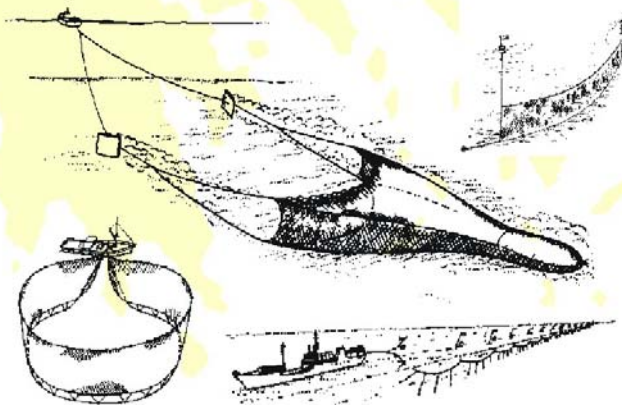


Update of National Fisheries Data Collection Program 2005

(IN APPLICATION OF REGULATION EC 1543/2000)



**MINISTRY OF AGRICULTURE
DIRECTORATE GENERAL FOR FISHERIES**

MAY 2004

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MODULE C

COLLECTION OF DATA CONCERNING FISHING CAPACITIES

Minimum program:

The data concerning the fishing capacities of vessels will be gathered on an annual basis for all vessels in the categories set out in Table 1.1 as defined in Council Regulation (EU) 1543/2000.

Table 1.1. Segmentation of the Greek Fishing Fleet per category of fishing technique and length

		Length category			
		<12 m	12-24 m	24-<40 m	>=40 m
Mobile gears	Demersal trawl seiner polyvalent				
Passive gears	Gears using hooks longlines nets Polyvalent* Pots & traps				
Polyvalent Gears	Beach-seiner				
Total vessels*					

* Vessels with fisheries licences for more than one passive fishing technique

The fishing capacity parameters, which will be recorded for each vessel per category, refer to the following characteristics and units:

1. Vessel tonnage (GT, GRT)
2. Maximum continuous engine power actually developed by the main engine, after derating if appropriate, expressed in kW as defined in regulation EU No. 2930/86.
3. The age of the vessel calculated on the basis of the age of the hull.

For vessels in the <12m length category, the category of passive techniques is merged while for vessels in the >12 m length category, the recording category will be determined by the level of use (>50%) of each fishing technique based on the fishing licence.

The above data will be stored in a database, which will be updated for any changes concerning the fishing fleet in terms of fishing capacity. The storage of these data will ensure access to the characteristics of the fishing vessels per length category as set out in the regulation 1639/2001, Annex III. Moreover, data will be geographical stratified according to fisheries management areas defined by the GFCM (No. 20 Ionian Sea, No.22 Aegean Sea, No. 23 South Aegean – Cretan Sea), Annex I, level 3.

Extended program:

No data collection will be carried out within the framework of the extended program

MODULE D

COLLECTION OF DATA RELATED TO FISHING EFFORT

Minimum program:

According to the regulation this module includes data concerning (a) fuel consumption, (b) fishing effort by gear technique, and (c) specific fishing efforts.

(a)

(i & ii) FUEL CONSUMPTION AND FISHING EFFORT BY TYPE OF TECHNIQUE

In order to collect the data needed to fulfil the aims of this project the basis infrastructure of the existing mechanism will be used and the necessary additions and amendments will be made.

The basic elements, which will make up the data collection and storage mechanism, are:

An information collection network from a large number of ports (30) where significant landings are made by the fishing fleet. All stations will be equipped with state of the art computer systems and have connections to the Internet through which the information is transferred. The collection of information is done by subcontracting 30 local correspondents, most of who are Prefecture's Fisheries Inspectors. In addition, scientists and technicians involved in the project will have to travel to the sampling sites for assisting local correspondents to their task. Given the dispersed and extensive number of landing sites, personnel involved have to travel to cover these sampling sites.

Local correspondents will be involved in data collection for Modules D, E & J and their costs have been split into these three modules

In order to meet the needs of the program and to achieve the levels of precision required data would be collected from 30 sites (Picture 2.1.1). Sampling sites will be disaggregated according to level 3 of geographical desegregation (Appendix I). This sampling grid will cover around 85% of vessels in the Greek fishing fleet. The sampling grid selected will make it possible to estimate fuel consumption and fishing effort by type of technique with precision of plus or minus 10 % for a 95 % confidence level (level 2 in annex, Chapter 1 of Reg. (EC) 1639/2001).



Figure 2.1.1. Sampling Sites

Local correspondents will be responsible for collecting data on fuel consumption and fishing effort for each vessel category and type of technique in each site on a monthly basis, as defined in Annexes III and VIII of the Regulation. The sampling density required in order to meet the above-mentioned precision levels per vessel category and fishing technique is presented in Table 2.1.

Table 2.1. Percentages of sampling of vessels per category of size, per month and station.

Vessel length		<12 m	12-24 m	24-40 m
Type of fishing technique				
Mobile gears	Demersal trawl	-	15%	50%
	Seiner	50%	15%	50%
Passive gears	Long line	2%	10%	-
	Other gears using hooks	2%	10%	-
	Nets	2%	10%	-
	Pots & traps, etc.	2%	-	-

Due to large fluctuations in fishing activity (from full time to zero) of coastal fishery, the sample will be chosen from the full time active group of vessels. At the same time in each port all vessels not operating on a full time basis will be also recorded. The fishing activity (Az) of vessels will be defined and each vessel will be classified in one of the 4 following categories with the analogous weighting coefficients:

1. Az = 1 (full-time active)
2. Az = 0.5 (part-time active)
3. Az = 0.25 (occasional active)
4. Az = 0 (inactive)

These coefficients will be used to make a deductive assessment of overall fishing effort.

(iii) SPECIFIC FISHING EFFORT

Data collection on specific fishing effort includes demersal, small and large pelagic species.

iii(a): *Specific Fishing Effort for stocks of demersal and small pelagic species*

Data will be collected from the sampling sites in the same manner as in fuel consumption and fishing effort section. Fishing effort of the vessels will be correlated with the species mentioned in Annex VI, focusing particularly on days when the percentages of landing exceed the thresholds set out in the aforementioned Annex, with precision of plus or minus 25 % for a 95 % confidence level (level 1 in annex, Chapter 1 of Reg. (EC) 1639/2001).

iii(b): *Specific fishing effort for stocks of large pelagic (migratory) species – Tuna, Swordfish*

The fishing of large pelagic species (swordfish, blue-fin tuna, albacore tuna), by the Greek fishing fleet, is characterised by: a) the fact that the fleet, and particularly the vessels targeting swordfish, do not have fixed landing points, given that they cover great distances in the Aegean, Cretan, Libyan Seas and the Levantine following the migrations of those species, and b) the intense time-space fluctuations in fishing activity, resulting from the extensive migrations of those species. The aforementioned characteristics do not allow systematic collection of data from randomly selected vessels at the aforementioned sampling stations and require the adoption of a different sampling system, which is described below.

The data collection system to be used is based on the principles of stratified random sampling and will be implemented by means of recording the fishing effort of a certain number of random in selected vessels of the main fleets, which are systematically involved in the fisheries of large pelagic species. Stratification will be done in accordance with the categorization of vessel length set out in Annex III for techniques used for the fisheries of large pelagic species in Greece (gears using hooks), with precision of plus or minus 25 % for a 95 % confidence level (level 1 in annex, Chapter 1 of Reg. (EC) 1639/2001).

The main fleets involved in the fisheries of large pelagic species on the basis of their point of departure are:

- Swordfish: The Kalymnos, Hania and Western Greek Fleets (Western Peloponnese – Ionian Islands)
- Blue fin tuna: The Kalymnos, Hania, Halkidiki – Eastern Macedonia (Porto Koufo, Kavala) and Thrace fleets (Fanari Rhodopi)
- Albacore tuna: the Northern Sporades island (Alonnisos) and the Halkidiki fleets (Porto Koufo).

Fisheries production of the above fleets represents 70-80% of the total Greek fisheries production for large pelagic species.

Given the movement of these fleets, constant monitoring by special technicians is required who will have to follow the fleet and move to the main landing points. In this manner calculation of the fishing effort in units related with the technique used will be feasible (e.g. number of hooks for the longlines) in accordance with the guidelines in the Field Manual of the ICCAT. Note that swordfish fishing in the Greek seas is prohibited during the period October – January and that the fishery of albacore tuna is mainly done during the months of September – November. In order to meet the required levels of precision a monthly sample of 15% of the vessels in the <12m category is needed and one of 10% for vessels in each of the other categories.

Extended program:

No data collection will be carried out within the framework of the extended program.

MODULE E

COLLECTION OF DATA RELATED TO CATCHES AND LANDINGS

Minimum program:

In this module the following parameters will be gathered:

Commercial landings for all stocks

Total catches landings and discards (for stocks mentioned in Appendix XII)

Catches for recreational and game fisheries in marine waters for stocks mentioned in Appendix XI

E1: COMMERCIAL LANDINGS FOR ALL STOCKS

This project is divided into two sub-projects. The first concerns the collection of data for benthic-pelagic and small pelagic species and the second large pelagic species. Landings will be recorded for vessels operating in Greek waters as well as for those prosecuting fishing operations in international or third countries waters and transacted their products in the Greek ports. There are no other flag landings in Greece to be recorded.

E.1.1.: Landings of benthic-pelagic and small pelagic species

Sampling of landings for all species except large pelagic will be undertaken by the same sampling sites and methodology described in Module D, in accordance to the levels for geographical grouping referred to in Annex I and the categories of vessels referred to in Annex III.

The assessment of overall production will be based on random observations of production per unit effort (fishing days) at each site for each vessel category (Annex III). Data collection will be carried out by subcontracting the same local correspondents involved in Module D. In addition, scientists and technicians involved in the project will have to travel to the sampling sites for assisting local correspondents to their task. Given the dispersed and extensive number of landing sites, personnel involved have to travel to cover these sampling sites. Local correspondents will be involved in data collection for Modules D, E & J and their costs have been split into these three modules.

For stocks mentioned in Appendix XII, total landings will be estimated according to the stratification in Appendix XII. Table 3.1 presents the estimated sampling density per category of fishing techniques according to the precision levels required by the Regulation.

Table 3.1. Percentages of samples on working days per category of vessel and technique, per month and per station

		Vessel length		
		<12 m	12-24 m	24-40 m
Type of fishing technique				
Mobile gears	Demersal trawl	-	2%	2%
	Seiner	2%	2%	2%
Passive gears	Long line	0.3%	2%	-
	Other gears using hooks	0.3%	2%	-
	Nets	0.3%	2%	-
	Pots & traps, etc.	0.3%	-	-

E.1.2.: Landings of large pelagic (migratory) species – Tuna – Swordfish

For the reasons presented in the specific effort section, concerning large pelagic species fishery, the same sampling scheme will be applied for monitoring the landings. Random production per unit effort will be recorded on a monthly basis for each category of vessel in Annex III. The specific sampling methodology permits for the calculation of fishing production per unit effort in units relating to the technique used (e.g. number of hooks for long-lines) in accordance with the guidelines of the ICCAT Field Manual.

Overall production will be assessed by extrapolating production per unit effort as part of overall effort. Since in most cases landings of large pelagic species concern net weight (fish without intestines etc.), the overall production of round weight will be assessed using the conversion factors proposed by the ICCAT. Conversion factors are needed only for large pelagics, since only these species are eviscerated before landings.

In order to meet the required levels of precision set by the regulation, (level 3 in case of blue fin tuna subjected to TAC system), 50% of the total working days for all categories of vessels will be monitor, and 30% for the remaining vessels in the fleet fishing large pelagic species (level 2).

E.2. TOTAL CATCHES LANDINGS AND DISCARDS (FOR STOCKS MENTIONED IN APPENDIX XII)

Data of catch, landings and discards for stocks mentioned in Appendix XII, will be collected from observers onboard of commercial fishing vessels for the following fleet categories:

- Demersal trawls
- Purse seiner
- coastal (nets- long-line)
- large pelagic species fishing vessels

Methodology

A. Stratification over time

Sampling onboard will be done three times a year taking into account the periods of time when the use of certain techniques is prohibited for Greek fisheries. These periods are June to October for demersal trawls, December to March for seiners and from October to February for swordfish fishing. According to the above and taking into account the periods on the prohibition of various techniques, the commercial value of species, the biological data and geographical data the sampling periods will be stratified over time as follows: (Table 3.6):

- For demersal trawls: October, February and May
- For seiner: March, July and November.
- For coastal fisheries (nets and long-lines): February, July and November
- For large pelagic species: February, June and September

Table 3.6: Sampling stratification over time

<i>Month</i>	01	02	03	04	05	06	07	08	09	10	11
Demersal trawl		*			*					*	
Seiner			*				*				*
Coastal (nets – long-lines)		*					*			*	
Large pelagic species		*					*				*

B. Stratification over area

Sampling will cover the main landing ports where most of the fishing vessels for each category operate by observers onboard. Skippers will be compensated for allowing observers to work on their vessels.

The distribution of Greek fishing fleet per gear category and size is as follows:

- 1) Demersal trawl and purse-seiner - almost all belong to the categories 12-24 and 24-36 meters
- 2) Coastal fisheries vessels (nets – long-lines) – almost all belong to the categories <12 meters and 12-24 meters.
- 3) Vessels involved in large pelagic species fisheries - < 12m and 12-14 meters categories

The proposed sampling will be as follows:

During each period 6 different vessels will be monitored for one day for each type of fishing technique (demersal trawls, purse-seiners, nets - long-line, large pelagic species).

The sampling areas for the specific categories of types of fisheries or catches will be:

- Kavala (Northern Aegean) Demersal trawl, Seiner, Coastal fisheries
- Porto Koufo (Northern Aegean) blue fin and albacore tuna
- Halkida (Central Aegean) Demersal trawl, Seiner, coastal fisheries
- Patra (Ionian sea) Demersal trawl, Seiner, coastal fisheries
- Hania (Crete) coastal fisheries, blue fin tuna, swordfish
- Kalymnos (Southern Aegean), blue fin tuna, swordfish
- Kyllini (Ionian Sea), swordfish

The observers have to travel to the above-mentioned sampling areas for boarding on the fishing vessels.

C. Sampling on board

Seiner, trawl, Coastal fisheries:

The following data will be recorded for each haul: longitude and latitude of the site fished, the maximum and minimum depth, the duration of the hauls. From the discarded fraction of the catch a random sample will be collected for further analysis. The following data will be recorded for each catch:

- The total weight of the retained catch
- The total weight of the discarded fraction of the catch
- The weight, number of individuals and length for the retained catch and discarded fraction of species in Appendix XII .
- Subsamples of 20 individuals per length interval will be collected from the discarded fraction for ageing estimates, where possible, for species in Appendix XII

Large pelagic species:

During sampling the program of the commercial fleet will be followed as chosen by the captain of the fleet. The following data will be recorded for each haul: longitude and latitude of the site fished, the date, technique used, number of hooks per haul (long-line) and length of fisheries (mobile, passive).

The following data will be recorded for each catch:

- The total weight of that section of the catch retained by the crew for landing
- The total weight of the discarded catch
- The weight, number of individuals and composition by length of each Annex XII commercial species retained by the crew for landing.
- The weight, number of individuals and composition by length of each Annex XII commercial species retained from the discarded section of the catch. The assessment will be done by measuring all individuals from each species.

Using the above measurements the relationships between the discarded catch and catch to be landed can be calculated. The data collected will be deduced into catches, landings and discards per fishing day so as to be comparable with other fishing effort measurements in the regulation.

In relation to large pelagic species assessments will also be made in terms of fishing effort units in accordance with the ICCAT field manual.

Extended program:

No data collection will be carried out within the framework of the extended program.

MODULE F

COLLECTION OF DATA CONCERNING THE CATCHES PER UNIT OF EFFORT AND/OR EFFECTIVE EFFORT OF SPECIFIC COMMERCIAL FLEETS

Minimum program

Catch per unit effort (CPUE) indices will be estimated for the large pelagic species exploited by the Greek fishing fleets, such as swordfish, bluefin tuna and albacore, according to STECF recommendations, following the evaluation of 2003 report. CPUE indices will be estimated from random catch-effort observations that will be gathered from the main (pilot) Greek large pelagic fleets.

The main fleets involved in the fisheries of large pelagic species have been recorded by previous research programs and on the basis of their point of departure are:

- Swordfish: The Kalymnos, Hania and Western Greek Fleets (Western Peloponnese – Ionian Islands)
- Blue fin tuna: The Kalymnos, Hania, Halkidiki – Eastern Macedonia Fleets (Porto Koufo, Kavala) and Thrace fleet (Fanari Rhodopi)
- Albacore tuna: the Northern Sporades island fleet (Alonnisos) and the Halkidiki fleet (Porto Koufo).

It is estimated that the fisheries production of the above fleets represents 70-80% of the total Greek fisheries production for large pelagic species. It should be noted that swordfish fishing in the Greek seas is prohibited during the period October – January and that the fishery of albacore tuna is mainly done during the months of September – November.

Given the fact that fleets move in different areas of the eastern Mediterranean following the migration pattern of the fish, fleet monitoring will be achieved by trained technicians that will move to the main landing points. Observations will be obtained in as much detail as possible and preferably on a trip basis. As it has been done till now, estimates will be expressed in the units suggested in the Field Manual of the International Commission for the Conservation of Atlantic Tunas (ICCAT). Sampling will cover 50% of the total working days for all categories of vessels of the studied fleets, which also covers ICCAT demands for stock assessment studies. Based on the results of previous studies it is estimated that such a scheme will make possible to obtain CPUE estimates with precision of plus or minus 10% for a 95% confidence level.

Collection of catch-effort data in the frames of modules D and E covers 50% of the total working days only for blue-fin tuna. For the rest of the species (swordfish, albacore) it has been foreseen a 30% coverage, according to the regulation. Thus, the extra money are asked, not only for the analysis of data, but also to cover the extra costs of a more intense sampling scheme, to reach the 50% coverage for swordfish and albacore. Data collection will be carried out in the framework of Modules D & E. CPUE indices will be estimated and the database will be updated in respect to the three large pelagic species.

MODULE G

ELIGIBILITY OF THE SCIENTIFIC EVALUATION SURVEYS OF STOCKS

Minimum program

G.1. International Bottom Trawl Surveys in the Mediterranean (MEDITS)

According to the Implementation Regulation this survey is classified as priority 1 survey. The survey is undertaken once a year (end of spring until the beginning of summer).

The aim of this survey is to continue to collect the above data in Greek seas until 2006 using the MEDITS protocol and to study from the 13 year data series which will arise, the trends existing in abundance indices and length frequency distributions of the species being examined. The use of the data series from the aforementioned experimental cruises, in conjunction with the use of fishing activity data which is proposed in other actions in this program, as well as the cross checking of data arising from various methods, will provide more reliable results for assessing the stocks in Greek seas.

Sampling procedure will be carried out as in the previous MEDITS program so that the results are comparable with those collected during the period 1994–2001. More specifically, the fishing technique (bottom trawl) designed specifically for the MEDITS program (IFREMER reference GOC 73) will be used while the sampling season will extend from the end of spring until the beginning of summer. The program will cover the continental shelf and slope of Greece at depths from 10 to 800 m. The sampling areas are presented in figure 5.1. Five depth zones have been defined for all areas: 10-50 m, 50-100 m, 100-200m, 200-500 m and 500-800 m. The sampling stations are distributed depending on the surface area of each depth zone with a random distribution inside of each zone. The total number of sampling stations and the surface area of each area are shown in table 5.1.

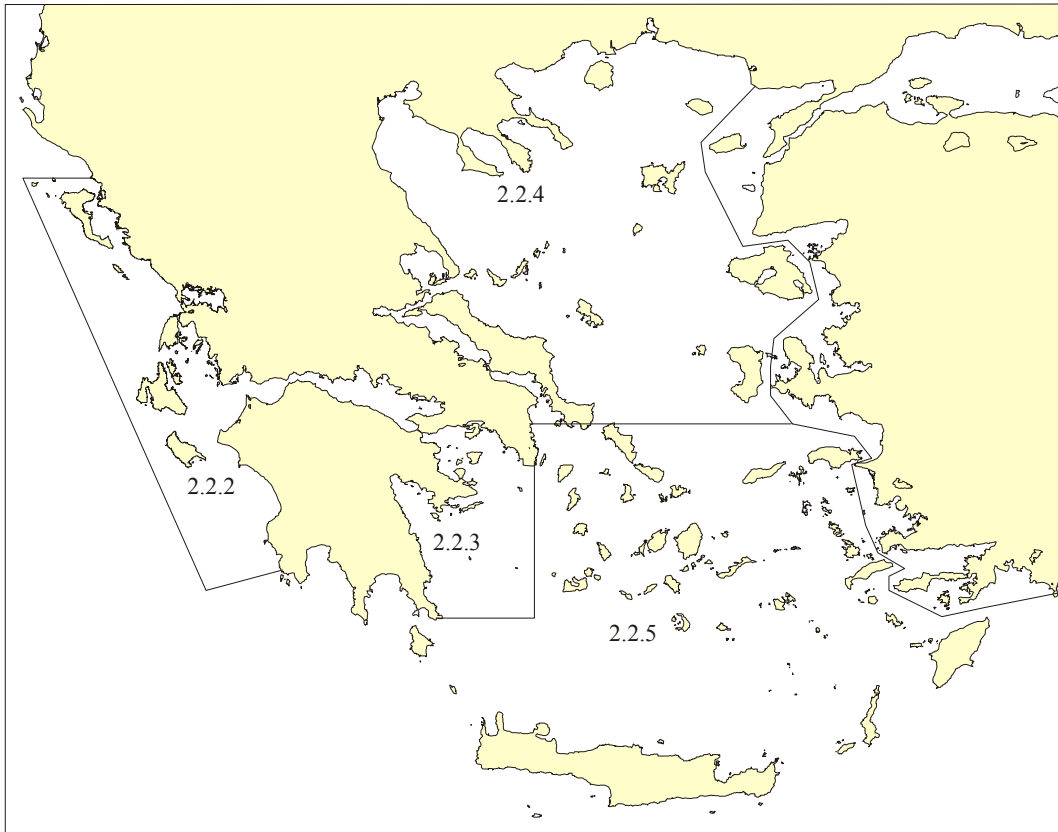


Figure 5.1. Map of biological sampling areas with experimental fisheries in the Greek seas

Table 5.1. Surface of depth zones from 10 to 800 m in Greek seas.

<i>Geographical zone</i>	<i>Surface</i>	<i>No. of hauls</i>
2.2.2	16823	32
2.2.3	24916	22
2.2.4	68157	65
2.2.5	62601	61
Total	172497	180

The biological parameters (total weight, sex, stage of sexual maturity, length of individuals for the 36 reference species and total weight and number for remaining species) will be collected in accordance with the last issue of the Manual of Protocols for MEDITS sampling. At the same time basic environmental data will be systematically collected (mainly temperature), which can help to interpret the biological data.

Where possible, participants will use the same vessels as in previous years, which are chartered commercial bottom trawlers. Moreover the basic equipment purchased for MEDITS sampling will be used and worn equipment will be replaced (e.g. bottom trawl) while back up equipment will be purchased.

Following sampling, the working groups will check the data and will be evaluated using the MEDITS Data Management System (MDMS) created in the context of program DG XIV/EU No 96/016. Following necessary correction the data will be stored in the MDMS database with the aid of which calculations of the abundance indices will be made and the composition by length will be given per depth zone and per area. The program allows the analysis and presentation of the results in accordance with the GFCM areas. Apart from these analyses, nursery areas will also be identified for the main reference species in accordance with the MEDITS 2000-2001 program methodology. Biological data (sex ratio, sexual maturity data, growth parameters, mortality and degree of exploitation) will be provided for commercially important species.

G.2. LARGE PELAGIC TAGGING

G.2.1. INTRODUCTION

Large pelagic fish stocks, such as bluefin tuna and swordfish are considered to be highly exploited in the world seas.

For the Mediterranean and the eastern Atlantic bluefin tuna populations, which are considered to form a common stock, the scientists of ICCAT have estimated that the fishing mortality rates have increased considerably the last decade. They have also pointed out that a catch reduction is needed to avoid a radical reduction of the spawning stock after some years. Bluefin tuna is characterised by a long life span and a late age at maturity. Spawning of the common Atlantic – Mediterranean stock occurs from late May to July, mainly in Mediterranean areas. High spawning activity has been reported around the Balearic Islands, and the Tyrrhenian Sea while very little is known about such activity in the eastern Mediterranean. However, high catch rates of large individuals in certain eastern

Mediterranean areas during the reproductive period, may suggest the presence of spawning grounds in the eastern part of the Mediterranean.

Regarding swordfish, all Mediterranean individuals are considered as belonging to a common stock separated from the Atlantic ones. A recent assessment carried out by ICCAT suggested that the recruitment and mortality rates are rather stable in the latest 10 years, but there are concerns regarding the high presence of juveniles in the commercial catches. Swordfish spawns during late spring – summer months and recruits appear to the fishery in early autumn. However, very little is known on the migration patterns of the fish all over the Mediterranean basin and its reproductive behaviour and spawning grounds.

As these species are highly migratory and the same stocks are exploited by several national fleets it is essential that all conservation measures taken are followed by all fleets involved in these fisheries. Information on the rate of mixing of the different stocks populations is essential for the implementation of stock assessment studies and proper management of the stocks. Tagging operations could help the clarification of such aspects and so far, they have demonstrated a certain mixing of the west and east Atlantic-Mediterranean blue-fin tuna stocks. However, further tagging has been recommended by ICCAT in order to reach conclusions on the amount of mixing and identify the migration pattern of the stocks. Past tagging operations for large pelagic fish in the eastern Mediterranean, indicated that massive tagging was unfeasible as high concentrations of animals are rarely observed in the area.

In the eastern Mediterranean, the main fishing fleets involved in the bluefin tuna fishery are located in N. Aegean Sea (Halkidiki Peninsula) and in S. Aegean (Crete, Dodecanese islands) while the main swordfish fleets are located in the S. Aegean. Catch rates of juvenile fish expressed in terms of number of animals per day show high variability but generally the higher rates are achieved in late summer and autumn months. In those months bluefin tuna juvenile catch rates of the hand-line fishery range mostly from 2-4 animals per day while they are about 30% lower in the long-line fishery. The corresponding catch rates for the swordfish longline fishery is about to 3-5 animals per day.

OUTLINE OF THE PROJECT

The aim of the project is to realise tagging operations on juvenile bluefin tuna and swordfish in the eastern Mediterranean. The work will be accomplished in the frame of a Mediterranean campaign that also includes tagging of mature bluefin tuna individuals by means of electronic pop-up tags in the central Mediterranean.

Current tagging operations will be carried out during the above-mentioned months of the higher catch rates (August – November) and will be performed by hiring commercial boats. For the capture of bluefin tuna, hand-lines and troll-lines will be mostly used. Alternatively small drifting long-lines will be employed. The latter will be also used for capturing swordfish. Those of the captured animals that are in good condition will be measured on the deck of the boat (when possible) and following will be tagged by conventional “spaghetti-type” tags and released to the sea. Date, time as well as the geographical co-ordinates of the fishing location will be recorded.

Tagging operations will last 60 days (35 days using hand and troll-lines and 25 using long-lines). In this way, taking into account the aforementioned catch rates of the Greek fishing fleets, the high variability of the large pelagic catch rates and the mortality during the fishing operations it is estimated that a total of 120 individuals will be tagged (60 bluefin tuna and 60 swordfish).

In order to maximise the chances of getting data on the recaptures, the tagging campaign will be advertised to fishers and harbour authorities through posters, circulars etc). Moreover, every reported recapture will be awarded. Recaptures, will provide information on the movements of juvenile fish and additionally, in the case of bluefin tuna, it is expected that together with the data that will be provided from tagging operations with pop-up electronic tags on mature animals in other Mediterranean areas will improve our knowledge on the overall migration patterns and behaviour of the fish.

Extended program

G.3. Anchovy

The proposed 'Extended' Greek program is eligible in the context of the priorities of DG XIV's regulation and aims:

- (a) To assess the anchovy stocks in the Aegean using two independent methods- the daily egg production method and the acoustic method.
- (b) to conduct integrated analysis of the fisheries data, which will be collected at the same time in the context of the 'minimum' Greek program, with fisheries independent estimates of biomass, for reliable assessment of natural mortality, abundance levels and pattern of exploitation.

The long-term and multi-disciplinary nature of this program, in conjunction with studies made to date, will permit a clear picture of the state and trends of the anchovy stock to be built up, and the formulation of a scientific opinion about management. The following procedure will be implemented:

a. Sampling

Acoustic, hydrographic and plankton sampling will be done in June in the area of the Aegean with the aim of assessing the anchovy stock using two fisheries independent methods: (a) the daily egg production method (DEPM) and (b) the acoustic method. At the same time, adult samples will be collected using pelagic trawlers for the needs of both methods and to assess the age structure of the population. Two vessels will be used in parallel for the implementation of this project.

b. Laboratory Analysis

The samples collected (plankton, acoustic data, hydrographic data, adult samples) will be analysed in a laboratory and the data inputted into a database in order for project 3 to be implemented.

c. Biomass Assessment

The size of the anchovy stock will be estimated using the DEPM and the acoustic methodology. The sardine stock will also be estimated using the acoustics data.

d. Integrated analysis of the state of the stock

Fishing mortality and the state of the stock will be assessed using integrated analysis of catch-at-age and biomass estimates using the two direct methods. The fisheries data will come from the minimum Greek program.

G.3.1 METHODOLOGY

A. Study area and time – sampling plan

The study area and time will be based on the existing experience and knowledge of the distribution and abundance of anchovy and sardine in the Aegean from previous programs as well as the spatial and temporal distribution and intensity of anchovy spawning. The study aims (a) at a direct assessment of biomass and the structure of anchovy populations using echo-sounding methods, and (b) at an assessment of the extent of spawning grounds and the reproductive biomass of the anchovy using the daily egg production method (DEPM).

Sampling will be done in June, which is the period of peak spawning for the anchovy. The study area will include the northern Aegean continental shelf (the Lemnos and Samothrace plateau, the gulfs of Kavala, Strymon, Halkidiki and Thermaikos as well as the Pagasitikos, Northern and Southern Evoikos and Saronikos Gulfs. Anchovy is mainly distributed in these areas according to studies carried out to date (figure 1). The extent of the surveyed area and the sampling intensity, will be adapted depending on the density of fish and the intensity of spawning (adaptive sampling).

More specifically, the basic sampling grid will consist of transects 10 nautical miles apart and inter-station distance will be shorter in areas of intense spawning. Transects will cover the continental shelf areas and will extend offshore up to full coverage of the distribution of fish and anchovy spawning grounds. The two methods will be applied concurrently by using two different vessels.

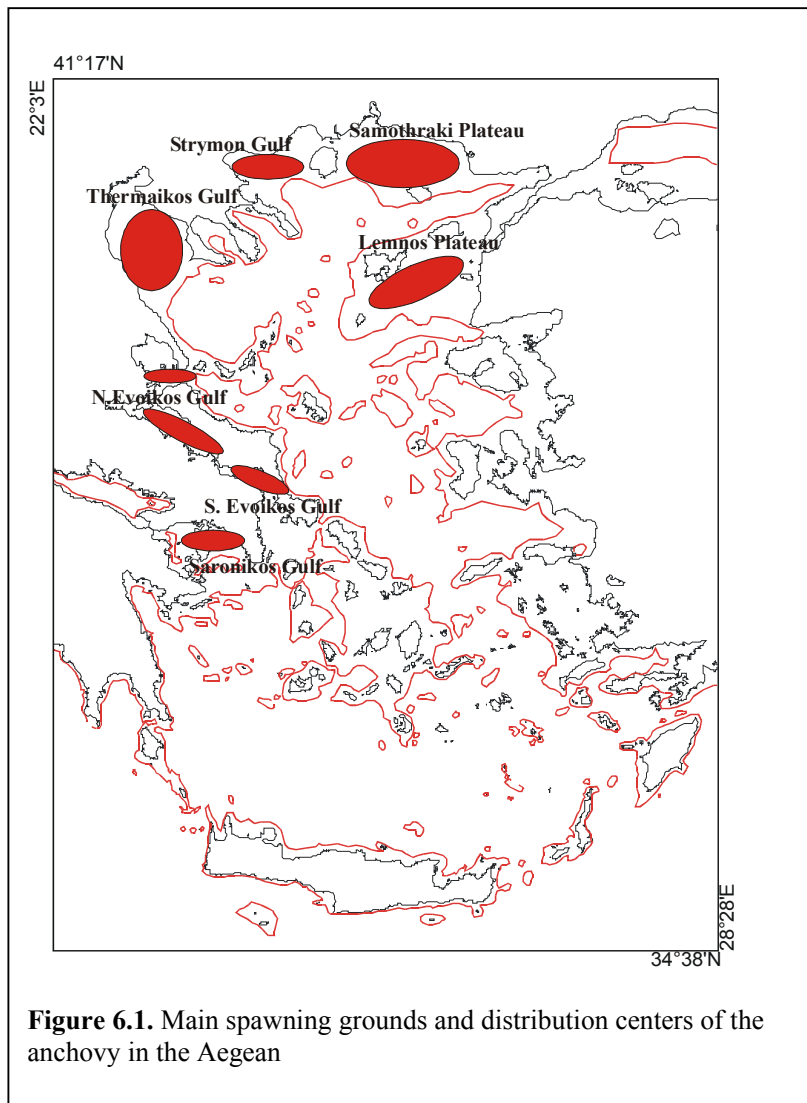


Figure 6.1. Main spawning grounds and distribution centers of the anchovy in the Aegean

B. Daily Egg Production Method

The assessment of the spawning biomass of the stock using the Daily Egg Production Method is based on the following model:

$$B = P \cdot A(k \cdot W) / (R \cdot F \cdot S)$$

where B : spawning biomass in metric tons,
 P : daily egg production, number of egg produced per m^2 per day by the stock,
 W : average weight of mature females (g),
 R : sex ratio (fraction of mature females by weight, g),
 F : batch fecundity,
 S : fraction of mature females spawning per day,
 A : total extent of survey area in m^2 ,
 k : coefficient for converting from grams to tons.

The variance of the biomass estimate is given by the formula:

$$VarB \cong \hat{B}^2 (CV(P)^2 + CV(W)^2 + CV(F)^2 + CV(S)^2 + 2COVS)$$

where CV = coefficients of variation and $COVS$ is a sum of terms containing covariances.

The method is based on two concurrent surveys: (a) ichthyo-plankton survey to assess the daily egg production and (b) adult survey to assess the adult parameters (fecundity, spawning frequency, average weight of mature females and sex ratio).

The adult samples will be collected during the ichthyoplanktonic and acoustic sampling using pelagic trawlers and/or purse seiners. These samples will be used for the needs of both methods.

Ichthyoplankton sampling will be done by the CalVET (0.1 m^2) or WP2 (0.255 m^2) nets. The surface temperature of the water at each station will be recorded while detailed hydrographic sampling (CTD profiles) will be done over a grid of 10 x 10 nautical miles.

C. The Hydro-acoustic method

The basic sampling network will follow the sampling plan for the daily egg production method. Transacts will cover the area of the continental shelf and will extend so as to completely cover the small pelagic fish distribution.

Two echo-sounding devices will be used: a dual-beam 120kHz Biosonics and a split-Beam 38kHz SIMRAD. In order to meet the needs of the acoustic and the daily egg production method experimental fishing will be done using pelagic trawlers.

MODULE H

Biological sampling of catches: composition by age and by length

Minimum program

H.1. METHODOLOGY

In order to meet all the needs of biological sampling of Greek landings as described in Articles 10 and 11 of Regulation 1543/2000 an extensive sampling plan is required which will cover all biological parameters for species mentioned in the regulation. This plan will include species which will be collected using all fishing techniques used in Greece, in different fishing ports and times of the year so that the length of catches and other biological parameters described in the regulation are representative both in terms of time and geographical area and fishing technique.

Due to different sampling methods for different species which can affect biological parameters it is considered necessary before implementing the program that the bodies participating in it prepare a sampling protocol which will describe in detail all data to be collected, referring to the regulation, repetitiveness per season, source of origin, fishing technique as well as the scale of the necessary biological parameters, e.g. scale of length, scale of sexual maturity, etc.

In addition to the above it is deemed necessary that a preliminary sampling plan be proposed as part of this proposal which will cover the general requirements of biological sampling of landings on the basis of the regulation and which will aid in preparing and understanding the budget for the relevant action. Thus in table 6.1 the number of species selected for biological sampling of landings in Greece is mentioned, which was made on the basis of the specifications in the regulation. For the following species exception from the biological sampling is requested for the reasons listed below:

Loligo vulgaris: It is not appear in the national catches in large numbers and for that reason this species was not included in the NP (*Loligo* species are only 0.64% of the total Greek landings)

Lophius piscatorius: This species is not included in the NP because of the very low landings of the species (*Lophiidae* species are 0.51% of the total Greek landings and the main component of this quantity is the species *Lophius budegassa*)

Scomber scombrus: This species is not included in the NP because of the very low landings (mackerel species are 0.18 of the total Greek landings)

Thunnus alalunga and *Xiphias gladius*: For these species the levels of Greek landings do not exceed the thresholds above which sampling is required. However, these species are of national importance to Greece and they are priority species for ICCAT: the stocks are already (and will be) sampled due to Greece's obligations as an ICCAT member (see also comments of the SGRN Meeting of 4-7 March 2002, page 9, section 1.9.4 of SEC (2002) 438).

Figure 6.1 presents the fishing ports in Greece, which will be covered, as a minimum by the biological sampling is shown. Sampling at different ports covers different species and fishing techniques so as to be representative over time and area (Table 6.2) while also being based on the following information:

- Biology of the species on the basis of existing scientific information published
- Fishing production of various species in different areas of the country
- The fishing technique used to catch the various species

- Temporal and spatial restrictions on the operation of fishing techniques, and
- Special features of geographical areas.

Table 6.1. Species selected for biological sampling of Greek landings. MP = Mean production in tons in accordance with data from the Greek National Statistical Service for the years 1998-1997.

<u>Scientific name</u>	Common name	MP 88-97	%	Sampling required	
				By length	By age
<i>Sardina pilchardus</i>	Sardine	16687	12,1	D3	E4
<i>Engraulis encrasicolus</i>	Anchovy	14915	10,9	D3	E4
<i>Trachurus sp*</i> (<i>T.trachurus</i> + <i>T. mediterraneus</i>)	Horse mackerel (European + Mediterranean horse mackerel)	8952	6,5	E3	E4
<i>Boops boops</i>	Bogue	8947	6,5	E3	E4
<i>Spicara smaris</i>	Picarel	6771	4,9	E3	
<i>Merluccius merluccius</i>	Hake	4440	3,2	C3	D4
<i>Mullus barbatus</i>	Red mullet	2642	1,9	C3	D4
<i>Mullus surmuletus</i>	Striped mullet	2316	1,7	C3	D4
<i>Octopus vulgaris</i>	Octopus	2289	1,7	E4	
<i>Xiphias gladius</i>	Swordfish	1600	1,0	C2	
<i>Nephrops norvegicus</i>	Norway lobster	951	0,7	B3	
<i>Thunnus thynnus</i>	Blue fin tuna	500	0,4	C2	
<i>Thunnus alalunga</i>	Albacore tuna	500	0,4	C2	
Mean overall catch for the years 88-97 =137380 tons					
<p>Key</p> <p>B3 = 100 individuals/50 tons C2 = 100 individuals /100 tons C3 = 50 individuals /100 tons D3 = 50 individuals/200 tons D4 = 25 individuals /200 tons E3 = 50 individuals /500 tons E4 = 25 individuals /500 tons</p> <p>* Fisheries statistics of the Greek landings are given for both <i>Trachurus sp.</i> However the species are analysed separately (see Table 6.2)</p>					



Figure 6.1. Map of selected landing sites for biological sampling

Table 6.2. Location and time of sampling for composition by age / length and study of species reproduction. EM = minimum number of individuals / per year length is measured, EH= minimum number of individuals / per year age is determined.

Species	EM	EH	Feb	Mar	Apr	May	Jun	Aug	Sep	Oct	Nov	Dec
Sardine ¹	4200	900	Lefkada Kavala Volos		Moudania		Patra Kavala	Piraeus		Alexan- droupoli		
Anchovy ¹	3800	800		Lefkada	Moudania		Patra Kavala Volos	Piraeus		Alexan- droupoli		
European horse mackerel ¹	450	250		Mihanonia Naxos Piraeus						Piraeus		
Mediterranean horse mackerel ¹	450	250					Mihanonia Naxos Piraeus		Piraeus			
Hake	2300	600		Patra ²		Ierissos ² Piraeus ² Kerkira ¹				Patra ¹ Piraeus ¹ Naxos ¹ Kavala ¹		Hania ² Ierissos ²
Boque	900	500		Alexan- droupoli ¹ Naxos ¹ Piraeus ¹ Hania ¹		Fanari ² Naxos ³				Piraeus ¹ Kavala ¹		
Red mullet	1400	400		Patra ¹		Kavala ¹ Halkida ¹ Piraeus ¹ Kerkira ¹				Mihanonia ¹ Piraeus ³ Iraklio ¹		
Striped mullet	1200	300				Volos ¹ Naxos ¹ Piraeus ¹ Iraklio ¹ Kerkira ¹				Mihanonia ¹ Kavala ¹ Naxos ³		

Species	EM	EH	Feb	Mar	Apr	May	Jun	Aug	Sep	Oct	Nov	Dec
Picarel	700					Piraeus ³ Naxos ³ Patra ³ Hania ¹				Piraeus ³ Naxos ³ Patra ³ Hania ¹		
Octopus	200					Preveza ⁴ Fanari ⁴						
Norway lobster	1900						Volos ²				Patra ¹ Halkida ¹ Kavala ¹	
Blue fin tuna⁵												
Albacore tuna⁵												
Swordfish⁵												

Notes to table 2

1. The samples will be collected from landings caught by mobile gears (demersal trawlers and seiners)
2. The samples will be collected from landings caught by passive gears (nets, long-lines)
3. The samples will be collected from landings caught by beach seiners
4. The samples will be collected from landings caught by passive gears (traps, pots).
5. These species will be monitored in relation to composition by length and maturity by the pilot fleet referred to in articles 6 & 7.

Discards

Data collected on discards in 2004, show that the discarded fraction of the stocks specified in Annex XII, did not exceed the threshold of 10% by weight or 20% by number of the total catch, according to the regulation EC 1639/2001. In the case that discards for the stocks specified in Annex XII exceed the threshold limits of the regulation during 2005, biological sampling of discards will be undertaken.

Extended program:

No data collection will be carried out within the framework of the extended program.

MODULE J

COLLECTION OF ECONOMIC DATA BY GROUP OF VESSELS

Minimum program

J.1. Introduction

The method that will provide acceptable results on the economic state of the fishing fleet is the sample-based collection of economic data as provided by the regulations. The collection of economic data, however, is a difficult task as its aims to the collection of sensitive information, which is not easily disclosed by professional fishermen. The fear of possible leakage of such information either to competitors or tax authorities or other authorities involved in the planning of fisheries policy is creating a negative attitude to the professional fishermen. Moreover, if the fishermen eventually provide such information, it might be of limited credibility since there is no particular mechanism for the objective evaluation of the information. In the case of the Greek fleet, in particular, a large segment does not have and keep financial books on income-expenses since they are taxed based on a fixed rate set based on a level of expected income while the VAT is paid as a lump sum based on a scale derived from the tonnage of the fishing vessel.

J.2. Methodology

For the minimisation of the error of the evaluation of socio-economic parameters, the project management will cooperate with local correspondents who have a good knowledge of the fishing sector and have close contacts with the fishermen. Most of these correspondents are Prefecture's Fisheries Inspectors. In addition, scientists and technicians involved in the project will have to travel to the sampling sites for assisting local correspondents to their task. Given the dispersed and extensive number of landing sites, personnel involved have to travel to cover these sampling sites.

Local correspondents will be involved in data collection for Modules D, E & J, and their costs have been split into these three modules

The information will be collected at thirty (30) sampling stations (Fig. 7.1), distributed in the whole country and especially the locations of high fisheries interest. These 30 stations will be organised in 3 groups dividing Greece in 3 major areas (Tables 7.1 & 7.2).

Figure 7.1. Geographic distribution of sampling stations



Table 7.1.: Distribution of sampling stations per control group

LOCATION	CONTROL GROUP
North Aegean Sea Sporades Pagassitikos Gulf	1 st Group
Ionian Sea Korinthiakos Gulf Argosaronikos N. & S. Evoikos Gulfs	2 nd Group
Central and South Aegean Sea Crete	3 rd Group

Table 7.2: Distribution of main sampling stations per control group

No	1 st Group	2 nd Group	3 rd Group
1	Alexandroupolis	Lamia	Nafplio

2	Fanari	Halkida	East Attiki
3	Xanthi	Pireas	Mitilini
4	Kavala	Igoumenitsa	Chios
5	Ierissos	Preveza	Samos
6	Moudania	Kefalonia	Naxos
7	Mihaniona	Mesologgi	Kalimnos
8	Katerini	Patra	Rodos
9	Sporades Isl.	Korinthos	Hania
10	Volos	Kalamata	Iraklio

The sampling density required in order to meet the precision levels mentioned to in the Regulation 1693/2001 and the percentages of vessels which will be included in the sampling per category of fishing technique are presented in Table 7.3.

Table 7.3. Segmentation of the fishing fleet per fishing gear category and per length class.

Fishing Gear Category	Gear	Length Classes			
		<12 m	12-24 m	24-40 m	>40 m
Trawled gears	Trawlers	-	15%	50%	-
	Purse-seines	50%	15%	50%	-
	Beach-seines	2%	10%		-
Static gears (All coastal and artisanal vessels using static gears)	Swordfish long-lines				
	Long lines	2%	10%	-	-
	Nets				
	Traps				

The parameters that will be recorded for each individual vessel (in accordance to the Reg. 1543/2000 and Reg.1639/2001) will be the following:

- Total income as well as distribution of income based on the species.
- Production costs detailed in categories (personnel, fuel, maintenance etc.).
- Fixed costs (average cost calculated from investment)
- Leverage ratio of own to foreign capitals.
- Assets.
- Prices of fisheries products per tonne for species sold in the market.
- Distribution of the personnel based on occupation and tasks.
- Technical description of the fishing vessel (tonnage, engine power, age and fishing gears used).
- Fishing effort.

The above parameters will be collected in accordance with the specification of Annex XVII of Regulation (EC) 1639/2001. Because of the Greek legislation specifies that taxing of the various segments of the fleet is based on different taxation method, the sampling methodology will inevitably conform to this aspect. Therefore, for the trawlers, which according to the Greek legislations (Law 666/66) are required to keep financial books of incomes and expenses and for which, account returns are published, the collection of economic data will based on those accounts and balance sheets in parallel to individual

interviews that will be based on a suitable questionnaire (see Appendix I). Interviewers will use PC's to store the collected information. Therefore, 8 more PC's are consider necessary for caring out this module. For the rest fleet segments, it is planned to examine which keep accounting books and records as well as which fishermen have a supplement income from other agriculture activities so that to adapt the sampling method accordingly.

For the record keeping of the information and the analyses, suitable databases will be created.

Extended program:

No data collection will be carried out within the framework of the extended program.

8. DATA BANK OF FISHERIES DATA

The data storage and management system, which consists of a central relational database and regional databases. These regional databases constitute the servers for the raw data, which is then sent to the central database. There is two-way communication between the central database and the regional databases.

A data diffusion system. This system consists of a webpage, which has a live connection to the central database and provides information to remote users via the Internet with the assistance of a wide number of available queries

8.1. INTRODUCTION

The national fisheries data collection program (Reg 1543/2000) requires the creation an integrated data bank which will consist of databases for recording, controlling the quality of, managing and statistical analysis of all data referred to below:

1. fishing capacity
2. fishing effort
3. catches and landings
4. biological sampling of benthic-pelagic – pelagic species with experimental fisheries
5. biological sampling of landings
6. scientific evaluation surveys of stocks
7. economic data by group of vessels

The existing databases which have been developed to date by the various research bodies, despite their lack of homogeneity in relation to their development tools and their programming languages for management and statistical processing of fisheries data, have up until now covered their needs at national and community level in a satisfactory manner. Nonetheless the needs of applying the new regulation (1543/2000) as well as the need for direct provision of information to all bodies involved in implementation, requires the planning of the system on a new bases. The new plan will permit direct communication between the various databases, the on line provision of information and the joint development of data management program, quality control, a joint data exchange system and the diffusion of information over the Internet.

8.2. METHODOLOGY

Information will be transferred at two levels:

- at the first level when data is collected the existing systems will be retained and further developed so as to meet the additional needs flowing from the application of the regulation.
- At the second level the information will be managed centrally.

With this design the single fisheries data management system is based on tried and tested information collection system, which have been in use for many years. Figure 9.1 below shows in detail the schematic flow chart of the information.

The data bank which will be capable of collecting and processing the data described in Regulation 1543/2000, will be developed in a multi-user environment using relational databases for managing and diffusing the information.

The databases will be interconnected using a common coding system and provision will be made for connections to other sources of fisheries data from Greece (the Statistical Service, ETANAL [the Fisheries Development Company], the Ministry of Agriculture) and from Member States of the European Union.

The data bank will be hosted at a predetermined location where data will be stored and dispatched to bodies involved in the program. The connection between the central system hosting the data bank and these bodies will be on line. Data entry and quality control will be done locally on the computer systems of each body and the data bank will be updated automatically. A complete version of the fisheries data management and statistical analysis software will be installed on both the local and central computer systems so that there is autonomy in entering, processing and tabulating results.

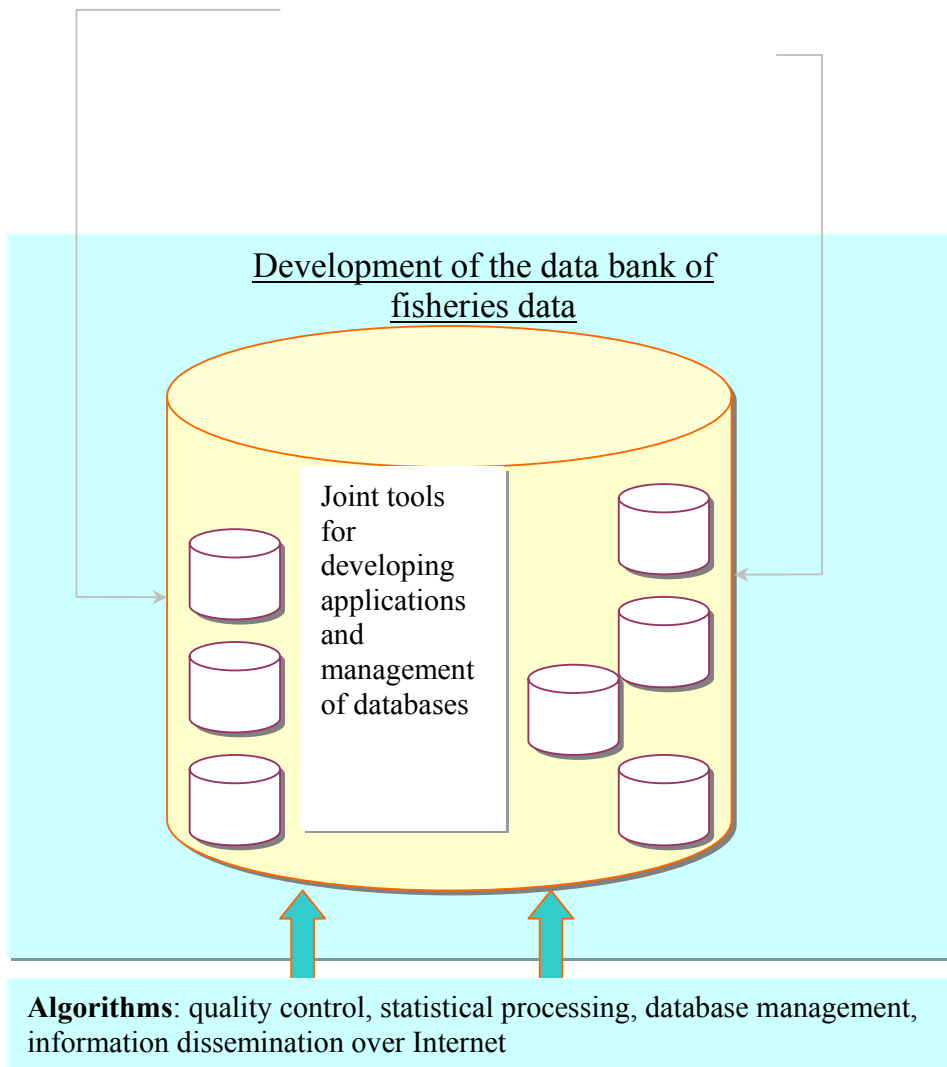


Figure 9.1. Information flow chart schematic

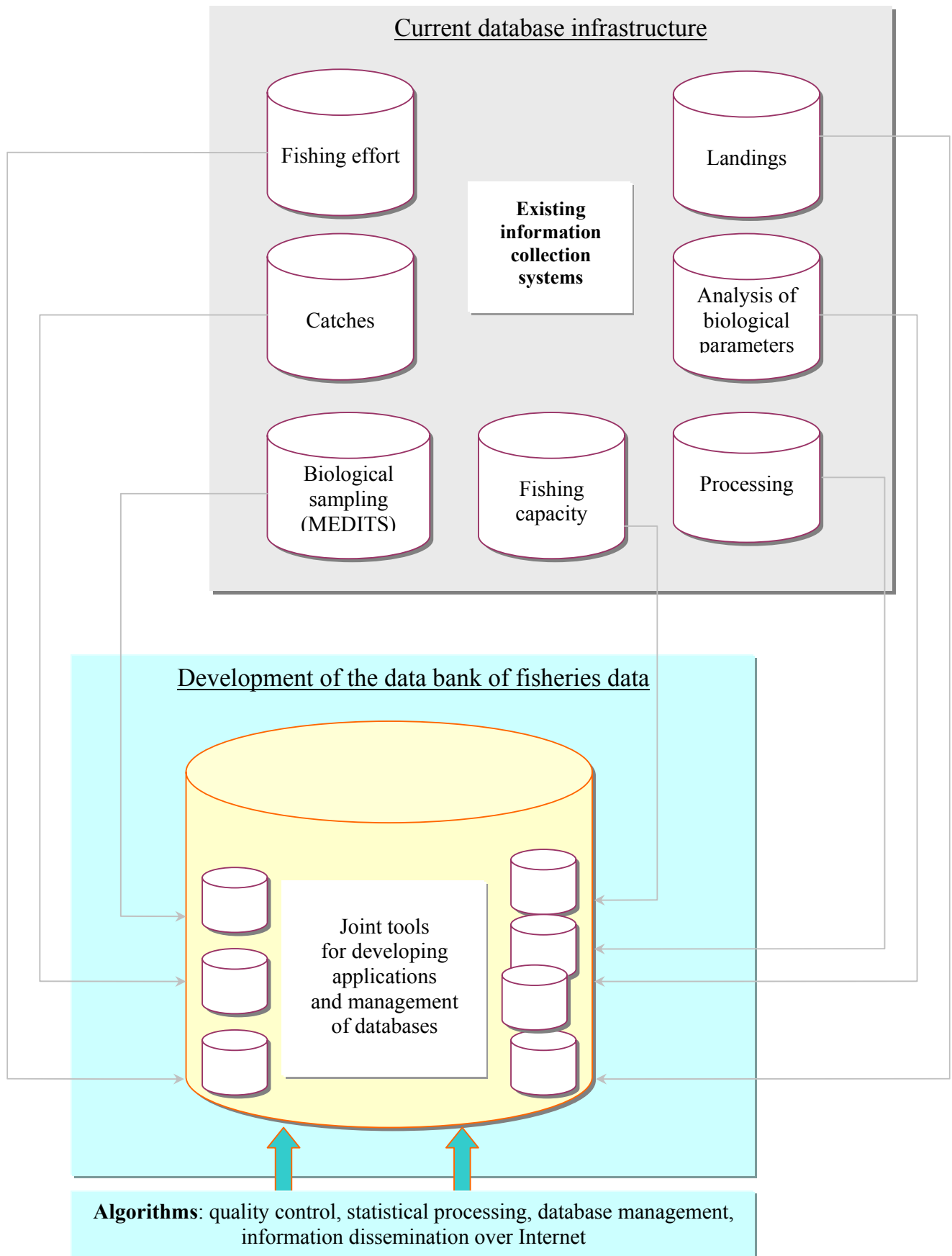


Figure 8.1. Information flow chart schematic

8.2.1. Fishing capacity

The database will be designed in line with existing ones and the management and statistical processing algorithms will be improved and enriched with new functions which will correspond to the requirements of a multi-user system. A common coding system will permit the direct connection of the fishing fleet database with the other activities of the proposed program. The database will be updated at regular intervals with data from the fisheries register which will be dispatched to the Ministry of Agriculture in electronic format (ASCII format). The procedure for updating the database will be automatic using special quality control and data entry routines. Information will be directly accessible to users of the system.

8.2.2. Fishing effort

In order to collect and manage data relating to fishing effort a database will be created and software designed for the collection, management and statistical analysis of that data and its dissemination based in part on the National Fisheries Data Management System (ESDAP). The management, quality control and statistical processing algorithms will be improved and enriched. A common coding system will permit the direct connection of the fishing effort database with the other actions. The database will be updated with data on fishing effort collected in the context of the relevant action and dispatched in a predetermined electronic format to the central data bank where special routines will undertake quality control and the input of new data. Information will be directly accessible to users of the system.

8.2.3. Catches and Landings

The databases for catches and landings will be based on the existing databases and the management, quality control and statistical processing algorithms will be improved and enriched. A common coding system will permit the direct connection of the landings and catches databases with other actions. Data will be entered locally by bodies involved in the program and then the central data bank will be updated automatically. Special quality control routines for new data will ensure the quality of data inputted. Information will be directly accessible to users of the system.

8.2.4. Biological sampling from bottom trawl gear experimental fisheries

In order to manage the collection of data related to biological sampling from bottom trawl gears experimental fisheries a database has been created and software collecting, managing and statistically processing this data has been designed in the context of the MEDITS data management system program. This database has been designed from scratch on the basis existing models. A common coding system will permit the direct connection with other actions. The database will be updated automatically by special quality control and data entry routines. Information will be directly accessible to users of the system.

8.2.5. Biological sampling of landings

In order to manage data from biological sampling of landings, a database will be designed and management, quality control and statistical processing algorithms will be developed. A common coding system will permit the direct connection with other actions. Data will be entered locally by bodies involved in the program and then the central data bank will be updated automatically. Special quality control routines for new data will

ensure the quality of data inputted. Information will be directly accessible to users of the system.

8.2.6. Processing

In order to manage data from processing, a database will be designed and management, quality control and statistical processing algorithms will be developed. A common coding system will permit the direct connection with other actions. Data will be entered locally by bodies involved in the program and then the central data bank will be updated automatically. Special quality control routines for new data will ensure the quality of data inputted. Information will be directly accessible to users of the system.

International Co-ordination

Co-ordination meetings are planning to meet the requirements of data acquisition protocols and to agree quality control on fish ageing methods. According to these provisions the following co-ordination meetings are included in the NP for 2005:

1. Data collection
 - National coordination
2. Data collection: Regional coordination
 - Mediterranean waters
3. Planning groups on data collection
 - Planning Group on commercial Catch, Discards and Biological Sampling, Plenary meeting
 - Workshop on precision level
 - Workshop on small scale fisheries
 - Workshop on age reading on sardine
 - Workshop on economic data
4. Planning Groups on surveys at sea
 - ICES Working group on Mackerel and Horse Mackerel Egg Surveys
 - MEDITS (Mediterranean Trawl Surveys) working group
 - Mediterranean waters tuna tagging

It should be noted here that in case that more meetings will be planed for Mediterranean on species that are not included in the above mentioned meetings these will be attended by Greek participants.

The suggested budget (Appendix “Co-ordination others” covers the travel cost and the daily allowances of the participants to the above-mentioned meetings.

APPENDICES

APENDIX I

COLLECTION OF ECONOMIC DATA BY GROUP OF VESSELS QUESTIONNAIRE

APENDIX II

FINANCIAL FORMS