of the capital value, investments and capital costs in the fisheries sector” (No FISH/2005/03) was applied.

In order to estimate the capital value (GCS) three steps were followed:

1. Specification of the composition of the active fleet by age
2. Estimation of value per LOA
3. Calculation of the value of each vintage (year of construction) of the fleet and converting values of all vintages to current prices using price indices.

The year of construction for each vessel was taken from the National Fleet register. For the estimation of value per LOA, data gathered through the survey was also used, as described in more detail in the following Table.

<i>Questions</i>	<i>Answers</i>
1. Which are the reference values taken into account for the estimation of the price per capacity unit (e.g. book value, second hand market, etc...)?	The reference values were estimated through the sample survey. They were also crosschecked with information provided by market stakeholders.
2. Which estimation methods and/or models have been used to estimate the PCU?	The reference values were estimated through the sample survey.
3. If a net value has been used, what is the method used to calculate the gross value? (e.g. formula, figures from the balance sheets, etc..)?	Digressive (replacement) formula: historical value/(1-depreciation rate of each asset) ^{age of the asset} .
4. What type of index price series have been used (e.g. heavy machinery index, etc..)?	Heavy machinery index.
5. What depreciation rates? From where do they come (e.g. national legislation, general scheme excel spreadsheet, etc...)?	Hull (7%), Engine, (25%), Electronics (50%), other equipment (35%) (see study No. FISH/2005/03).
6. Which age schedule (service life time) has been used?	Hull (25), Engine (10), Electronics (5), other equipment (7).
7. What is the share of each asset on the total value of the capital?	Hull (46%), Engine, (25%), Electronics (2%), other equipment (27%).

Inactive vessels have been included in the evaluation of capital value and capital costs.

III B 2 DATA QUALITY: RESULTS AND DEVIATION FROM NP PROPOSAL

The sampling strategy and the achieved values of the accuracy indicators are presented in Table III.B.3.

Data quality is also given in terms of planned sample rate, response rate and achieved sample rate.

All economic variables of Appendix VI are collected through the sample survey and therefore data is consistent.

In the case of the value of capital and annual depreciation costs data from the National Fleet Register was also used, as already mentioned in the previous chapter.

FTE and engaged crew

Total employment and FTE are estimated according to the methodology suggested by the study on “calculation of labour including FTE (full-time equivalent) in fisheries” (No FISH/2005/14).

In order to estimate the FTE, data from the questionnaires regarding the average number of days at sea, the number of average crew per vessel excluding and including rotation and the average number of hours of work per crew member per day at sea, are gathered.

The estimation of the employment in terms of FTE has been made by assuming an FTE threshold (representing the standard working time for the fishing sector) expressed in terms of yearly hours per man.

The FTE threshold is equal to 2,000 hours per year. It is also assumed that:

- each crewman working annually 2,000 hours or more is counted as one FTE
- each crewman working less than 2,000 hours per year is counted as a percentage of an FTE according to the number of hours worked in relation to the threshold of 2,000 hours
- working time is the time spent on fishing and related activities on board or on shore. This means that working time is only a part of the duration of a fishing trip.

During the data collection extra measures were taken in order to achieve high quality of the collected data. The data collectors were properly educated and detailed written instructions regarding the collection of the data were provided to them. They were also advised to contact the institute in charge of economic data processing throughout the data collection process whenever a problem or question arose. Furthermore, each data collector was asked to submit a completed trial questionnaire to ensure that all fields were filled out correctly.

In addition, as soon as data was submitted by the data collectors they were evaluated mainly in terms of missing values and typing errors and the data collector was contacted in case any problem arose.

For a more extensive evaluation of the quality of the collected data several indicators were used. The days at sea, the fuel consumption per day at sea, the number of employees per vessel, the volume of landings and the average price per kilo were used to identify outliers in every fleet segment. Furthermore, the ratio of each cost category (e.g. variable costs, fuel costs, wages and salaries, fixed costs etc.) to the revenues of the vessels were used for the same purpose.

After the extensive evaluation of the collected data the CV of the economic variables was also estimated as another quality indicator. Both the values of the CV of the estimated economic variables and the response rate were adequate, given the fact that there were significant delays in the beginning of the NP. Finally, for the final quality check of the estimated economic variables the DV tool proposed by the JRC was used.

III B 3 ACTIONS TO AVOID DEVIATIONS

The deviations from the NP proposal concern mainly the target population and the clustering of two fleet segments that, as mentioned in detail above, are explained by changes in the fleet composition during 2008 that was used in the NP proposal and the reference year (2014). These deviations are justified and necessary for sampling reasons and therefore should not be avoided. Moreover, to align with the transversal variables data collection scheme, the segmentation of the fleet was altered and some small segments with minor importance were excluded from the economic data collection.

Finally, it should be noted that despite the fact that there were significant delays in the beginning of the NP in year 2015, the MS managed to meet the deadlines for the economic data collection and to achieve an adequate level in all qualitative indicators. However, an early start of the NP in year 2016, will give the MS the opportunity to further improve its qualitative indicators.

III C. Metier-related variables

REGION: MEDITERRANEAN SEA

III C 1 ACHIEVEMENTS: RESULTS AND DEVIATION FROM NP PROPOSAL

The sampling was carried out for the evaluation of length distribution of species in the catches and the quantity of catches and discards. The data have been collected by metier referred to as level 6 of the matrix defined in Appendix IV (EU Dec. 93/2010), and has been agreed at regional level (RCMMed&BS 2009 and 2010), per GSA as defined in Appendix I Level 4 (EU Dec. 93/2010) and for the stocks listed in Appendix VII (EU Dec. 93/2010).

The **Table III.C.1** provides information on the metiers that are realised by the Greek fishing fleet, considered as major and were selected for sampling purpose through the ranking system. The selected metiers are in full agreement with the most recent regional ranking (PGMED 2014). Metiers are given at GSA level, based on the requirements of the Commission Decision (EU Dec. 93/2010). The reference period is 2014 because it was the year with full implementation of NP. For 2013 the NP was implemented only for the last quarter of the year.

The **Tables III.C.3** and **III.C.4**, provide information on the number of trips that were achieved by métier in each GSA for 2015 and on the number of trips that were initially planned, respectively. Sampling has been carried out in each GSA, through concurrent sampling on-board the fishing vessels and on-shore, providing data on all the species that were fished in the first case (on-board) and only on landings in the second case (on-shore). The sampling has been designed taking into account the spatial and temporal variability in order to detect seasonal differences in the demographic structure and composition of the landings for different métiers. The sampling unit was the fishing trip. The discards were estimated for all the metiers that were selected for sampling through the ranking system. More effort was given to sampling at sea in order to have better information on the discards and more representative length and age distribution per species. Therefore the trips at sea are more than the planned in most of the cases. However, the delayed start of the program, due to the heavy financial difficulties that Greece faced during 2015, affected in a significant degree the sampling intensity.

A brief description of the sampling intensity per métier is given below:

Bottom otter trawl fisheries targeting demersal species (OTB_DES_>=40_0_0)

The trawl fishery was sampled to a lesser extent compared to what was planned in all GSAs. Due to the delayed start of the programme the data collection was restricted to the last quarter of the year. The sampling intensity was 15.6% in GSA 20 (20 trips instead of 128), 20.5% in GSA 22 (39 trips instead of 190) and 11.7% in GSA 23 (7 trips instead of 60).

Purse seine fisheries targeting small pelagic fish (PS_SPF_>=14_0_0)

The purse seine fishery was also sampled to a lesser extent compared to what was planned in all GSAs. The delayed start of the programme restricted the data collection

to the last quarter of the year. The sampling intensity was 23.1% in GSA 20 (37 out of 160 trips), 19.1% in GSA 22 (36 out of 188 trips), while only 1 trip out of 96 was realized in GSA 23.

Pots and traps for demersal species (FPO_DES_0_0_0)

The pots and traps fishery is realised only in GSA 22. The delayed start of the programme restricted the data collection to the last quarter of the year. The sampling intensity was 25.5% (13 trips instead of 51).

Set gillnet for demersal fish (GNS_DEF_>=16_0_0)

The sampling coverage of gillnet fishery didn't met the sampling requirements in all GSAs. The delayed start of the programme restricted the data collection to the last quarter of the year. The sampling intensity was 32% in GSA 20 (46 out of 144 trips), 28% in GSA 22 (65 instead of 232 trips) while in GSA 23 was only 3% (4 out of 120 trips)

Set trammel net for demersal fish (GTR_DEF_>=16_0_0)

The trammel net fishery was sampled to a lesser extent compared to what was planned in all GSAs. The delayed start of the programme restricted the data collection to the last quarter of the year. The sampling intensity was 31.6% in GSA 20 (86 out of 272 trips), 22.2% in GSA 22 (112 out of 504 trips) and 15% in GSA 23 (20 out of 132 trips).

Set long lines for demersal fish (LLS_DEF_0_0_0),

The set long line fishery was also sampled to a lesser extent compared to what was planned. The delayed start of the programme restricted the data collection to the last quarter of the year. The sampling intensity was 23.6% in GSA 20 (52 trips out of 220) and 22.4% in GSA 22 (61 trips out of 272). In GSA 23 the coverage was 15.8% (19 trips out of 120).

Metier LLD_LPF_0_0_0 (SWO) was not operating during the period covered by the 2015 DCF due to the seasonal swordfish fishery closure imposed through national and international legislation.

The **Table III.C.6** provides the achieved length sampling by species and by metier. Landings and discards were monitored for the Group 1, 2 of Appendix VII (EU Dec. 93/2010) and Group 3 species that were decided by 2008 RCM Med and BS.

The number of individuals that were collected for length sampling was achieved mostly in GSA 22 and in GSA 20 while there was a shortfall in the achieved length sampling in GSA 23.

There was an excess in the number of individuals collected for length sampling, for a number of species (in GSA 22: *Anguilla anguilla*, *Boops boops*, *Eledone moschata*, *Illex coindetii*, *Loligo vulgaris*, *Lophius budegassa*, *Merluccius merluccius*, *Mullus barbatus*, *Mullus surmuletus*, *Nephrops norvegicus*, *Pagellus erythrinus*, *Parapenaeus longirostris*, *Penaeus kerathurus*, *Sepia officinalis*, *Sardina pilchardus*,

Solea solea, *Spicara smaris*, *Trachurus trachurus*, *Trachurus mediterraneus* in GSA 20: *Boops boops*, *Loligo vulgaris*, *Pagellus erythrinus*, *Penaeus kerathurus*, *Sepia officinalis*). Nevertheless, this excess sampling did not affect the expenses of the Greek NP.

For Group 3 species there were no planned numbers in the Greek NP and were sampled for length whenever they were encountered during sampling

III C 2 DATA QUALITY ISSUES

The delayed start of the program, due to the heavy financial difficulties that Greece faced during 2015, affected in a significant degree the sampling intensity. For most of the métiers the sampling intensity ranged between 20-30% in GSA 20 and GSA22 which consists expected coverage rate for a sampling that was limited to the last quarter of the year. In GSA 23 the coverage was even poorer for all the métiers.

Regarding the length sampling many fish stocks were oversampled in terms of the number of length measurements, well exceeding the planned and requested minimum numbers described in the NP.

III C 3 ACTIONS TO AVOID DEVIATIONS

The existing deviations (sampling intensity lower than the required levels) are related to the delayed start of the program which resulted in reduced coverage of fishing activities for 2015. For 2016 data collection has started on time.

III D. Recreational fisheries

III D 1 ACHIEVEMENTS: RESULTS AND DEVIATION FROM NP PROPOSAL

Recreational fisheries of bluefin tuna

There is no recreational fishery of bluefin tuna in Greece. According to the Ministerial Decision 170317/162669/20-4-2004 which lays down specific rules for the fisheries of large pelagic species (*Thunnus thynnus*, *Thunnus alalunga* and *Xiphias gladius*) in Greek waters, the fisheries for these species (i) can only be practiced by professional fishermen with a special licence, and (ii) is strictly forbidden for recreational fishermen.

Also, in 2003, a derogation was requested by Greece concerning blue fin tuna and the derogation was justified according to SGRN document: 05-01 Evaluation of NP for 2005_Sec(2005)-255 (pages 55, 103-104)

Recreational fisheries of eels

According to the Ministerial Decision 643/39462/01-4-2013 which lays down specific rules for the eels' fishery, the recreational fishery of eels is prohibited all year throughout the country.

Recreational fisheries of sharks

Sharks and rays are not target but by-catch species in commercial fishery of Greece. In recreational fishery, according to recreational fishing associations, the capture of sharks and rays is rare and random. However, in the submission of the new NP (2016-

20) Greece intends to include a pilot study in order to investigate the existence of recreational fishery of sharks.

III D 2 DATA QUALITY ISSUES

Not applicable

III D 3 ACTIONS TO AVOID DEVIATIONS

Not applicable

III E Stock-related variables

III E 1 ACHIEVEMENTS: RESULTS AND DEVIATION FROM NP PROPOSAL

Biological stock-related variables are collected from surveys, on board sampling, landings and market place spatio-temporally to detect seasonal differences in the structure and composition of the species examined.

The **Table III.E.1** provides all the species and stocks for which biological variables sampling is mandatory according to the requirements of the Appendix VII of Commission Decision 2010/93/EU, for the areas where the Greek fishing fleet is operating. The reference period used in the most recent NP 2011-2013 was the 2005-2007 period which has nearly a decade time gap from today. Therefore it was decided to be given the average landings (in tons) and share in EU landings (%) over the 2009-2014 period for all the species as it is provided in the report of PG MED 2015.

Concerning the landings of *Lophius piscatorius*, neither the fishermen nor the fish merchants separate them as the price is the same for both *Lophius* species; they separate them only by the size. From the onboard sampling we have noticed that the real quantities of *Lophius piscatorius* are very small. Therefore, a minimum number of individuals to be measured for all the biological variables at national level cannot be planned. However, whenever it is found during sampling as well as during MEDITS scientific survey the species is sampled.

For the species *Sparus aurata*, *Micromesistius poutassou*, if their landing are considerable also for the next years we will include them in the national sampling for biological variables

The **Table III.E.2** provides the biological variables (sex, age, weight, maturity) collected in 2015.

The **Table III.E.3** provides the achieved sample numbers for the stocks sampled according to Greek NP by species and by GSA.

For 8 out of 24 species (33%) the planned number of individuals that had to be measured was achieved for most of the variables. The coverage rate per stock and GSA is given below.

Anguilla Anguilla: The planned number of individuals was achieved and over sampling occurred for all the variables (>175%).

Engraulis encrasicolus: The planned number of individuals was achieved in GSA 20 and over sampling occurred for length-at-age, weight-at-age and weight-at-length variables (140%) while poor coverage rate occurred for maturity-at-length and sex ratio at length (11%). In GSA 22 the number of individuals collected was 40% for all the variables and 45% for weight-at-length.

Mullus barbatus: The species was sampled for biological variables in GSAs 20 and 22. The planned number was nearly achieved in GSA 22 (>90%) while in GSA 20 the achieved number ranged from 20-28% for all the variables.

Nephrops norvegicus: The species was sampled for biological variables only in GSA 22 and the planned number was nearly achieved (>80%) for all the variables.

Parapenaeus longirostris: The species was sampled for biological variables in GSAs 20 and 22. The planned number was nearly achieved (~90%) for all the variables in GSA 22, while in GSA 20 was 43% for all the variables

Sardina pilchardus: The species was sampled for biological variables in GSAs 22 and 20. The species was oversampled in GSA 22 for length-at-age, weight-at-age and weight-at-length variables (134%) and had good coverage rate (62%) for maturity-at-length and sex ratio at length variables. In GSA 22 the number of individuals collected was 45% for the age related variables and 56% for the length related variables

Scomber spp.: The species was sampled for biological variables in GSAs 22 and 20. The planned number was achieved (>90%) for all the variables in GSA 22. In GSA 20 the coverage rate was 23-42% depending on the variable.

Trachurus trachurus: The species was sampled for biological variables in GSAs 22 and 20. The planned number was nearly achieved (>80%) for the length related variables and was quite good (61%) for the age related variables in GSA 22. In GSA 20 the coverage was much lower (12%) for all variables.

For the species *Coryphaena hippurus* and *Thunnus alalunga*, according to their landings, no individuals were planned for sampling for 2015 from the relevant PGMed meeting.

For the species *Thunnus thynnus* samples were not available because of the very limited sampling period (less than 3 months).

III E 2 DATA QUALITY ISSUES

The planned number of individuals that had to be measured was achieved for 33% of stocks and for most of the variables. For the rest of the stocks the target was not met. The lack of availability of samples was related to the late start of the program.

III E 3 ACTIONS TO AVOID DEVIATIONS

Due to the late start of the programme, the sampling was realized in the last quarter of the year and consequently the planned number of individuals was not achieved for most of the species. For 2016 data collection has started on time and we expect better outcomes.

III E 5 MONITORING OF COMMERCIAL EEL

III.E.5. Introduction

i) General information for European eel fishery in Greece.

The population of European eel (*Anguilla anguilla* (L.)) has been reduced and the current fishery is considered to be outside the limits of sustainability. Factors contributing to the decline include the fishing activity, and also other anthropogenic interferences (habitat loss, migration barriers, pollution) and physical factors (e.g. cormorants).

Due to the above mentioned reasons, the eel was included in the regulations for the data collection of the E.U. (Council Regulation 1543/2000 and Commission Regulations 1639/2001, 1581/2004). According to the new EU Regulation 199/08 (Article 3) the monitoring of the commercial and recreational fishery of the eel in inland waters must be included in the national program of each Member State. The estimates must refer to the total production, effort and biological efforts of the landings.

The fishery for European eel in Greece is limited to the capture of adults during their migration to the Atlantic for reproduction. In Western Greece there is limited fishery of yellow eels, as part of the local tradition of consuming younger eels, a practice that is not found elsewhere in Greece.

It has to be mentioned that the fishery of glass eels is prohibited, and requires special permission from the regional authorities. Also there are no scientific data for the existence of eel recreational fishing until now.

The majority of eels are caught in the lagoons. Most of the lagoons are found in North Greece (estuarine systems of Evros, Nestos and Lake Vistonis) and in Western Greece (Mesolongi and Amvrakikos lagoons). The regional authorities are responsible for the management of the lagoons, while some belong to the Ministries of Development and Economics and some belong to local municipalities. In any case, the economic exploitation of the lagoons is performed for a certain period of time by fishing cooperatives, which lease the lagoons (in most cases for 10 years). The local fishing cooperatives have the exclusive right to exploit the fishes of the lagoons (Koutrakis et al., 2007).

The Hellenic Eel Management Plan defines four Eel Management Units (EMU) (Figure 1.1.1). The management measures concerning fishing restrictions and environmental aspects are applied to all EMUs.

EMU-01 (7 Prefectures, 3 Regions) is located on the North Western Greece. It comprises 70% of the total Hellenic lagoons surface and 45% of the lakes surface. Despite the considerable decrease of the EMU-01 landings (180 t in mid 1980's, 50 t the recent years), the unit remains the most important eel producer. EMU-02 (5 Prefectures, 2 Regions) is located on the Western Peloponnesus. It comprises 5% of the total Hellenic lagoons surface and 3% of the lakes. The eel landings of this EMU increased since the mid-1980's, contrary to the general pattern and now represents about 40% of the Hellenic lagoon landings (about 40 t). EMU-03 (4 Prefectures, 1

Region) is located on the North Eastern part of the country. It comprises 24% of the total Hellenic lagoons surface and 9% of the lakes surface. The landings dropped from 70 t in early 1980's to less than 10 t. EMU-04 covers the rest of the country, mainly central eastern continental Greece and the islands of the Aegean Sea (35 Prefectures and 8 Regions). The landings of the EMU-04 are very low.



Figure III.E.5.1. Geographical distribution of the Hellenic Eel Management Units (HEMU).

ii) Fishing activity and relevant fishing reforms

Fishing in the lagoons is based on the use of fixed barrier traps, which catch fishes during their seasonal or ontogenic offshore migration. Barrier traps (V-shape traps) are passive, fixed gears and are part of the fence installed at the interface between the lagoon and the sea (for more details see Ardizzone et al., 1988). The traditional barrier fish traps used to be wooden installations, consisting of wooden sticks hammered into the lakebed sustaining a net of reeds. Most of these installations were replaced after 1980 with cement installations (modern barrier fish trap) copied from the Italian “vallicultura” capture systems (Figure 1.4.1).

Eels fisheries used to be performed with fyke nets in some lakes outside the main fishing period (during eel migration). A fyke net is made from a series of bag-shaped nets held open by hoops. Fyke nets equipped with wings and leaders are used in sheltered places in lakes where there is plenty of plant life. The system is secured to the bottom so the fish move with the flow of the water trapped in the bag. By Ministerial Decision 643/39462/01-04-13 (in implementation of Regulation (EC) No. 1100 to 1107) fishing of eels with fyke nets in all the lagoons of the territory is banned. Since 2013, eel fishing in lagoons, in accordance with the above Ministerial Decision, is permitted only by using permanent structures and with the precondition

of the mandatory release of 30% of annual lagoon's eel production. Each lagoon's tenants are obliged to promptly inform the regional state fisheries services to upcoming eels fishing, so that the proposed procedure would be applicable.

Fishing in estuaries is conducted primarily by commercial fishermen, who are also using fyke nets. According to the same Ministerial Decision the period November 1st - end of January next year, fishing eels by any means and every tool in the rivers and deltas, around and within 3 nm from the mouth, is prohibited.

Moreover coastal eel fishing can only be conducted by specially licensed professional boats. The owners of these specially licensed vessels should declare to the regional state fisheries services, the number and weight of eels and the catch area.

Small quantities of eels are caught by independent fishermen using longlines. These particular quantities of eels are placed on the internal market and in any case these quantities are not recorded.

III.E.5.1. ACHIEVEMENTS: RESULTS AND DEVIATION FROM NP PROPOSAL

III.E.5.1.1. Eel landings

The total landings of all legally caught eels (i.e. TL > 30cm) for 2015 in Greece (EMU-1, EMU-2 and EMU-3) were 54.99 t, slightly higher than the 46.76 t of 2014. The recorded landings in 2015 for Western Greece (EMU-1) including the Mesolongi - Aitoliko lagoons, lagoons of Ambrakikos Gulf, Preveza and Lefkada lagoons were 45.34 t. Iliia and Achaia lagoons of Western Peloponnese (EMU-2) eel landings were approximately 8.33 t. Finally the landings recorded in 2015 for Eastern Macedonia and Thrace was 1.32 t (Lake Vistonida and Evros).

III.E.5.1.2. Eel measurements

In the framework of the National Fisheries Collection Program 2015, length, weight, sex, sexual maturity and the number of parasites measurements were collected for a sample of 1,338 eels, from the landings of the 3 EMUs where eel production exists. Data of age were, also, collected, calculated according to the proper ICES protocol, for a subset of the above sample (528 specimens).

For EMU-3, the total number of specimens measured for Total Length (TL, mm) and Total Weight (TW, mm), was 207 (all derived from Lake Vistonida). In EMU 3 the total eel production in 2015 was even lower than the production of 2014 (25% decrease). This decline was due to the weather conditions prevailed during the main eel fishing period (November-December 2015). During the above mentioned period the high temperatures and drought prevailed had as a result the significantly delay of the initiation of the spawning migration, which was observed to have started in mid-January 2016. For EMU-1, the total number of specimens that had TL (mm) and TW (mm) calculated, were in total 950 (482 of the Mesolongi and Aitolikou lagoons, 117 of Arta's lagoon, 90 and 261 of Lefkada and Preveza lagoons respectively) while in EMU-2 181 specimen were measured (Prokopou and Kotychi lagoons).

III.E.5.1.3. Age assessment

For the discrimination of eel specimens into age classes, the otolith method was used instead of the scale method, as proposed by the age assessment protocol of ICES.

The age of 190 specimens of Mesolongi and Aitoliko Lagoons and 218 of Arta, Preveza and Lefkada lagoons, was calculated for EMU-1. The mean age for the specimens from Mesolongi and Aitoliko Lagoons was estimated at 4.27 years with a standard deviation (SD) equal to 2.12 and the most common age in the sample, was found to be age 3. High SD of the ages is possibly caused by the environmental heterogeneity among the lagoons of the Messologhi-Aitoliko wetland complex. In EMU-2, the age of 120 specimens of Prokopos and Kotychi lagoon were assessed. Sample's mean age was estimated at 2.87 years with a standard deviation (SD) equal to 1.23. Same as 2014, eels of EMU-2 seem to become silver eels faster than in EMU-1.

III.E. 5.1.4. Sexual maturity

For the discrimination of the eel specimen into sexually immature (including all 5 stages of yellow eels, proposed by Duriff et al. (2005)) and sexually mature, a combination of 3 indices was used. Those three indexes were, Eye Index (Punkharst et al., 1982), Fin Index (Duriff et al., 2005) and the Mean Minimum Length of Female eels caught while migrating from all Greek lagoons. When all 3 indices gave the same result about a specimen, only then it was accepted to be mature or immature, the rest of specimens that failed to get a common result by all 3 indices were not classified. This method was applied on the total sample, thus 1,338 specimens from all 3 EMUs of Greece.

III.E.5.1.5. Parasites and various diseases

The eels sample collected from Lake Vistonida (EMU-1) in 2014 was tested in the laboratory for parasites revealing that a large number of fish were infected parasites. Out of the 207 specimens, 128 (62.32%) were carriers of at least one individual of the nematode *Anguillicoloides crassus*. From the Mesolongi -Aitoliko Lagoons a total of 190 specimens were examined, the parasite *A. crassus* was carried by 37 specimens (19.5%). Finally, for EMU-2 a total of 120 specimens were checked for parasites, resulting that 49 specimens (40.8%) of the sample were carriers of the parasite. The fact that the biggest proportion of eel specimen of Vistonida lake (62.32%) are carriers of the nematode is already known from 2013 but it is not clear yet, why this is happening.

III.E.5.2.DATA QUALITY: RESULTS AND DEVIATION FROM NP PROPOSAL

The collection and assessment of eel samples was successful for all 3 EMU's for 2015. The target number of specimens that has been proposed in the Greek Eel Management Plan was met or even exceeded.

III.E.5.3.FOLLOW-UP OF REGIONAL AND INTERNATIONAL RECOMMENDATIONS

There are no recommendations about Eel *Anguilla anguilla* (L.) from the Liaison Meeting (LM) for 2013.

III.E.5.4.ACTIONS TO AVOID DEVIATIONS

There are no shortfalls

Eel Report Contributors

For the derivation of the results of the chapter III.E.5 MONITORING OF COMMERCIAL EEL the following organisations collaborated, under the scientific supervision of Dr. Manos Koutrakis:

- Laboratory of Freshwater systems and Lagoons (Scientific Supervisor: Dr. Manos Koutrakis) / FRI (Institute of Fisheries Research) Kavala, Greece
- Division of animal Biology (Scientific Supervisor: Dr. Kostantinos Koutsikopoulos) / Department of Biology, University of Patra, Patra, Greece
- Laboratory of Zoology (Scientific Supervisor: Dr. Ioannis Leonardos) / Department of Biological Applications and Technology Department, University of Ioannina, Ioannina, Greece

III F Transversal variables

III F 1 CAPACITY

III F 1 1 ACHIEVEMENTS: RESULTS AND DEVIATION FROM NP PROPOSAL

Data on fleet capacity for 2015 was available from the National Fleet Register and includes vessels operating in GSA-20, GSA-22 and GSA-23.

The following parameters were estimated:

- Number of professional fishing vessels
- Length
- GT
- kW
- Age

Parameters were estimated annually, by fleet segment, GSA and supra-regions (in case of large pelagic fishery).

III F 1 2 DATA QUALITY: RESULTS AND DEVIATION FROM NP PROPOSAL

Data were collected exhaustively from the fleet register, cover the entire Greek fleet so, no further estimation is required and it is in accordance with the NP with no deviations.

III F 1 3 ACTIONS TO AVOID DEVIATIONS

There are no shortfalls

III F 2 EFFORT

III F 2 1 ACHIEVEMENTS: RESULTS AND DEVIATION FROM NP PROPOSAL

Data on effort were collected for all the required métiers. Considerable attempt was made to allocate the effort of small scale fishery vessels to the required métiers. This was due to the fact that till the end of 2015 it was not mandatory for small-scale fishery vessels to specify the type of activity they practice along the year. Each vessel can use all the fishing gears indicated in the license. The majority of the fishing licenses of the Greek small scale fishery vessels allow the use of more than one gear (~96%). This framework is also more complex if we consider the high number of existing métiers, with differences in seasonality and geographical areas.

In order to estimate fishing effort by métier and GSA, the following data sources have been used:

- field survey to detect the prevalent fishing activity
- sample survey to estimate the monthly distribution of activity by métiers. The sample survey was based on a frame of 592 vessels (**Table III.F.2.1.1**) distributed in the 12 major fishing areas (GSA20: N-ION, C-ION, S-ION, GSA-22: ARG SAR, EVIA, THERM, THR-LIM, CHI-MIT, CYCL, DODEC, VOL_SPOR, GSA-23: CRETE) (**Figure III.F.2.1.1**) Data on fishing effort, vessel activity and fishing area were recorded by gear using purposely formulated questionnaires. Results for each area, by month and by métier were obtained by applying raising factors to the sampled data.
- VMS data to estimate fishing effort for trawlers (100% of vessels) and purse seines (88% of vessels).
- ERS data covering part of the year to estimate fishing effort for trawlers and purse seiners.

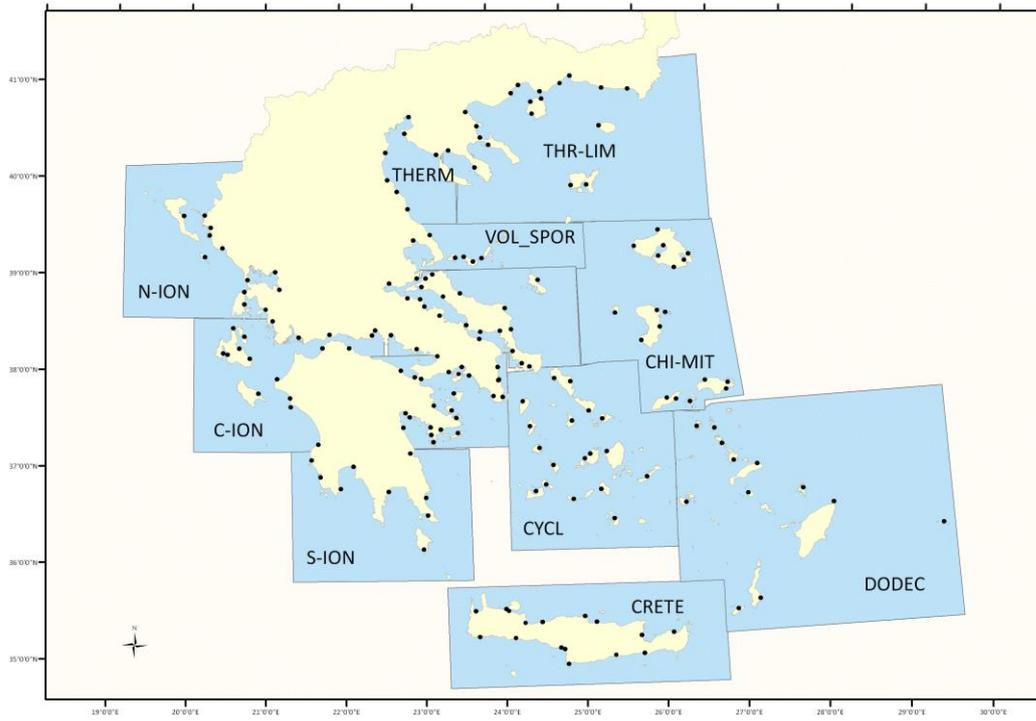


Figure III.F.2.1.1 The 12 major fishing areas for the stratified sampling scheme of the Greek DCF

Table III.F.2.1.1.The number of vessels per fleet segment and length category that were sampled for effort and landings data in each of the 12 major areas of Greek territory.

Statistical methods described in the 2011-2013 NP have been applied. The Standard

		Fishing Areas												
FLEET_SEG1	Length	ARGSAR	EVIA	THERM	THR-LIM	CHI-MIT	CRETE	CYCL	DODEC	N-ION	C-ION	S-ION	VOL-SPOR	Total
	Class													
Trawlers (Demersal trawlers)*	VL1218	1	0	0	1	0	0	0	0	0	0	0	0	2
	VL1824	3	1	2	5	1	1	1	1	1	2	1	1	20
	VL2440	14	10	23	16	7	4	2	3	2	3	1	3	88
PurseSeine (Purse seiners)	VL0612													0
	VL1218	3	4	1	1	1	1	1	1	1	2	0	1	17
	VL1824	4	4	2	3	1	1	1	1	1	2	1	2	23
	VL2440	0	4	6	4	1	1	1	0	0	0	0	1	18
BoatSeine	VL0006													0
	VL0612	6	5	2	1	3	1	3	4	5	3	2	1	36
	VL1218	1	1	0	1	1	1	1	1	0	1	1	0	9
	VL1824													0
Bottom longlines (Vessels using hooks)	VL0006	5	5	2	2	4	3	2	3	2	2	3	2	35
	VL0612	10	5	3	3	4	4	3	5	3	3	3	2	48
	VL1218	2	1	1	1	1	1	2	1	1	1	1	1	14
	VL1824	0	0	0	1	0	1	0	0	0	0	0	0	2
Fixed nets (fixed netters)	VL0006	7	8	7	7	11	3	3	4	9	6	5	4	74
	VL0612	18	10	11	12	11	6	7	8	17	10	7	5	122
	VL1218	3	1	1	2	1	2	4	3	1	1	1	1	21
	VL1824	0	0	0	0	0	0	1	1	0	0	0	0	2
Pots and Traps (pots and/or traps)	VL0006	1	1	1	1	1	0	0	1	1	1	1	0	9
	VL0612	1	1	3	2	1	0	0	1	1	1	1	1	13
	VL1218	0	0	0	1	0	0	0	1	0	0	0	0	2
	VL1824	0	0	0	0	0	0	0	1	0	0	0	1	2
Drifting longlines (vessels using other Passive gears)	VL0006	1	1	1	1	1	0	0	1	1	1	1	1	10
	VL0612	1	1	1	1	1	0	1	1	1	1	1	1	11
	VL1218	0	1	1	1	1	1	2	0	1	0	1	1	10
	VL1824	0	0	0	0	0	0	1	0	1	0	1	1	4

Table III.F.1 provides the information collected during the sampling year.

III F 2 2 DATA QUALITY: RESULTS AND DEVIATION FROM NP PROPOSAL

Elementary and aggregated data have been checked to verify their reliability. Consistency among different variables has been analyzed. A census of effort for all bottom trawlers operated in Greek territorial waters has been obtained from VMS and ERS data. Concerning purse seines, the estimated fishing effort value from VMS and

ERS data cover 88% of fishing fleet. The remaining data was collected through the sample survey and therefore data is consistent

III F 2 3 ACTIONS TO AVOID DEVIATIONS

Data collection was in accordance with the NP. The poor coverage of small scale fishery segments was due to the late start of the program. The 2016 NP has started on time.

III F 3 LANDINGS

III F 3 1 ACHIEVEMENTS: RESULTS AND DEVIATION FROM NP PROPOSAL

Landings by métier were sampled in the same way as effort was sampled and outlined above (according to the variables and desegregation levels listed in Appendix VIII). The landings indicators from the sampling programme are:

- Total live weight per vessel
- Total value per vessel
- Unit value per species per vessel

These indicators were disaggregated to live weight or value per day, per kw*day or per effort unit.

Data related to BFT landings are provided by a specific data collection implemented by the national administration in accordance with ICCAT procedures.

The **Standard Table III.F.1** provides the information collected during the sampling year.

III F 3 2 DATA QUALITY: RESULTS AND DEVIATION FROM NP PROPOSAL

Landings data by species and métier have been sampled in detail for all fleet segments. All variables of Appendix VIII were collected through the sample survey and therefore data is consistent. Data quality is given in terms of coverage rate.

III F 3 3 ACTIONS TO AVOID DEVIATIONS

Data collection was in accordance with the NP. The poor coverage of small scale fishery segments was due to the late start of the program. The 2016 NP has started on time.

III G Research surveys at sea

III G 1 ACHIEVEMENTS: RESULTS AND DEVIATION FROM NP PROPOSAL

According to appendix IX of DCF (EU Dec. 93/2010), the Greek National Programme for 2011-2013, which was extended to the period 2014-2016, included two surveys:

- MEDITS, MEDiterranean International bottom Trawl Survey
- MEDIAS, MEDiterranean International Acoustic Survey

MEDITS

The MEDITS survey was not realized in any GSA of Greece due to the late funding of the NP for 2015 (in September 2015) by the Greek Government.

MEDIAS

DIRECT ASSESSMENT OF THE BIOMASS OF ANCHOVY AND SARDINE STOCKS IN THE AEGEAN AND IONIAN SEA

During the implementation of the DCF in Greece in 2015 one research survey, instead of two, was carried out: in Ionian Sea during October 2015. Collected data were used for:

- Abundance and biomass estimation of anchovy stock and sardine stock by a fishery-independent technique: Acoustics.
- The survey focused on the delimitation of the juvenile grounds distribution for anchovy and sardine stocks and the biomass estimation of the respective stocks.

Hydrographic parameters were recorded over a grid of 59 sampling stations in Ionian Sea (**Fig 1**). At each station of the sampling grid vertical profiles of temperature and salinity were obtained by a Temperature-Salinity-Depth (CTD) system SBE-25 of Seabird Electronics.

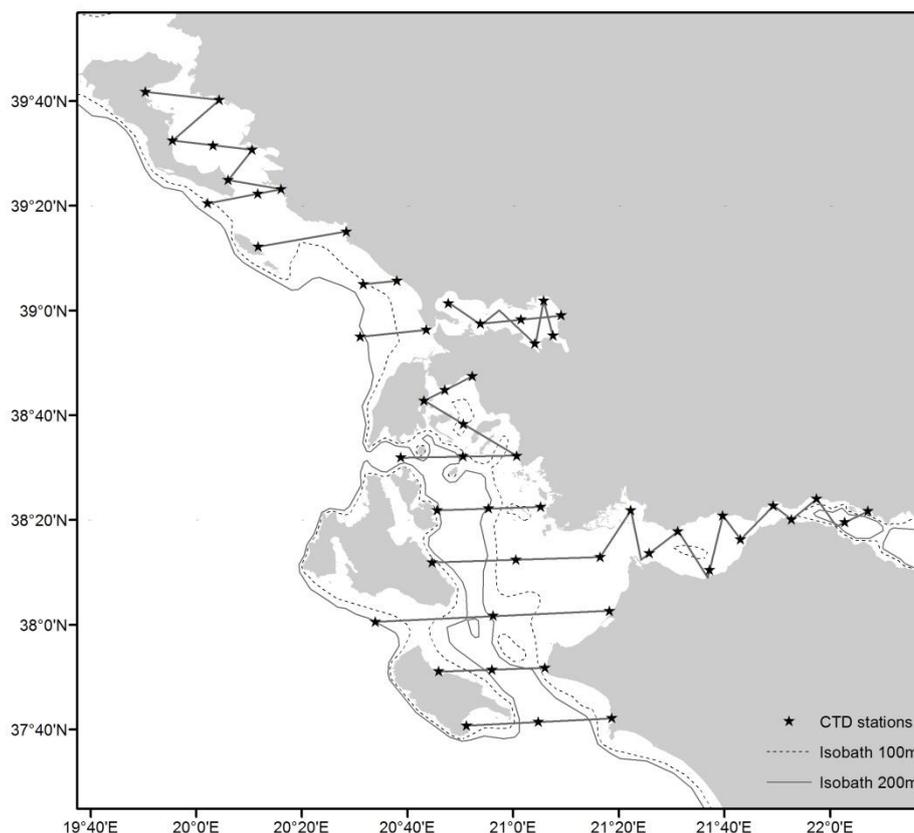


Fig 1. Transects and CTD sampling stations carried out in Ionian Sea during October 2015.

The abundance indices that were estimated and provided within the framework of the MEDIAS survey in the Greek waters in 2015 are listed below and shown in Tables 1-5 and Figs 1-13:

1. Total fish NASC per EDSU (Elementary Distance Sampling Unit) (Annex I, Table 1)
2. Target Species (anchovy and sardine) NASC per EDSU (Elementary Distance Sampling Unit) (Annex I, Table 1)
3. Biomass per EDSU per target species (Annex I, Table 1)
4. Number of individuals per EDSU per target species (Annex I, Table 1)
5. Number of individuals/age/Target species (Annex I, Tables 2-5)
6. Biomass/age/Target species (Annex I, Tables2-5)
7. Number of individuals/length class/Target species (Annex I, Tables2-5)
8. Biomass/length class/Target species (Annex I, Tables2-5)

In addition in the report for the DCR the following items are provided:

1. Point maps of total pelagic fish NASC per EDSU (Fig 2)
2. Point maps of anchovy and sardine NASC per EDSU (Fig 3 and 4)
3. Point maps of anchovy and sardine biomass per EDSU (Fig 5 and 6)
4. Catch compositions of the hauls: pie-charts indicating biomass per species (Fig 7)

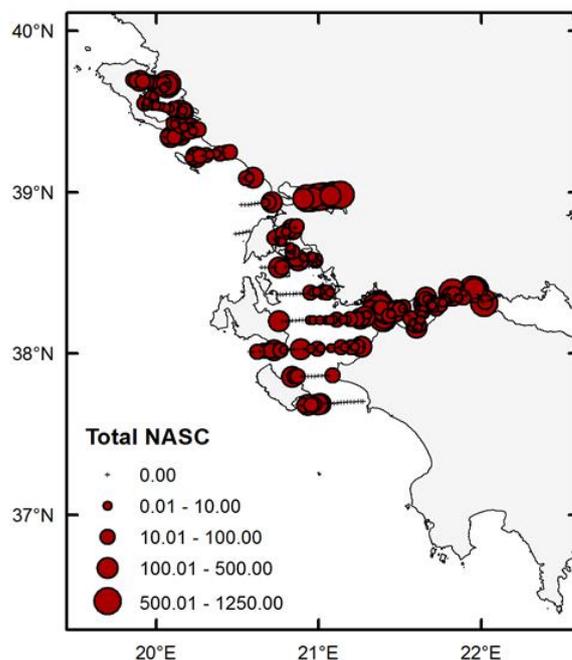


Fig 2.The distribution of the total fish NASC (m^2/nm^2) per EDSU in Ionian Sea during October 2015.

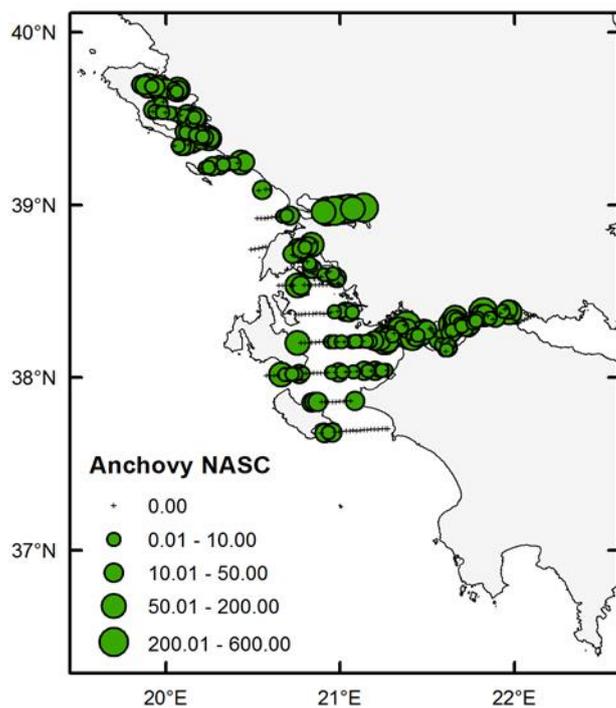


Fig 3.The distribution of anchovy NASC (m^2/nm^2) per EDSU in Ionian Sea during October 2015.

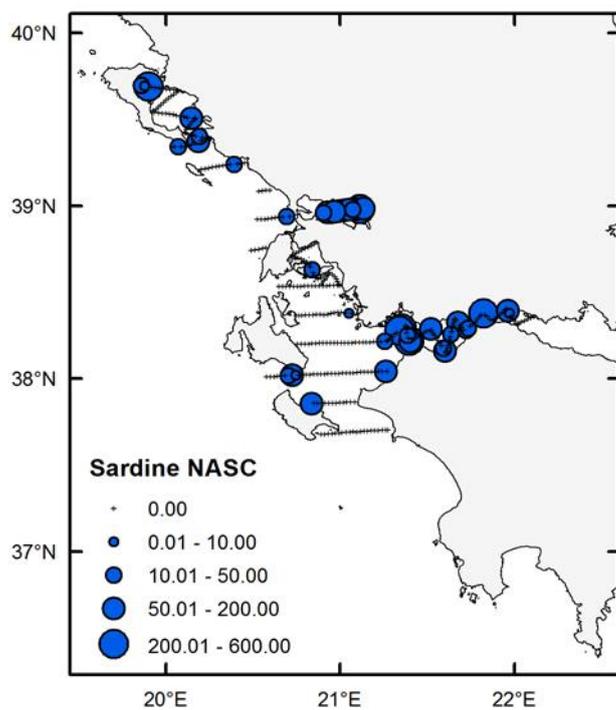


Fig 4.The distribution of sardine NASC (m^2/nm^2) per EDSU in Ionian Sea during October 2015.

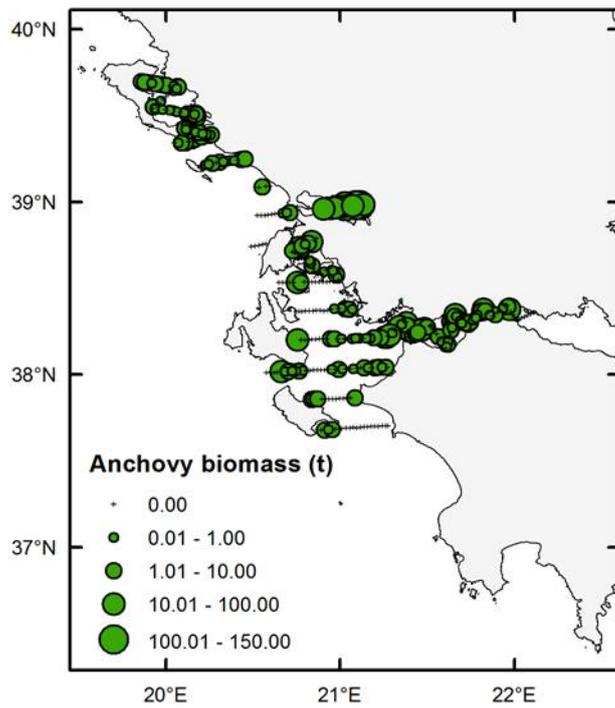


Fig 5.The distribution of anchovy biomass (t) per EDSU in Ionian Sea during October 2015.

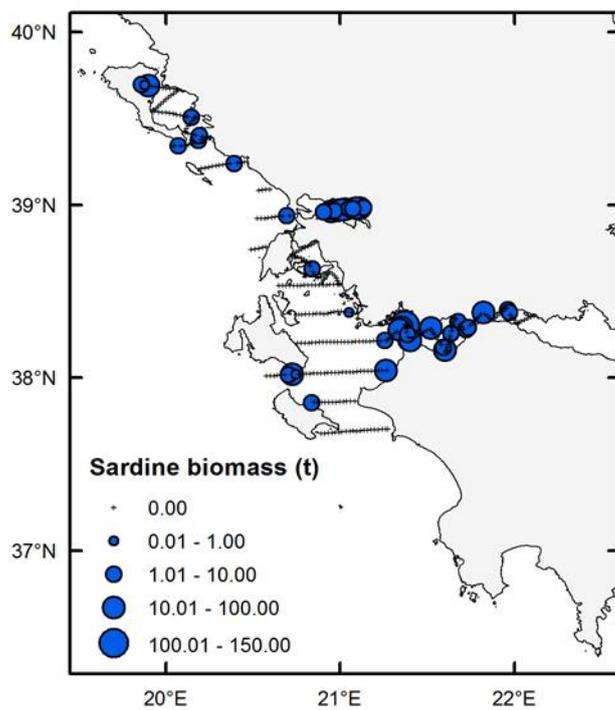


Fig 6.The distribution of sardine biomass (t) per EDSU in Ionian Sea during October 2015.

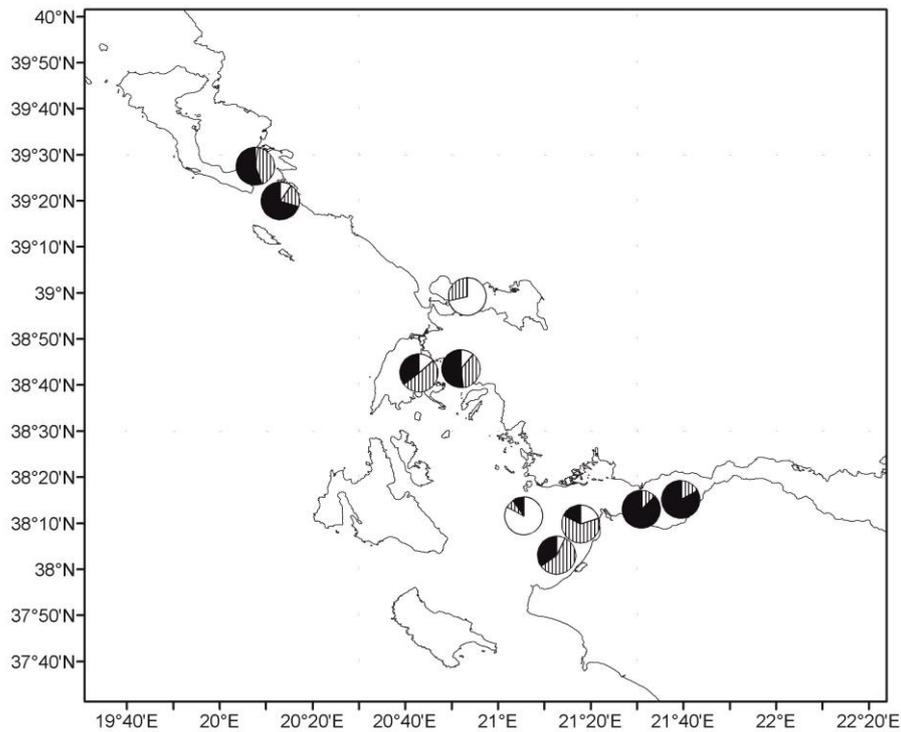
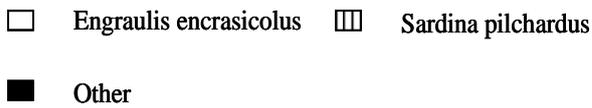


Fig 7. The catch compositions of the hauls (species kg/haul) weighted per hauling hour in Ionian Sea during October 2015.

For non-target pelagic species that are considered important in each area, Length-Weight relationships (where an adequate number of samples is available) and Length frequency distributions in Ionian Sea are provided (Table 6 and Figures 8-13).

Table 6. Length-Weight relationships (TW (gr)- TL (mm)) for the main species in Ionian Sea.

Species	Ionian Sea
Anchovy (<i>Engraulis encrasicolus</i>)	$TW = 9E-07TL^{3.3896}$
Sardine (<i>Sardina pilchardus</i>)	$TW = 2E-05TL^{2.7834}$
Round sardinella (<i>Sardinella aurita</i>)	$TW = 6E-06TL^{3.0513}$
Mediterranean horse mackerel (<i>Trachurus mediterraneus</i>)	$TW = 1E-05TL^{2.9278}$
Bogue (<i>Boops boops</i>)	$TW = 3E-06TL^{3.2022}$
Mackerel (<i>Scomber scombrus</i>)	$TW = 3E-06TL^{3.2022}$

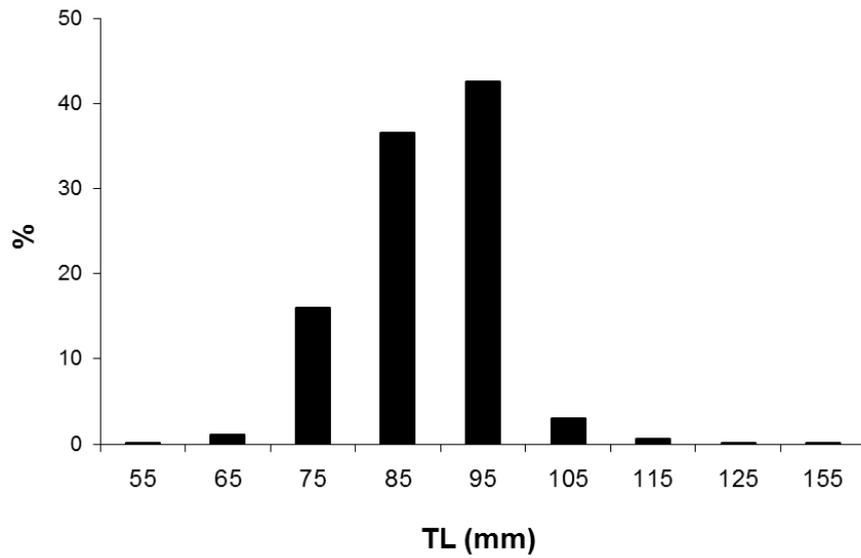


Fig 8. Anchovy (*Engraulis encrasicolus*): Length frequency distribution in Ionian Sea during October 2015.

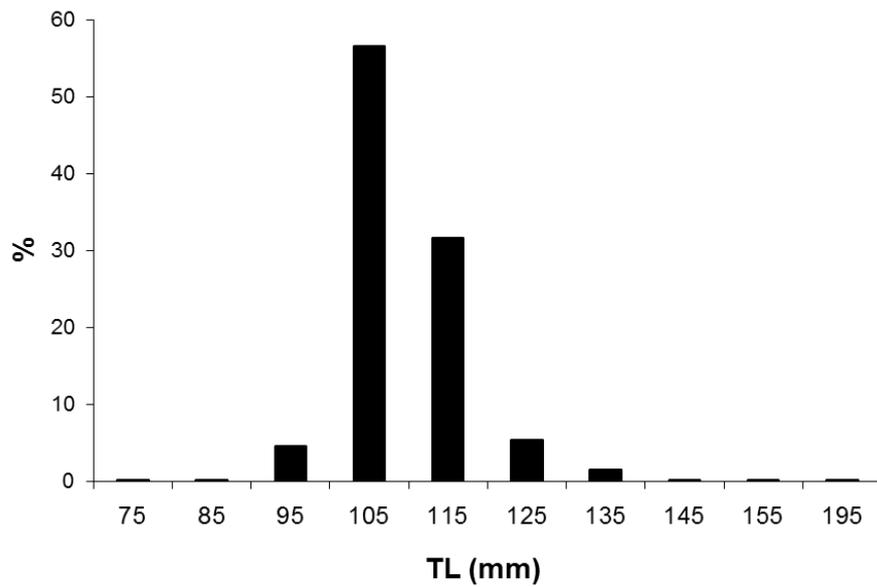


Fig 9. Sardine (*Sardina pilchardus*): Length frequency in Ionian Sea during October 2015.

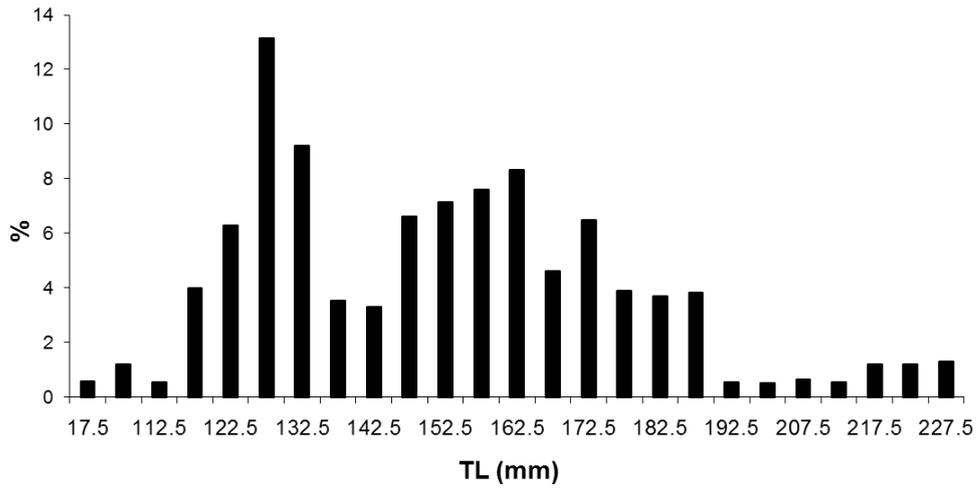


Fig 10.Round sardinella (*Sardinella aurita*): Length frequency distribution in Ionian Sea during October 2015.

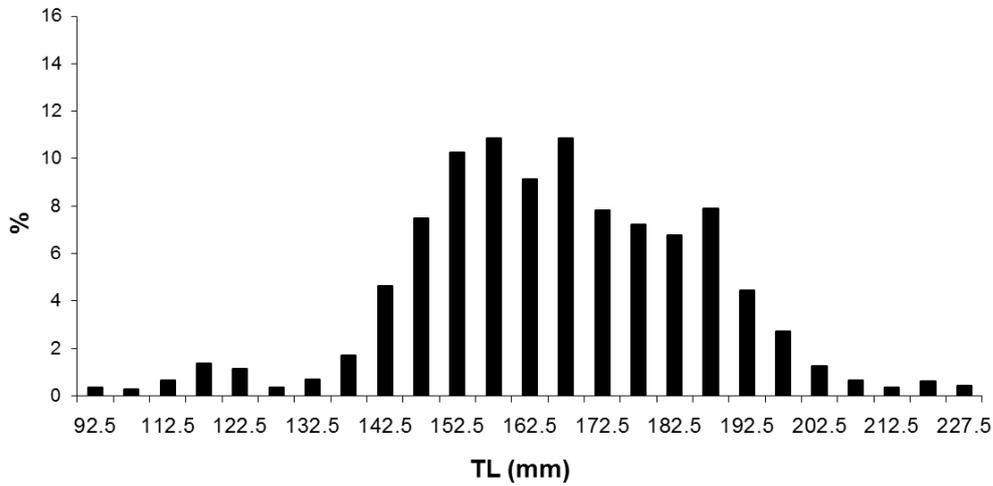


Fig 11.Bogue (*Boops boops*): Length frequency distribution in Ionian Sea during October 2015.

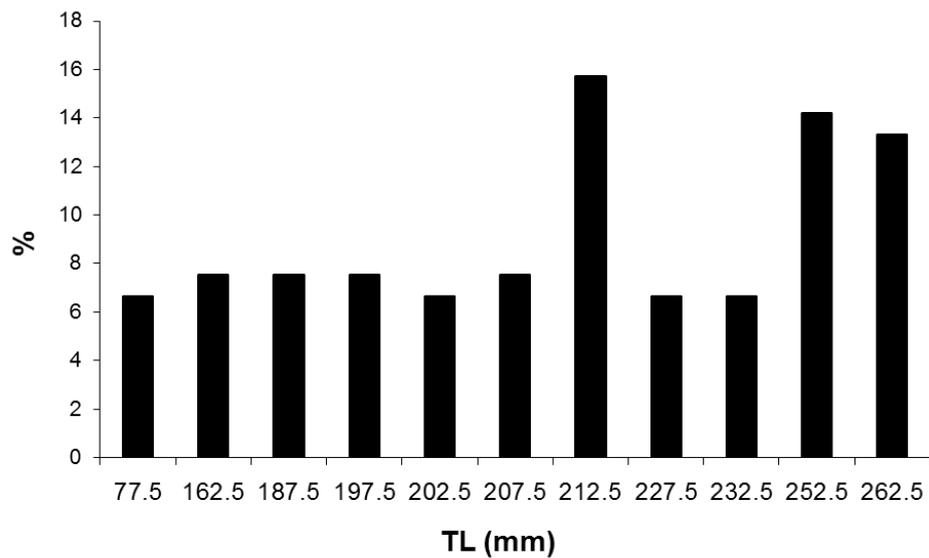


Fig 12.Mediterranean horse mackerel (*Trachurus mediterraneus*): Length frequency distribution in Ionian Sea during October 2015.

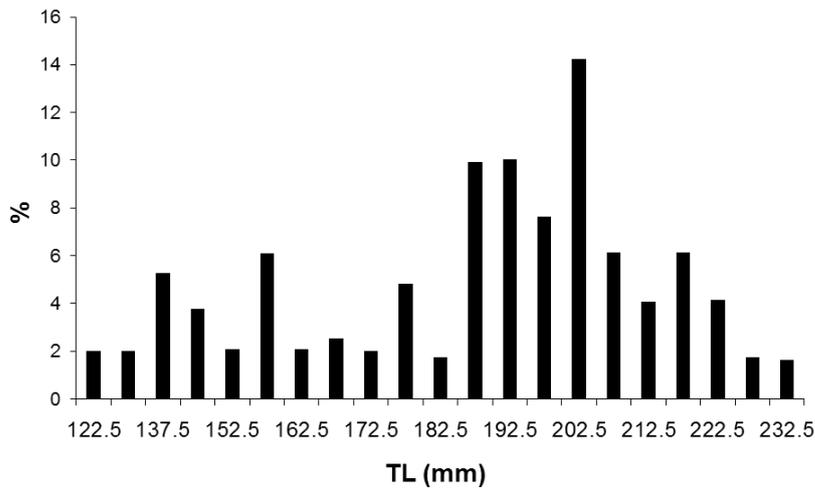


Fig 13. Atlantic mackerel (*Scomber scomber*): Length frequency distribution in Ionian Sea during October 2015.

III G 2 DATA QUALITY: RESULTS AND DEVIATION FROM NP PROPOSAL

MEDITS

NA

MEDIAS

Major deviations of the proposed plan were due to the delayed adoption of the NP for 2015 by the Greek Government in September 2015. The importance of the delayed funding of the NP is a major issue that was tackled also in 2014 report. This, along with the limited availability of the R/V *Philia* during September- October imposed the need to skip the Aegean Sea and focus on Ionian Sea. Ionian Sea (GSA 20) is surveyed during autumn consistently since 2013 and thus allows the evaluation of stock status and the implementation of stock assessment purposes. As a result we present reduced percentage of coverage: only 21% cover of the planned EDSU (Elementary Distance Sampling Units) for acoustics and 26% in the number of CTD stations. **However, the quality of the MEDIAS survey indices such as sufficient geographical coverage, abundance and recruitment estimates for GSA 20, the GSA where the survey was carried out in 2015, was good and not affected by the delayed funding.**

III G 3 ACTIONS TO AVOID DEVIATIONS

MEDITS and MEDIAS

The most important action to avoid deviations in 2016 is the funding of the NP on time. The NP for 2016 has already been adopted by the Greek Government and subsequently, it is likely that both MEDITS and MEDIAS surveys will be realized properly.

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

Fish and shellfish have been produced using aquaculture techniques in Greece since early 1960s. The strengthening of the aquaculture industry with the implementation of new techniques and the rapid increase of production commenced in late 1990s, when the amount of captured fish reached a plateau while the demand for aquatic product continued to rise.

It should be noted that the aquaculture units in Greece, are not financially autonomous entities but belong to larger firms most of which keep parallel economic activities. Furthermore, in most cases, it is difficult to achieve the distinction between different segments' productions.

The active aquaculture units according the licensing of the Ministry of Rural Development and Food for the fiscal year of 2014 are 670 (Total and frame population). 584 units were planned to be sampled, data were achieved from 498 aquaculture units that belong to 248 companies of aquaculture sector.

According to NP proposal, the data collection methodology includes the mailing of a properly structured questionnaire to the aquaculture enterprises, on site visits and interviews and finally data collection from public sources and published balance sheets.

The questionnaire included the following 3 topics:

- (1) cost and profit: value of total sales, personnel costs, energy related costs, value of purchased raw material(fry) and other material necessary for the production, production costs and value of the final product, capital costs, special costs, investments, and debt.
- (2) Aquaculture techniques: freshwater marine fish, coldwater or warmwater marine fish, shellfish, Cages, Land based farms, Hatcheries and Nurseries, Rafts or Long line Mussel production, Extensive farming in estuaries and lagoons
- (3) The socio-economic criteria of the sector are attributed to: employment per sector, gender employment statistics, number and location of enterprises, and the problems of the enterprises.

IV A 2 DATA QUALITY: RESULTS AND DEVIATION FROM NP PROPOSAL

As in the previous year's attempt, the census method was followed for the majority of the segments. The collected data were of high quality given that they have been extracted from Greek National authorities which keep detailed data of the sector that are also crosschecked.

IV A 3 ACTIONS TO AVOID DEVIATIONS

As mentioned in IV A 1, most aquaculture units in Greece are not financially autonomous entities but belong to larger firms most of which keep parallel economic activities. Although the distinction of costs between the various activities was hard to be accurate due to lack of companies' track of cost distinction, an effort was made to acquire additional accounting and financial data to distinguish the production costs

between the parallel operating activities. The effort will continue in the next year's survey using a more comprehensive questionnaire that will provide a better cost distinction, while attempting to upgrade the quality and time of meetings and on site interviews with the companies' representatives.

IV B Collection of data concerning the processing industry

In Greece, the traditionally important, due to its geographical location, fishing industry has led to the development of fisheries processing industry. The entire fisheries sector, including fishing and fisheries processing, historically played a social and economic key role, nationally and regionally. It has been the basis for settlement and employment along the entire coast.

The term fish processing refers to the processes associated with fish and fish products from the harvest of fish in aquaculture or fish farming, until the product is in its final form. Activities like freezing, processing (filleting, salting, drying, smoking, marinating, cooking, canning) of fish, and the de-shelling of mussels are included in the Greek fishery processing sector.

For the fiscal year of 2014, there are 150 companies with proven activity of freezing, processing (filleting, salting, drying, marinating, smoking, cooking, canning) of fish, and the de-shelling of mussels of which 133 participated in the survey

Following Greece's NP proposal, the data collection methodology included the mailing of a properly structured questionnaire to the processing industry enterprises, on site visits and interviews and finally data collection from public sources and published balance sheets.

The questionnaire included the following topics: (1) value of total sales per processed products, (2) personnel costs, (3) energy related costs, (4) quantity and value of purchased processed raw material and other material necessary for the production, (5) production costs and value of the final product, (6) capital costs, (7) special costs, (8) investments, and (9) debt. The socio-economic criteria of the sector are attributed to: (1) employment per sector, (2) gender employment statistics, (3) number and location of enterprises, and (4) the problems of the enterprises.

A 10 day period was provided for the collection of the required data and the completion of the questionnaire.

Regarding the completion of the questionnaires, only 32 were sent back completed in addition to the 101 questionnaires completed during the onsite interviews.

Additional to the questionnaire data, basic financial ratios of economic liquidity, productivity, structure and activity are estimated for the fiscal year 2014, with the purpose of estimating the basic financial indices of LTD or SA companies that are obliged to publicize their balance sheets and also have the largest sales of seafood products in the Greek and the International food market.

IV B 1 ACHIEVEMENTS: RESULTS AND DEVIATION FROM NP PROPOSAL

The enterprises that received the aforementioned questionnaire, were generally positive in providing the required data. The completed questionnaires produced a

significantly high percentage of sample (<85%), thus ensuring reliability of the estimations and conclusions.

The collected data provided by completed questionnaires (filled out by the companies or during onsite interviews) were supplemented with and cross checked by data from the following sources: (a) Prefectural Chambers of Commerce, Industry and Trade (e.g. brand name, location, VAT number, phone and fax numbers) (b) Prefectural Directorates of Fisheries and Veterinary Services, as well as the National Food Control Agency (EFET), and the Hellenic Ministry of Rural Development and Food (e.g. purchase of raw material, production per species, total sales in quantity and value, employment, functioning regulations) and (c) World Wide Web (e.g. location, phones, projected investments, sales, general economic data).

The analysis of the financial statements of corporations (gross revenue, net profits, assets, liabilities) and key indicators (profitability, liquidity, economic structure and activity) for the year 2014, consists of processing data acquired from published balance sheets of 45 SA and Ltd companies (27 of freezing and 18 of processing sector) out of a total of 57 companies, (6 companies had not a published balance sheet by the time of the survey and another 6 had various issues during the data uploading on government's financial online platform, therefore did not allow any data collection until the procedure was finalized.). The 45 firms account for over 82.6% of the fish processing industry based on raw material purchases.

The main difficulties of collection and processing of questionnaire data from companies were the following:

- Due to the fact that over 50% of the companies in the processing industry maintain two (or more) parallel economic activities, most of them, (especially the small sized ones), lack the precise cost analysis and distinction about each activity, fact that leads to either overestimation of processing cost or its revenue.
- Distrust and in some cases refusal to provide information, particularly on larger-sized businesses, on questions concerning loans and selling prices of finished.
- Difficulties in filling in the questionnaire appeared again mainly in larger companies, due to the lack of time and available staff especially during high production periods.
- Crosschecking questionnaire data was not always feasible due to delayed publication of companies' balance sheets. (6 companies had not a published balance sheet during the survey so only the questionnaires' data was used on the early data process)

IV.B.2 DATA QUALITY: RESULTS AND DEVIATION FROM NP PROPOSAL

All requested indicators listed in Appendix XII of Commission Decision 2010/93/EC were collected in the Greek data collection program for the fish processing industry.

As mentioned before, the data sources were the completed questionnaires, data provided by official bodies, the fishing ports, official financial agencies and published balance sheets

For most variables the achieved sample rate and the response rate exceeded 90% (Table IV.B.2.).

Also, according to the NP proposal, the data collection for the variables of Energy Costs and Other Operational Costs was estimated by Probability Sample Survey (Type B in Table IV.B.2). The census method was used for the rest required variables.

Of the 150 active processing companies for the fiscal year 2014, 17 companies either refused to participate(11) or had no published balance sheets or data from official bodies(6), a percentage acceptable according to the NP proposal(>10-15%).

IV.B.3: ACTIONS TO AVOID DEVIATIONS

As in previous years, companies with parallel activities other than processing did not or could not provide sufficient data for cost allocation per activity, a distinction which is also not reflected in the balance sheets and financial statements of most, especially small sized, companies. The only relevant information is derived from questionnaires and relates solely to distinguish sales of finished products.

Actions to address the difficulty of cost distinction, especially the ones concerning staff, energy and other operating expenses, were: a) an adjustment on the cost topic of the questionnaire, b) requesting additional information from companies' administration in order to establish a logical cost quota for each activity and c) contacting the companies' accountants for additional information to the balance sheet data.

Since the aforementioned approach effort already took place in the previous year, more companies were accustomed to the additional data demand and the percentage of the agreeable and adequate cost analysis data keeps increasing.

Furthermore, companies with parallel aquaculture activity, showed no cost when using their own aquaculture products in the processing activity. In this case, the minimum raw material price for the financial year 2014 was used as the aforementioned cost, a suggestion from companies' representatives during the onsite interviews.

V. MODULE OF EVALUATION OF THE EFFECTS OF THE FISHING SECTOR ON THE MARINE ECOSYSTEM

V. 1. ACHIEVEMENTS: RESULTS AND DEVIATION FROM NP PROPOSAL

Indicators 1-4: Conservation status of fish species Proportion of large fish Mean maximum length of fishes Size at maturation of exploited fish species

Data for the Indicators for this module are usually collected by MEDITS & MEDIAS survey. Since, MEDITS survey was not implemented at all in 2015 and MEDIAS survey implemented only in Ionian Sea, indicators 1-4 cannot be estimated

Indicators 5-7: Distribution of fishing activities, Aggregation of fishing activities, Areas not impacted by mobile bottom gears.

According to the Commission Regulation (EC) No 2244/2003, fishing vessels larger than 15 meters in total length, are obligated to be equipped with Vessel Monitoring System (VMS), which at regular intervals (every 2 hours) provides data to the fisheries authorities on the location, course and speed of vessels. In case of Greece, all trawlers are equipped with VMS, while the majority of purse seiners (~89%) and 84 coastal vessels have total length greater than 15 meters and therefore are controlled by VMS. The rest of coastal fishing vessels are not obligated to have VMS. For the purposes of the DCF, VMS data are provided by the Hellenic Ministry of Maritime Affairs, Islands and Fisheries and specific routines were implemented for analysis and mapping (Kavadas S. & Maina I). It has already proven possible to link daily VMS positional data with logbook information. The distribution of fishing activities, aggregation of fishing activities and areas not impacted by mobile bottom gears can be mapped and provided as required. Greece continued to manage and analyse all of the relevant resulting data sets, and made these data available to various expert groups under a formal data request.

Indicator 8: Discarding rates of commercially exploited species

Metier based discard sampling is conducted as part of the concurrent sampling at sea programme. Trip specific discard rates by species measured in weight are raised to discard rates by quarter and metier using species landings data.

Indicator 9: Fuel efficiency of fish capture

The collected economic data were used to calculate the indicator of the relationship between fuel consumption and the value of landed catch. It provides information on trends in the fuel efficiency of different fisheries.

V. 2. ACTIONS TO AVOID DEVIATIONS

The most important action to avoid deviations in 2016 is the funding of the NP on time. The NP for 2016 has already been adopted by the Greek Government and consequently all the data needed for NP will be collected on time.

VI. MODULE FOR MANAGEMENT AND USE OF THE DATA

VI. 1. ACHIEVEMENTS: RESULTS AND DEVIATION FROM NP PROPOSAL

VI.1.1 Management of data

The data are hosted in a centralized integrated database and GIS Fisheries Information System called IMAS-Fish which supports the Data Collection programme. IMAS-Fish was developed between 2003 and 2006. During the development of the IMAS-Fish databases, a particular attention was attached to design the system to fulfill the requirement of the Data Collection Regulation in force at that time. The system was updated to fit with the new DCF requirements. This includes the update of the database structure, the update/constructing of data entry forms and the update of the query tool that support the data mining procedure and EU data calls. In addition, supplementary tests were done to ensure that the system is working properly and is able to provide the expected results. The COST structure was incorporated into IMAS-Fish as well as the required insert/update procedures were constructed.

Use of the data

The data of the surveys (MEDITS and MEDIAS) are stored on ORACLE database server, and a special tool generates output to the relevant international database of each survey.

Biological data from commercial fishery are transmitted to EU organizations for international stock assessment. Greece continued to use the tools developed by the COST project to analyse and report on the sampling data. Greece has also been involved in the plans for the establishment of a regional database.

Greece responded to data requests from the EC in 2014, and achieved successful transmission in all cases.

The continuing effort to upgrade and integrate database as well as to improve the analysis and data mining tools has helped to avoid many shortfalls, with the Greek DCF data.

VI.1.2 DATA TRANSMISSION

The data transmission to end-user is provided to the Standard table VI_I.

VI. 2. ACTIONS TO AVOID DEVIATIONS

Not applicable

VII LIST OF ACRONYMS AND ABBREVIATIONS

AR	Annual Report
EC	European Community
EU	European Union
DCF	Data Collection Framework
GFCM	General Fishery Commission for the Mediterranean
GSA	Geographical Sub Areas
ICCAT	International Commission for the Conservation of Atlantic Tunas
MEDIAS	Pan-Mediterranean pelagic survey
MEDITS	Mediterranean International Trawl Survey
MS	Member State
NP	National Programme
PGMED	Mediterranean Planning Group for Methodological Development
RCM MED&BS	Regional Coordination Meeting for the Mediterranean and Black Sea
RDB	Regional data Base
SGRN SUB	Group on Research Needs
STECF	Scientific, Technical and Economic Committee for Fisheries
SAC	Scientific Advisory Committee of GFCM

VIII. COMMENTS, SUGGESTIONS AND REFLECTIONS

None

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X. ANNEXES

ANNEX I. MEDIAS

Table 1. Ionian Sea: Total fish NASC (Nautical Area Scattering Coefficient, in m^2/nm^2) per EDSU (Elementary Distance Sampling Unit), and also NASC, biomass, and abundance of anchovy and sardine (target species) per EDSU.

Aa EDSU	Total NASC	Anchovy NASC	Anchovy biomass (t)	No. of individuals of anchovy	Sardine NASC	Sardine biomass (t)	No. of individuals of sardine
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	16.59	0.00	0.00	0.00	0.00	0.00	0.00
7	626.79	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	161.05	145.57	20.28	4705684.59	9.42	0.85	107482.62
13	1955.40	20.95	2.92	677096.43	50.06	4.52	571122.45
14	110.62	0.00	0.00	0.00	0.00	0.00	0.00
15	1415.87	0.00	0.00	0.00	0.00	0.00	0.00
16	176.42	2.27	0.32	73502.74	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	26.70	26.70	3.72	863261.24	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	1.35	1.35	0.19	43653.21	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	11.26	10.05	1.40	324827.71	0.00	0.00	0.00
24	897.77	359.66	50.11	11626625.45	327.40	29.59	3735326.48
25	38.15	38.15	5.31	1233202.50	0.00	0.00	0.00
26	46.97	46.97	6.54	1518250.51	0.00	0.00	0.00
27	2.06	0.87	0.12	28173.54	0.00	0.00	0.00
28	1.93	0.48	0.07	15640.65	0.00	0.00	0.00
29	0.93	0.93	0.13	29993.10	0.00	0.00	0.00
30	12.98	12.98	1.81	419599.26	0.00	0.00	0.00
31	26.80	13.36	1.86	431928.94	10.95	0.99	124960.73
32	19.65	1.61	0.22	52120.37	16.96	1.53	193497.13
33	4.92	4.92	0.69	159108.36	0.00	0.00	0.00
34	1.41	1.41	0.20	45665.30	0.00	0.00	0.00
35	2.88	2.88	0.40	93234.95	0.00	0.00	0.00
36	75.30	16.12	2.25	520950.21	57.97	5.24	661332.29
37	8.19	8.19	1.14	264659.26	0.00	0.00	0.00

Aa EDSU	Total NASC	Anchovy NASC	Anchovy biomass (t)	No. of individuals of anchovy	Sardine NASC	Sardine biomass (t)	No. of individuals of sardine
38	149.97	147.37	20.53	4763841.35	0.00	0.00	0.00
39	16.36	11.48	1.60	371055.26	0.00	0.00	0.00
40	28.29	28.29	3.94	914510.60	0.00	0.00	0.00
41	239.25	239.25	33.33	7734109.16	0.00	0.00	0.00
42	45.92	45.92	6.40	1484559.59	0.00	0.00	0.00
43	2.44	2.44	0.34	78993.06	0.00	0.00	0.00
44	82.49	14.17	1.97	458116.62	41.57	3.76	474231.40
45	0.80	0.00	0.00	0.00	0.00	0.00	0.00
46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47	0.61	0.00	0.00	0.00	0.00	0.00	0.00
48	1.01	1.01	0.14	32627.34	0.00	0.00	0.00
49	14.40	14.40	2.01	465659.65	0.00	0.00	0.00
50	0.96	0.96	0.13	31100.60	0.00	0.00	0.00
51	0.00	0.00	0.00	0.00	0.00	0.00	0.00
52	132.07	2.10	0.29	67966.19	124.18	11.22	1416786.19
53	34.94	5.11	0.71	165263.29	14.99	1.36	171076.62
54	1.27	1.27	0.18	40957.12	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
56	19.75	19.75	2.75	638353.06	0.00	0.00	0.00
57	0.00	0.00	0.00	0.00	0.00	0.00	0.00
58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
61	85.30	0.00	0.00	0.00	85.30	7.71	973247.98
62	0.08	0.00	0.00	0.00	0.00	0.00	0.00
63	13.60	13.60	1.89	439634.33	0.00	0.00	0.00
64	232.51	146.47	20.41	4734871.80	0.00	0.00	0.00
65	130.75	130.75	18.21	4226536.88	0.00	0.00	0.00
66	9.63	9.63	1.34	311357.03	0.00	0.00	0.00
67	15.22	14.59	2.03	471555.47	0.00	0.00	0.00
68	63.64	63.64	8.87	2057208.73	0.00	0.00	0.00
69	190.87	0.00	0.00	0.00	190.87	17.25	2177604.01
70	533.85	0.00	0.00	0.00	533.18	48.19	6083083.24
71	75.27	75.27	10.49	2433200.01	0.00	0.00	0.00
72	34.07	0.00	0.00	0.00	24.97	2.26	284887.27
73	143.03	143.03	19.93	4623669.38	0.00	0.00	0.00
74	22.60	22.60	3.15	730637.10	0.00	0.00	0.00
75	461.22	208.69	29.07	6746203.27	0.00	0.00	0.00
76	312.79	0.00	0.00	0.00	0.00	0.00	0.00
77	1682.95	0.00	0.00	0.00	1156.11	104.49	13190115.82
78	506.62	1.52	0.21	49125.71	497.13	44.93	5671846.78
79	338.04	123.79	17.25	4001611.80	214.02	19.34	2441743.98
80	238.02	238.02	33.16	7694473.77	0.00	0.00	0.00
81	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Aa EDSU	Total NASC	Anchovy NASC	Anchovy biomass (t)	No. of individuals of anchovy	Sardine NASC	Sardine biomass (t)	No. of individuals of sardine
82	0.91	0.91	0.13	29545.86	0.00	0.00	0.00
83	105.13	105.13	14.65	3398403.47	0.00	0.00	0.00
84	0.00	0.00	0.00	0.00	0.00	0.00	0.00
85	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86	51.95	48.92	7.38	1367635.11	0.00	0.00	0.00
87	130.98	3.86	0.58	107780.19	0.00	0.00	0.00
88	37.39	27.68	4.18	773687.04	0.00	0.00	0.00
89	85.62	0.00	0.00	0.00	0.00	0.00	0.00
90	158.86	0.00	0.00	0.00	0.00	0.00	0.00
91	241.54	0.00	0.00	0.00	0.00	0.00	0.00
92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
94	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
96	0.00	0.00	0.00	0.00	0.00	0.00	0.00
97	0.00	0.00	0.00	0.00	0.00	0.00	0.00
98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101	0.00	0.00	0.00	0.00	0.00	0.00	0.00
102	0.00	0.00	0.00	0.00	0.00	0.00	0.00
103	0.00	0.00	0.00	0.00	0.00	0.00	0.00
104	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	25.03	12.50	1.89	349301.35	0.00	0.00	0.00
106	0.00	0.00	0.00	0.00	0.00	0.00	0.00
107	0.00	0.00	0.00	0.00	0.00	0.00	0.00
108	0.00	0.00	0.00	0.00	0.00	0.00	0.00
109	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00
111	0.00	0.00	0.00	0.00	0.00	0.00	0.00
112	0.00	0.00	0.00	0.00	0.00	0.00	0.00
113	0.00	0.00	0.00	0.00	0.00	0.00	0.00
114	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	11.04	11.04	1.67	308482.21	0.00	0.00	0.00
116	46.98	16.54	2.50	462439.95	0.00	0.00	0.00
117	297.29	46.41	7.00	1297470.13	72.69	9.23	816541.75
118	0.00	0.00	0.00	0.00	0.00	0.00	0.00
119	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	18.52	0.00	0.00	0.00	0.00	0.00	0.00
121	0.00	0.00	0.00	0.00	0.00	0.00	0.00
122	85.09	83.19	12.55	2325517.45	0.00	0.00	0.00
123	62.41	2.57	0.39	71978.82	0.00	0.00	0.00
124	29.22	9.95	1.50	278165.66	17.40	2.21	195397.62
125	203.10	1.69	0.26	47344.09	167.48	21.26	1881293.97

Aa EDSU	Total NASC	Anchovy NASC	Anchovy biomass (t)	No. of individuals of anchovy	Sardine NASC	Sardine biomass (t)	No. of individuals of sardine
126	60.28	4.88	0.74	136443.34	4.19	0.53	47073.38
127	23.67	22.71	3.43	634718.46	0.00	0.00	0.00
128	9.52	5.76	0.87	161133.28	0.00	0.00	0.00
129	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00
131	0.00	0.00	0.00	0.00	0.00	0.00	0.00
132	0.00	0.00	0.00	0.00	0.00	0.00	0.00
133	304.40	0.00	0.00	0.00	0.00	0.00	0.00
134	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00
136	1.55	1.55	0.23	43271.86	0.00	0.00	0.00
137	0.00	0.00	0.00	0.00	0.00	0.00	0.00
138	14.33	14.33	2.16	400514.29	0.00	0.00	0.00
139	0.86	0.86	0.13	24028.50	0.00	0.00	0.00
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00
141	0.00	0.00	0.00	0.00	0.00	0.00	0.00
142	6.03	6.03	0.91	168434.67	0.00	0.00	0.00
143	0.00	0.00	0.00	0.00	0.00	0.00	0.00
144	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	12.00	12.00	1.81	335530.44	0.00	0.00	0.00
146	3.65	3.65	0.55	102032.16	0.00	0.00	0.00
147	0.00	0.00	0.00	0.00	0.00	0.00	0.00
148	14.68	14.68	2.22	410412.09	0.00	0.00	0.00
149	8.49	8.49	1.28	237357.41	0.00	0.00	0.00
150	28.53	1.48	0.22	41499.14	0.00	0.00	0.00
151	160.50	7.24	1.09	202369.74	148.71	18.88	1670477.84
152	0.00	0.00	0.00	0.00	0.00	0.00	0.00
153	112.61	112.61	16.99	3147942.19	0.00	0.00	0.00
154	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00
156	0.00	0.00	0.00	0.00	0.00	0.00	0.00
157	0.00	0.00	0.00	0.00	0.00	0.00	0.00
158	0.00	0.00	0.00	0.00	0.00	0.00	0.00
159	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00
161	0.00	0.00	0.00	0.00	0.00	0.00	0.00
162	8.25	8.25	1.24	230501.21	0.00	0.00	0.00
163	8.16	8.16	1.23	228049.16	0.00	0.00	0.00
164	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	2.66	2.66	0.40	74388.29	0.00	0.00	0.00
166	0.00	0.00	0.00	0.00	0.00	0.00	0.00
167	9.44	0.00	0.00	0.00	0.00	0.00	0.00
168	4.72	2.83	0.43	79001.68	0.00	0.00	0.00
169	7.55	0.42	0.06	11778.67	0.00	0.00	0.00

Aa EDSU	Total NASC	Anchovy NASC	Anchovy biomass (t)	No. of individuals of anchovy	Sardine NASC	Sardine biomass (t)	No. of individuals of sardine
170	65.88	1.52	0.23	42453.88	0.00	0.00	0.00
171	0.00	0.00	0.00	0.00	0.00	0.00	0.00
172	0.70	0.70	0.11	19623.26	0.00	0.00	0.00
173	7.08	1.37	0.21	38251.41	0.00	0.00	0.00
174	15.73	15.73	2.37	439627.16	0.00	0.00	0.00
175	42.29	40.47	6.11	1131247.89	0.00	0.00	0.00
176	38.86	34.27	5.17	957841.92	0.00	0.00	0.00
177	262.35	227.60	34.35	6362361.43	34.75	4.41	390339.97
178	81.28	81.28	12.27	2271947.39	0.00	0.00	0.00
179	2.29	1.64	0.25	45886.83	0.00	0.00	0.00
180	21.22	19.54	2.95	546259.57	0.50	0.06	5633.62
181	22.15	22.15	3.34	619052.46	0.00	0.00	0.00
182	4.70	4.70	0.71	131441.04	0.00	0.00	0.00
183	0.65	0.00	0.00	0.00	0.00	0.00	0.00
184	1.80	1.80	0.27	50384.48	0.00	0.00	0.00
185	19.45	0.00	0.00	0.00	0.00	0.00	0.00
186	0.00	0.00	0.00	0.00	0.00	0.00	0.00
187	0.00	0.00	0.00	0.00	0.00	0.00	0.00
188	0.00	0.00	0.00	0.00	0.00	0.00	0.00
189	0.00	0.00	0.00	0.00	0.00	0.00	0.00
190	0.00	0.00	0.00	0.00	0.00	0.00	0.00
191	0.00	0.00	0.00	0.00	0.00	0.00	0.00
192	0.00	0.00	0.00	0.00	0.00	0.00	0.00
193	0.00	0.00	0.00	0.00	0.00	0.00	0.00
194	0.00	0.00	0.00	0.00	0.00	0.00	0.00
195	0.00	0.00	0.00	0.00	0.00	0.00	0.00
196	0.00	0.00	0.00	0.00	0.00	0.00	0.00
197	0.00	0.00	0.00	0.00	0.00	0.00	0.00
198	0.00	0.00	0.00	0.00	0.00	0.00	0.00
199	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00	0.00
201	0.00	0.00	0.00	0.00	0.00	0.00	0.00
202	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203	0.00	0.00	0.00	0.00	0.00	0.00	0.00
204	0.00	0.00	0.00	0.00	0.00	0.00	0.00
205	0.00	0.00	0.00	0.00	0.00	0.00	0.00
206	0.00	0.00	0.00	0.00	0.00	0.00	0.00
207	0.00	0.00	0.00	0.00	0.00	0.00	0.00
208	119.11	113.21	17.09	3164694.56	0.00	0.00	0.00
209	74.33	46.94	7.08	1312184.90	0.00	0.00	0.00
210	0.00	0.00	0.00	0.00	0.00	0.00	0.00
211	0.00	0.00	0.00	0.00	0.00	0.00	0.00
212	0.00	0.00	0.00	0.00	0.00	0.00	0.00
213	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Aa EDSU	Total NASC	Anchovy NASC	Anchovy biomass (t)	No. of individuals of anchovy	Sardine NASC	Sardine biomass (t)	No. of individuals of sardine
214	0.00	0.00	0.00	0.00	0.00	0.00	0.00
215	0.00	0.00	0.00	0.00	0.00	0.00	0.00
216	0.00	0.00	0.00	0.00	0.00	0.00	0.00
217	0.00	0.00	0.00	0.00	0.00	0.00	0.00
218	0.00	0.00	0.00	0.00	0.00	0.00	0.00
219	0.00	0.00	0.00	0.00	0.00	0.00	0.00
220	0.00	0.00	0.00	0.00	0.00	0.00	0.00
221	0.00	0.00	0.00	0.00	0.00	0.00	0.00
222	4.94	1.17	0.18	32803.58	0.00	0.00	0.00
223	28.22	28.22	4.26	788749.94	0.00	0.00	0.00
224	4.18	4.18	0.63	116984.93	0.00	0.00	0.00
225	1.00	1.00	0.15	27881.23	0.00	0.00	0.00
226	0.00	0.00	0.00	0.00	0.00	0.00	0.00
227	0.00	0.00	0.00	0.00	0.00	0.00	0.00
228	1.62	1.62	0.25	45411.75	0.00	0.00	0.00
229	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	124.09	0.00	0.00	0.00	0.00	0.00	0.00
231	43.63	0.00	0.00	0.00	0.00	0.00	0.00
232	0.00	0.00	0.00	0.00	0.00	0.00	0.00
233	0.00	0.00	0.00	0.00	0.00	0.00	0.00
234	35.77	16.92	2.55	472912.96	13.42	1.70	150693.58
235	3.94	3.94	0.59	110158.16	0.00	0.00	0.00
236	0.36	0.36	0.05	10051.88	0.00	0.00	0.00
237	0.00	0.00	0.00	0.00	0.00	0.00	0.00
238	0.00	0.00	0.00	0.00	0.00	0.00	0.00
239	1.33	0.00	0.00	0.00	0.00	0.00	0.00
240	7.72	0.00	0.00	0.00	0.00	0.00	0.00
241	0.00	0.00	0.00	0.00	0.00	0.00	0.00
242	0.00	0.00	0.00	0.00	0.00	0.00	0.00
243	33.37	33.37	5.04	932905.46	0.00	0.00	0.00
244	44.21	44.21	6.67	1235929.49	0.00	0.00	0.00
245	74.06	68.07	10.27	1902889.78	0.00	0.00	0.00
246	17.01	17.01	2.57	475388.73	0.00	0.00	0.00
247	0.55	0.55	0.08	15334.87	0.00	0.00	0.00
248	32.71	24.41	3.68	682253.47	0.00	0.00	0.00
249	109.51	109.51	16.53	3061288.63	0.00	0.00	0.00
250	0.00	0.00	0.00	0.00	0.00	0.00	0.00
251	16.04	0.00	0.00	0.00	0.00	0.00	0.00
252	0.00	0.00	0.00	0.00	0.00	0.00	0.00
253	0.00	0.00	0.00	0.00	0.00	0.00	0.00
254	0.00	0.00	0.00	0.00	0.00	0.00	0.00
255	0.00	0.00	0.00	0.00	0.00	0.00	0.00
256	0.00	0.00	0.00	0.00	0.00	0.00	0.00
257	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Aa EDSU	Total NASC	Anchovy NASC	Anchovy biomass (t)	No. of individuals of anchovy	Sardine NASC	Sardine biomass (t)	No. of individuals of sardine
258	0.00	0.00	0.00	0.00	0.00	0.00	0.00
259	0.00	0.00	0.00	0.00	0.00	0.00	0.00
260	0.00	0.00	0.00	0.00	0.00	0.00	0.00
261	0.00	0.00	0.00	0.00	0.00	0.00	0.00
262	0.00	0.00	0.00	0.00	0.00	0.00	0.00
263	0.00	0.00	0.00	0.00	0.00	0.00	0.00
264	7.69	4.67	0.63	127486.84	0.00	0.00	0.00
265	69.72	0.63	0.08	17088.51	35.21	4.89	339724.87
266	134.31	30.47	4.11	832441.13	0.00	0.00	0.00
267	103.58	0.00	0.00	0.00	0.00	0.00	0.00
268	6.62	0.00	0.00	0.00	0.00	0.00	0.00
269	41.25	41.25	5.56	1127005.46	0.00	0.00	0.00
270	0.00	0.00	0.00	0.00	0.00	0.00	0.00
271	9.80	0.00	0.00	0.00	0.00	0.00	0.00
272	90.86	3.89	0.52	106327.22	0.00	0.00	0.00
273	115.87	2.51	0.34	68573.59	0.00	0.00	0.00
274	12.19	12.19	1.64	333013.48	0.00	0.00	0.00
275	0.00	0.00	0.00	0.00	0.00	0.00	0.00
276	20.10	20.10	2.71	549143.13	0.00	0.00	0.00
277	0.69	0.69	0.09	18761.02	0.00	0.00	0.00
278	9.49	9.49	1.28	259297.73	0.00	0.00	0.00
279	7.53	7.53	1.02	205761.28	0.00	0.00	0.00
280	13.14	1.75	0.24	47882.18	11.39	1.58	109874.70
281	0.00	0.00	0.00	0.00	0.00	0.00	0.00
282	63.85	53.27	7.18	1455537.31	0.00	0.00	0.00
283	13.05	13.05	1.76	356544.53	0.00	0.00	0.00
284	0.00	0.00	0.00	0.00	0.00	0.00	0.00
285	31.49	1.39	0.19	37896.88	30.10	4.18	290440.70
286	210.56	12.98	1.75	354563.50	0.00	0.00	0.00
287	28.74	16.85	2.27	460265.33	0.00	0.00	0.00
288	53.93	0.00	0.00	0.00	0.00	0.00	0.00
289	350.76	29.06	3.92	793939.17	0.00	0.00	0.00
290	62.50	19.41	2.62	530346.68	0.00	0.00	0.00
291	95.87	24.96	3.37	682002.93	70.43	9.79	679520.83
292	25.71	19.12	2.58	522419.84	0.00	0.00	0.00
293	6.03	6.03	0.81	164888.59	0.00	0.00	0.00
294	87.39	75.09	10.13	2051675.82	0.00	0.00	0.00
295	29.91	29.91	4.03	817330.85	0.00	0.00	0.00
296	59.94	10.11	1.36	276197.52	0.00	0.00	0.00
297	68.19	5.13	0.69	140062.97	0.00	0.00	0.00
298	142.51	0.76	0.10	20814.03	0.00	0.00	0.00
299	239.39	13.78	1.86	376573.41	15.23	2.12	146972.75
300	1.20	1.20	0.16	32761.93	0.00	0.00	0.00
301	23.32	23.32	3.14	637109.52	0.00	0.00	0.00

Aa EDSU	Total NASC	Anchovy NASC	Anchovy biomass (t)	No. of individuals of anchovy	Sardine NASC	Sardine biomass (t)	No. of individuals of sardine
302	33.54	13.37	1.80	365181.72	0.00	0.00	0.00
303	3.36	3.36	0.45	91774.83	0.00	0.00	0.00
304	31.87	11.23	1.51	306764.07	0.00	0.00	0.00
305	4.27	4.27	0.58	116694.00	0.00	0.00	0.00
306	0.00	0.00	0.00	0.00	0.00	0.00	0.00
307	0.00	0.00	0.00	0.00	0.00	0.00	0.00
308	0.92	0.92	0.12	25244.25	0.00	0.00	0.00
309	149.15	149.15	20.11	4075136.44	0.00	0.00	0.00
310	11.15	11.15	1.50	304698.06	0.00	0.00	0.00
311	0.88	0.88	0.12	23940.42	0.00	0.00	0.00
312	114.94	20.63	2.78	563559.75	75.58	10.50	729173.27
313	62.75	54.41	7.34	1486486.12	0.00	0.00	0.00
314	24.85	1.43	0.19	39114.75	0.00	0.00	0.00
315	4.20	0.00	0.00	0.00	0.00	0.00	0.00
316	3.28	3.28	0.44	89714.20	0.00	0.00	0.00
317	5.25	5.25	0.71	143384.72	0.00	0.00	0.00
318	2.18	2.18	0.29	59435.58	0.00	0.00	0.00
319	0.38	0.00	0.00	0.00	0.00	0.00	0.00
320	0.86	0.47	0.06	12734.92	0.00	0.00	0.00
321	6.65	6.65	0.90	181644.71	0.00	0.00	0.00
322	2.44	2.44	0.33	66566.70	0.00	0.00	0.00
323	0.00	0.00	0.00	0.00	0.00	0.00	0.00
324	39.31	38.98	5.26	1065055.57	0.00	0.00	0.00
325	1.25	0.00	0.00	0.00	0.00	0.00	0.00
326	0.00	0.00	0.00	0.00	0.00	0.00	0.00
327	16.39	8.77	1.18	239585.46	0.00	0.00	0.00
328	1.56	0.00	0.00	0.00	0.00	0.00	0.00
329	0.00	0.00	0.00	0.00	0.00	0.00	0.00
330	7.19	0.00	0.00	0.00	0.00	0.00	0.00
331	0.00	0.00	0.00	0.00	0.00	0.00	0.00
332	2.44	2.44	0.33	66615.12	0.00	0.00	0.00
333	10.00	1.09	0.15	29825.75	0.00	0.00	0.00
334	194.75	23.18	3.13	633355.94	0.00	0.00	0.00
335	548.93	64.43	8.69	1760321.49	0.00	0.00	0.00
336	30.52	3.59	0.48	98155.27	0.00	0.00	0.00
337	32.88	0.00	0.00	0.00	0.00	0.00	0.00
338	34.36	22.17	2.99	605840.08	0.00	0.00	0.00
339	34.94	34.94	4.71	954765.15	0.00	0.00	0.00
340	93.94	63.43	8.55	1733142.10	0.00	0.00	0.00
341	22.25	15.06	2.03	411598.39	0.00	0.00	0.00
342	12.67	3.99	0.54	108974.24	0.00	0.00	0.00
343	352.65	83.35	11.24	2277362.55	268.11	37.26	2586779.06
344	34.04	29.20	3.94	797732.80	1.76	0.25	17028.48
345	54.07	35.24	4.75	962750.54	16.33	2.27	157587.58

Aa EDSU	Total NASC	Anchovy NASC	Anchovy biomass (t)	No. of individuals of anchovy	Sardine NASC	Sardine biomass (t)	No. of individuals of sardine
346	578.80	502.81	68.60	17582962.89	75.88	9.31	860989.01
347	1961.11	1703.62	232.44	59574944.42	257.10	31.54	2917220.07
348	1133.82	984.95	134.39	34443237.32	148.64	18.23	1686589.96
349	162.58	141.23	19.27	4938793.30	21.31	2.61	241839.03
350	494.92	429.94	58.66	15034881.97	64.88	7.96	736216.54
351	1073.02	932.14	127.18	32596435.96	140.67	17.26	1596157.21
352	715.89	621.89	84.85	21747431.59	93.85	11.51	1064911.51
353	830.27	721.26	98.41	25222058.73	108.85	13.35	1235054.38
354	492.10	427.49	58.33	14949052.85	64.51	7.91	732013.72
355	1002.15	870.57	118.78	30443522.83	131.38	16.12	1490735.02
356	510.38	443.37	60.49	15504400.35	66.91	8.21	759207.55
357	162.49	141.16	19.26	4936240.90	21.30	2.61	241714.05

Table2.Biomass estimation of anchovy in Ionian Sea per length class based on the results of the acoustic surveys in 2015.

Ionian Sea		
Total biomass (t): 12055.737		
Length class	No. of individuals	Biomass (t)
57.5	289 972	282
62.5	3 244 245	4 138
67.5	29 629 577	48 465
72.5	91 008 256	187 541
77.5	393 342 481	1 005 546
82.5	280 731 284	878 382
87.5	826 709 042	3 128 536
92.5	1 131 778 626	5 125 719
97.5	158 563 202	851 321
102.5	78 574 614	495 877
107.5	14 128 975	104 006
112.5	10 660 073	90 892
117.5	6 784 923	66 581
122.5	2 995 185	33 630
127.5	1 792 230	22 901
132.5	0	0
137.5	0	0
142.5	0	0
147.5	0	0
152.5	526 831	11 921
Sum	3030759515	12055737

Table3.Biomass estimation of anchovy in Ionian Sea per age class based on the results of the acoustic surveys in 2015.

Biomass	No. of individuals	Biomass (t)
0	124 172 050	240.43
1	2 905 641 972	11798.21
2	857 689	15.12
3	87 805	1.99
Sum	3 030 759 515	12055.737

Table4.Biomass estimation of sardine in Ionian Sea per length class based on the results of the acoustic surveys in 2015.

Ionian Sea		
Total biomass (t): 3461.955		
Length class	No.of individuals	Biomass (t)
77.5	144 099	523
82.5	0	0
87.5	355 681	1 809
92.5	2 819 062	16 738
97.5	13 853 792	95 234
102.5	79 957 650	631 741
107.5	125 380 776	1 131 054
112.5	91 988 388	941 762
117.5	23 184 705	267 901
122.5	12 578 720	163 224
127.5	6 881 738	99 817
132.5	1 880 897	30 365
137.5	3 676 552	65 799
142.5	173 528	3 430
147.5	147 143	3 202
152.5	133 444	3 186
157.5	0	0
162.5	0	0
167.5	0	0
172.5	0	0
177.5	0	0
182.5	0	0
187.5	0	0
192.5	0	0
197.5	125 833	6 170
Sum	363 282 007	3 461 955

Table5.Biomass estimation of sardine in Ionian Sea per age class based on the results of the acoustic surveys in 2015.

Age	No. of individuals	Biomass (t)
0	220 178 332	1984.79
1	139 261 516	1404.21
2	3 779 243	69.88
3	62 916	3.09
Sum	363 282 007	3461.955

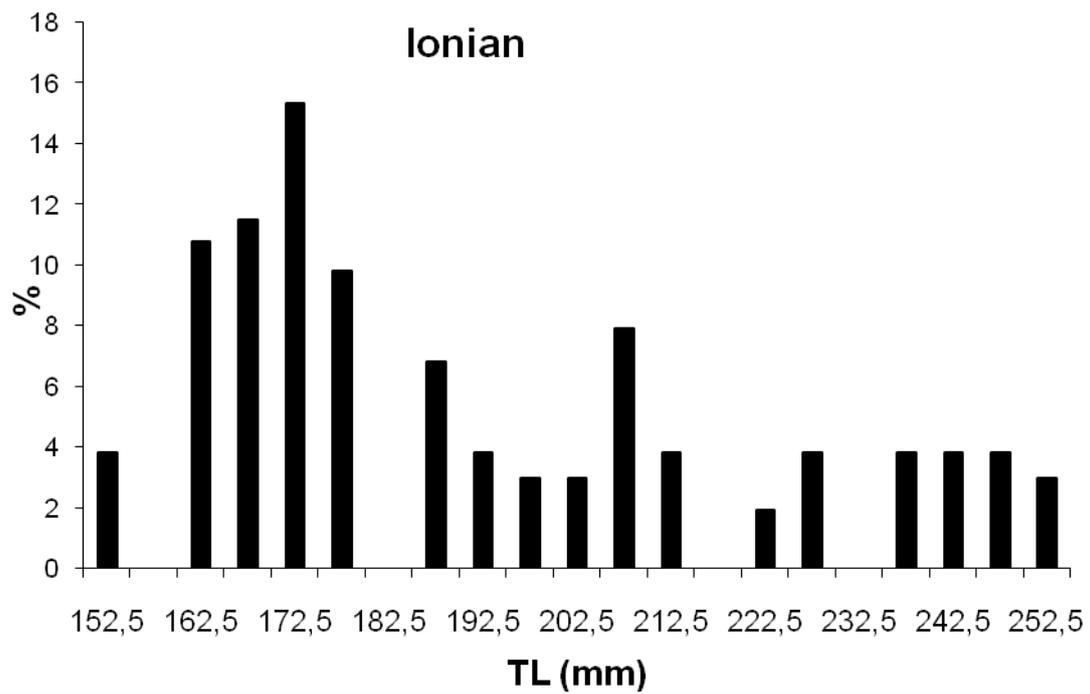
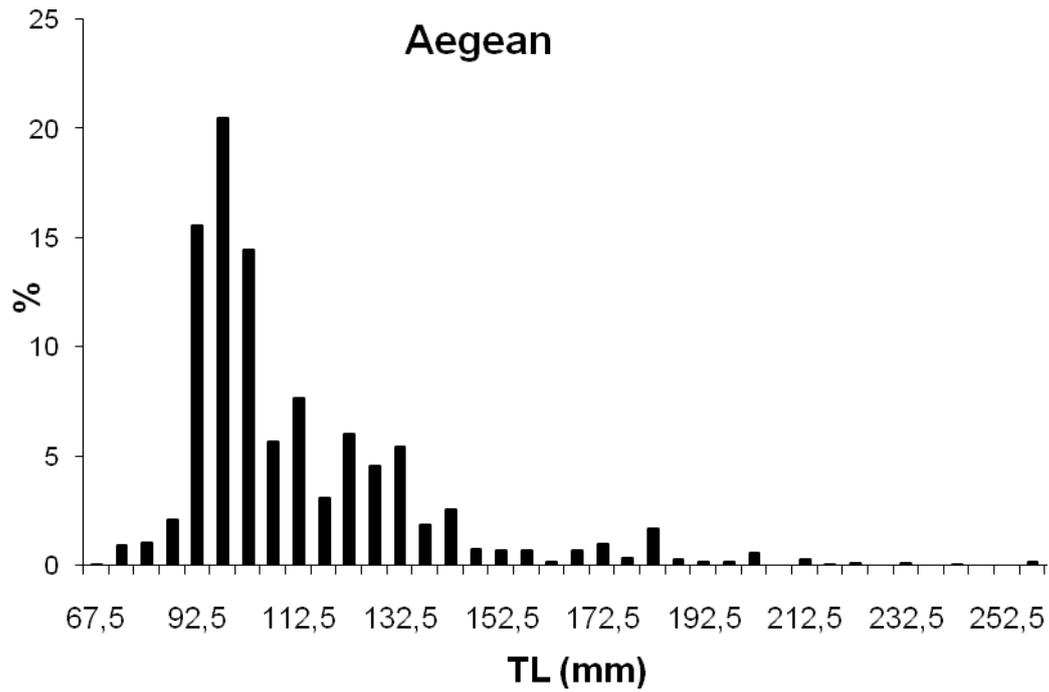


Fig 11. Mediterranean horse mackerel (*Trachurus mediterraneus*): Length frequency distribution in Aegean and Ionian Sea during June-July and September 2014, respectively.

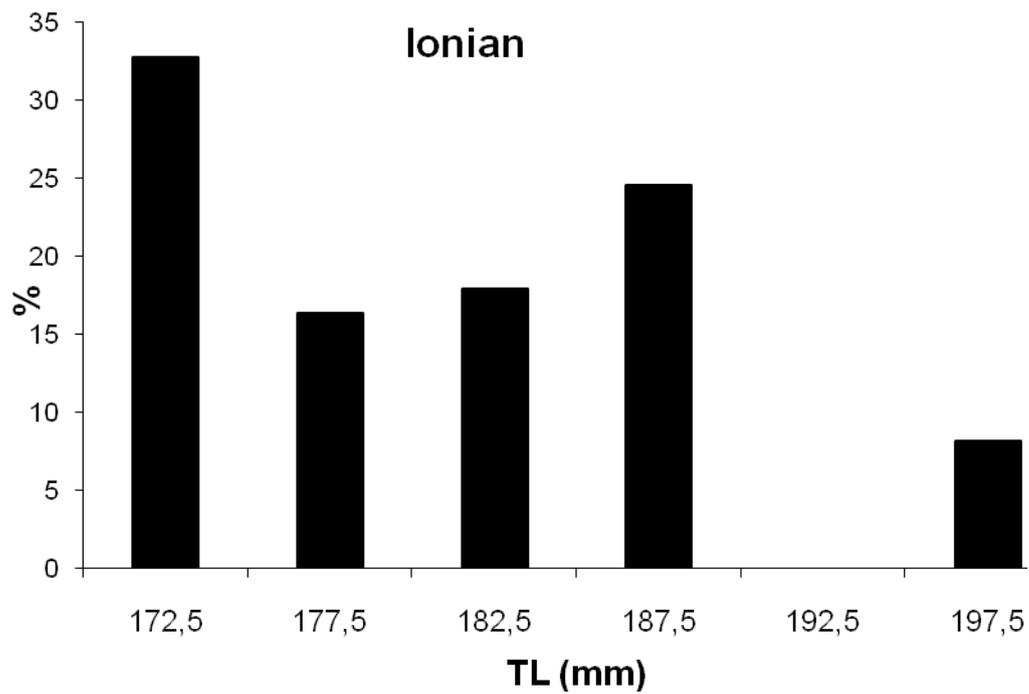
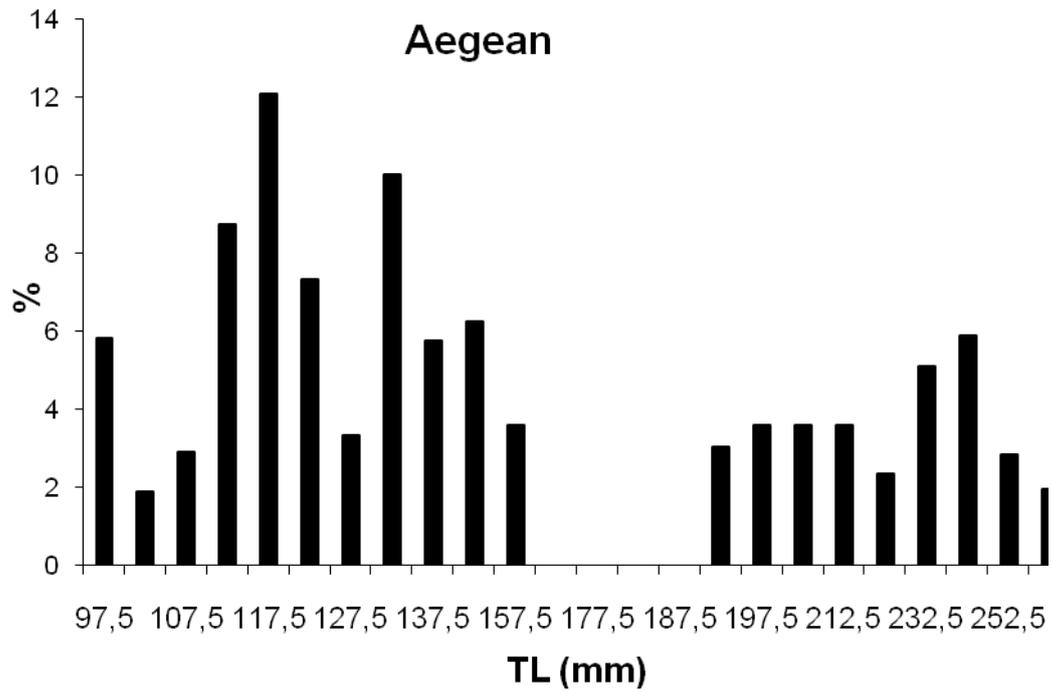


Fig 12.Chub mackerel (*Scomber colias*): Length frequency distribution in Aegean and Ionian Sea in Aegean and Ionian Sea during June-July and September 2014, respectively.

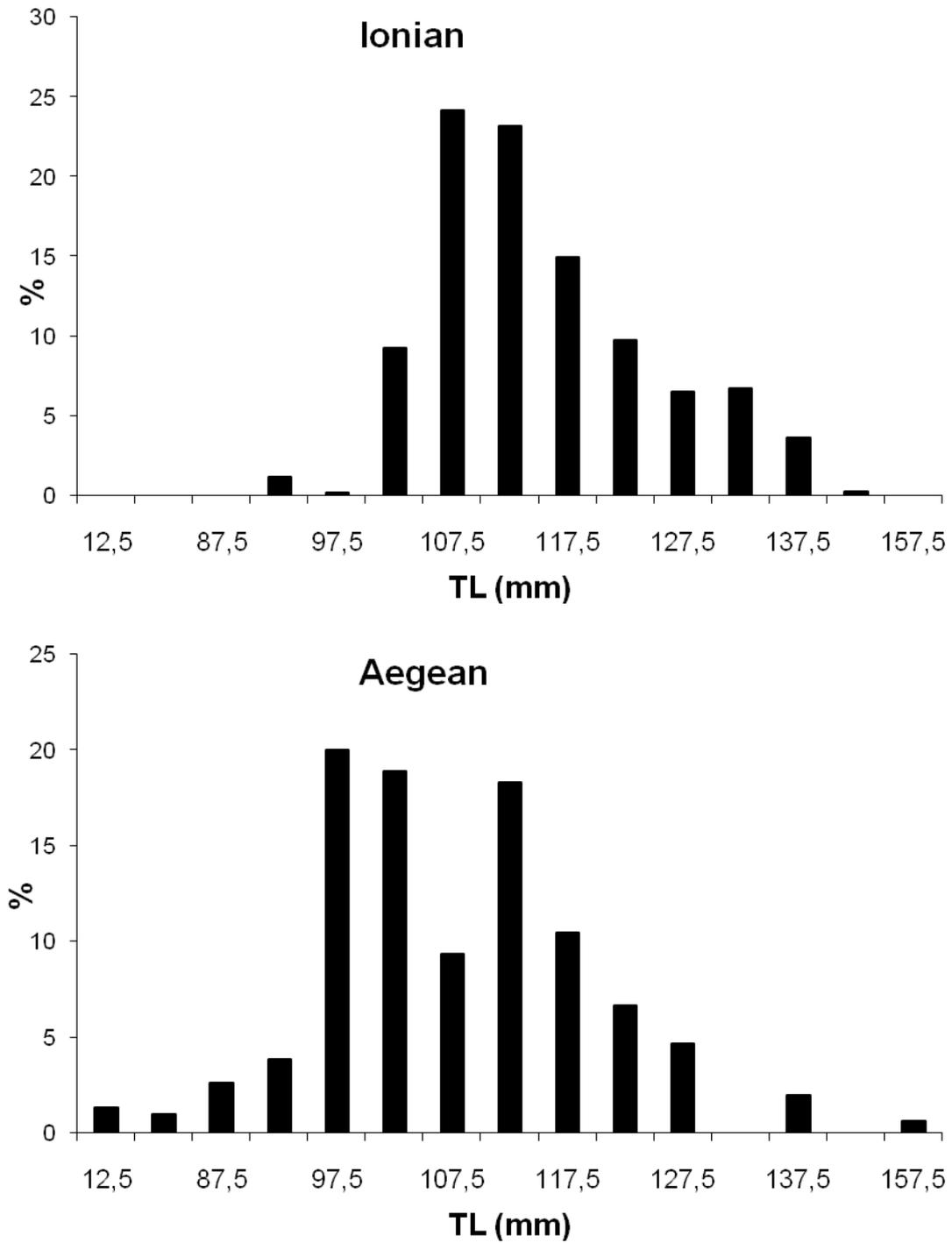


Fig 13. Atlantic horse mackerel (*Trachurus trachurus*): Length frequency distribution in Aegean and Ionian Sea during June-July and September 2014, respectively.