Sport Fishing: an informative and economic alternative for tuna fishing in the Mediterranean (SFITUM).

EC Project 02/C132/11/41

Volume II

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PORTS

Ports Data

Ports general data have been gathered through three different approaches: requests for information to the port department of every Region, requests for same information to private organizations (e.g. Ports joint corporations and ports non profit organizations) when the Region Authorities have delegated management of the ports to such organisations, and finally downloading information directly from different websites (tourism, ports and navigation portals). The data collected on number of ports and moorings is 100% complete for each country. Ports services are complete for Spain and France. Italian sampled directly every port with moorings and cove or parking bay with vessels. The information on number of ports and moorings is complete also for Italy.

Additionally specific questionnaires has been sent by email to the ports, in order to confirm the data obtained from the previous sources, and to complete the data about ports with specific information as mooring price, discounts, fix and temporal workers, fuel consumption, etc. A total of 65 specific questionnaires have been reported for Spain and 17 for France, no information was sent from Italian ports. There is lack of transparency for the tourist harbours in Italy. Prices of moorings are generally provided on a case-by-case base, which make this market quite difficult for the clients, which are often forced to make a choice on other factors.

Analysis and Results.

Ports data have been analysed at Regional spatial unit (NUTS II), a smaller spatial scale has been rejected not only because the present amount of information would not be enough but also because the rational unit from a social and economic perspective is mainly the Region.

The observed results are always presented in tables and if results are statistic estimations additional information are included in order to show their reliability. The consistency of the estimations depends on their variability and on the number of observations used in the analysis. The most reliable results are also presented in maps which help to understand the geographical variability and their regional dependence.

- **Harbors**

The interest of analyzing harbors density distribution and associated services is not only because is a key indicator of nautical activity: Nautical sport, sailing, diving, fishery, etc, but also because it is related with social and economic factors.

The distribution of the harbors and moorings may be related with:

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- The economic development of the region (measured as PIB or available richness)
- The proximity to Developed areas
- The tourist potential (nature environment, tourist infrastructures, etc.)

But harbors and moorings density also may reach a level at which it may has a negative impact as:

- Environmental limits
- Economic limits, because can disincentive the demand (reduce attraction of area)

It is necessary to remark that there is an important nautical activity not associated with harbor infrastructures. In certain regions anchoring or mooring takes place over beaches or in bays which more or less seasonal incidence. It may be expected that this type of free mooring is more frequent in regions of lower development but also it is facilitate by the coast line contour. To estimate potential areas of free moorings was out of the scope of this project though, we have detailed information gathered by the Italian team on the total number of free mooring places from coves to beaches. This result shows that the number of free mooring places was similar to the number of harbors. Although this figure is unreliable to extrapolate to France or Spain because their shore contour are not as winding as the Italian, we must state that the results presented here on France and Spain mooring capacity is underestimated. However, free mooring is strictly regulated in France and especially in the Mediterranean where urban pressure is high. Therefore, the number of places where free mooring occurs in France Mediterranean can be assumed to be very low.

Harbors information: numbers, capacity and services are presented in absolute figures and in spatial density. The spatial density has been estimated dividing each data by the kilometers of shore line. We decided to estimate the shore line instead of using the official available ones because the latter considered every fold of the shore contour magnifying the true available shore length. In addition, it was found that official data sources vary from one administration to another, with no indications of what has been actually taken into account. Therefore, the coast length has been estimated using the Measure tool of the ArcView software by summing up small straight line segments.

General Ports information is shown in table 1 and also illustrated in maps 1 to 5. Maximum number of harbours are in Provence-Alpes-Côte d'Azur followed by Balearic Islands, Serdegna and Sicilia. The low number of ports in Italy is hidden the real mooring capacity (including free moorings) as it is clearly seen in Figure 1. The geographical distribution of moorings (Map 2) does not correlate with ports distribution because the regional differences observed in ports capacity or size (Map 3). Looking at port density and mooring density we get a picture of the level of nautical facilities in each region.

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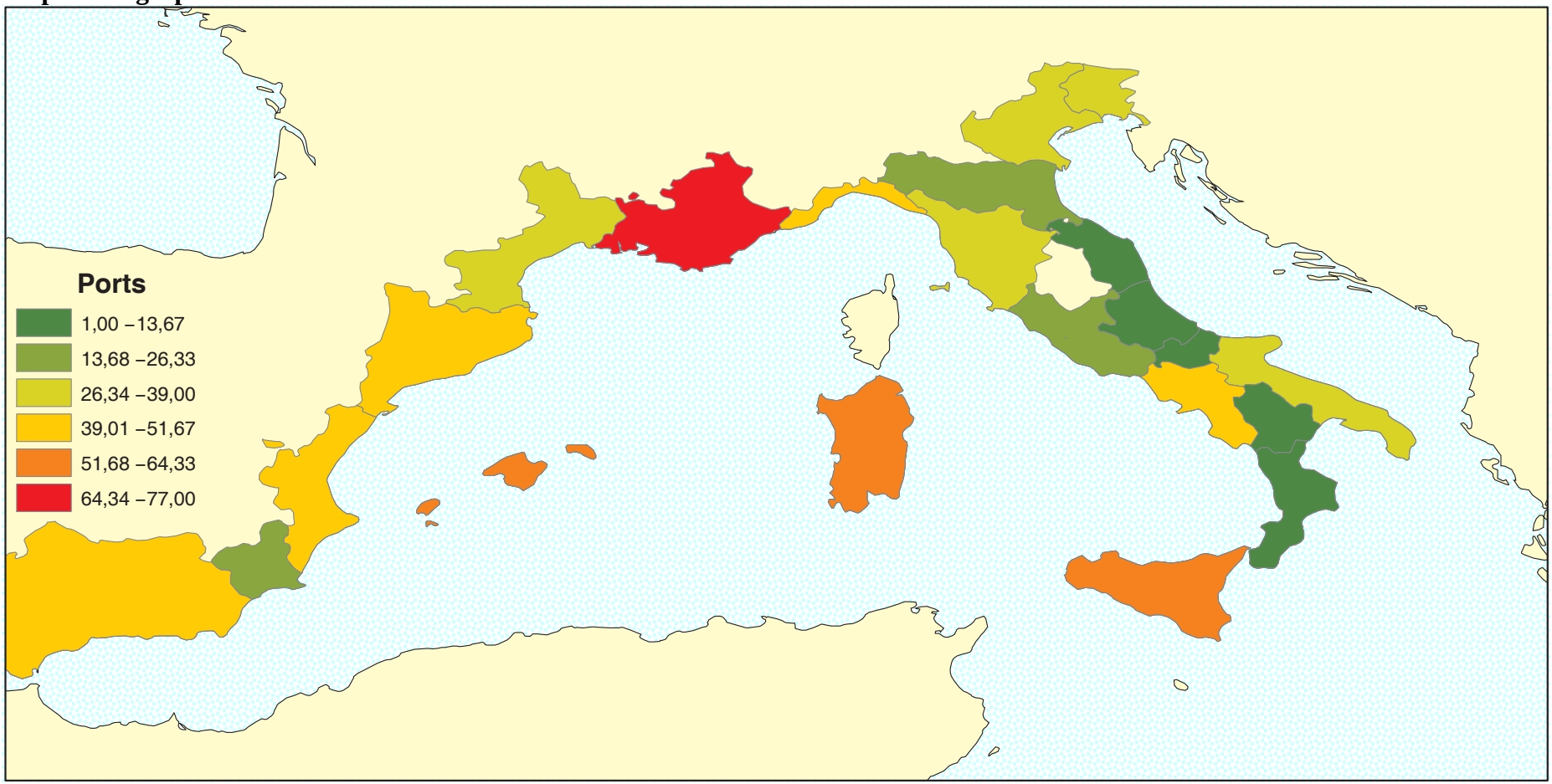
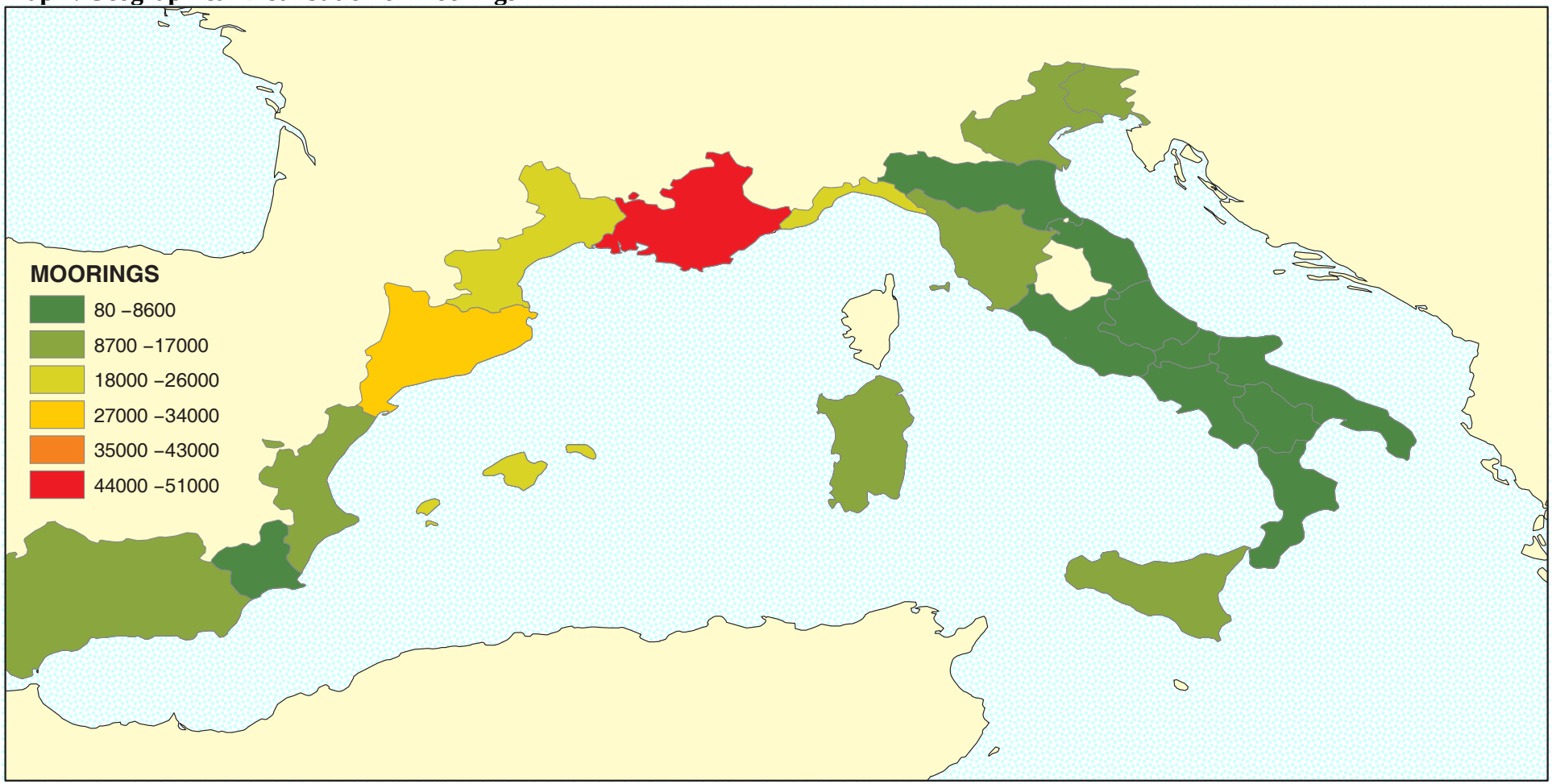
REGION	COASTKM	MOORINGS	PORTS	Ports/Km	MOORIING/KM	MEAN PORTS_SIZE	STD.DEV PORTS_SIZE	CV PORTS_SIZE
Andalucia	704	16238	49	0,07	23,07	331,00	247,00	0,70
Baleares	540	20580	59	0,11	38,11	349,00	305,00	0,90
Catalunya	427	25648	46	0,11	60,07	534,00	426,00	0,80
Languedoc-Roussillon	213	22500	31	0,15	105,63	726,00	888,00	1,20
Murcia	121	7874	22	0,18	65,07	358,00	316,00	0,90
Provence-Alpes-Cote d'Azur	441	51171	77	0,17	116,03	665,00	510,00	0,80
Valencia	376	16517	45	0,12	43,93	367,00	244,00	0,70
Abruzzo	120	1711	5	0,04	14,26	342,20	323,90	0,90
Basilicata	52	600	1	0,02	11,54	600,00		
Calabria	650	2222	8	0,01	3,42	277,75	203,40	0,70
Campania	270	8155	42	0,16	30,20	194,17	190,90	1,00
Emilia-Romagna	118	4921	15	0,13	41,70	328,07	375,30	1,10
Friuli-Venezia Giulia	89	12736	37	0,42	143,10	344,22	359,00	1,00
Lazio	253	6331	25	0,10	25,02	253,24	291,80	1,20
Liguria	244	17210	41	0,17	70,53	419,76	418,00	1,00
Marche	165	4825	9	0,05	29,24	536,11	336,30	0,60
Molise	35	80	1	0,03	2,29	80,00		
Puglia	652	5443	34	0,05	8,35	160,09	131,70	0,80
Sardegna	826	15884	61	0,07	19,23	260,39	217,30	0,80
Sicilia	853	9863	57	0,07	11,56	173,04	179,90	1,00
Toscana	344	11161	34	0,10	32,44	328,26	330,20	1,00
Veneto	247	9484	39	0,16	38,40	243,18	258,40	1,10

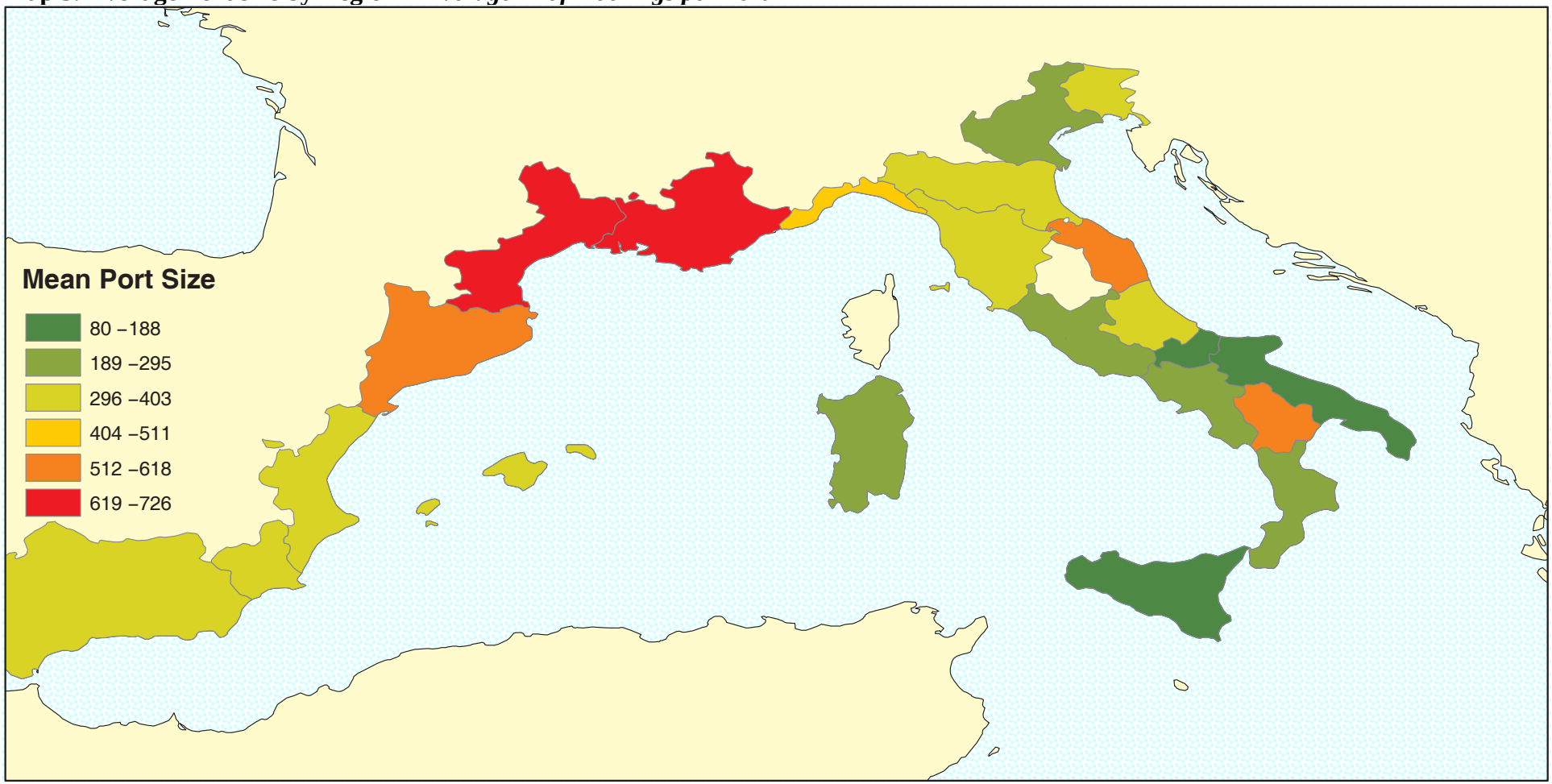
Map 1. Geographical Distribution of Ports



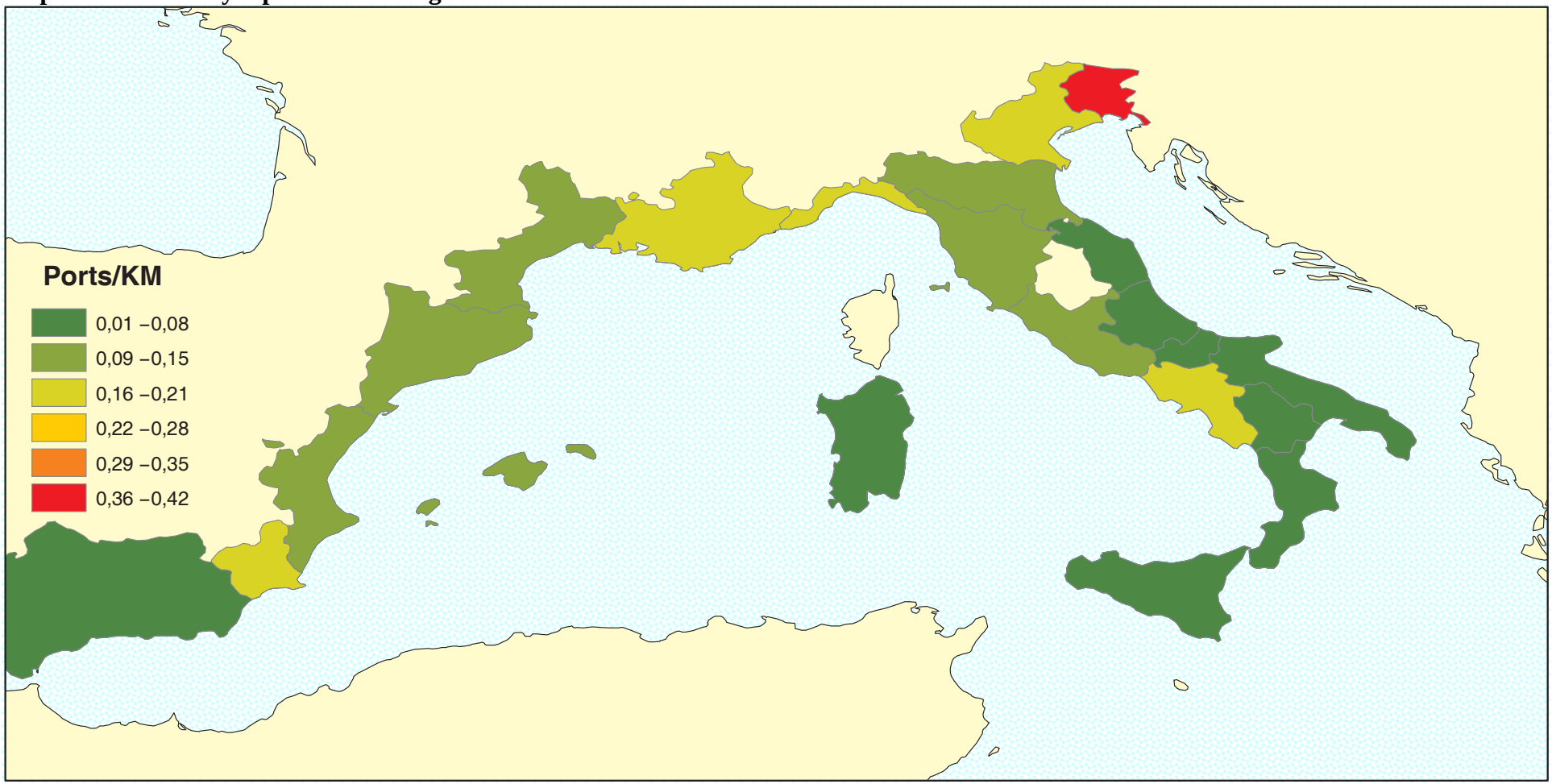
Map 2. Geographical Distribution of Moorings



Map 3. Average Port size by Region = *Average nº of moorings per Port*

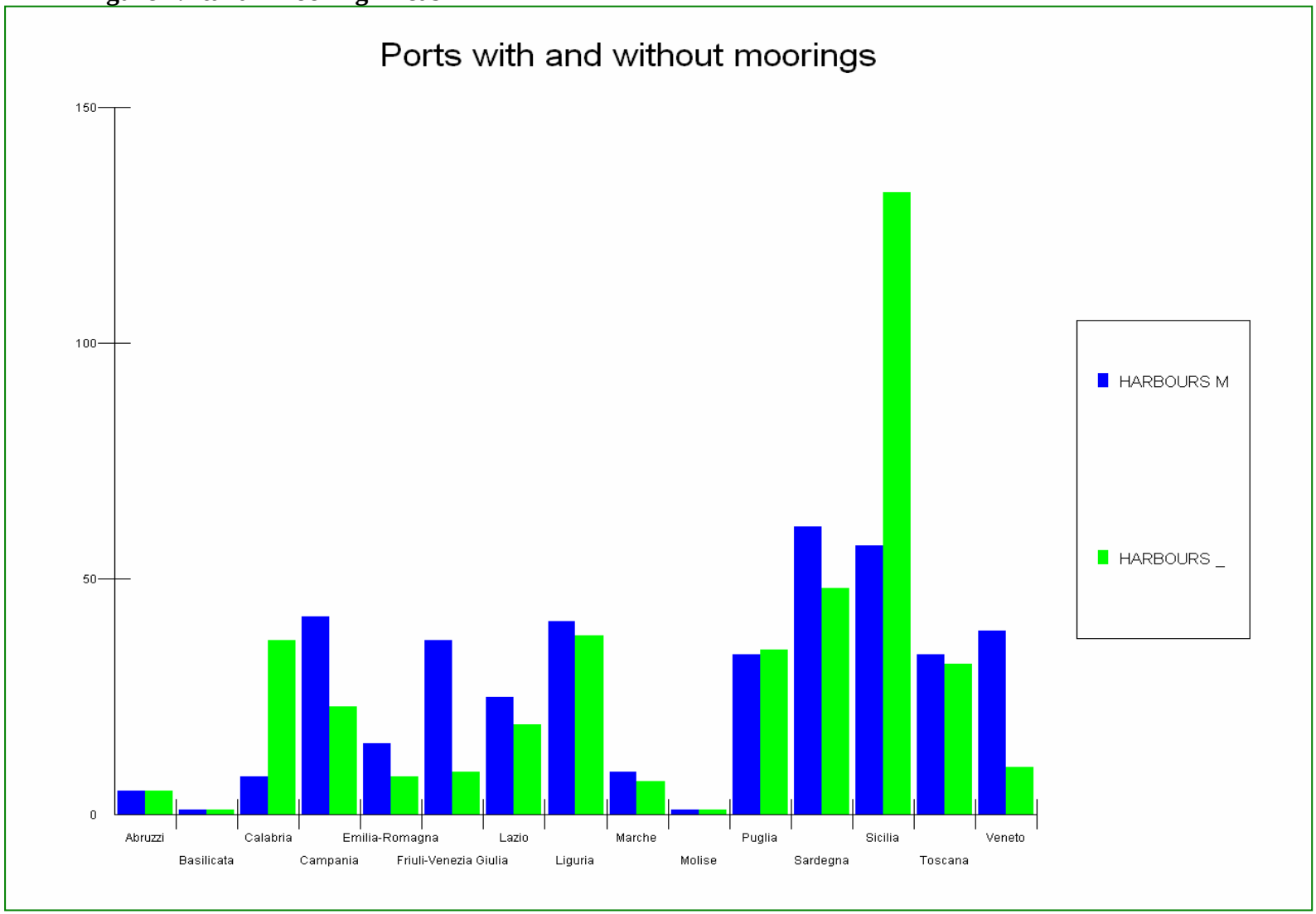


Map 4. Ports Density = ports/ coast length



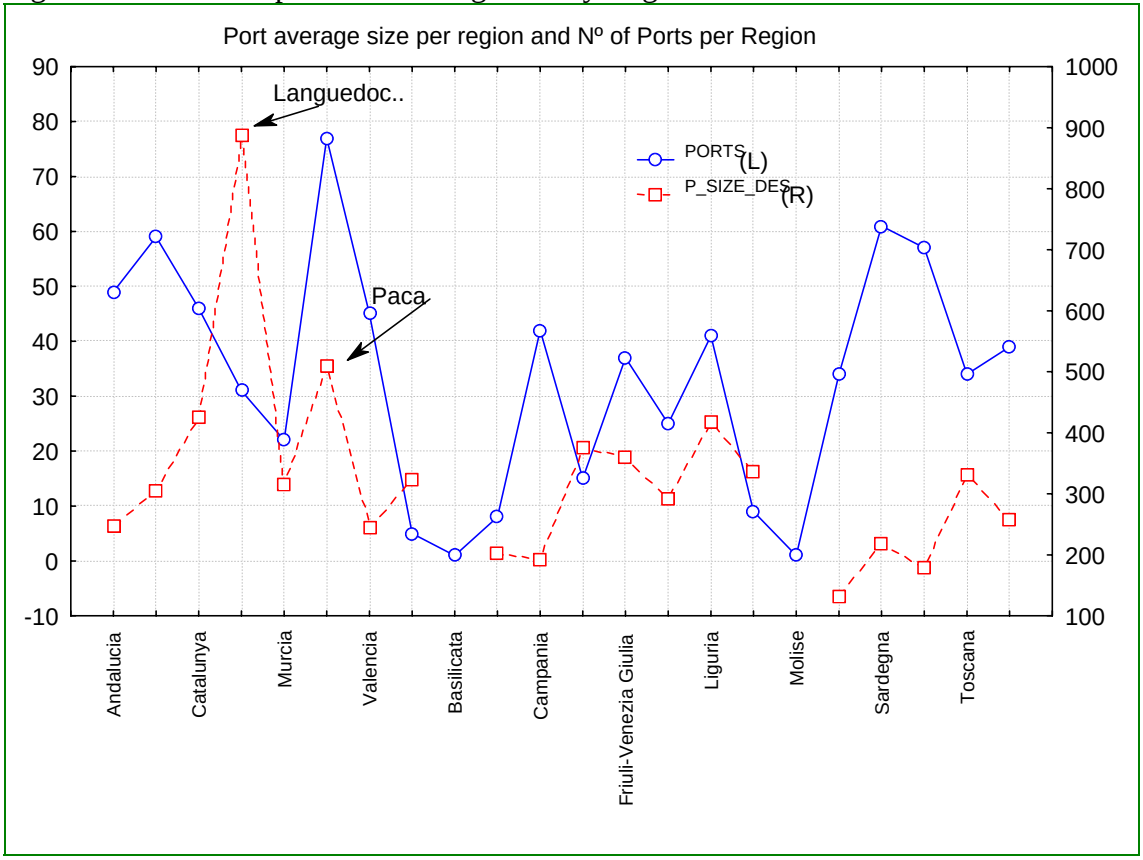
Map 5. Moorings Density = moorings/ coast length

Figure 1. Italian mooring Areas



There are different scenarios of coastal management related with harbours spatial building (figure 2) from region with many small ports (Andalucia, Baleares, Sicilia, Sardegna..) to regions with less but bigger harbours (Languedoc-Rousillon). The variables of these scenarios (ports, port size, moorings) gave no significant correlation with the income per capita in each region. We presume that ports and mooring availability as well as ports size vs. ports number strategy may be due to a number of factor, among which the natural presentation of the coast :building a harbour in rocky, sheltered areas (e.g. PACA) is easier and less expensive than on open sandy coasts (e.g. Languedoc Roussillon).

Figure 2. Number of ports and average size by Region



Mooring prices varies highly in each region and also between seasons, and visibly varies greatly between mooring sizes. In table 2.1 average price of mooring per region, size and season is presented jointly with the standard deviation and the number of data available for each estimation.

The Italian average mooring prices is presented separately in table 2.2 because it has not been able to estimate it for every Italian region and because for regions with information the number of ports has been very scarce. This has prevented to estimate any deviation and we advise the reader to take this data with cautious. The number of Italian ports with mooring prices is specified in brackets below the region name.

Table 2.1. Information of mooring prices by size and Region.

Nº OBSERVATIONS	ANDALUCIA	BALEARES	CATALUNYA	LANGUEDOC-ROUSSILLON	MURCIA	PROVENCE-ALPES-CÔTE D'AZUR	VALENCIA
Category 1 High Season	25	4	25	6	6	11	12
Category 1 Low Season	25	3	16	6	4	8	6
Category 2 High Season	25	5	17	6	6	11	12
Category 2 Low Season	25	3	15	6	4	8	6
Category 3 High Season	25	5	16	6	6	11	12
Category 3 Low Season	25	4	14	6	4	8	6
Category 4 High Season	25	5	16	6	6	10	12
Category 4 Low Season	25	4	14	6	4	8	6
Category 5 High Season	25	4	12	6	4	10	9
Category 5 Low Season	25	3	10	6	4	8	6
Mean Price							
Category 1 High Season	171	199	507	252	249	273	332
Category 1 Low Season	87	84	276	142	157	117	225
Category 2 High Season	230	264	965	347	373	375	477
Category 2 Low Season	116	132	435	192	249	170	323
Category 3 High Season	321	363	1312	463	520	517	677
Category 3 Low Season	169	142	629	256	351	236	478
Category 4 High Season	412	508	1801	570	730	689	1076
Category 4 Low Season	217	221	904	322	498	336	776
Category 5 High Season	564	817	2357	777	1824	982	1698
Category 5 Low Season	300	367	1103	386	995	455	1309

STD DEV							
Category 1 High Season	17	118	503	26	134	81	297
Category 1 Low Season	9	82	266	32	35	32	93
Category 2 High Season	27	144	691	57	186	106	401
Category 2 Low Season	16	129	305	38	42	49	135
Category 3 High Season	57	174	869	61	248	161	585
Category 3 Low Season	43	137	460	53	45	78	196
Category 4 High Season	97	252	1163	69	361	265	992
Category 4 Low Season	79	236	645	69	84	156	438
Category 5 High Season	140	403	1776	114	1234	358	1253
Category 5 Low Season	119	375	939	196	559	192	700

Table 2.2. **Information of mooring prices by size and Region in Italy.**
(in brackets the number of ports with information)

MEAN PRICE	**Abruzzo (1)**	**Emilia-Romagna (1)**	**Friuli-Venezia Giulia (4)**	**Liguria (2)**	**Sardegna (7)**	**Sicilia (5)**	**Toscaza (2)**	**Veneto (4)**
Category 1 High Season	600	480	622	400	661	476	680	484
Category 1 Low Season	103	108	163	162	91	176	285	121
Category 2 High Season	705	855	643	607	872	652	715	679
Category 2 Low Season	141	166	168	285	171	260	285	173
Category 3 High Season	1050	1170	719	871	1264	945	750	866
Category 3 Low Season	214	210	205	468	291	371	285	238
Category 4 High Season	1380	1410	935	1191	1726	1277	900	1104
Category 4 Low Season	266	271	265	629	338	440	365	295
Category 5 High Season		3557	1381	2820	5752	1308	1200	2337
Category 5 Low Season		798	427	1194	951	627	465	459

Category 1= 6 m Category 2= 8 m Category 3= 10 Category 4= 12 Category 5 => 15 m

The smallest mooring size is not always present in every port and neither the biggest. Consequently, the middle category has been chosen to be represented geographically (Map 6 and Map 7). Catalunya consistently present the highest price in low and high season while the high prices in Emilia-Romagna, Abruzzo and Sardegna are only during the high season. The rate between high and low season prices gives us the rate of price increase during summer. In Spain the increase is not bigger than two fold, in France, it may rise close to three times and in Italy rises five times and a half the price during the low season. In order to find any factor affecting mooring price we have correlated low and high season prices with the following variables: port, moorings, ports density, moorings density, ports size, and euros per capita. None of the estimated correlations were significant (Table 3).

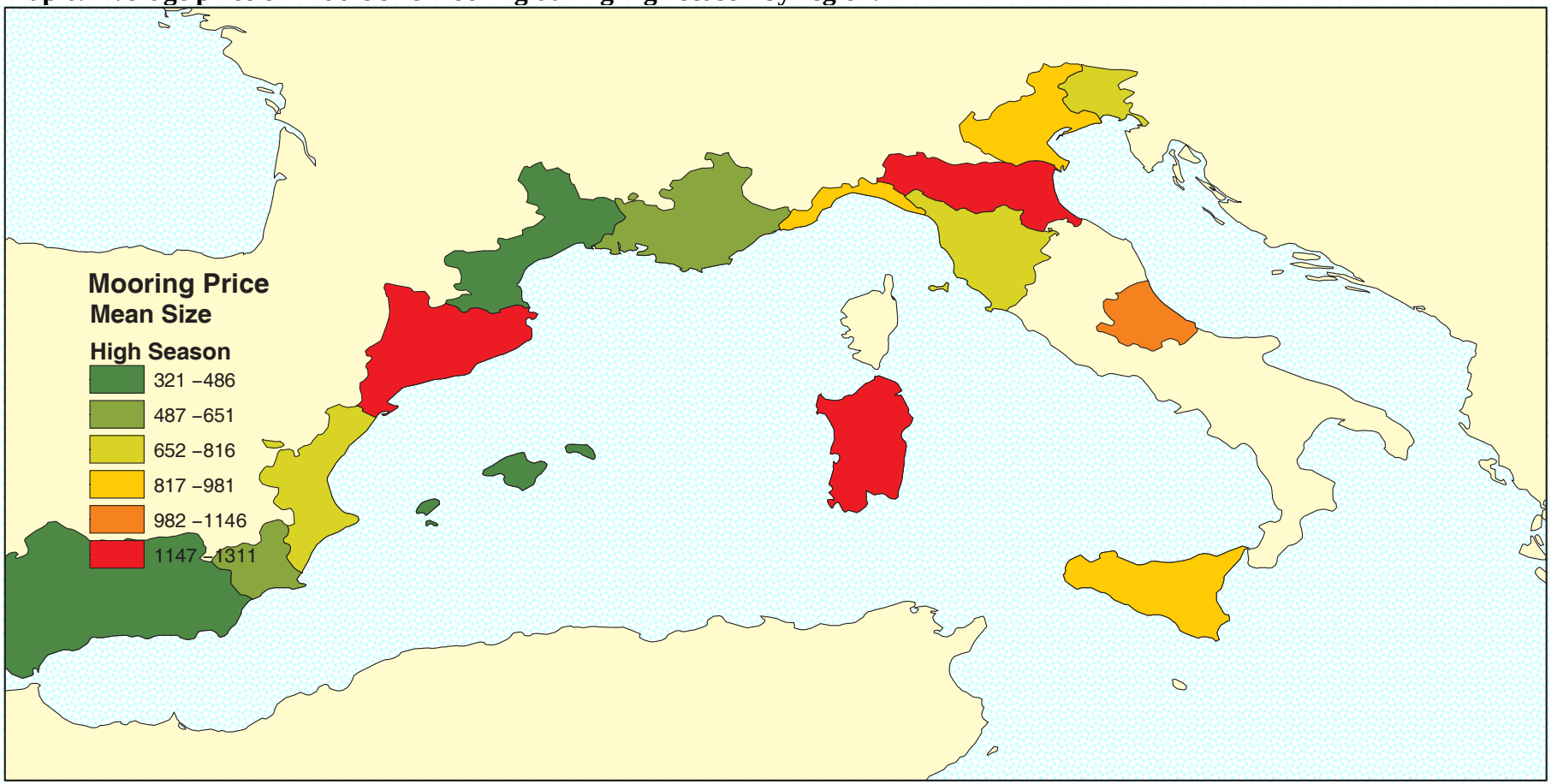
Table 3. Correlation matrix between ports variables and €/citizen (*In blue spurious correlation)*

	€-Citizen	MOORINGS	PORTS	KM_PORTS	MOOR_KM	PORTS_SIZE	MOOR_WORKE	P_WORKEST	M-Price3H
€-Citizen									
MOORINGS	0,77	1,00							
PORTS	0,60	0,81	1,00						
KM_PORTS	0,32	0,28	-0,12	1,00					
MOOR_KM	0,61	0,66	0,14	0,76	1,00				
PORTS_SIZE	0,64	0,67	0,17	0,44	0,91	1,00			
MOOR_WORKE	0,63	0,68	0,64	0,26	0,44	0,37	1,00		
P_WORKEST	0,27	0,39	0,34	-0,06	0,17	0,26	-0,37	1,00	
M-Price3H	0,25	0,10	-0,07	-0,06	0,05	0,19	-0,30	0,40	1,00
M-Price3L	0,01	-0,11	-0,28	0,03	-0,02	0,06	-0,59	0,50	0,93

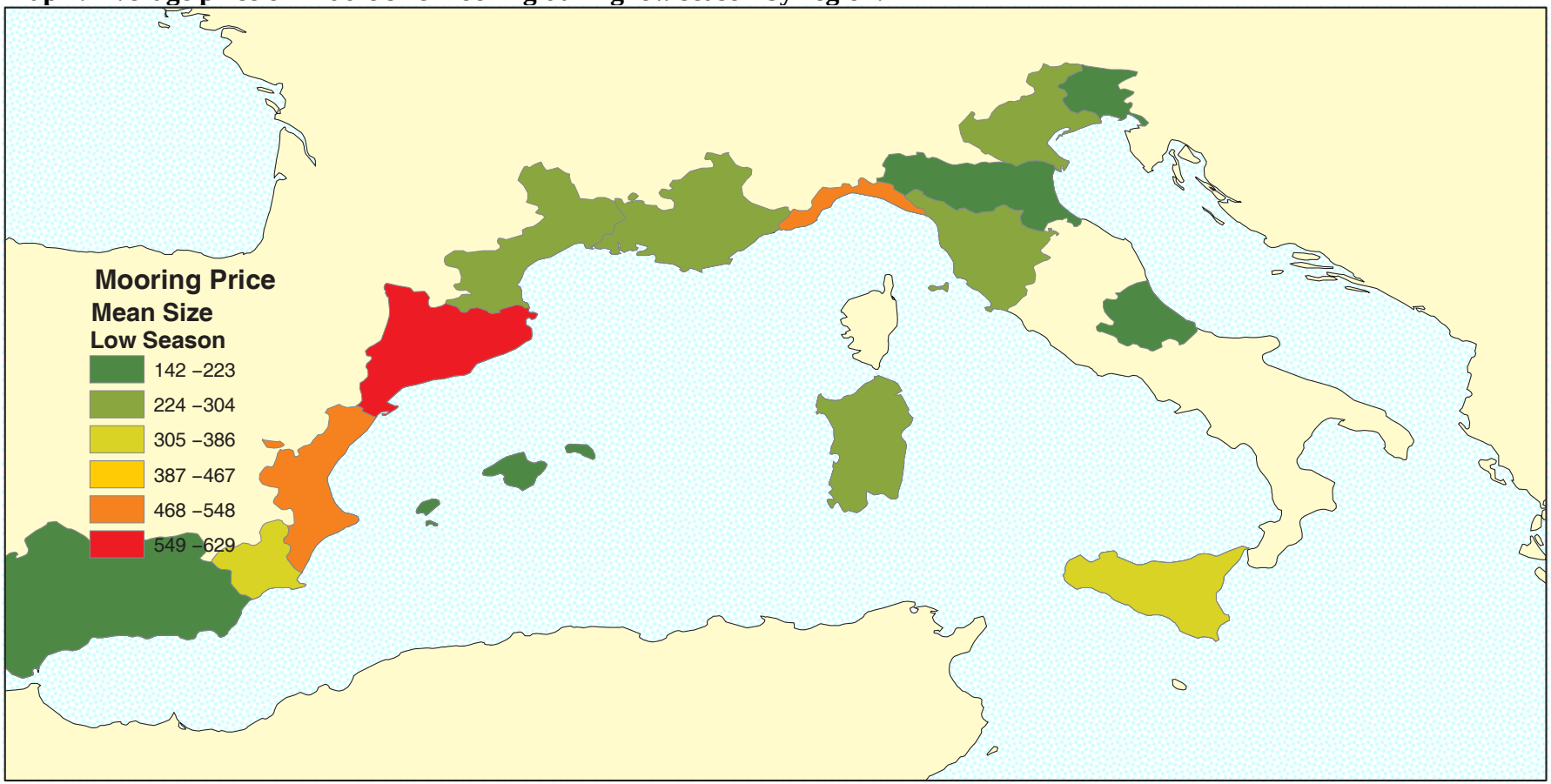
Table 4. Working efficiency (nº of moorings per worker) and an estimation of ports workers by region

REGION	MEAN MOOR/WORKER	Nº OF DATA MOOR/WORKER	STD.DEV MOOR/WORKER	ESTIMATION OF WORKERS	APROACH OF WORKERS
Andalucia	55	16	41	295,24	318,39
Baleares	79	3	65	260,51	403,53
Catalunya	51	26	52	502,90	502,90
Languedoc-Roussillon	56	6	38	401,79	441,18
Murcia	51	2	6	154,39	154,39
Provence-Alpes-Cote d'Azur	93	8	64	550,23	1003,35
Valencia	21	7	14	786,52	323,86

Map 6. Average price of middle size mooring during high season by region.



Map 7. Average price of middle size mooring during low season by region.



The reported information about port workers permits us to estimate the average number of moorings per worker in each region. Numbers of workers have been estimated in full time equivalent and an estimate made for France has been applied to transform seasonal employment into full time equivalent employment: 3 seasonal equal to 1 full time. The results are given in Table 4, where clearly the standard deviation shows high variability among ports belonging to the same region. The average number of moorings per worker also show big differences between regions and although the correlation between moorings per worker is not significant with euro per inhabitant per region (€/citizen) this correlation is high enough to think it could be significant with a higher sample size. The same happen between port size and € per citizen, which may indicate the richer the area the bigger the ports. Both correlations together may drive to the perception that in richer regions where average ports are bigger the numbers of workers are less and consequently ports expenses are reduced. In fact looking at correlation between average mooring price all along the year (better indicated by low season price) and moorings per worker it is negative and high, though not significant we again presume it is due to the small sample size. Ports size and €/citizens show a positive correlation which we could expect to be significant with bigger sample size, in other words the richer the region the bigger are the ports. This can be explained by the fact that high income citizens have enough financial resources to purchase leisure boats, creating therefore a demand for mooring. Although there is not any relationship between workers efficiency (moorings/worker) and ports size, both indicate a relationship with region richness. We could have expected that the bigger the port is, the fewer employees per mooring is needed because the manpower can be more efficiently employed, but this has not seen in our results. We only observed the richer the region the more efficient the workers. This may explain that mooring price is not related with the region income per citizen but is negative related with worker efficiency which is clearly understandable.

Ports services are indicators of harbors quality. In each region the percentage of ports with each service and their average will show the differences in ports quality among regions. For this estimation we have chosen what has been considered key services and the others have been removed because there are not relevant. The latter is the case of restaurants because if they are not in the harbor there are always so close to it that makes no difference. Other services are present always and neither makes a difference (VHS, ramp..,). The services presented in table 5 are those which have been considered in the quality analyses.

Table 5. Percentage of ports with each specified services by region.

Region	Total Ports	%P WaitingPier	%P DryDock	%P Crane	%P travelLift	%P security24h	%P Fuel	%P Electricity	%P Water
Andalucia	49	59	84	61	55	67	76	88	96
Baleares	59	41	61	61	53	44	61	76	75
Catalunya	48	63	79	79	58	65	79	92	94
Languedoc-Roussillon	31	87	52	84	55	26	74	94	100
Murcia	22	18	82	82	55	14	68	95	100
Provence-Alpes-Côte d'Azur	77	87	51	79	51	9	73	97	100
Valencia	45	51	84	89	40	18	67	93	98

Water and electricity services the most abundant with an average presence of 94,7% and 90, % respectively. Only the Balearic Islands show significant lower facilities of these services. The next most common ports facility is the crane (an average of 76%) with significant lower presence in Andalucia and Bal. Isl. Crane is close follow by Dry dock (71%) and fuel services (70%), French regions are significantly lower in the first and Bal. Isl in the second. Waiting Pier (58%) and Travel lift (52%) are less frequent, the first with significant differences among regions: maxima in French regions and minima Bal. Isl. The less frequent service (on average 35%) is 24 hours security service but differences among regions goes from 9% in PACA to 67% in Andalusia and also significantly high in Catalunya. If we measure the ports quality in each region by the average of all service presence in each ports the regions are range as follows:Catalunya (76%), Andalucia (73%), Languedoc-R (72%), PACA (68%), Valencia (68%), Murcia (64%) and Bal. Is (59%). At present it is beyond our understanding the big differences observed in security services and to consider it in ports quality estimation may be distort the real value. Thus, a second range has been estimated where this service has been removed in the approximation. This second range gives the following quality scenario: Languedoc-R and Catalunya (68%) PACA (67%), Valencia and Andalucia (65%), Murcia (63%) and Balearic. Is (54%). It is likely that the latter range represents better the class of ports services in each region.

Table 6. Correlations between density of ports services and annual € per citizen

	€-Citizen
WaitPierKm	-0,70
DDockKm	0,02
Cranekm	-0,44
TraLiftKm	-0,51
secur24hkm	0,19
Fuelkm	-0,44
Electrkm	-0,41
Waterkm	-0,33

The density of these services (number of services by Km of coast line) by region is geographically illustrated (maps 9 to 16). Although density services or/and services presence could be related with region development table 6 and 7 clearly show that this is not applied in this study. Table 6.1 where service density correlation with citizen annual income is presented shows nothing if not negative relationship. Because density is strongly dependent on the coast length we estimated the correlation between % of service and citizen income (table 6.2). This gives only one significant and sensible result: the negative correlation between Dry dock and region income level, this is explained by the price of land occupied by the dry docks, as the price goes up the ports may sell the place and substitute the dry dock by parking infrastructures in inland areas of cheaper value.

[2] Table 7. Correlations between percentage of services and annual € per citizen

	€-Citizen
WaitPier	0,52
Ddock	-0,79
Crane	0,09
TraLift	0,07
secur24h	-0,21
Fuel	-0,06
Electr	-0,07
Water	-0,29

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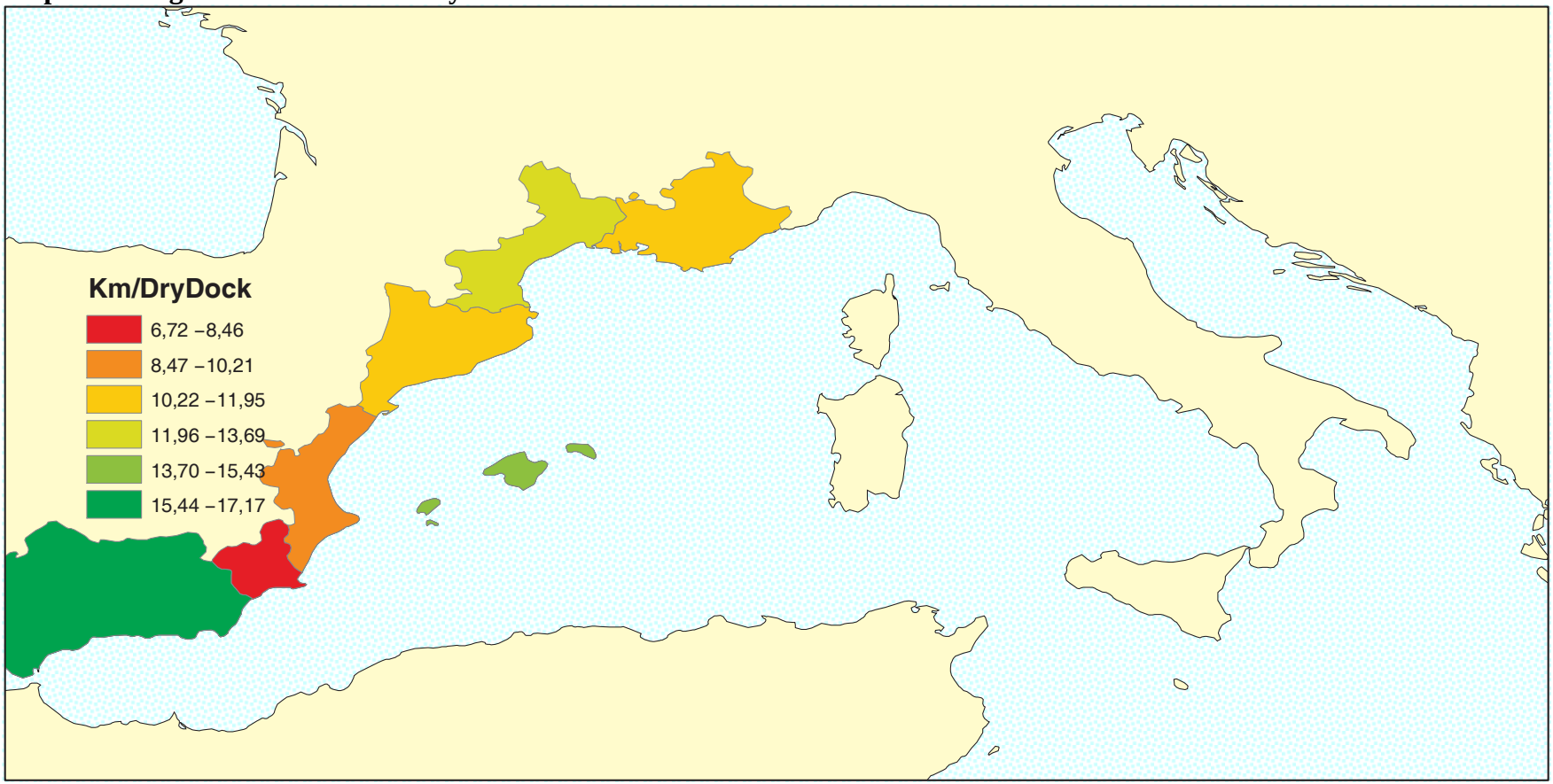
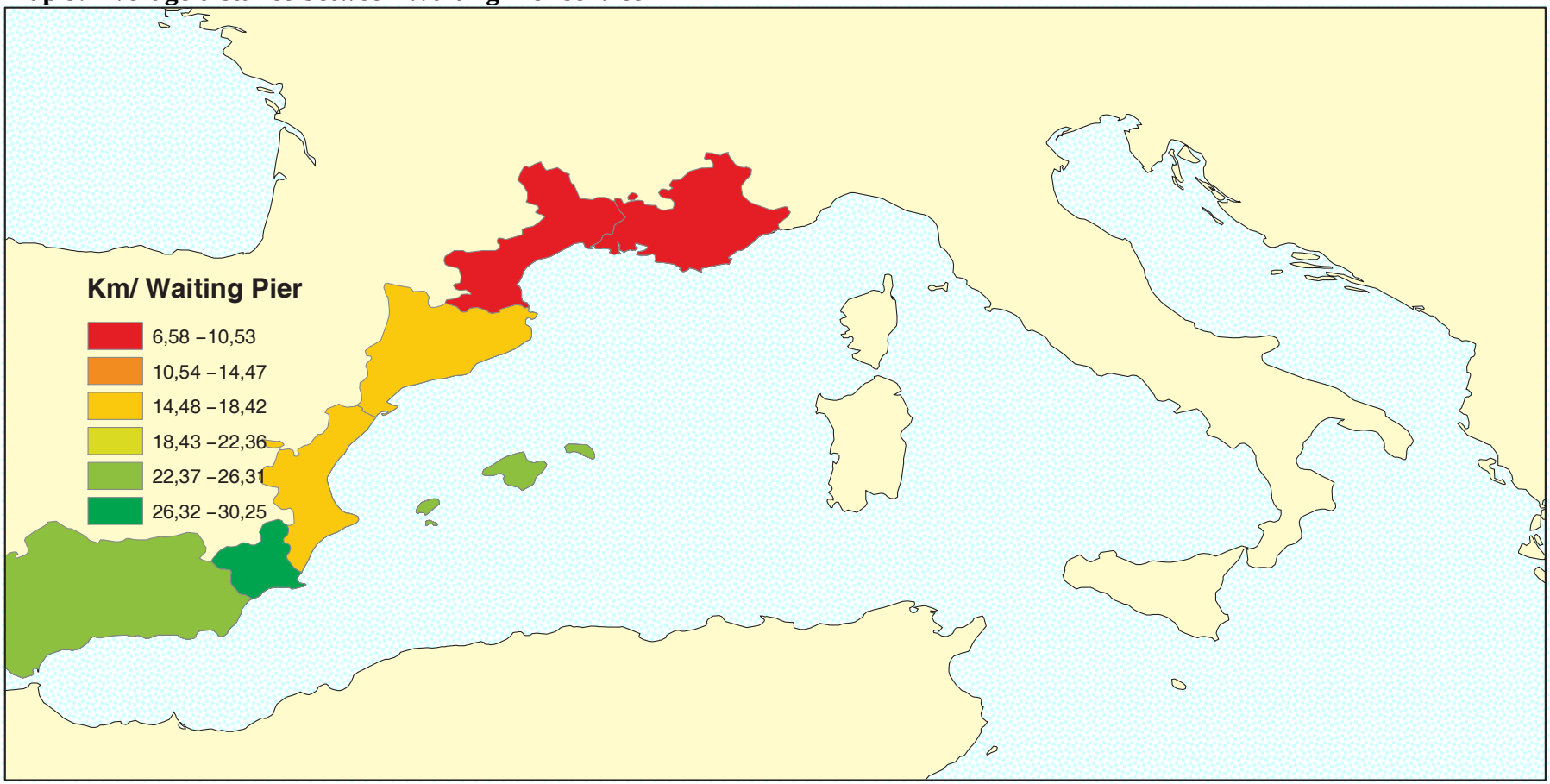
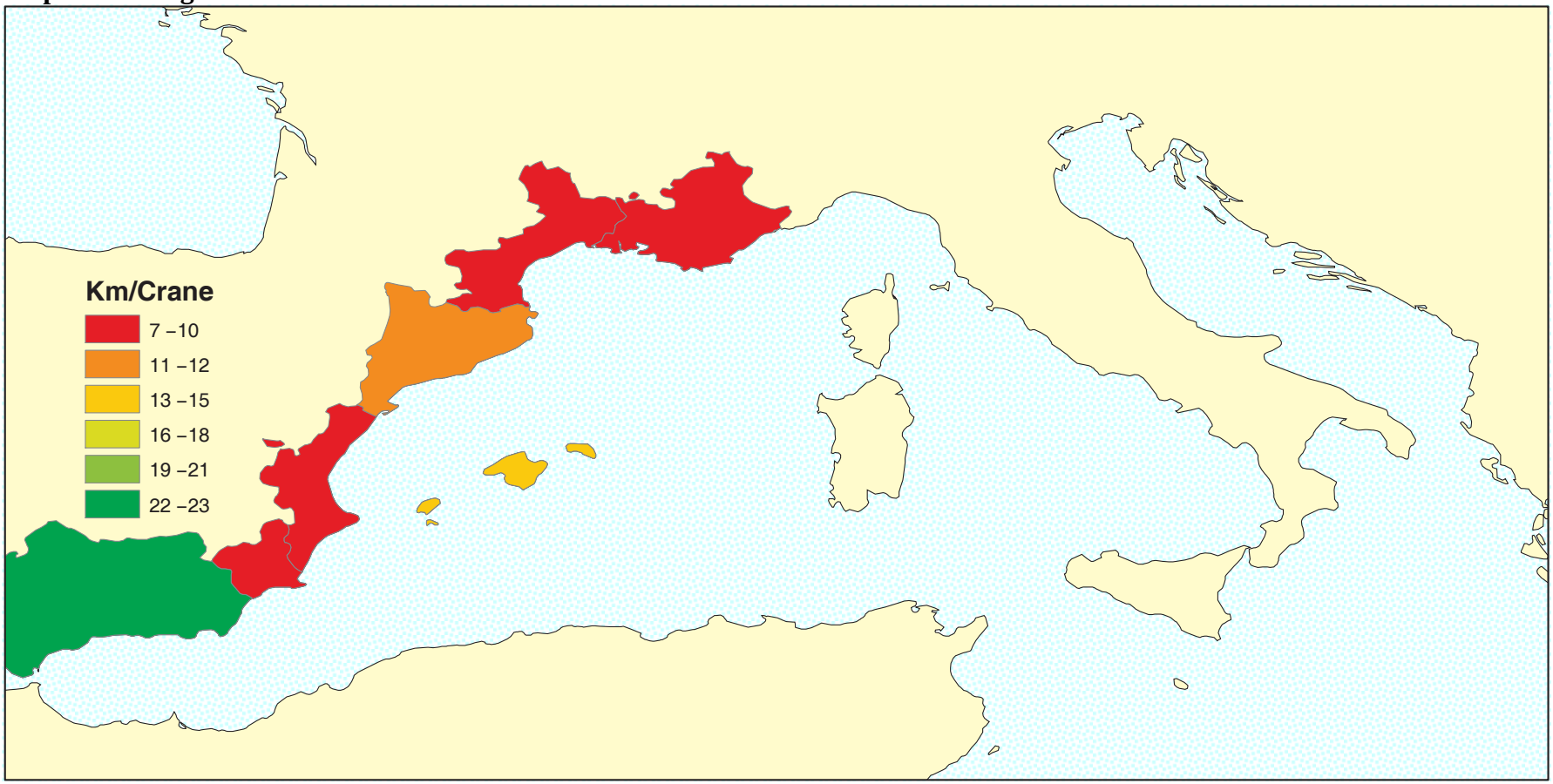
Map 8. Average distance between DryDock service



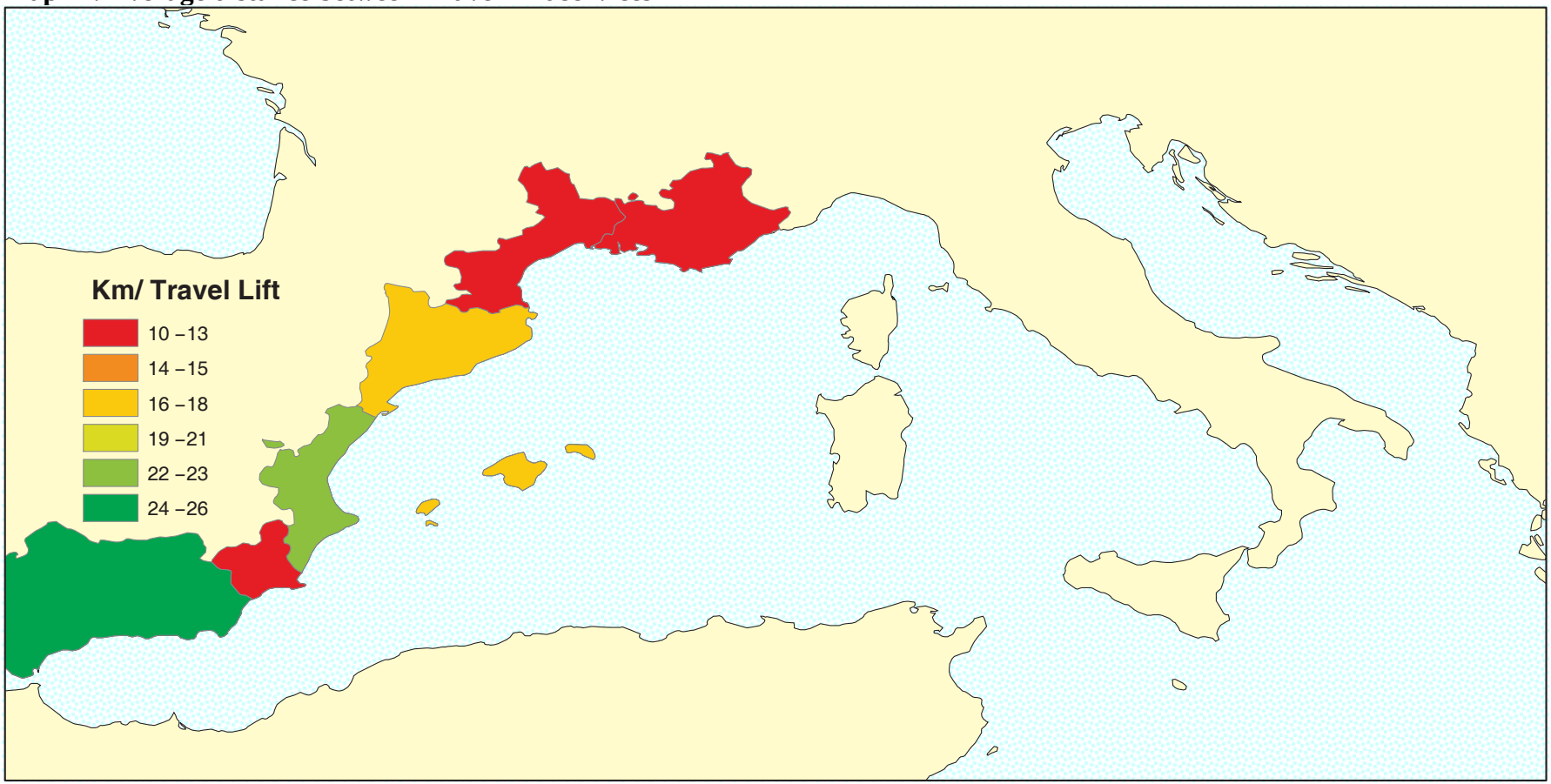
Map 9. Average distance between Waiting Pier service



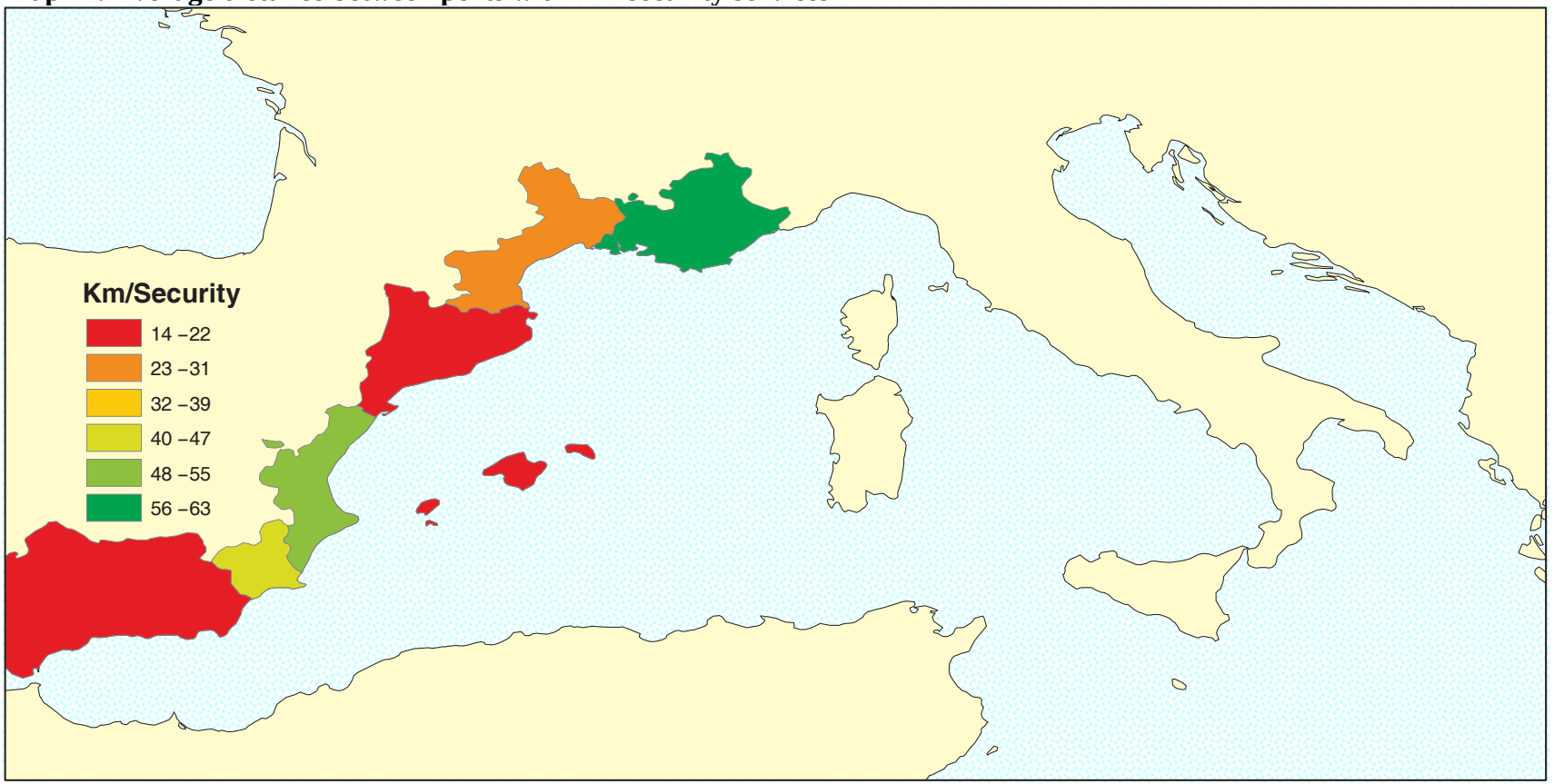
Map 10. Average distance between Crane services



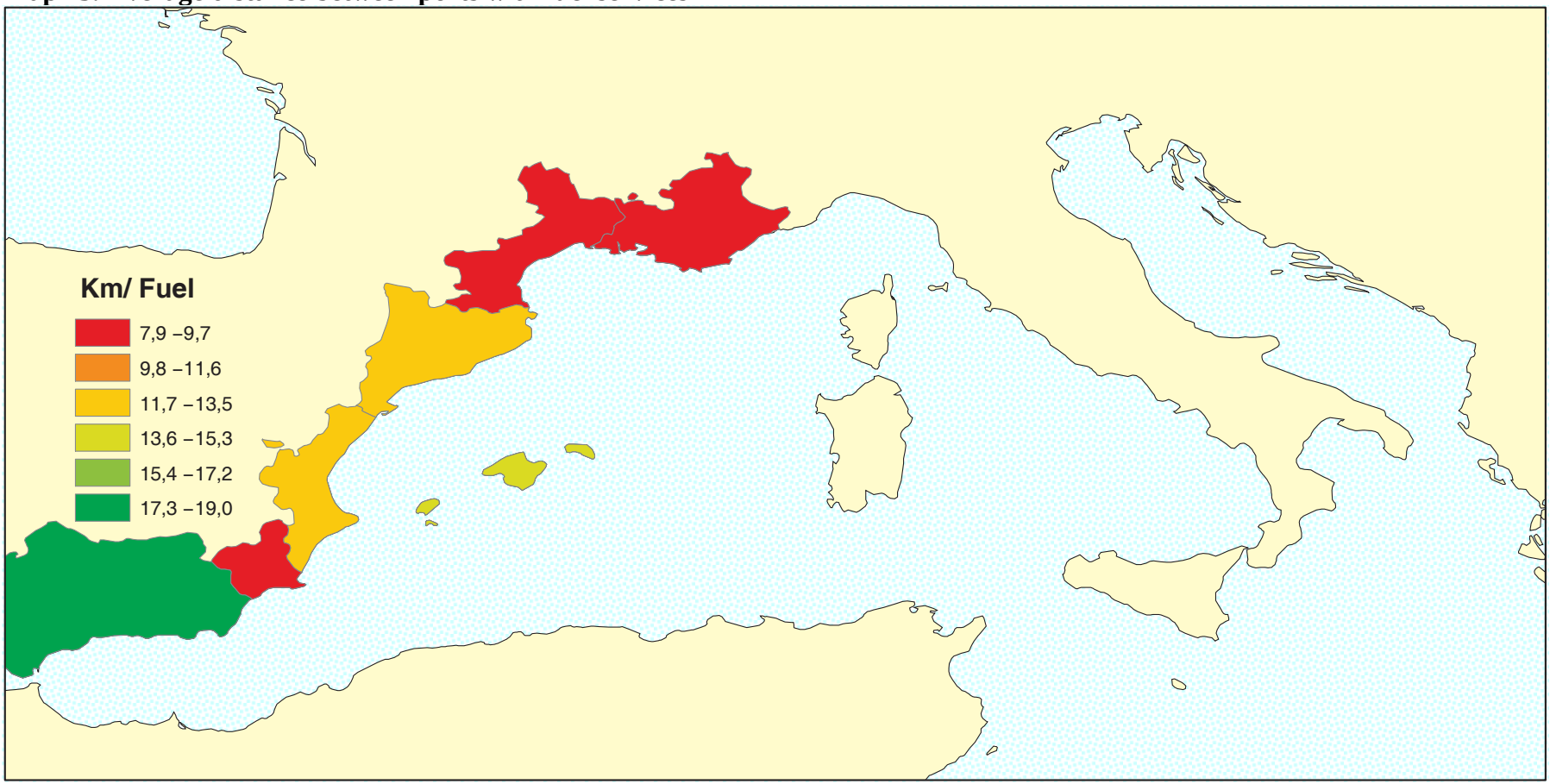
Map 11. Average distance between Travel Lift services



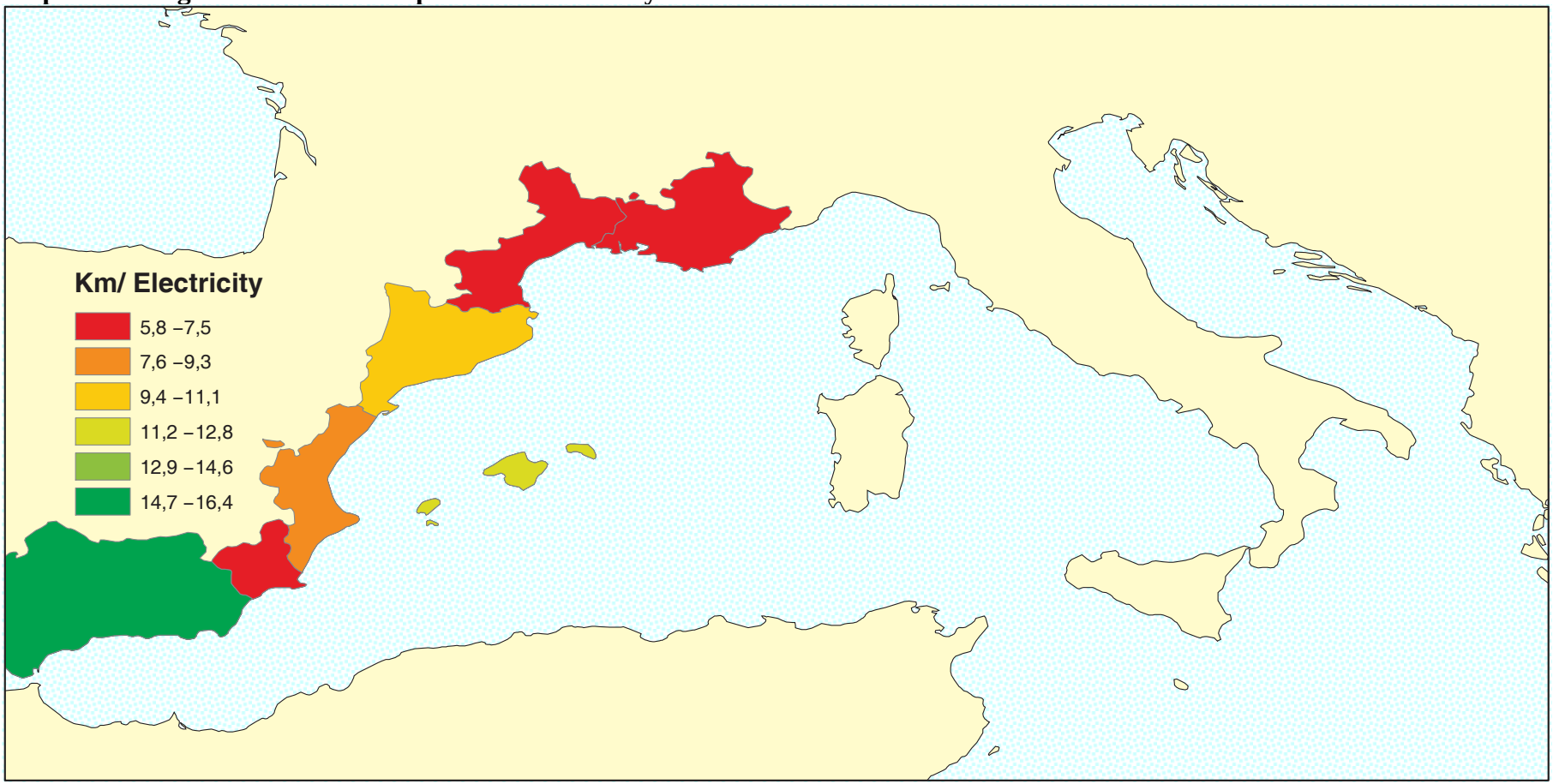
Map 12. Average distance between ports with 24h security services



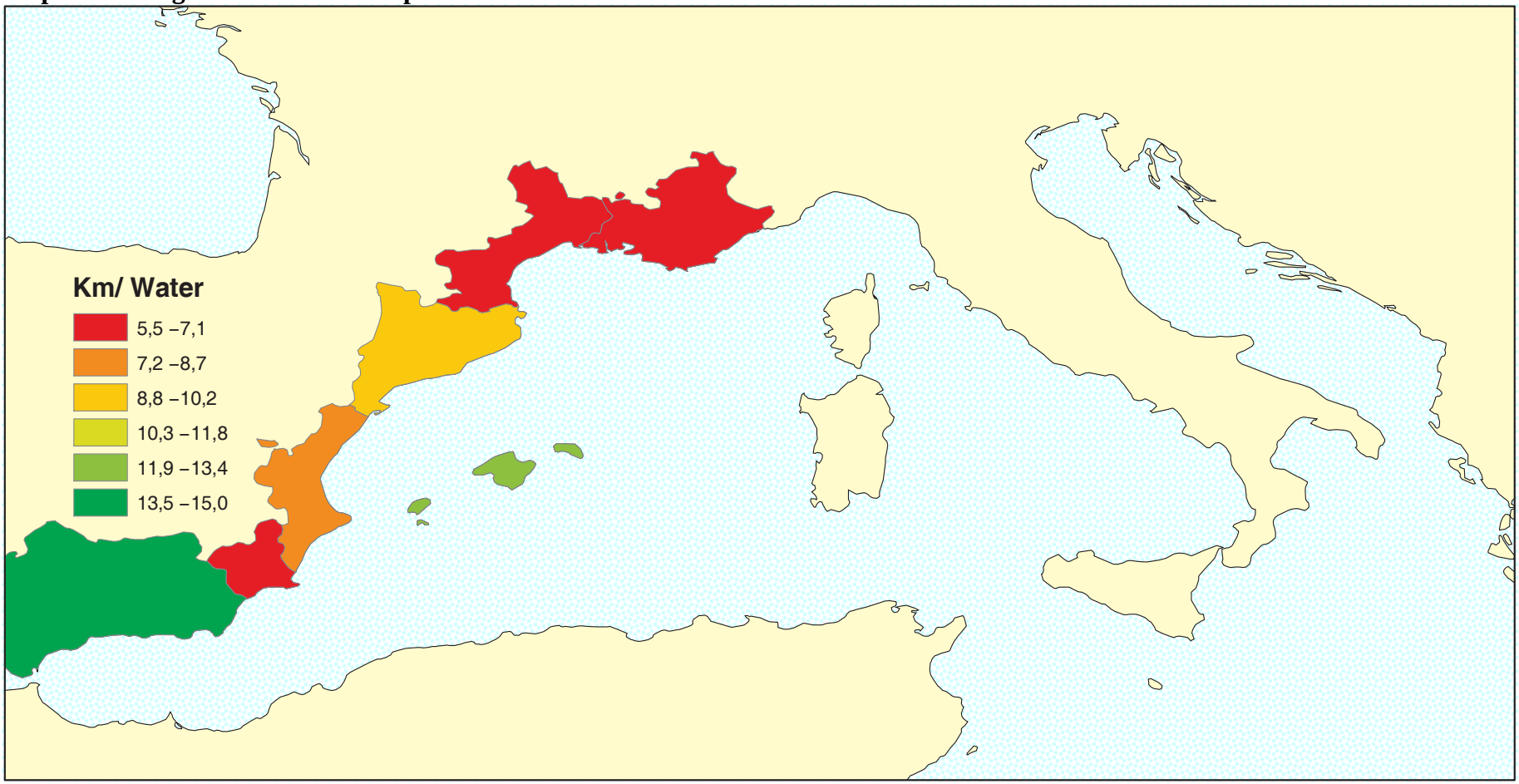
Map 13. Average distance between ports with fuel services



Map 14. Average distance between ports with electricity services



Map 15. Average distance between ports with water services



Recreational Fishing Activities and Expenses

Recreational fishing activity from boat as any other fishing activity can be studied from different perspectives that may be summarized in: social, economical and extractive components. Traditionally it has been considered a leisure activity and even only as a sportive practice and the only economic relevant activity was considered the professional fisheries. This bias perception explains the lack of interest and effort invests in direct studies on recreational fishing. Consequently, at present there is lack of information which prevents to know the economical and environmental impact of the recreational fishing. It is time to consider that the sportive part of recreational fishing and the global recreational fishing from the economic point of view as a harvesting activity and its potential interactions with the professional fishery and also its economical impact in the society.

Our start point of view is to consider all expenses of the recreational fishermen as contribution of this activity to the development of the national economy. In the practice any component of these expenses contributes to growth the Gross National Product (GNP). From this perspective we can produce some indicators that this is changing and some local, state, and international administration begins to consider this activity as a harvesting activity.

The scope of this project is to give a first approach on recreational fishing impact and to show to the administrations the difficulties, at present, on its monitoring and management. Furthermore this study pursuit to provide advice on included control measures to correct the present deficiencies jointly with the associated legislative actions. The international differences detected between countries in recreational fishing legislations (SFITUM: Recreational Fishing: Definitions, modalities and legislation. (Vol. I)), as well as those observed in fishing activities under recreational fishing term, indicate that a European standardization on this fishing will have a very different impact in each country.

It will be desirable that any study on recreational fishing could work with the same variables and units used in the professional fishing. These are few and simple but impossible to get at present: types of fleets (fishing gears or modalities), fleets size (number of vessels), fleets fishing power (vessels length or engine horse power), crew size, fishing effort (fishing days), target species. The impossibility of getting this information is due to the legal framework regulating recreational fishing which does not impose declarations such as logbooks. However, certain administrative measures like the registration of recreational vessels or license applications could provide information on some of the above mentioned variables. Unfortunately the latter measures are only applied in Spain.

In this study we present a first approach on Recreational fishing impact. Results should be taken as an approximate and with cautious and some are merely qualitative. The methodology has been through fishermen sampling but the total number of fishermen and vessels remains unknown.

Specific questionnaires were designed to get the most relevant information on recreational fishing. The questionnaires covered the following fields:

- Fishing Port
- Gender
- Age
- Years of fishing experience
- Vessel Owner
- Vessel Length
- Engine Horse Power
- Nº of contests per year
- Average Nº of licenses per vessel
- Used vessel (own, friend, charter..)
- Nº of Fishing per year
- Type of fishing modality in percentage of activity
- Annual catch per species and fishing modality
- Costs of rental mooring
- Costs of fishing licenses
- Costs of electronic equipment
- Fuel costs
- Insurance costs
- Costs on Tackles and baits
- Seasonal or continuous activity
- Transport costs
- Lodging Costs
- Tournament Costs
- Fuel costs during tournaments.

We have tried different sampling approaches to distribute the questionnaires to the fishermen. The questionnaires were sent to clubs and associations, they were also enclosed in the most popular recreational fishing magazines and finally through direct poll during Nautical fairs. Unfortunately only the latter had a certain degree of success in Spain (350 questionnaires) while only 10 questionnaires were recovered from the 15000 published in the magazine. In France the degree of success was even lower (19) although they were only sent to tuna recreational fishermen. In Italy, also addressed to tuna recreational fishermen, the sampling effort was focused on two regions which represent the extremes on development level: Liguria and Sicilia. The number of questionaries in Italy was close to 100 and again thanks to a direct poll methodology.

The differences among countries in the type of sampled fishermen as well as the differences in the final sampled size prevent a general comparative analysis among them. Consequently the general study on recreational fishing is presented only for Spain while recreational fishing on tuna is analyzed for each country separately and differences between them are also analyzed.

Results

Results are presented by region, vessel size or country depending on the variable under analysis and on the amount of available data for each variable which oblige its grouping when data is few. It must be remarked not all questionnaires have been fully answered by interviewees, thus the number of observations in each variable does not correspond to the total number of questionnaires. Although the region under studied is limited to Mediterranean regions of France, Italy and Spain some questionnaires have been received from the Atlantic Spanish regions and they are also added in some results.

The results presented here are very likely biased towards the most active and sensitive recreational fishermen, the latter is obvious because these fishermen accepted to answer our questions and their high activity results from their answers. In Spain 45% declared their fishing as a continuous activity, in France and Italy although they are tuna fisherman and this activity is seasonal 33% and 28% respectively declare a continuous activity.

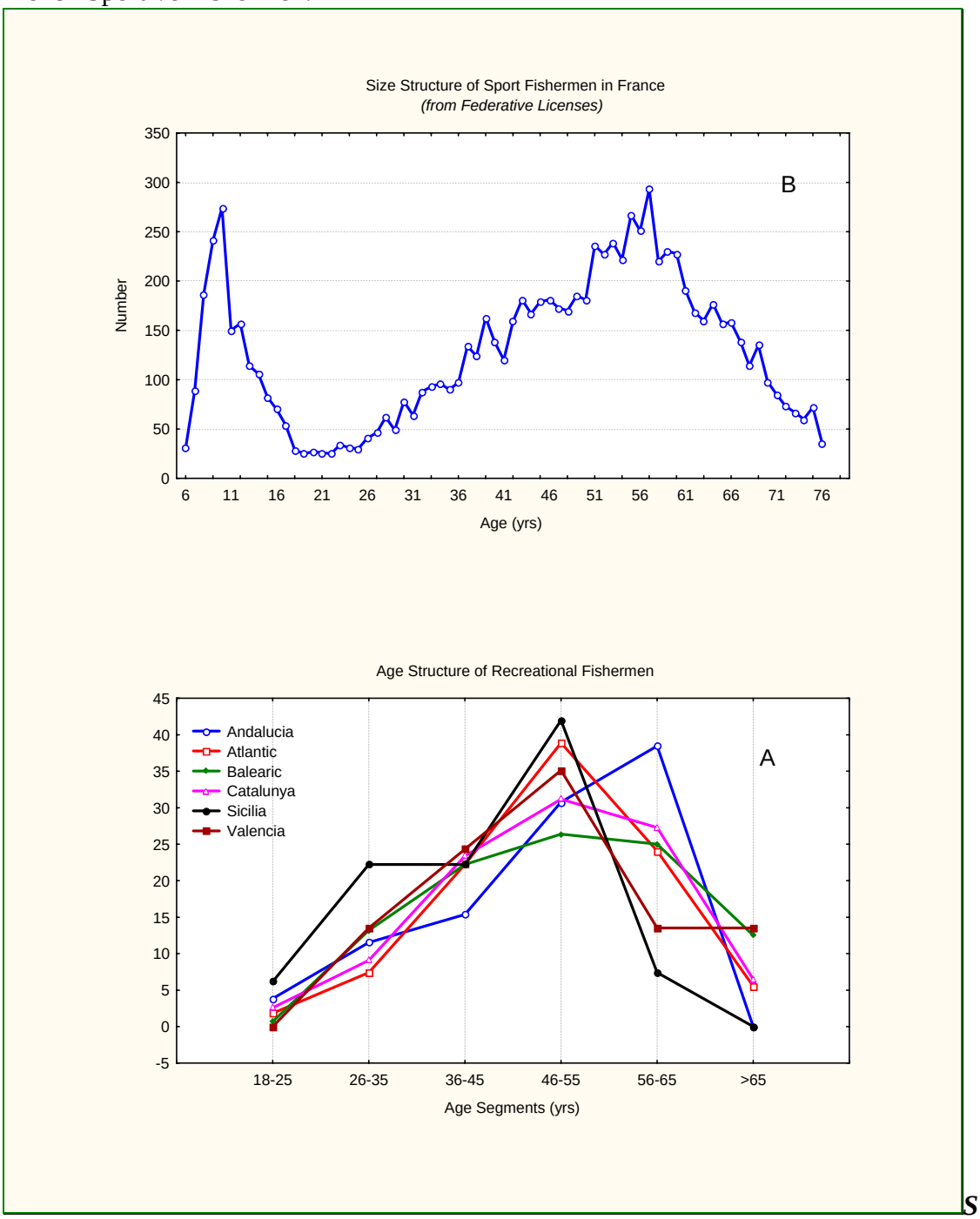
Age and Experience.

The recreational fisherman in our region is a man with an average age of 50 yrs. old most of them are comprised between 40 and 60 yrs. old. In figure 3.1A age frequency of fisherman is illustrated by region, French regions, Liguria and Murcia are excluded because the number of questionnaires are not enough to divide them by 6 age intervals. Although there are some differences among regions the only relevant to be mentioned are the older mean age in Andalucia and the younger in Sicilia.

The answers on years of fishing experience (Fig. 3.2) may contradict the results obtained in the age frequency curves. Most of fishermen declared more than 18 years of experience which means than at thirties years of age one should expect a peak in age frequency if the fishing activity is uninterrupted. This peak is not observed and an explanation may be that fishermen population is getting older and new generations are fewer and fewer every year. But the data provided by French Sportive Federations shows that the latter is not true (Fig 3.1B). The size structure of sport fishermen in France (from federative license) shows clearly that both age and experience curves are explained by the discontinuity of this activity along fisherman life. Recreational fishing activity begins at very young ages around 10 years old, fishing declines after 15 yrs. old and begins again in the thirties reaching the peak in the fifties. It means that fishing begins as a family activity and stops when young people become self-governing and begin their leisure activities with friends. The period elapsed until they begin again with fishing is long, too long to be explained only by youth and new experiences. The peak of fishermen found around 50 yrs old may be explained by the age at which the economic stability is reached in our society. Recreational fishing from boat requires minimum expenses above the average means of people at younger ages. The older ages found in Andalucia, although they are not very consistent due to the low number of questionnaires (27), indicates that fishing begins fully active at retirement ages. The opposite figure is found in Sicilia, this is a region less developed but strikingly recreational fisherman can afford to reinitiate fishing at younger ages. We presume that this is showing us a none real recreational activity, on the contrary an activity that is

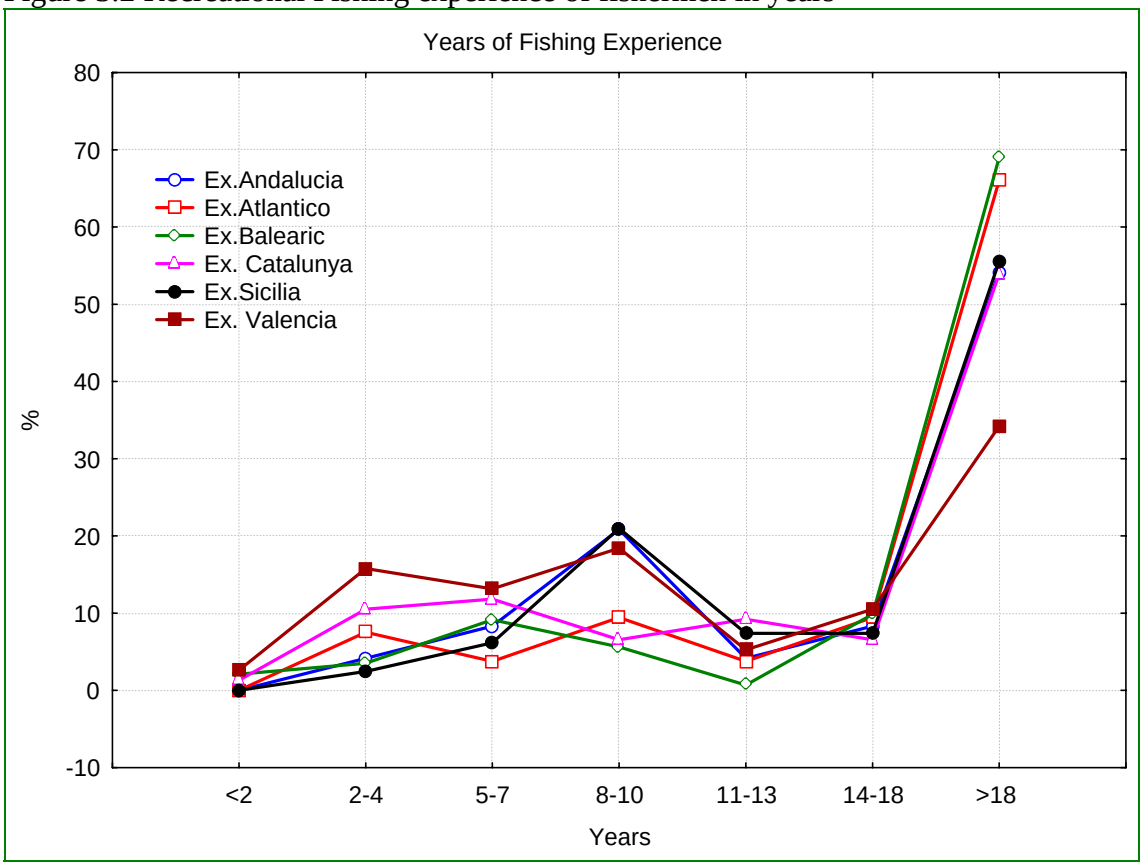
producing an economical benefit to these fishermen. Although in Italy as in the other countries the sale of the catch is prohibited for recreational fishermen, it is also truth that the sale of the catch is considered socially acceptable and in some regions as Sicilia may have a relevant impact in the local economy. It is remarkable that a variable like fisherman age may point this fact.

Figure 3.1. A) Age structure of Recreational Fishermen by Region. B) Age structure of French Sportive Fishermen.



Source : FFSPM

Figure 3.2 Recreational Fishing experience of fishermen in years



The Fleet

The size structure of the fleet in Spanish regions is closer to the structure of the whole recreational fleet although it may be biased towards bigger sizes because those questionnaires have been filled by visitors at nautical fairs. In figure 3.3 fleet size structure by region is given in percentage.

In Spain the smaller vessels are in Balearic Islands But keeping in mind that this is the best sampled region and that a nautical fair was sampled there facilitating the assistance of local visitors, it may be considered as the less bias sample and its size frequency may be close to the whole recreational fishing vessel size structure.

The Languedoc-Rousillon (L-R) and Sicilia samples came from tuna recreational fleet but they represent two very different fleets. In Sicilia the fleet is formed by very small vessels, in fact extremely small for tuna while in L-R the vessel size is the one expected

for this type of fishing. Once again Sicilia data is pointing towards a non recreational tuna fishing activity, with vessels of low autonomy and capacity with catchability limited to inshore and small tuna.

Figure 3.3. Size Structure of Recreational Fleet by Region

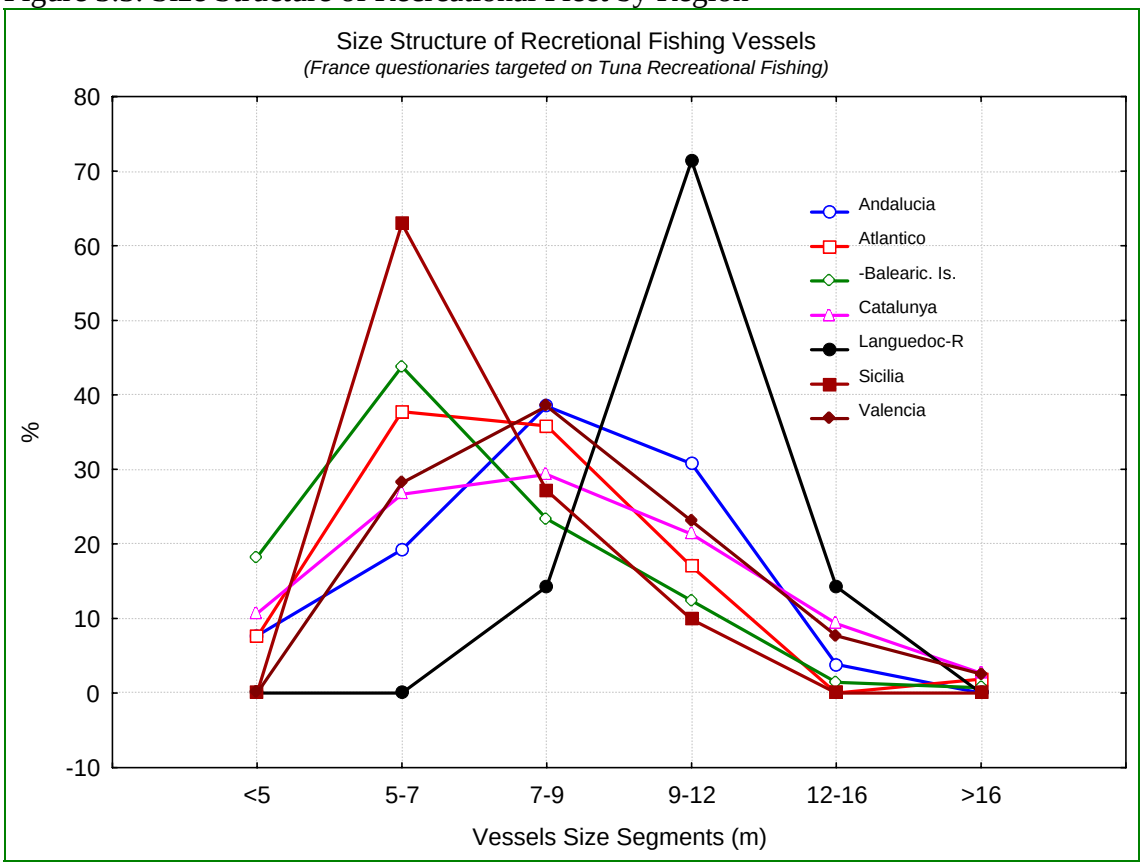
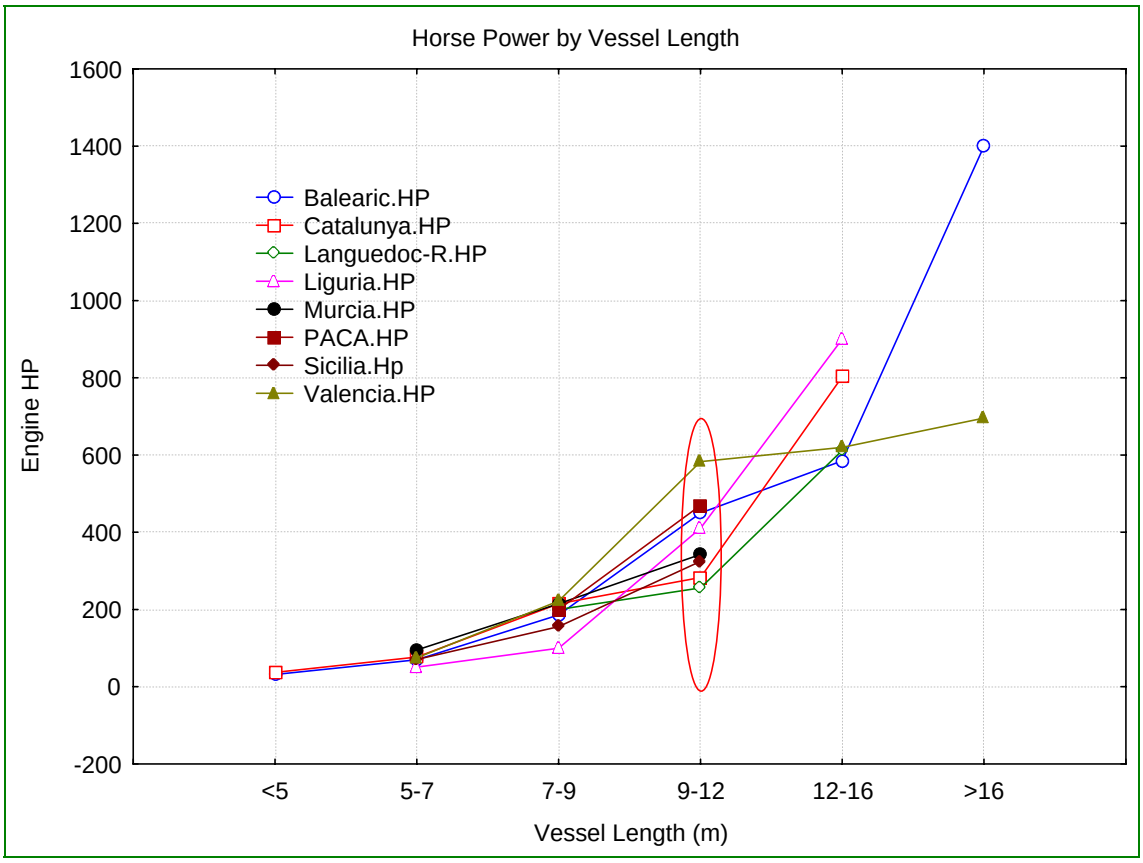


Figure 3.4. Engine Horse Power vs. Vessel length



The fishing power could be best represented by the engine horse power (HP), the relation ship between HP and vessel length (Fig 3.4) shows big differences among regions in vessels between >9-12 m. This high variability may not be due to region differences but to a selected size interval too large. It is likely that the differences in HP take place above and under 11 m size, in future studies we recommend to divide this interval in two, meanwhile we prefer to be cautious and to avoid any discussions in the regional differences found in HP.

The average crew per vessel can only be estimated from Spanish data because this in the only country in which all recreational fishermen are obliged by law to have a recreational fishing license, be they skippers or crew members. Consequently, the field of number of fishing licence per vessel permits the estimation of the crew size per vessel. This variable has been analyzed per vessel length interval, this is based on the assumption that the bigger the vessel bigger the crew. This relationship is shown in the table 3.1, the total average of our sample indicates that recreational fishing activity is a social activity which on average is shared by 2,6 fishermen per vessel.

Table 3.1

Vessel length	Average nº of licenses
>5	2,24
>5-7	2,43
>7-9	2,64
>9-12	3
>12-16	3,3
>16	3,5

The percentage of questionnaires reporting number of licenses per vessel (Table 3.2) is close to 100% in Spain. In France the reported license number represents federative sportive license and on average 58% of fishermen reported its tenure and the percentage on contest participation is also higher (>80%) so it is indicative that licenses have been underreported in French questionnaires. In Italy license have not been reported in any questionnaire and although the recreational one does not exist in this country it is quite striking that federative license have not been reported either. This result could be expected in Sicilia where the sportive activity is almost inexistent (2,4%) but in Liguria where 47% of the fishermen have declared their participation in contest they neither declared having the sportive license.

Participation to Sportive events is lower in Balearic Islands followed by Murcia and Andalucia and the Spanish Atlantic region. Intermediate values are in Liguria, Valencia and Catalunya and Maximum for French regions (Table 3.3). The average licenses per vessel are higher in French regions because the sampling has been done over tuna recreational segment where vessels are of longer length.

The term Sportive has been wrongly used to define or express recreational activity. The sportive activity represents a small fraction of the recreational activity. The available data will permit to estimate approximately the dimension of this fraction in Spain. The French sample is too small and biased towards sport fishermen. In Italy the regional differences are too big and any estimation would have a great degree of uncertainty. In Spain, on average, 34% of fishermen declared to participate in some competition, moreover the average annual number of competitions they join is 3,2. In Spain competitions last one day in most cases but also two days in some cases, taking an average duration of 1,3 days the number of fishing days in competition is 4,20 days and only for 34% of the fishermen population. The sampled fishermen declared on average 50,8 fishing days per year so in Spain fishing days on competition is around 2.7% of the recreational fishing activity. It is clear that sample is biased towards the most active fishermen and very likely the sportive activity is also positive bias so the estimation on the sportive fraction should buffered both bias and consequently close to the real value. This result demonstrate the wrong perception that society and administrations have on recreational fishing, the sportive activity would represent less than 3% of the recreational fishing but it is still being use as illustrative of the recreational.

Table 3.2 Number of Samples and % of answers

%Answers								
Region	**nºQuest.**	**Licences %**	**L.Request. %**	**Contest %**	**Own Boat%**	**Friends-Boat%**	**C-R-PT %**	**F.days %**
Andalucia	27,00	92,59	44,44	33,33	74,07	40,74	18,52	88,89
Atlantico	57,00	94,74	45,61	31,58	77,19	28,07	0,00	78,95
Baleares	146,00	93,84	26,71	13,01	91,10	36,30	4,11	87,67
Catalunya	79,00	93,67	32,91	55,70	68,35	36,71	16,46	82,28
Languedoc-Roussillon	8,00	62,50	12,50	87,50	87,50	0,00	12,50	75,00
Liguria	17,00			47,06	82,35	29,41	5,88	100,00
Murcia	8,00	100,00	12,50	25,00	100,00	12,50	0,00	100,00

Provence-Alpes-Côte d'Azur	9,00	55,56	33,33	77,78	77,78	22,22	22,22	88,89
Sicilia	81,00			2,47	97,53	29,63	0,00	95,06
Valencia	39,00	92,31	28,21	48,72	89,74	43,59	7,69	87,18

Table 3.3 Average values

Region	**Licences**	**Contests**	**Own Boat**	**Fr-Boat**	**F.days**
Andalucia	2,72	3,56	89,25	25,45	54,50
Atlantico	2,89	2,33	92,27	33,13	51,53
Baleares	2,47	3,16	89,71	28,09	50,87
Catalunya	2,62	4,32	84,11	34,41	55,29
Languedoc-Roussillon	3,40	3,57	92,86		40,33
Liguria		4,13	89,64	89,00	57,00
Murcia	2,38	3,00	92,50	50,00	38,50
Provence-Alpes-Côte d'Azur	3,20	3,57	95,71	50,00	30,50
Sicilia		2,00	95,70	22,50	40,73
Valencia	2,61	3,05	87,71	26,18	52,88

Fishing modalities of the sampled fleet are given in percentage in table 3.4. The sum by countries of fishing modalities percentage does not match in the desirable 100%. This results from errors in some questionnaires where fishermen did not answer the 100% percent of their fishing activity by modalities.

The data on fishing modalities clearly show that the fishermen sampled in Italy and France were tuna fishermen. Although out of tuna season they also practice other types of fishing, but Italy and French sampling prevent any estimation or comparative analysis between recreational fishing modalities. In Spain the most popular modality is line fishing even when our sample may be also bias towards big game fishing, so line fishing is likely to be rather underestimated in the given results.

Table 3.4 Average percentage of fishing by fishing modalities

%Fishing Modalities	**Spain**	**France**	**Italy**
Big Game Trolling	15,9	27,9	68,3
Big Game Shumming	2,0	39,2	0,3
Coastal Bottom Trolling	8,9	1,1	
Coastal Surface Trolling	21,8	9,4	14,3
Line Fishing hand	6,4	0,3	4,5
Line Fishing rod	34,6	6,9	0,1
Squid Fishing hand	5,2	0,8	
Squid Fishing Rod	2,5	2,8	
Nets			
traps			

Long-line		0,3	
Others	0,3		12,3

In Spain nets, traps and long-line are prohibited in recreational fishing which explain that nobody declared using these gears. Questionnaires ignored non common recreational fishing modalities which are represented by “Others”, but Italy results showed that the unspecified modalities are not so scarce.

Catch Species Composition.

Recreational fishing modalities differ mostly in their fishing areas and depths and consequently each modality will differ in species catch composition. The degree of difference between modalities in species composition will differ with the degree of fishermen selectivity (gear and fishing grounds) and in the species spatial overlap. The complete list of species consider in this section is included at the end of this chapter (in Annex I).

For each fishing modality and for each country we have estimated the contribution of each species to the total catch. The contribution (or percentage) has been estimated in weight and also in the frequency of appearance. It is necessary to remark that this frequency does not represent the number of specimens but the number of questionnaires where each species have been reported as catch of a specific fishing modality. Catch species composition by fishing modality and country is given in Annex I (Tables 3.5-3.7). Most of this information is also illustrated in pie charts but species which contribute less than 0.8% (limit for Big Game modalities) or less than 2% (limit for other modalities) to the total catch in weight have been not plotted.

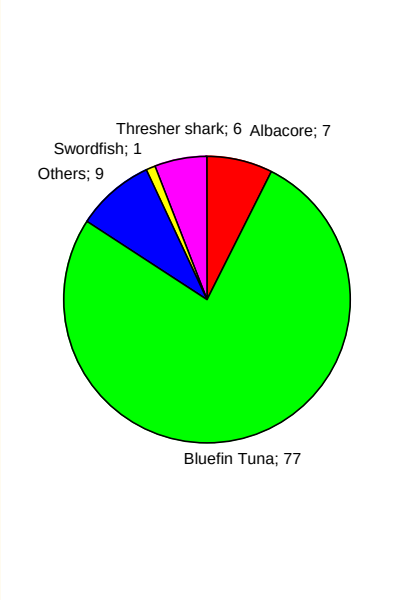
Catch composition of Big Game in Spain shows (Figure 3.5) differences in species richness between modalities. Shumming is more limited in species number and its harvesting impact is restricted to 4 species: Bluefin tuna, albacore, Swordfish and Thresher shark. Trolling impact is slightly more diverse: Bluefin tuna, albacore, Atlantic Bonito, Dolphinfish, Greater Amberjack, Marlins and Spearfish. These differences are hidden when the species contribution is given in weight because catch in kilograms has not been reported always and because differences in species size.

French species composition is not represented in pie charts due to the low number of questionnaires. Results presented in table 3.6 show that species richness in French Big Game catches is even lower than in Spain: 2 and 3 species in each modality. In Italy no data on shumming has been reported and Big game trolling impact only on 5 species. Bluefin tuna represent around 75% of Big Game catch in Spain and more than 80% in Italy and France. The lower diversity in French and Italian Big game catch could be due to a more selective fishermen behaviour, more focused on "noble" species.

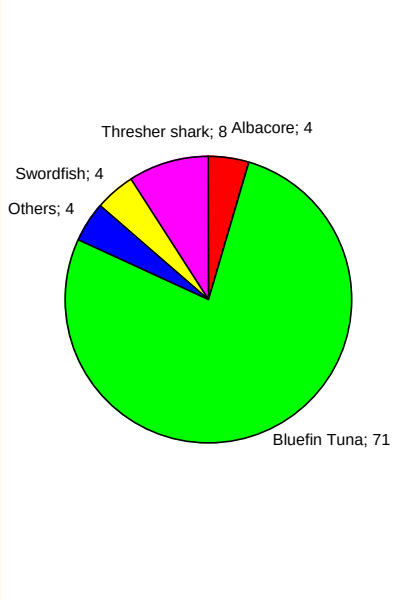
In Spain Costal trolling fishing impact on 10 species in the surface modality and on 8 species in the bottom modality. Sea bass and Greater amberjack are frequent in both modalities which indicate they occupied a wide depth range. While catch of surface modality is mostly formed by Greater Amberjack and Dolphinfish, bottom catches are clearly dominated by Toothed Bream and Greater Amberjack. In France coastal surface trolling although impact is over 8 species 49% of the total catch is Atlantic Bonito which is a clear signal of the high selectivity of French fishermen and sampling bias. The high selectivity over target species is even higher in Italy, 3 and 4 species for bottom and surface coastal trolling respectively. In Italy coastal surface trolling is mostly formed by Bluefin tuna (69%) while in Spain does not arrive to the 5% of this catch. The reverse is observed for the Dolphinfish which is the dominant catch in Spain for this modality while in Italy is only around the 3%. The most striking result is on bottom coastal trolling where the 62% of catch is represented by Dolphinfish in Italy and none in Spain, in fact Italian species on this modality are characteristic of surface modalities. The only explanation of Italian species composition of coastal bottom modality is that Italian fisherman consider bottom what it is not.

Figure 3.5

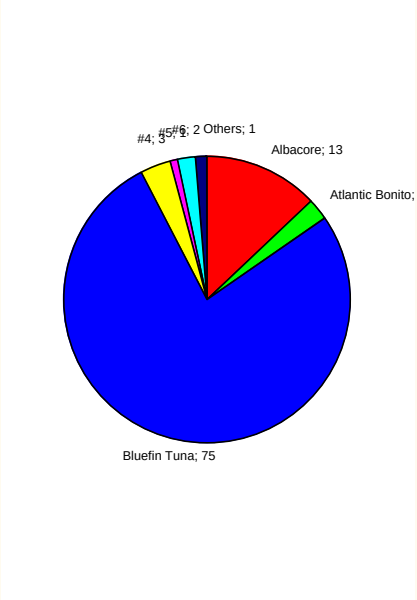
ercentage of Species catch weight in Spain Mediterranean
ıples (excluding species lower than 0,8% of total catch) in Big Game B.



Percentage of Species occurance in Spain Mediterranean
ıples (excluding species lower than 0,8% of total catch) in Big Game B.



ercentage of Species catch weight in Spain Mediterranean
ıples (excluding species lower than 0,8% of total catch) in Big Game T.



Percentage of Species occurance in Spain Mediterranean
ıples (excluding species lower than 0,8% of total catch) in Big Game T.

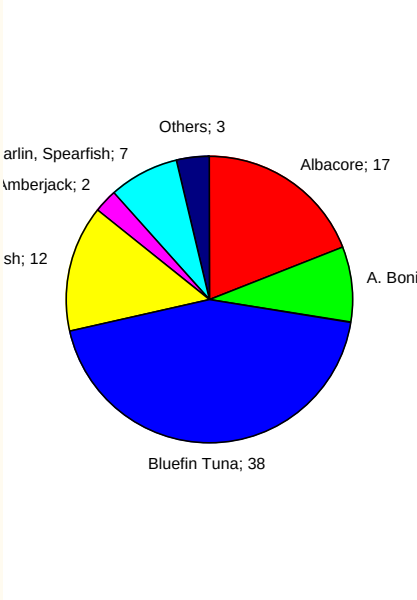
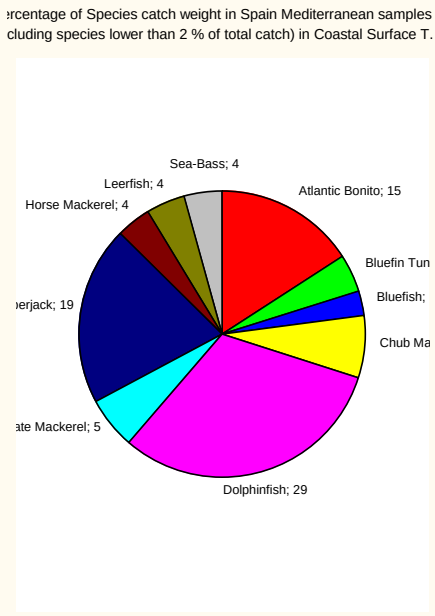
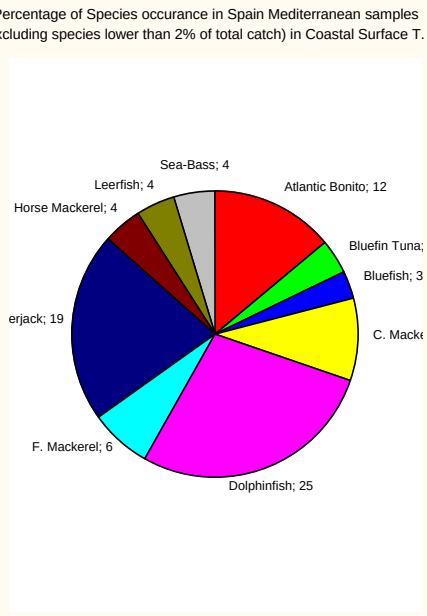
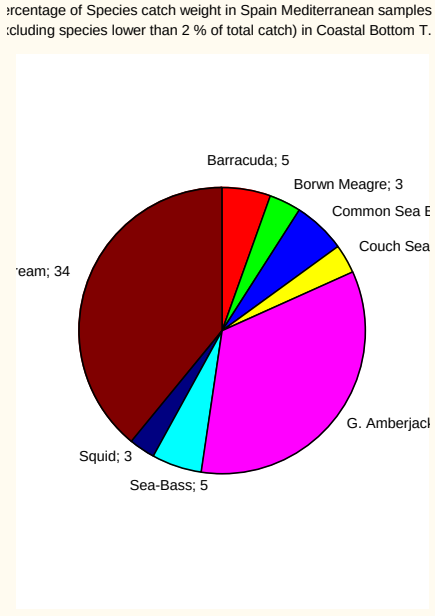


Figure 3.6


ercentage of Species catch weight in Spain Mediterranean samples
cluding species lower than 2 % of total catch) in Coastal Surface T.
Sea-Bass; 4
Leerfish; 4
Atlantic Bonito; 15
Horse Mackerel; 4
Bluefin Tun
Bluefish;
erjack; 19
Chub Ma
ate Mackerel; 5
Dolphinfish; 29


ercentage of Species occurance in Spain Mediterranean samples
cluding species lower than 2% of total catch) in Coastal Surface T.
Sea-Bass; 4
Leerfish; 4
Atlantic Bonito; 12
Horse Mackerel; 4
Bluefin Tuna;
Bluefish; 3
erjack; 19
C. Macke
F. Mackerel; 6
Dolphinfish; 25


ercentage of Species catch weight in Spain Mediterranean samples
cluding species lower than 2 % of total catch) in Coastal Bottom T.
Barracuda; 5
Borwn Meagre; 3
Common Sea E
Couch Sea
eam; 34
G. Amberjacl
Squid; 3
Sea-Bass; 5

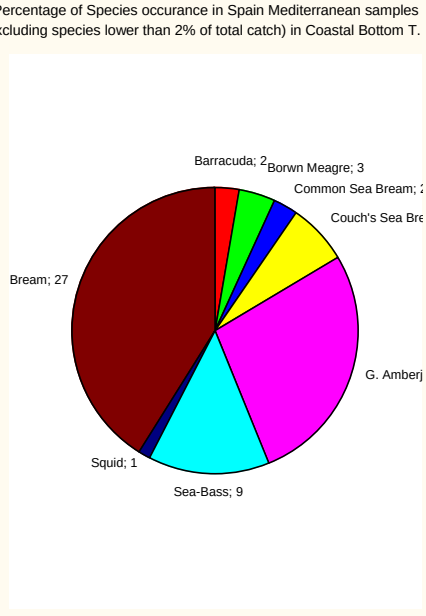
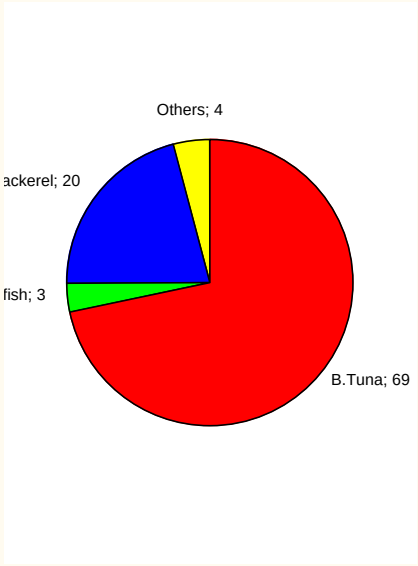
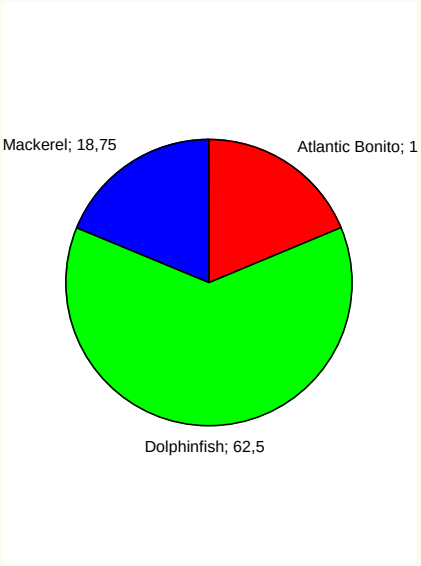

ercentage of Species occurance in Spain Mediterranean samples
cluding species lower than 2% of total catch) in Coastal Bottom T.
Barracuda; 2
Borwn Meagre; 3
Common Sea Bream; 2
Couch's Sea Bre
Bream; 27
G. Amberj
Squid; 1
Sea-Bass; 9

Figure 3.7

Percentage of Species catch weight in Italy samples
excluding species < 2% of total catch) in Coastal Surface T.



Percentage of Species catch weight in Italy samples
excluding species < 2% of total catch) in Coastal Bottom T.



Percentage of Species catch weight in Italy samples
(excluding species <0,8% of total catch) in Big Game T.

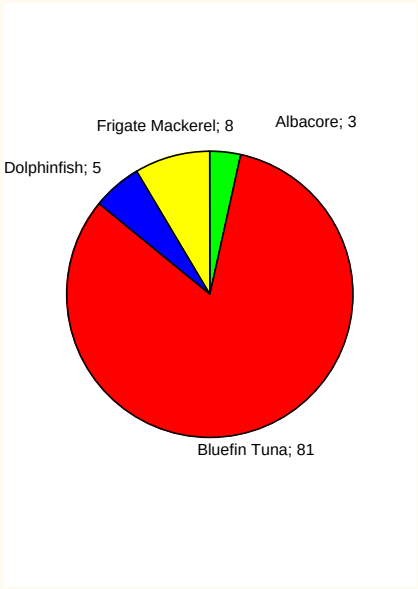
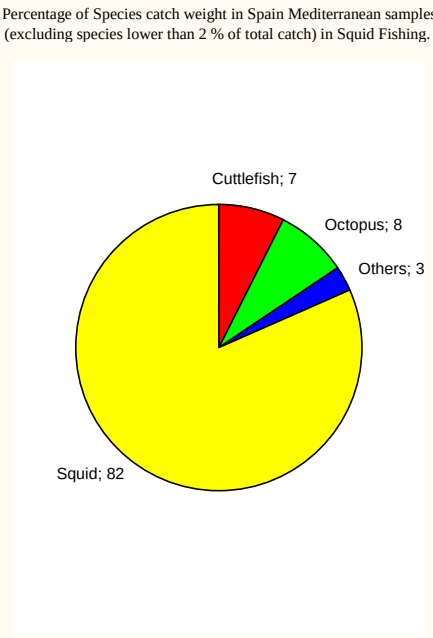
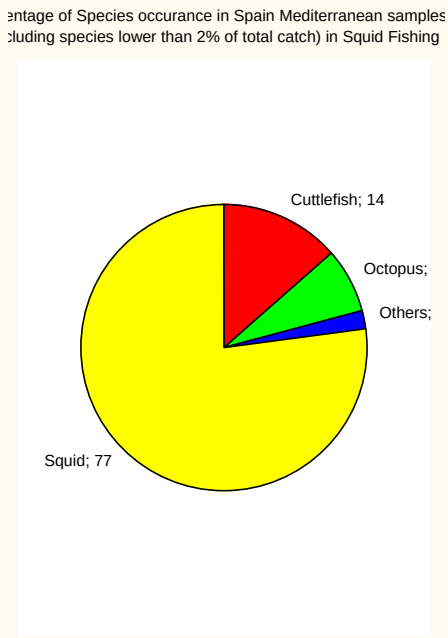
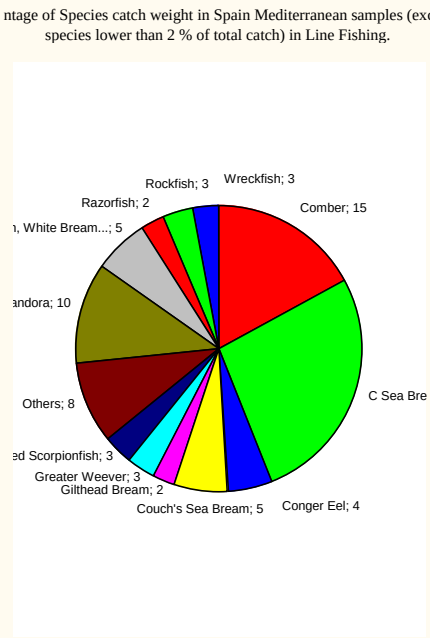


Figure 3.8







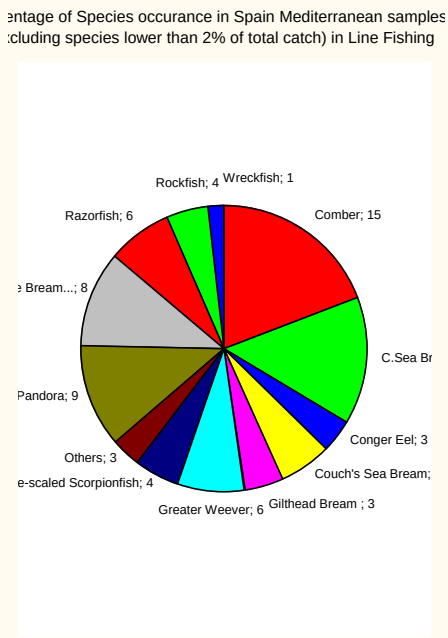
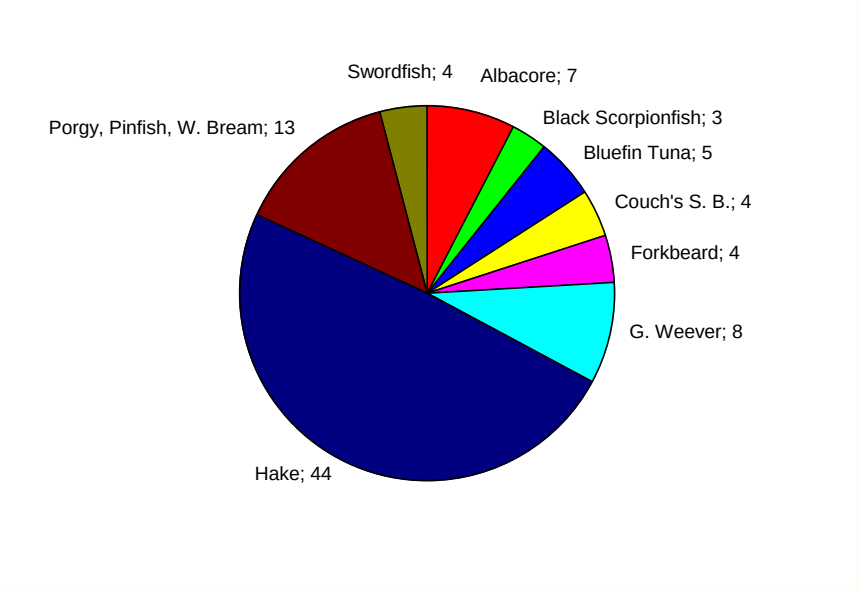
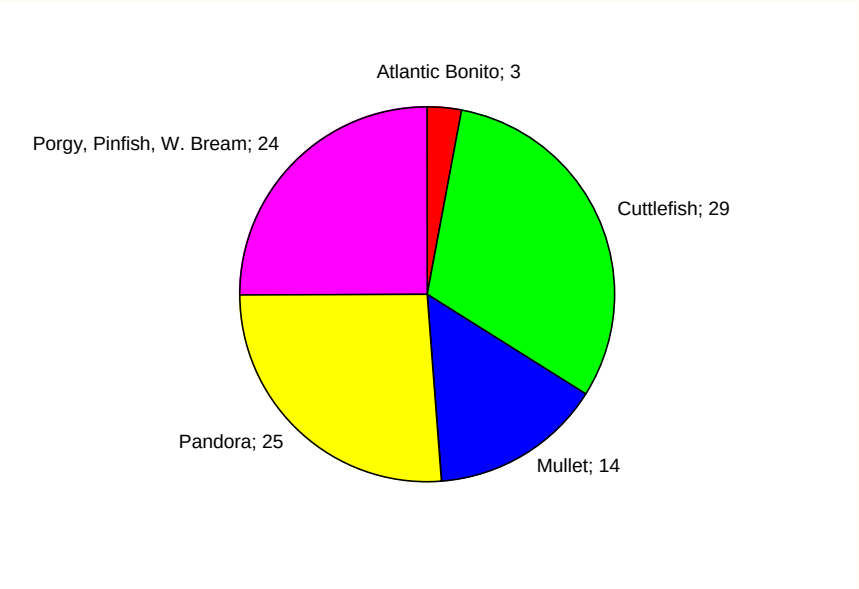


Figure 3.9

Percentage of Species catch weight in Italy samples
(excluding species < 2% of total catch) with unespecified gears



Percentage of Species catch weight in Italy samples
(excluding species < 2% of total catch) in Line Fishing.



Recreational Line fishing modality harvest over 13 species in Spain (Figure 3.8) in France species number is reduced to 10. In Italy is restricted to 5 species (Fig 3.9) all of

high commercial value and with high presence of Atlantic Bonito. This result may be indicative that recreational Italian fishermen are only reporting the most commercial species because they discard the non profitable ones which is indicative of a hidden commercial activity. The species composition of unspecified gears in Italy is formed by bottom, midwater and bottom species which indicates that very different modalities have been reported under "others".

Squid represent most of squid fishing modality in Spain (Fig 3.8) and France. In Italy (Fig. 3.9) this fishing has not been reported, squid is likely to be mixed with the Cuttlefish catch in line fishing modality.

Catch per Unit of Effort- Fleet Size and Total Recreational Catch

It is of major interest to begin to analyse recreational fleet with the same procedures used for the professional fleet and to provide similar output variables. The first problem is that we do not know the total fishing effort and neither the total catch but indirectly a rough approach can be estimated. Spanish sampling represents better the whole recreational fleet with different modalities, species and fishing grounds, thus the approach to a recreational CPUE is going to be estimated with Spanish data.

The average daily catch of Spanish Recreationalvessel has been estimated from the rate between their total catch between their total fishing days. The resulting kilograms per day is 4,99, any further extrapolation on this figure is going to be positive biased (higher total catch) because the sampled fishermen being more active that the population mean is also expected they have got fishing skills above the mean. The annual average catch of a standard vessel results from the product between the daily CPUE and the number of fishing days per year. The average annual fishing days of our sample is around 50, this figure is rather large to represent the mean activity of the whole fleet population. In order to prevent more positive bias we consider that 35 days per year is closer to the mean of the population. After applying 35 days of fishing effort the total annual catch of a standard vessel would be 165 kg.

The final scope will be to give an approximately figure of the Spanish recreational fleet. The size of recreational fleet is unknown, as far as we know no census of it has ever been done, consequently an indirect estimation must be used again. This is only possible to be estimated in Spain because is the only country where recreational fishing license is obliged but the number of recreational fishing licence at present does not represent number of vessels neither the number of fishermen practising the activity from boat. In some region this license is common for fresh and marine fishing together lasting from 2 to 5 years, in others marine fishing license are separated but from shore and boat together and in some regions are valid for two years and in others for 5 years. In order to estimate the number of fishermen which fish only from boat we have to apply different approaches depending on the region. The final figure on recreational fishing license from boat is around 93.168 in the Spanish Mediterranean regions and because the Spanish results give an average of 2,6 licenses per vessel, a roughly figure of 35.834 recreational fishing vessel has been estimated. This result is underestimating the true size of recreational fleet because the crew size from our sample is overestimating the

average crew size of the whole recreational fleet. A more reasonable figure of the average crew size would be around 2 fishermen per vessel which would give a fleet size around 46584 vessels. For further estimations an intermediate value of 40.000 vessels is going to be used as the size of the Spanish Mediterranean recreational fleet.

The total annual catch of the Spanish Mediterranean Recreational fleet will be close to 6.600 tons, this figure result from the estimated annual catch of a standard vessel and fleet size.

Costs of Recreational Fishing and Catch Value

In this chapter annual cost of recreational fishing activities have been analysed excluding the initial expenses on vessel or mooring buying. In each region the annual average costs has been estimated per vessel length interval (Table 3.8) and finally it has been averaged by country (3.9).A detailed description of average and deviation costs for each type of concept by region and vessel size is given in tables (3.10-3.17)

Table 3.8

Vessel Length	Spain Costs €	Nº vessels	Italy Costs	Nº vessels	France Costs	Nº vessels
<5	7445	39				
5-7	11169	119	3012	60	3500	2
7-9	11226	101	8760	24	7226	4
9-12	17899	62	13834	13	10070	7
12-16	37225	13			14100	1
>16	34777	5				

Recreational Fishing activity is more expensive in Spain than in the other two countries, for vessels equal or smaller than 7 meters the expenses are around 3 times higher in Spain. To identify the specific costs which make these differences, the average costs by variable were estimated for those vessels bigger than 7 m which are the sizes in common sampled for all countries. Table 3.8 indicates that mooring price is a key factor, although maintenance cost seems to be higher in France. However, the lack of declarations in this country of costs associated with renewal of electronic equipment is indicative that the costs of electronic equipment may have been included in maintenance. Costs associated with transport from residence to mooring localities indicates that in France ports are closer to bigger towns and associated costs are lower. Fuel consumption is significantly lower in France than in Spain or Italy this may be due to less fishing activity or shorter trips. The average annual fishing days of vessels > 7 m give us the following figures: 55, 41 and 59 days for Spain, France and Italy respectively. This clearly indicates the lower fishing activity in France. The lower fuel consumption in Italy (with more fishing days) and the higher costs associated to tackle and baits comparing with Spain points that Spanish trips are longer and less effective.

Table 3.9. RF costs of vessels > 7 m length by Country

	Mooring	Licenses	Insurance	Maintenance	Electronic	Tackles & Baits	Fuel	Transports	Total
Spain	3.284	25	847	2.165	1.313	1.759	4.571	773	**14.966**
France	1.449	64	946	3.682		1.746	2.296	400	**10.583**
Italy	1.264	0	532	1.270	368	2.080	4.365	638	**10.518**

But all this data can be taken with attention. The cost efficiency is not a necessary characteristic of the recreational fisheries. In fact the objective for the recreational fishermen it is not maximise the incomes but the pleasure of fishing. A Recreational Fishery costs mostly dependent on fuel consumption, bait use, etc can indicate the use of the recreational fishery as screen of the professional activity.

Graph pies on costs distribution (Figure 3.10-3.12) shows that in Italy 62% of expenses are directly related with fishing activity (Fuel, tackles and baits) while in Spain and France are around 42% and 38% respectively. The removal from the total costs of those costs associated with fishing activity gives the expenses of recreational fleet without going for fishing (fixed costs as opposed to variable costs which are associated with the level of fishing activity). In other words base line costs give the economical impact of recreational fishermen without impact on stocks. The above total expenses per country become: 8635 €, 6545 € and 4073 € per boat and per year for Spain, France and Italy respectively. This figure does not include the costs associated with purchase of the vessel itself.

Also the use of the vessel in a way more intensive (more economic) can indicate a certain economic use of the fishery in the Italian case. In this sense it is important to remember that in Italy the professional activity it is regulated (as in the other EU Mediterranean countries). But the Recreational Fishery is not submitted to licenses system and the vessels under 9,9 meters are not registered. Thus a certain risk of use the recreational level to develop professional fisheries at artisanal level is present: the use the activity to catch fish for sale. The absence of the local auction markets in many harbours can facilitate the direct sale to restaurants and small shops

The economic measures (as tax) can provide Safety Limits of Recreational Fisheries impact on the resources but the economic measures should move in between certain limits. From the bioeconomic point of view maintain some “non-fishing costs” or “fishing costs” not lower of certain limits can contribute to reduce incentives to fish and reduce (if is necessary) the pressure over the resource. Although, unnecessary extreme “non-fishing costs” may have a non desirable effects by reducing the RF and associated economy.

Figure 3.10

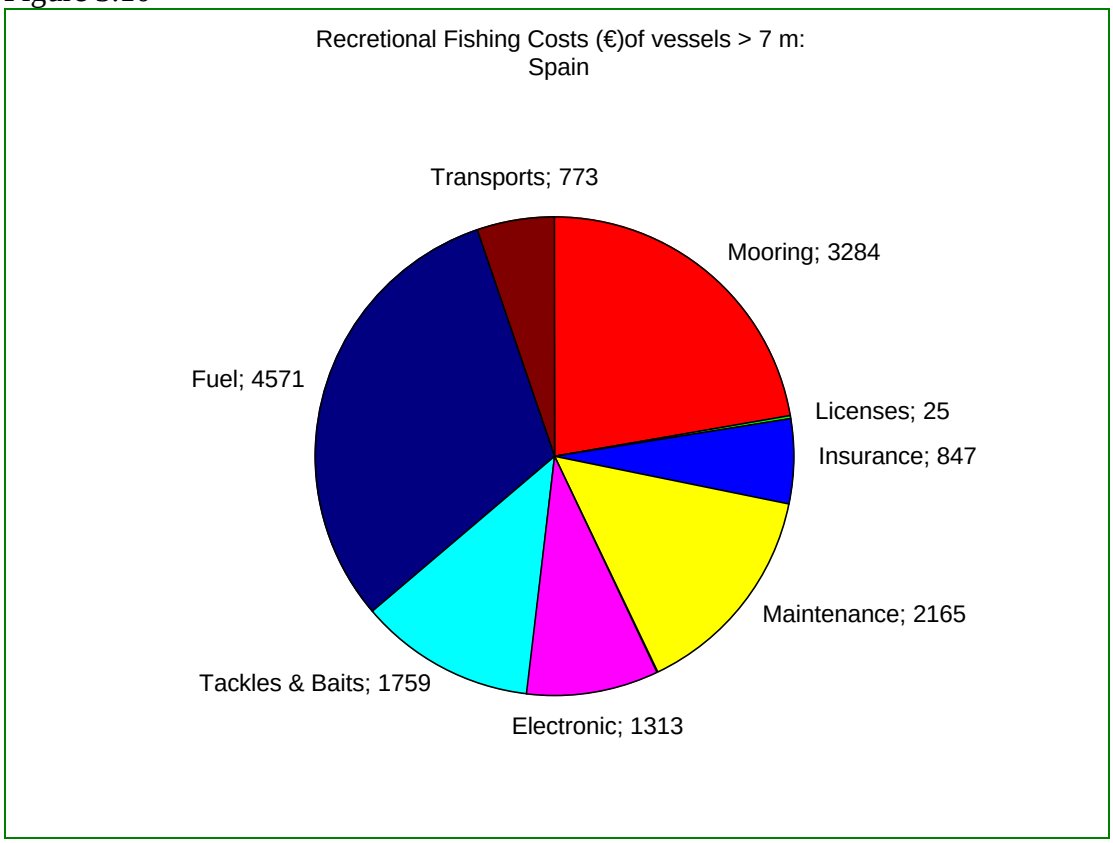


Figure 3.11

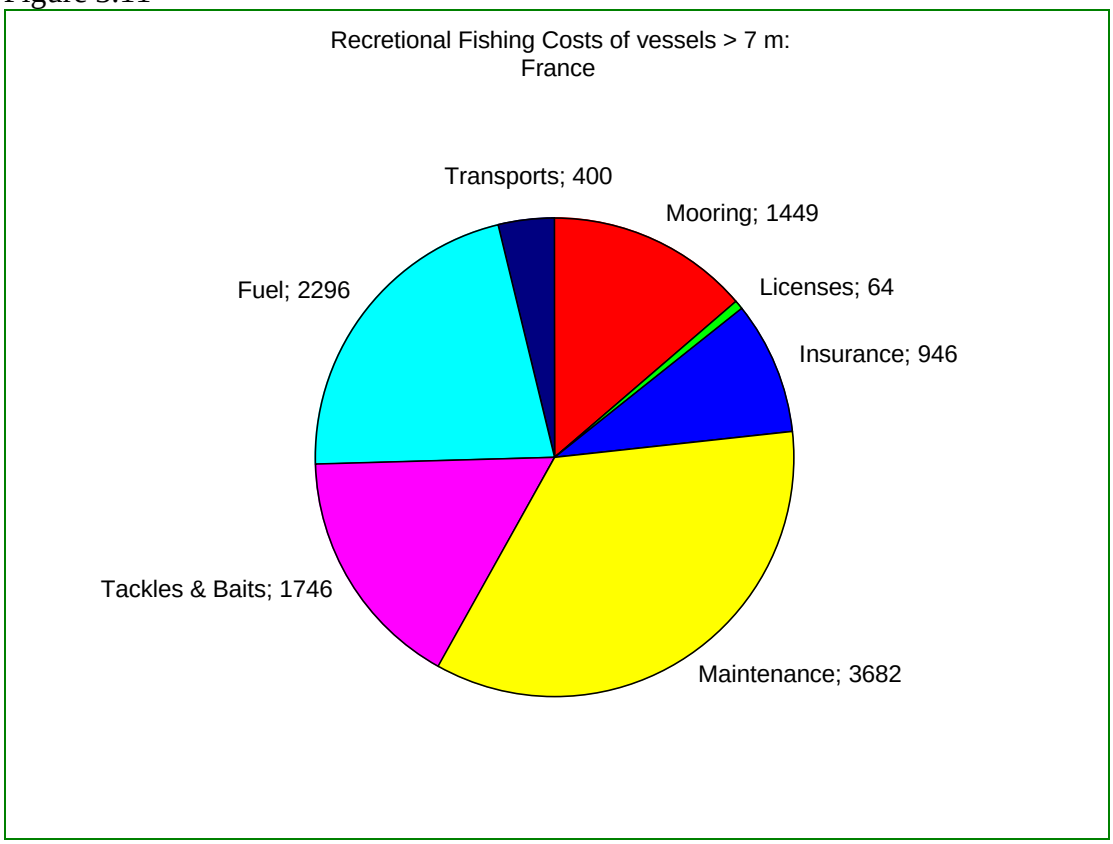
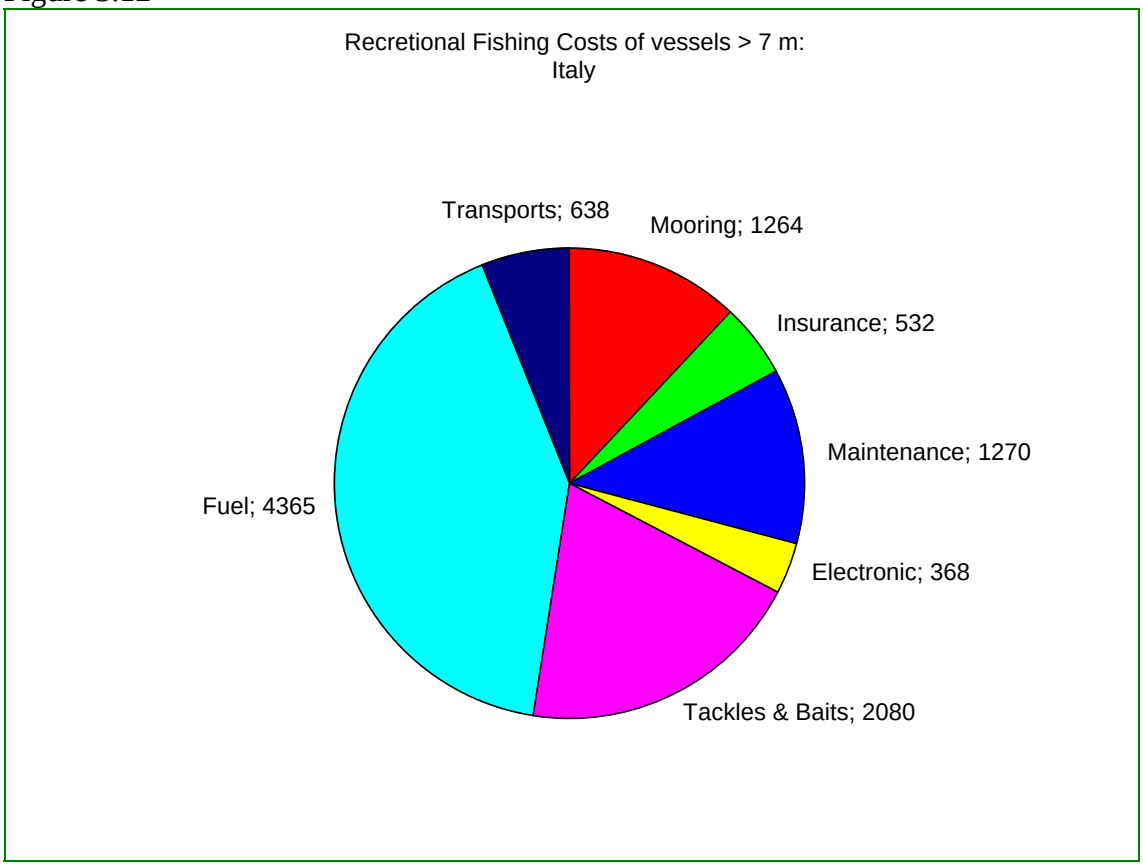


Figure 3.12



The Spanish fleet which represent closer the whole recreational fleet and not only those vessels targeting tuna gives that the annual expenses of the standard vessel is 13.336 €. The total expenses of the Mediterranean Spanish fleet would be around 534 millions of euros.

The term catch value we define as the vessels expenses per kilogram of fish harvested. The annual catch of the standard vessels is around 164 kg and the respective annual associated expenses is 13.336 € thus each kilogram of fish costs 81€. This figure is rather underestimated because in this study the cost of buying a vessel has not been considered. For instance in Spain the average price of a boat of 9 meters of length is around 150.000 € plus 30% of taxes sums up a total cost of 195.000 €. The use of a vessel may reach a period of 20 years after it the residual value at most would be around 20% of its original value. The 80% left is costs and its annual fraction would be 7.800 €. Consequently the annual total expenses of a recreational fishing vessel will be 21.136 € and the cost associated with each kilogram of fish harvested would be 129 €. The total annual expenses of the Spanish Mediterranean Recreational fleet would increase from 534 millions of euros to 845 millions of euros. The mean Spanish vessel size could be slightly smaller than 9m so total annual expenses should be around 800 millions of euros.

This figure it is very relevant to be compared with the professional total production in the Spanish Mediterranean (380 millions € in 2003). The professional fish is more economic (obviously the market price is lowest that the cost of recreational fish), the professional activity probably produce more economic impact in the local communities

(in activities as transport, market, logistics, processing, etc.), but the direct contribution to GNP of the Recreational Activities is most important in the Mediterranean that in the Professional Activity.

Fishing and Ports Activities.

The contribution of recreational fishing to ports services and maintenance can be estimated in Spain where we have got an approximate figure on the dimension of the recreational fleet. The number of moorings in the Spanish Mediterranean is 86.957 if the Spanish recreational fleet is at least around 40.000 vessels it may conclude that 46% of ports moorings are occupied by the recreational fleet.

The average mooring occupation goes from 74% in the low season to 87% during the high season. These estimation are not very reliable because the number of ports that have provided this information is low and because French figures were significantly higher. The average mooring occupation in French ports goes from 91% in low season to 98% during high season. This result jointly with the higher mooring prices in Spain indicates that Spanish ports are at least as saturated as French ones. Thus, in the Mediterranean regions Spanish moorings would be evenly occupied by the sailing and recreational fishing fleet.

The contribution of recreational fleet to ports services and activity is expected to be higher because this practice is less restricted by weather conditions than sailing. Moreover, services as fuel consumption depend mostly on the RF. The 80% of recreational Spanish fleet costs consumption is of gas oil and 20% of gasoline. From fuel costs by fuel type declared in the sampled questionnaires the averaged litres consumed per vessel have been estimated considering the price per litre and type of fuel in Spain at the beginning of August of 2003. The annual average litres of fuel consumed per each recreational vessel is 2815 litres. This consumption is much higher for the annual mooring consumption estimated from ports questionnaires which goes from a minimum of 303 l. in Murcia to a maximum of 1824 l. in Balearic Islands Al. The observed difference partially is expected because most of fuel consumption is done by the recreational fleet which only represents 46% of total moorings. This assessment is based on the following reasoning; if a recreational fishing vessel on average consumes 2815 litres per year and recreational fleet represents 46% of ports moorings the consumption per mooring will be 1537 litres (=2815*0,54%). The ports data set shows that the best sampled region were Andalucia and Catalunya and average mooring consumption estimated only over them gives 839 lt. per mooring which is far below the previous estimation.

The differences observed in mooring consumption between ports and fishermen data sets it may due to different factors:

1. The positive bias in the fishermen sample. The average fishing days of the sample was 50 annual fishing trips, it has already be commented that the number of average trips reliable to represent the whole fleet is closer to 35. On this basis we re-estimated the fuel consumption. First, the estimated fuel per fishing trip is 56,3 l (=2815/50) and second the estimated annual fuel is 1907 (=56,3*35). Third, the estimated mooring consumption is 1064 l (=1907*0,54%), this figure

is still slightly higher than the 839 l. estimated from ports data set which may be indicative that other factors are involved.

2. The number of moorings during the high season may underestimate the number of vessels in ports or closing bays. During summer many ports are fully occupied and even over their capacity keeping more vessels than moorings. This situation may lead that the proportion of recreational fishing vessel may increase. For instance let say that RF fleet increases a 10% from a 46% to 56%, then the estimated mooring consumption would be 867 l. per mooring. This latter figure is closer to the one estimated from ports data set, but we must expect it smaller because in its estimation we have consider that sailing and others vessels have no fuel consumption. Thus, may be fishing days is still too high. The same estimations redone for 30 fishing days result on a final mooring consumption of 743 l.

The benefit of working with two independent data sets to estimate the same variable is of quantitative and qualitative value. It shows the magnitude of bias in our estimation permitting the tuning of our previous estimation. It also shows circumstances that were previously overlooked like that part of the recreational fleet are kept inland part of the year.

Annex I

Table 3.5. Spanish catch composition in % of presence and weight by fishing modality. BGB:Big Game Shumming; BGT: Big Game Trolling; CTB: Coastal Bottom Trolling; CTS: Coastal Surface Trolling; LF: Line Fishing; SF: Squid Fishing. Acronyms ending in W represents percentage in weight.

	BGB	BGT	CTB	CTS	LF	SF	BGBW	BGTW	CTBW	CTSW	LFW	SFW
Albacore	4	17	0	0	0	0	7	13	0	0	0	0
Atlantic Bonito	0	7	0	12	0	0	0	2	0	15	0	0
Barracuda	0	0	2	4	0	0	0	0	5	2	0	0
Black Scorpionfish	0	0	0	0	0	0	0	0	0	0	0	0
Black Sea Bream	0	0	0	0	0	0	0	0	0	0	0	0
Black-tail	0	0	0	1	0	0	0	0	0	1	0	0
Blotched pickarel	0	0	0	0	1	0	0	0	0	0	0	0
Blue whiting	0	0	0	0	0	0	0	0	0	0	0	0
Bluefin Tuna	71	38	0	3	0	0	77	75	0	4	0	0
Bluefish	0	0	0	3	0	0	0	0	0	3	0	0
Borwn Meagre	0	0	3	0	1	0	0	0	3	0	1	0
Chub Mackerel	0	2	2	8	1	0	0	1	2	7	1	0
Comber	0	0	2	0	15	0	0	0	1	0	15	0
Common Sea Bream	0	0	2	0	11	0	0	0	5	0	24	0
Conger Eel	0	0	1	0	3	0	0	0	1	0	4	0
Couch's Sea Bream	0	0	5	0	5	0	0	0	3	1	5	0
Cuttlefish	0	0	0	0	0	14	0	0	0	0	0	7
Dolphinfish	0	12	3	25	0	0	0	3	0	29	0	0
Flying gurnard	0	0	0	0	0	0	0	0	0	0	0	0
Forkbeard	0	0	1	0	2	0	0	0	0	0	1	0
Frigate Mackerel	0	4	0	6	0	0	0	1	0	5	0	0
Garfish	0	0	0	1	0	0	0	0	0	1	0	0
Gilthead Bream	0	0	5	0	3	0	0	0	2	0	2	0
Greater Amberjack	0	2	18	19	0	0	0	1	30	19	0	0
Greater Weever	0	0	5	0	6	0	0	0	1	0	3	0
Grouper	0	0	1	0	0	0	0	0	0	0	0	0
Hake	0	0	0	0	2	0	0	0	0	0	2	0
Horse Mackerel	4	1	2	4	1	0	0	0	1	4	1	0
John Dory	0	0	0	0	0	0	0	0	0	0	0	0
Large-scaled Scorpionfish	0	0	1	0	4	0	0	0	0	0	3	0
Learned Rockfish	0	0	0	0	2	0	0	0	0	0	1	0
Leerfish	0	0	0	4	0	0	0	0	0	4	0	0
Marlin, Spearfish	4	7	0	0	0	0	0	2	0	0	0	0
Marmor Beam	0	0	0	0	0	0	0	0	0	0	0	0
Mullet	0	0	1	0	0	0	0	0	0	0	0	0
Octopus	0	0	0	0	0	7	0	0	0	0	0	8
Others	4	3	2	2	3	2	9	1	1	1	8	3
Pandora	0	0	3	0	9	0	0	0	1	0	10	0
Porgy, Pinfish, White Bream...	0	0	3	0	8	0	0	0	1	0	5	0
Pout, Capelan	0	0	0	0	1	0	0	0	0	0	0	0
Rainbow Wrasse	0	0	1	0	3	0	0	0	0	0	1	0
Razorfish	0	0	2	0	6	0	0	0	1	0	2	0
Rockfish	0	0	1	0	4	0	0	0	0	0	3	0
Sea-Bass	0	0	9	4	1	0	0	0	5	4	0	0

Shortfin mako	0	0	0	0	0	0	0	0	0	0	0	0
Spanish Bream	0	0	0	0	2	0	0	0	0	0	1	0
Squid	0	0	1	0	1	77	0	0	3	0	1	82
Swordfish	4	4	0	0	0	0	1	1	0	0	0	0
Cont. Table 3.5												
Thresher shark	8	0	0	0	0	0	6	0	0	0	0	0
Toothed Bream	0	0	27	1	2	0	0	0	34	1	1	0
Wrasse	0	0	0	0	0	0	0	0	0	0	0	0
Wreckfish	0	0	1	0	1	0	0	0	1	0	3	0

Table 3.6. French Catch composition in % of presence and weight by fishing modality.
Catch in weight of Line fishing modality was not declared in weight (LW)

	BGB	**BGT**	**CTB**	**CTS**	**L**	**LF**	**SF**	**BGBW**	**BGTW**	**CTBW**	**CTSW**	**LFW**	**SFW**
Albacore	9	18	0	0	0	0	0	0	3	0	0	0	0
Atlantic Bonito	0	0	0	29	0	0	0	0	0	0	49	0	0
Barracuda	0	0	0	6	0	0	0	0	0	0	5	0	0
Blue whiting	0	0	0	0	0	5	0	0	0	0	0	2	0
Bluefin Tuna	73	55	0	0	0	0	0	94	96	0	0	0	0
Chub Mackerel	0	0	0	6	0	23	0	0	0	0	5	71	0
Common Sea Bream	0	0	0	0	0	14	0	0	0	0	0	4	0
Conger Eel	0	0	0	0	0	5	0	0	0	0	0	0	0
Dolphinfish	0	18	0	12	0	0	0	0	2	0	19	0	0
Garfish	0	0	0	6	0	0	0	0	0	0	3	0	0
Gilthead Bream	0	0	0	6	50	14	0	0	0	0	4	4	0
Greater Amberjack	0	0	0	6	0	0	0	0	0	0	4	0	0
Hake	0	0	0	0	50	9	0	0	0	0	0	5	0
Horse Mackerel	0	0	0	6	0	0	0	0	0	0	3	0	0
Large-scaled Scorpionfish	0	0	0	0	0	9	0	0	0	0	0	3	0
Learned Rockfish	0	0	0	0	0	5	0	0	0	0	0	3	0
Leerfish	0	0	25	6	0	0	0	0	0	0	0	0	0
Longfin Pompano	18	9	25	6	0	0	0	6	0	0	0	0	0
Pandora	0	0	0	0	0	5	0	0	0	0	0	2	0
Sea-Bass	0	0	50	12	0	0	0	0	0	100	9	0	0
Spanish Bream	0	0	0	0	0	9	0	0	0	0	0	5	0
Squid	0	0	0	0	0	0	100	0	0	0	0	0	100
Wreckfish	0	0	0	0	0	5	0	0	0	0	0	0	0

Table 3.7. Italian Catch composition in % of presence and weight by fishing modality

	BGT	CTB	CTS	LF	O	BGTW	CTBW	CTSW	LFW	OW
Albacore	9	0	8	0	2	3	0	1	0	7
Atlantic Bonito	3	33	16	4	0	0	19	1	3	0
Black Scorpionfish	0	0	0	0	8	0	0	0	0	3
Bluefin Tuna	28	0	20	0	1	81	0	69	0	5
Bluefish	2	0	3	0	0	0	0	0	0	0
Chub Mackerel	1	0	0	0	1	0	0	0	0	1
Common Sea Bream	0	0	0	2	0	0	0	0	1	0
Conger Eel	0	0	0	2	5	0	0	0	1	1
Couch's Sea Bream	0	0	0	0	2	0	0	0	0	4
Cuttlefish	0	0	0	21	2	0	0	0	29	1
Dolphinfish	26	33	20	0	0	5	63	3	0	0
Forkbeard	0	0	0	0	2	0	0	0	0	4
Frigate Mackerel	21	0	29	0	1	8	0	20	0	1
Garfish	3	0	0	0	0	0	0	0	0	0
Gilthead Bream	0	0	0	4	2	0	0	0	2	1
Greater Amberjack	2	0	0	0	0	0	0	0	0	0
Greater Weever	0	0	0	0	13	0	0	0	0	8
Grouper	0	0	0	2	1	0	0	0	1	0
Hake	0	0	0	0	23	0	0	0	0	44
Horse Mackerel	1	33	3	0	1	0	19	1	0	1
Large-scaled Scorpionfish	1	0	0	0	5	0	0	0	0	2
Mullet	0	0	0	19	2	0	0	0	14	0
Others	0	0	1	0	0	0	0	4	0	0
Pandora	0	0	0	15	3	0	0	0	25	1
Porgy, Pinfish, White Bream...	0	0	0	30	19	0	0	0	24	13
Ray's Bream	0	0	0	0	2	0	0	0	0	1
Swordfish	1	0	0	0	2	0	0	0	0	4

Table 3.10 Average Horse power, Estándar Dev. And number of observation per Vessel length Interval

'PromedioDehp	<¨5			5-7			7-9			9-12			12-16			>16		
'DesvEstDehp	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std
Andalucia	2	38	18	5	-	-	9	167	110	8	420	212	0	-	-	-	-	-
Atlántico	4	-	-	19	102	60	18	212	85	8	574	181		-	-	1	150	-
Baleares	23	32	22	59	70	50	32	186	126	16	450	179	2	-	-	1	1400	-
Catalunya	8	37	25	20	77	45	22	215	116	15	283	126	7	803	390	2	750	14
Ceuta-Melilla	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Languedoc Roussillon	-	-	-	-	-	-	1	200		5	526	213	1	612	-	-	-	-
Liguria	-	-	-	9	51	41	2	100	113	5	411	224	1		-	-	-	-
Murcia	-	-	-	2	-	-	2	215	35	3	-	-	-	-	-	-	-	-
Provence-Alpes-Côte d'Azur	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-
Sicilia	-	-	-	51	71	39	22	156	58	8	325	46	-	-	-	-	-	-
UK	-	-	-	-	-	-	1	90	-	-	-	-	-	-	-	-	-	-
Valencia	-	-	-	10	75	27	13	222	78	7	583	741	3	620	468	1	-	-

Table 3.11 Average Annual expenses on mooring rent, Estándar Dev. And number of observation per Vessel length Interval

Mooring rent	<¨5			5-7			7-9			9-12			12-16			>16		
	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std
Andalucia	1	1000	-	3	-	-	7	1817	703	4	2375	826	0	-	-	-	-	-
Atlántico	0	-	-	14	3482	2604	8	3242	2748	2	1773	463	-	-	-	1	12000	-
Baleares	7	3418	1917	39	4933	2511	19	4151	3107	8	2249	1685	0	-	-	1	964	-
Catalunya	5	6144	2807	11	3581	3129	10	3008	2997	6	2241	1874	5	2007	2017	1	2520	-
Ceuta-Melilla	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Languedoc Roussillon	-	-	-	-	-	-	1	1300		5	1729	181	1	1600	-	-	-	-
Liguria	-	-	-	7	629	716	2	1825	1662	5	5160	2475	0	-	-	-	-	-
Murcia	-	-	-	0	-	-	1	7200	-	0	-	-	-	-	-	-	-	-
Provence-Alpes-Côte d'Azur	-	-	-	-	-	-	0	-	-	0	-	-	-	-	-	-	-	-
Sicilia	-	-	-	51	256	154	22	508	85	8	765	89	-	-	-	-	-	-
UK	-	-	-				1	1200					-	-	-	-	-	-
Valencia	-	-	-	5	2619	3392	8	5571	3249	5	2877	2478	1	5400	-	0	-	-

Table 3.12 Average Annual expenses on Insurance, Estándar Dev. And number of observation per Vessel length Interval

Insurance	<¨5			5-7			7-9			9-12			12-16			>16		
	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std
Andalucia	2	175	177	5	-	-	9	742	619	7	1629	685	0	-	-	-	-	-
Atlántico	4	-	-	19	398	390	16	707	541	6	1784	1272	-	-	-	1	6000	-
Baleares	17	119	98	52	831	2974	28	479	300	12	1458	929	2	-	-	0	-	-
Catalunya	6	103	70	20	248	182	18	690	484	11	570	361	6	2017	2046	2	1335	1506
Ceuta-Melilla	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Languedoc Roussillon	-	-	-	-	-	-	1	700	-	5	1135	575	1	1200	-	-	-	-
Liguria	-	-	-	8	138	168	1	90	-	5	860	654	0	-	-	-	-	-
Murcia	-	-	-	2	-	-	2	510	467	3	-	-	-	-	-	-	-	-
Provence-Alpes-Côte d'Azur	-	-	-	-	-	-	0	-	-	0	-	-	-	-	-	-	-	-
Sicilia	-	-	-	51	51	16	22	215	247	8	1255	192	-	-	-	-	-	-
UK	-	-	-	-	-	-	1	180	-	-	-	-	-	-	-	-	-	-
Valencia	-	-	-	10	246	197	12	636	547	8	1188	872	3	2500	500	1	-	-

Table 3.13. Average Annual expenses on Ship maintence, Estándar Dev. And number of observation per Vessel length Interval

Ship maintenance	<¨5			5-7			7-9			9-12			12-16			>16		
	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std
Andalucia	1	300	-	4	-	-	9	797	568	8	1470	788	1	-	-	-	-	-
Atlántico	3	-	-	13	617	529	15	1780	1923	6	4836	5258	-	-	-	1	30000	-
Baleares	21	340	401	51	785	774	29	1416	1141	12	3882	3466	0	-	-	1	18000	-
Catalunya	7	277	270	20	542	424	18	1219	1268	12	4119	4460	6	7417	8663	2	9000	4243
Languedoc Roussillon	-	-	-	-	-	-	1	4100		5	3937	3152	1	7900	-	-	-	-
Liguria	-	-	-	4	200	115	2	900	849	5	1500	1173	1	-	-	-	-	-
Murcia	-	-	-	2	-	-	2	425	247	2	-	-	-	-	-	-	-	-
Provence-Alpes-Côte d'Azur	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-
Sicilia	-	-	-	51	117	99	22	995	433	8	1975	406	-	-	-	-	-	-
UK	-	-	-	-	-	-	1	350	-	-	-	-	-	-	-	-	-	-
Valencia	-	-	-	10	309	244	11	2041	1682	7	2783	1599	3	7200	4327	1	-	-

Table 3.14. Average Annual expenses on Electronic equipment, Estándar Dev. And number of observation per Vessel length Interval

Electronic	<¨5			5-7			7-9			9-12			12-16			>16		
	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std
Andalucia	1	100	-	3	-	-	6	1275	1190	5	2220	2213	1	-	-	-	-	-
Atlántico	2	-	-	11	448	452	7	1468	772	4	1244	1004		-	-	1	7500	-
Baleares	4	148	107	29	270	345	24	991	1281	7	2714	2910	1	-	-	1	5000	-
Catalunya	2	33	47	10	182	185	11	601	751	5	1803	1539	3	3222	3146	2	325	247
Ceuta-Melilla	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Languedoc Roussillon	-	-	-	-	-	-	0	-	-	0	-	-	0	-	-	-	-	-
Liguria	-	-	-	8	321	364	2	292	295	5	867	519	1	-	-	-	-	-
Murcia	-	-	-	1	-	-	2	750	354	1	-	-	-	-	-	-	-	-
Provence-Alpes-Côte d'Azur	-	-	-	-	-	-	0	-	-	0	-	-	-	-	-	-	-	-
Sicilia	-	-	-	51	15	23	22	161	129	8	646	58		-	-	-	-	-
UK	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-
Valencia	-	-	-	8	1271	2585	7	1040	763	7	1247	852	3	4500	2784	1	-	-

Table 3.15. Average Annual expenses on Fuel, Estándar Dev. And number of observation per Vessel length Interval

Fuel	<¨5			5-7			7-9			9-12			12-16			>16		
	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std
Andalucia	2	90	0	2	-	-	9	1790	1283	8	4963	3204	0	-	-	-	-	-
Atlántico	3	-	-	17	1198	1600	9	1558	1219	6	2282	3372	-	-	-	1	1800	-
Baleares	21	861	1060	53	733	931	32	2085	2524	15	4553	3615	1	-	-	1	1800	-
Catalunya	7	334	402	20	636	632	17	1998	2422	12	2919	3848	6	10500	10173	2	8150	5445
Ceuta-Melilla	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Languedoc Roussillon	-	-	-	-	-	-	1	2000	1700	5	3091	1331	1	3000	-	-	-	-
Liguria	-	-	-	9	356	305	2	350	212	5	4420	3462	0	-	-	-	-	-
Murcia	-	-	-	2			2	810	976	3	-	-	-	-	-	-	-	-
Provence-Alpes-Côte d'Azur	-	-	-	-	-	-	1	-	-	0	-	-	-	-	-	-	-	-
Sicilia	-	-	-	51	783	501	22	2127	1057	8	1406	603	-	-	-	-	-	-
UK	-	-	-	-	-	-	1	880	-	-	-	-	-	-	-	-	-	-
Valencia	-	-	-	8	639	440	12	1553	989	6	5308	2264	3	3867	3204	1	-	-

Table 3.16. Average Annual expenses on Tackles and Baits, Estándar Dev. And number of observation per Vessel length Interval

T&B	<¨5			5-7			7-9			9-12			12-16			>16		
	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std
Andalucia	2	300	212	4	-	-	8	1675	1893	6	865	463	1	-	-	-	-	-
Atlántico	4	-	-	16	682	605	13	712	757	7	903	956	-	-	-	1	500	-
Baleares	20	523	563	58	623	807	30	1702	2161	13	1428	1023	0	-	-	1	2300	-
Catalunya	7	336	212	19	842	1431	16	1059	1546	11	2097	2290	5	4220	4432	0	-	-
Ceuta-Melilla	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Languedoc Roussillon	-	-	-	-	-	-	1	1700		5	1653	654	1	2000	-	-	-	-
Liguria	-	-	-	9	450	521	2	175	106	4	1538	941	1	-	-	-	-	-
Murcia	-	-	-	1	-	-	1	500		3	-	-	-	-	-	-	-	-
Provence-Alpes-Côte d'Azur	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-
Sicilia	-	-	-	51	659	605	22	2215	772	8	1881	724	-	-	-	-	-	-
UK	-	-	-	-	-	-	1	650	-	-	-	-	-	-	-	-	-	-
Valencia	-	-	-	11	375	294	10	1594	1351	9	3462	3815	3	3333	1155	1	-	-

Table 3.17. Average Annual expenses on Transport from residence to port, Estándar Dev. And number of observation per Vessel length Interval

Transport Costs	<¨5			5-7			7-9			9-12			12-16			>16		
	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std	n	x	std
Andalucia	2	229	16	1	-	-	7	867	818	5	860	483	0	-	-	-	-	-
Atlántico	2	-	-	5	663	605	4	865	679	4	570	151	-	-	-	1	400	-
Baleares	12	778	682	26	833	1196	13	565	488	5	2200	1643	0	-	-	0	-	-
Catalunya	3	240	216	8	559	386	10	379	460	6	908	1278	3	433	208	0	-	-
Ceuta-Melilla	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Languedoc Roussillon	-	-	-	-	-	-	0	-	-	3	467	473	0	-	-	-	-	-
Liguria	-	-	-	1	50	-	0	-	-	3	1400	656	0	-	-	-	-	-
Murcia	-	-	-	0	-	-	1	150	-	2	-	-	-	-	-	-	-	-
Provence-Alpes-Côte d'Azur	-	-	-	-	-	-	0	-	-	0	-	-	-	-	-	-	-	-
Sicilia	-	-	-	51	211	168	22	625	430	8	391	191	-	-	-	-	-	-
UK	-	-	-	-	237	269	0	213	75	-	638	918	-	1500	2121	-	-	-
Valencia	-	-	-	6	-	-	4	-	-	4	-	-	2	-	-	0	-	-

List of Species: Names in different languages

Latin	Spanish	English	French	Italian
Alopias vulpinus	Tiburón zorro	Thresher shark	Renard	Squalo volpe
Anthias anthias	Tres colas	Swallowtail sea perch	Barbier hirondelle	Castagnola rossa
Auxis rochei	Melva	Frigate Mackerel	Auxide	Tombarello
Belone belone	Aguja	Garfish	Orphie	Aguglia
Boops boops	Bogas	Bogue	Bogue	Boga
Bothus podas	Tapaculo	Wide-eyed flounder	Platophrys	
Brama brama	Japuta	Ray's Bream	Grande Castagnole	Pesce castagna
Chelon labrosus, Liza sp.	Lisas	Lesser grey Mullet	Muge a grosses lèvres	Cefalo bosega (cefali)
Conger conger	Congrio	Conger Eel	Congre	Grongo
Coris julis	Julia	Rainbow Wrasse	Girelle commune	Donzella
Coryphaena hippurus	Dorado	Dolphinfish	Coryphène	Lampuga
Dactylopterus volitans	Chicharra	Flying gurnard	Poule de mer	Pesce civetta
Dentex dentex	Dentón	Toothed Bream	Dente	Dentice
Dicentrarchus labrax	Lubina	Sea-Bass	Bar commun	Spigola, branzino
Diplodus sp.	Sargos	Porgy, Pinfish, White Bream...	Sargue, sar...	Saraghi
Epinephelus marginatus	Mero	Grouper	Mérou	Cernia
Galeorhinus galeus	Cazón	Tope	Milandre	Canesca
Helicolenus dactylopterus	Gallineta	Rockfish	Rascasse du nord	Scorfano di fondale
Istiophorus albicans	Pez Vela	Atlantic Sailfish	Voilier de l'Atlantique	Pesce vela
Isurus oxyrinchus	Marrajo	Shortfin mako	Requin-taupe bleu	Mako
Lamna nasus	Marrajo sardinero, cailón	Porbeagle	Taupe	Smeriglio
Lepidopus caudatus	Sable, pez cinto	silver scabbard fish	Sabre argenté	Pesce sciabola
Lichia amia	Palometón	Leerfish	Liche amie	Leccia
Lithognathus mormyrus	Herrera	Marmor Beam	Morme	Marmora
Loligo vulgaris	Calamar	Squid	Calmar	calamari
Merluccius merluccius	Merluza	Hake	Merlu	Nasello, merluzzo
Micromesistius poutassou	Bacaladilla, lirio	Blue whiting	Merlan bleu, poutassou	Potassolo
Mullus sp.	Salmonete	Mullet	Barbet	Triglie
Mustelus mustelus	Musola, cazón	Smooth hound	Émissole lisse	Palombo

Oblada melanura	Oblada	Black-tail	Oblade	Occhiata
Octopus vulgaris	Pulpo	Octopus	Poulpe	Polipo
Pagellus acarne	Aligote	Spanish Bream	Pageot Espagnol	Pagello bastardo
Pagellus bogavareo	Besugo	Common Sea Bream	Daurade	Rovello
Pagellus erithrynus	Breca	Pandora	Pageau	Fragolino
Pagrus pagrus	Pargo	Couch's Sea Bream	Pagre commun	Pagro
Phycis sp.	Brótola	Forkbeard	Phycis	Musdea bianca
Pleuronectes platessa	Platija	Plaice	Pire	Platessa
Polyprion americanus	Cherna	Wreckfish	Cernier Atlantique	Cernia di fondale
Pomatomus saltatrix	Anjova	Bluefish	Tassergal	Pesce serra
Prionace glauca	Tintorera	Blue Shark	Requin bleu	Verdesca
Psetta maxima	Rodaballo	Turbot	Turbot	Rombo chiodato
Raja sp.	Rayas	Skates	Raie	Razze
Salpa salpa	Salemas	Gold lined Bream	Saupe	Salpa
Sarda sarda	Bonito	Atlantic Bonito	Bonite a dos raye	Palamita
Sciaena umbra	Corvallo	Borwn Meagre	Corb noir	Corvina
Scomber sp.	Caballa, Estornino	Chub Mackerel	Maquereau Espagnol	Sgombro, lanzardo
Scophthalmus rhombus	Rémol	Brill	Barbue	Rombo liscio
Scorpaena porcus	Rascacio	Black Scorpionfish	Rascasse brune	Scarpena
Scorpaena scrofa	Cabracho	Large-scaled Scorpionfish	Rascasse rouge	Scorfano rosso
Scyliorhinus canicula	Pintarroja	Lesset spotted Dogfish	Petite Roussette	Gattuccio
Scyliorhinus stellaris	Alitan	Larger spotted Dogfish	Grande Roussette	Gattopardo
Sepia officinalis	Chocos	Cuttlefish	Seiches	Seppie
Seriola dumerili	Seriola	Greater Amberjack	Seriole	Ricciola
Serranus cabrilla	Cabrilla	Comber	Serran Cabrille	Perchia
Serranus scriba	Serrano	Learned Rockfish	Serran Écriture	Sciarrano
Solea vulgaris	Lenguado	Sole	Sole	Sogliola
Sparus aurata	Dorada	Gilthead Bream	Dorade	Orata
Sphyraena sphyraena	Espetón	Barracuda	Brochet de mer	Esfirena
Spicara smaris	Chucla	Blotched pickarel	Picarel, mendole	Zerri

Cont. List of Species by Languages

Spondyliosoma cantharus	Chopa	Black Sea Bream	Griset	Tanuta
Symphodus sp.	Tordo	Wrasse	Crénilabre	tordo
Tetrapturus sp.	Agujas	Marlin, Spearfish	Makaire	Marlin
Thunnus alalunga	Atún Blanco	Albacore	Germon	Alalunga
Thunnus thynnus	Atún Rojo	Bluefin Tuna	Thon Rouge	Tonno
Todarodes sagittatus	Pota	Shortfin squid	Encornet rouge	Totano
Trachinotus ovatus	Palometa	Longfin Pompano	Palomine	Leccia stella
Trachinus draco	Escorpión, araña	Greater Weever	Grande Vive	Tracina drago
Trachurus trachurus	Jureles	Horse Mackerel	Chinchard	Sugherello, sugarelli, suri
Trisopterus sp.	Fanecas	Pout, Capelan	Capelan, Tacaud	Merluzzo cappellano
Xiphias gladius	Pez Espada	Swordfish	Espadon	Pesce spada
Xyrichtis novacula	Raor, Galán	Razorfish	Rason	Pesce pettine
Zeus faber	Gallo San Pedro	John Dory	Saint pierre	Pesce San Pietro
	Otros	Others	Autres	Altri

Recreatinal Fishing: The Tuna case

The practice of tuna fishing and related species is a very particular case of recreational fishing. In the previous chapter we have presented the species composition of each recreational fishing modality and it showed that tuna is caught by different modalities. In this chapter we will estimate the total catch of Tuna recreational fisherman in two countries. In Spain by an indirect approach and in Italy through a direct sampling developed in every port and bay. The indirect approach is possible to be applied in Spain and not in France because in Spain for the practice of Big game fishing (BGF) a special authorisation is required per vessel (license). This permits to have the size of the Spanish recreational BGF fleet.

Moreover we will present an independent section on French tuna tournaments which will show the power tool of tournaments data as additional information in population assessment.

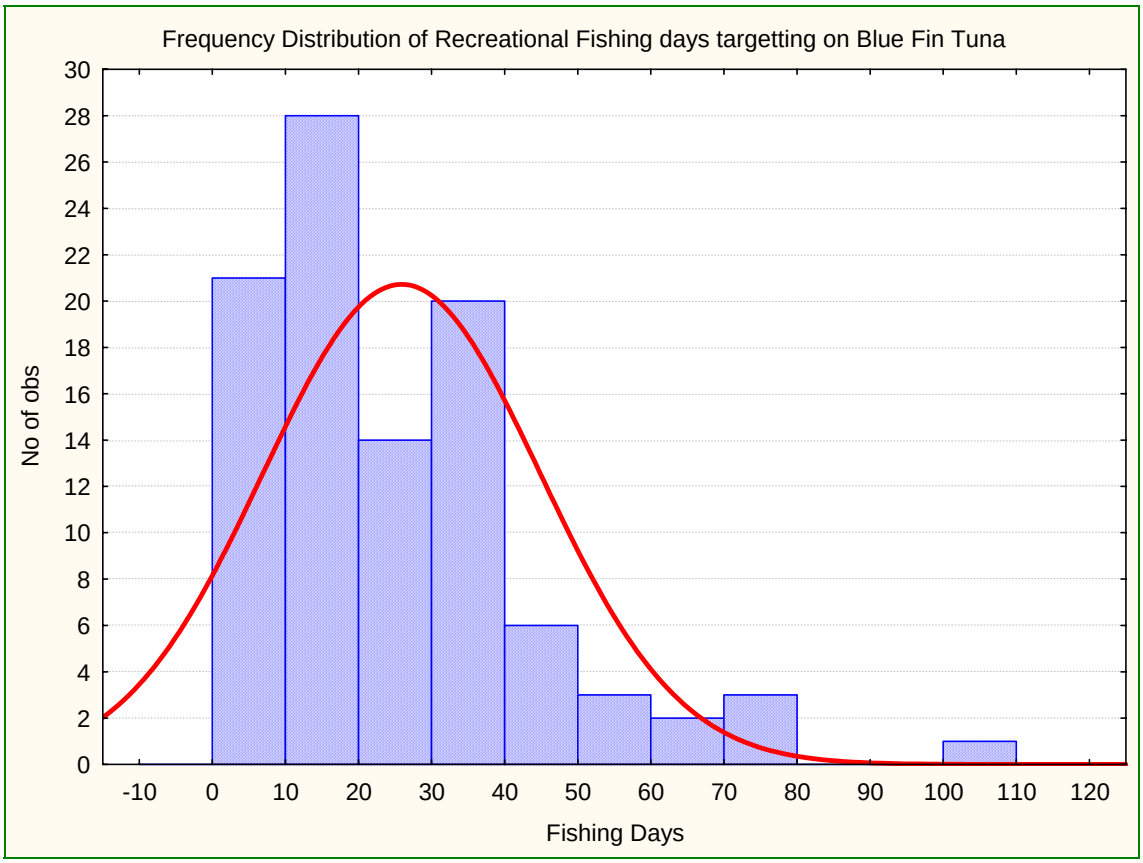
Spanish Mediterranean Recreational Fleet: Indirect Approach of Total Tuna catch and added Value

The percentage of Spanish fishermen questionnaires which target on Bluefin tuna represent 27% of the total sample. To estimate the total catch of this species, in the Mediterranean, by the recreational fleet previously it has been estimated the total fishing days (total effort) and the average daily catch of the fleet (daily CPUE).

The tuna fishing days have been estimated for each questionnaire by multiplying the annual fishing days by the proportion of the activity of the fishing modalities on which catch on tuna was reported. The total fishing days of the sample is 2.416 and the total catch 24.416 which gives a daily CPUE of 10, 11 Kg per day.

The size of the Big game recreational fleet in the Mediterranean, estimated from the number of authorisations required for this fishing, is around 2580 vessels. To estimate the total fishing days of the fleet previously the average annual fishing days per vessel were estimated. The average fishing days on tuna fishing of the sample is 24,9 days which represent 43% of the fishing activity of this fishermen. Nevertheless, the frequency distribution of tuna fishing days in this sample is positive bias (Figure 4.1) and the sample is also biased towards the most active fishermen. Consequently, the annual average fishing days on tuna for the Big game fishermen population is expected to be lower. Applying a correction of 30% positive bias (same bias already applied for the whole recreational fleet) fishing on tuna drops to 17,43 days per year.

Figure 4.1



Thus, the annual effort of this fleet (fishing days) which results from the product between vessels and fishing days per vessel would be 64242 or 44969 days depending on the annual fishing days per vessel considered in the estimation (24,9 or 17,43). Total catch results from the product between the daily CPUE and total fishing days and depending on the figure chosen for the later, total catch varies between 649 tons or 455 tons. The latter figure, based on previous reasoning, is more likely to represent the total catch of Bluefin Tuna by the Spanish Big game recreational fleet. Anyhow the latter figure it is extremely high because we have considered that every vessel with the special fishing tuna authorization fish on tuna 17, 43 days per year which is quite unlikely. This show the need of tuna catch declaration by the RF including the catch cero, otherwise any further study will be once again obliged to use indirect approaches which would give distorted results.

Average annual costs of this fleet have been estimated following the same method applied for the whole recreational fleet explained in the previous section. An exception has been made for the fuel consumption the total costs of fuel has not been considered because this fleet also practice other modalities of fishing. It has been consider than the fuel consumption in BG is three times the one consumed at practicing other modalities

and the proportion on consumption in this activity has been estimated after the standardisation of fishing day.

Average annual cost per vessel was 16.209 €, thus the fleet expenses was close to 42 millions of euros. The expenses divided by the total catch result that each kilogram of tuna caught by a Spanish recreational vessel costs to the vessel owner 92 €.

Italian Recreational Tuna Fleet: Direct estimation of Total Tuna catch and added Value

According to the plan of this study, given the lack of any list of licences (and of the licence itself) for the tuna sport fishery, as established by the current Italian regulation, the only reference point to have a list of fishermen concerned is provided by the list of voluntary request from various sport fishermen, after the decision to establish an individual quota for the bluefin tuna by the Ministry of Agriculture and Forestry Policy (art. 5 Ministerial Decree 27 July 2000).

The Direction General for Fishery and Aquaculture provided this list under the condition to strictly follow the privacy regulation and the statistic secret, with the obligation to use only aggregated data.

According to the list (Table 4.1), a total of 1826 sport fishermen presented formal request to obtain a bluefin tuna catch quota.

TABLE 1 – Total by Region of requests presented by sport fishermen to the Direction General for Fishery and Aquaculture to obtain a bluefin tuna catch quota in 2000.

ITALY	REQUESTS FOR BFT SPORT FISHERY QUOTA	
REGION	No.	%
LIGURIA	119	6,52
TOSCANA	286	15,66
LAZIO	183	10,02
CAMPANIA	51	2,79
BASILICATA	3	0,16
CALABRIA	57	3,12
PUGLIA	11	0,60
ABRUZZO E MOLISE	57	3,12
MARCHE	205	11,23
EMILIA ROMAGNA	168	9,20
VENETO	206	11,28
FRIULI VENEZIA GIULIA	33	1,81
SARDEGNA	167	9,15
SICILIA	104	5,70
PIEMONTE	*30*	*1,64*
LOMBARDIA	*60*	*3,29*
TRENTINO ALTO ADIGE	*22*	*1,20*
UMBRIA	*7*	*0,38*
OTHERS	*57*	*3,12*
TOTAL REQUESTS	**1.826**	
ACCEPTED REQUESTS	1379	75,5

OFF TIME LIMITS	245	13,4
UNCOMPLETE DOCUMENTS	192	10,5
WITHOUT SIGNATURE	8	0,4

A presentation showing the number of requests per Maritime Compartment was originally planned by this study, but the reality of the existing situation made this impossible. As a matter of fact, several requests for BFT quota originated from people resident in town, provinces or regions far from the sea where the Maritime Compartment are not present. As a consequence, the data have been grouped and presented by Region, showing in italics the data concerning Regions without the coastline or non-pertinent for other reasons.

90,37% of the request for bluefin tuna sport fishery quota was originated from coastal Regions. After the evaluation, the Direction General for Fishery and Aquaculture accepted 1379 requests (75.5% of the total), rejecting the others, with the motivation reported on table 1.

As a matter of fact, the information obtained from this procedure is the only available about the tuna sport fishery, even if it is not directly reliable in terms of assessing the real activity.

As reported before, the sport fishermen do not have any obligation to join the Federation and, furthermore, the FIPSAS refused to provide any information, even if aggregated, about the tuna sport fishermen members of the Italian Federation.

One of the most important parts of this study is the detailed census of the real activity of the tuna sport fishery in all the Italian Regions.

The “census” has been possible only applying a very high research effort by all the Operative Units concerned. The difficulties were given by the long coastline, the enormous quantity of landing places and the high number of small island to be checked but, also, for the lack of any relevant parameter to identify the sport fleet concerned.

The first step was to provide a list of harbours by Region, with their main characteristics including a total of 812 harbours having a total of 106,931 moorings.

As reported before, the Marine Sector of the Italian Federation of Sport Fishery and Underwater Activities (FIPSAS) was contacted since the beginning, with the purpose to obtain at least a list of local Clubs carrying on a regular base the tuna sport fishery. Due to the total lack of co-operation, this approach was not able to provide any result.

After this preliminary work, each Operative Unit charged of the study of a portion of the Italian coast checked in detail all the coastline, verifying the presence of any tuna sport fishery activity according to the following procedure:

- Visual check of all the vessels, with the purpose to identify the presence of significant elements of the tuna sport fishery activity (fighting fishery chairs, pole holders, pole divergent, tuna organisations stickers, etc);
- Interviews in the most important shops for sport fishery equipments;
- Interviews in all the harbours;
- Interviews in Nautical Clubs;
- Target interviews to sport fishermen.

This heavy work, carried out with a very costly and high workload on field, allowed the group to set up a series of Regional list of activities, including all the landing sites concerned by the tuna sport fishery, the tuna sport fleet divided in size classes (the classes were established before the enforcement of the Ministry Decree of 6 June 2003), the estimate quantities of Bluefin tuna catches obtained in the last year (possibly in number and weight) and a preliminary evaluation of the total number of tuna sport fishermen. At the same time, it was possible to obtain first information on the total number of leisure vessels carrying out some sport fishing activities and the total number of sport fishermen concerned.

A summary of the main information is detailed in Table 4.2. The size of tuna fleet is around 4233 vessels while requests on tuna fishing were only 1826 (Table 4.1) this shows that most tuna fishermen do not even apply for the administrative request.

Table 4.2

Region	Tuna Fleet	Catch of Tuna>25Kg.	Catch of Tuna<25Kg.	Total catch in number	total catch in Kg.	Tuna size in Kg.	Catch per vessel
Abruzzi	85	5130		63	5130	81,43	60,35
Basilicata	48		200	150	200	1,33	4,17
Calabria	210	3835	1290	1796	5125	2,85	24,40
Campania	176	360	3900	2167	4260	1,97	24,20
Emilia-Romagna	36	2700		25	2700	108,00	75,00
Friuli Venezia Giulia	43	4975		37	4975	134,46	115,70
Lazio	658	36550	24450	5272	61000	11,57	92,71
Liguria	1232	2209	7602	2098	9811	4,68	7,96
Marche	328	69325		978	69325	70,88	211,36
Molise	2						
Puglia	106	12415	4841	756	17256	22,83	162,79
Sardegna	152	58285	106	588	58391	99,30	384,15
Sicilia	400	10300	3306	4779	13606	2,85	34,02
Toscana	490	1750	540	55	2290	41,64	4,67
Veneto	267	10970		107	10970	102,52	41,09
Total	4233				265039		

The total annual catch and the total tuna fleet give an annual catch per vessel of 62,6 Kg. The daily catch per vessel would be the total catch dividing by the number of fishing days. In the previous section it has shown that Italian tuna fisherman declared on average 47 fishing days per year, thus the daily catch of each vessel would be 1,25 Kg. This figure is extremely low and rather unlikely and contradicts the results from Italian questionnaires. The total catch of the Italian questionnaires was 27023 Kg. and total fishing days 2768 this indicates that the daily catch per vessel is 9,76 Kg. The annual total catch of Italian recreational tuna fleet based on the latter daily CPUE is above 1.942 tons, this catch is seven times the one shown in table 4.2.

Italian questionnaires gave a figure of 10.518 € annual costs per tuna recreational vessel and the direct census over ports and bays show that 41% of recreational fleet do not use mooring ports being park in bays or beaches. Figure 4.2 shows the bays or vessel parking places in Italy. To estimate the annual expenses of tuna fleet we consider that

only 49% of it has mooring costs then average annual costs of tuna vessel become 9.872 €. The annual expenses of the whole fleet would be close to 42 millions of euros and the cost of catch a Kg. of Tuna by an Italian vessel 21,5 euros. This figure become 22,9 € considering that every vessel has mooring costs.

Figure 4.2 Italian Harbours/Bays without moorings

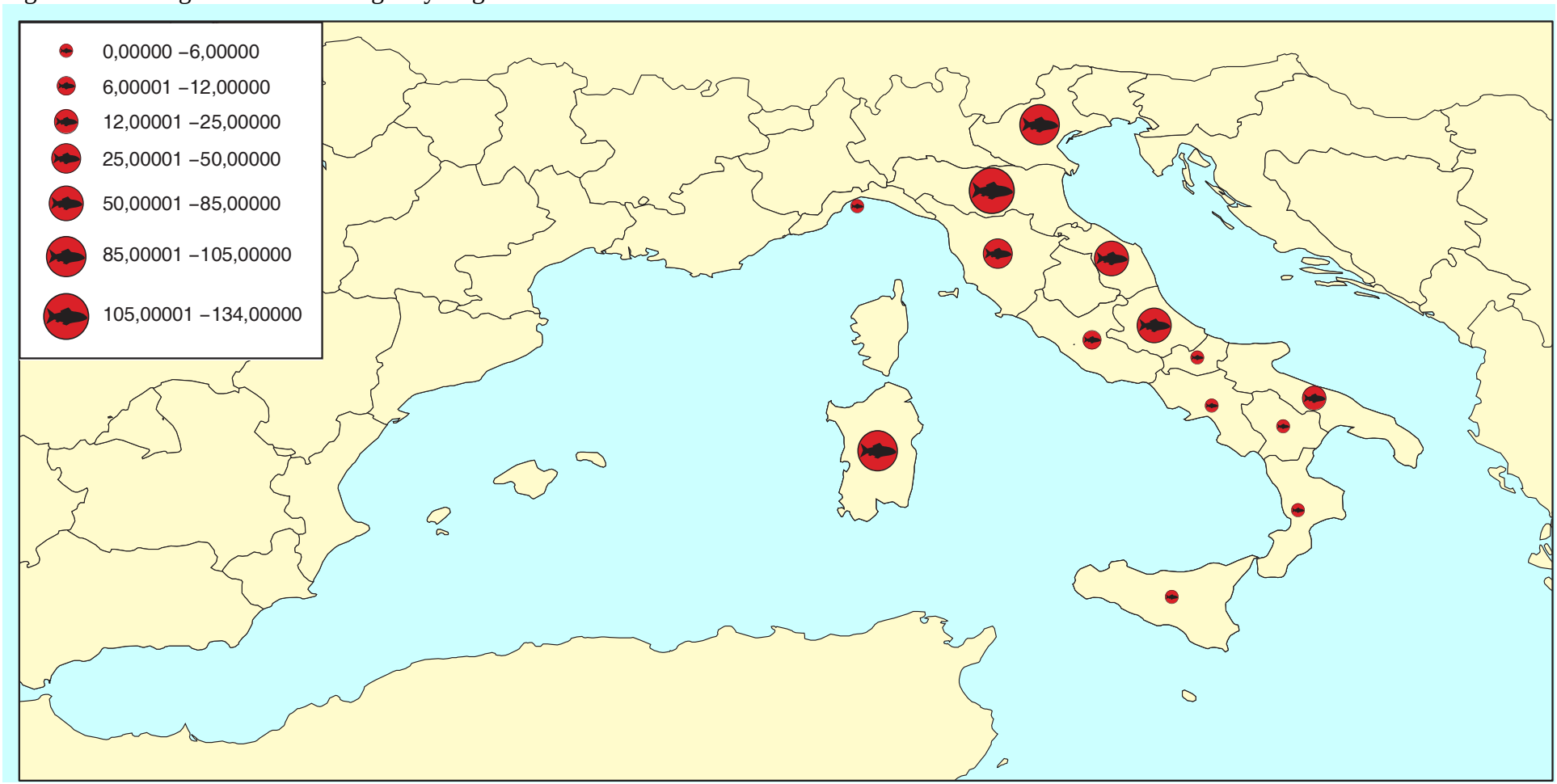
Total catch in Kg. shows the regional differences in biomass and not the fishing effort in terms of fleet size or abundance in number. For instance the difference between fleet size in Liguria and Sicilia is not shown in their respective catch in Kg. Moreover the differences between catch in Kg. and catch in number show the spatial segregation by size of tuna population. The Italian sampling port by port allows to identify the regional differences in the tuna recreational fleet as well as the regional differences in tuna distribution.

The size structure of tuna fleet by region is mapped in Figure 4.3. and it is clearly evident the differences in average vessel size between regions. The fleet of the half southern part of Italy is formed by small vessels in contrast to the northern half. The size of tuna caught in each region (Figure 4.4) it is not directly due to the vessel sizes, Sardegna and Sicilia have the same type of fleet butt their catches show both extremes: high catch of big tuna and low number versus low catch of the young of the year in extremely high number. These extremes show the spatial segregation by size and not vessel capability. Another similar example is Liguria vs Emilia-Romagna both fleets with big vessels but with extreme difference in tuna sizes, young of the year in Liguria and bigger than 100 Kg. in the northern Adriatic. This is a clear example of how Recreational catches gives a better understanding on tuna spatial behaviour than professional fleet which fish in further fishing grounds and its autonomy makes it less dependant of their ports.

Port by port sampling shows that 10.990 Kg. Of tuna < 6 Kg is caught by the recreational fleet. This catch represents the 4% of the total catch estimated by the direct census. Although, it has been shown that this total catch is very unlikely to represent the real catch and contradict the one get from fishermen questionnaires. The total catch estimated from fishermen questionnaires is rather likely to represent the true catch. The total catch of young tuna is expected to be as biased as the total catch estimated by the direct census but the proportion removed both bias and could be rather precise. Applying the 4% of the total catch estimated from fishermen questionnaires the total catch of the young of the year become 77680 kg. At present, the weight limit for tuna is 6.4 Kg so almost 79 tons are of illegal sizes in Italian catches. To prevent this catches in regions where the aggregation of young tuna is particularly high the implementation of restrictions on hook sizes is an urgent measure to be taken.

Figure 4.3 Average Size of tuna vessel by Region

Figure 4.4 Average size of tuna caught by Region



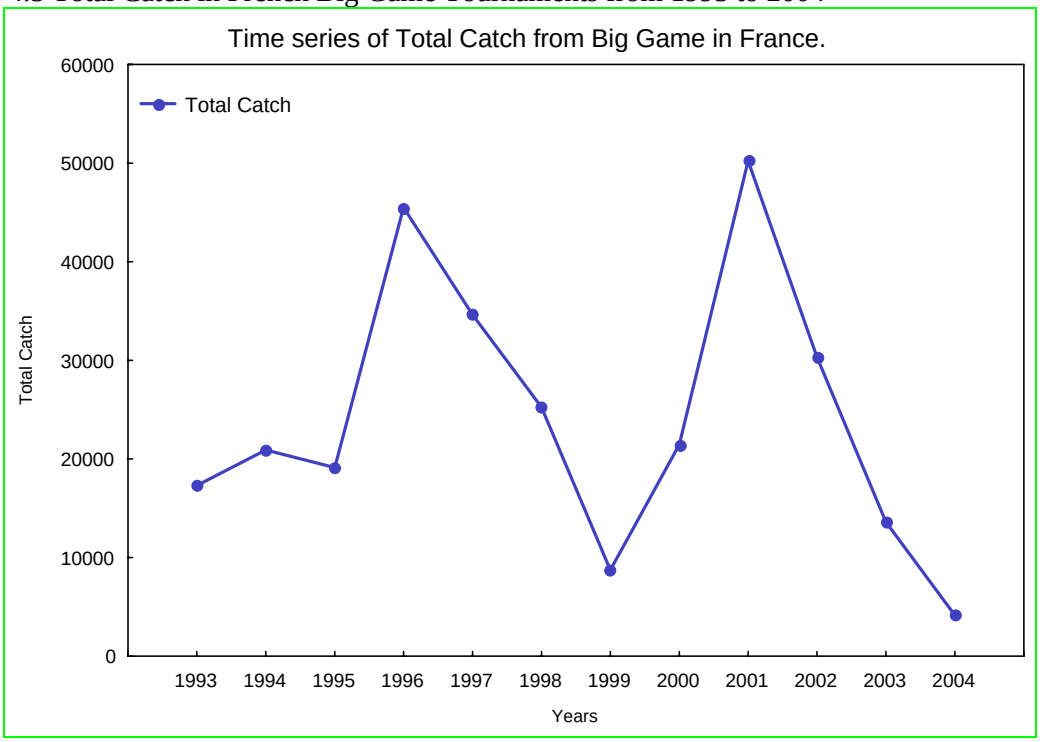
French Tournaments.

The F.F.P.M. provided different sets of data from Big Game tournament. The first is an annual time series of total catch from 1993 to 2004 by region. The second is a detailed report of tournaments data from 2003 in Languedoc Roussillon region though for Côte Azur Region information is shorter. The time series data is shown in table*.1 but the temporal pattern is more clearly illustrated in figure *.1. Although the temporal pattern shown here cannot be directly interpreted as time trend of tuna catch because no information on other species has been given neither the number of participants, sharps ups and downs are visible with maxims in 1996 and 2001.

Table 4.3. Time series total catch (Kg) from Côte Azur and Languedoc Roussillon regions.

Year	Total Catch (Kg)	Total Catch Côte Azur	Total Catch Languedoc Roussillon
1993	17305	12455	4850
1994	20910	14200	6710
1995	19125	10909	8216
1996	45489	14291	31198
1997	34628	11323	23305
1998	25242	9053	16189
1999	8725	6566	2159
2000	21453	10570	10883
2001	50209	14098	36111
2002	30343	14290	16053
2003	13594	6125	7469
2004	4151	2899	1246

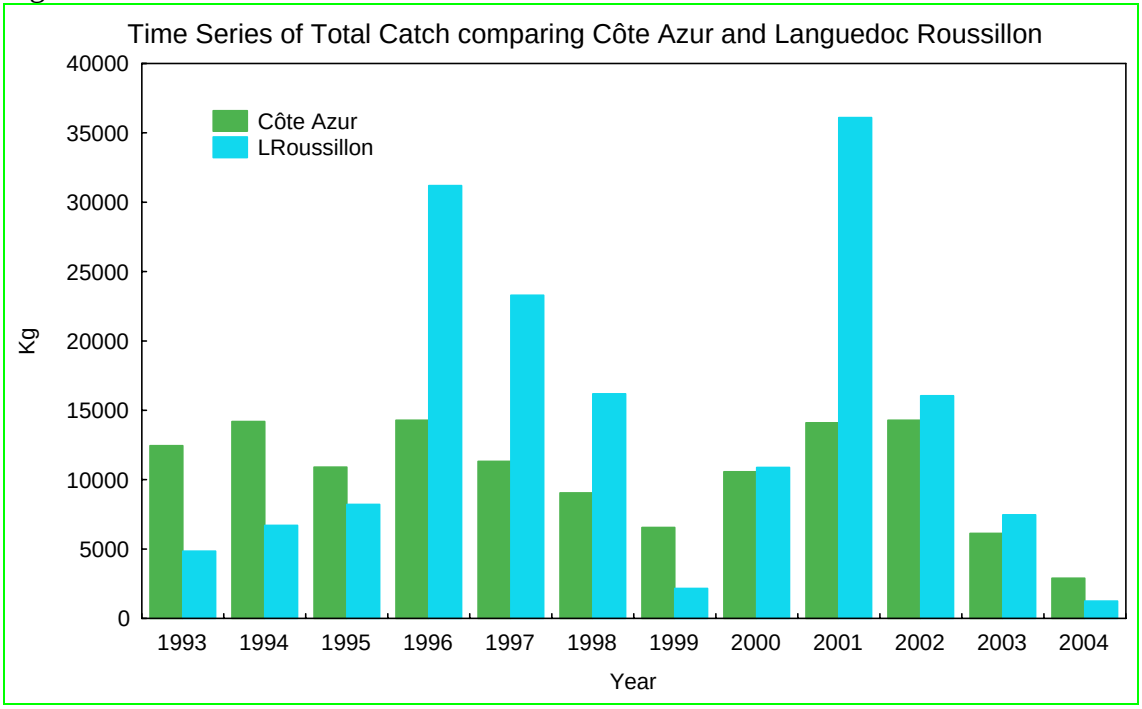
Fig. 4.5 Total Catch in French Big Game Tournaments from 1993 to 2004



From 1993 to 1995 the results are more or less constant, around 20.000 kg. Afterwards a sharp increase is observed in 1996 but during the next three years catch decreased down to the minimum of the series, 8.725 kg in 1999, emerging again and reaching the second peak in 2001. Since then it descends again to the minimum of the time series: 4.151 kg in 2004

French sportive federation informed that annual fishing effort in competitions has not changed significantly during the last decade. Tournaments in Côte Azur differ from those in the Languedoc-Rousillon in the fishing modality which is limited to Big Game Shumming in the first region while in the second region tuna tournaments are on both BG modalities: trolling and Shumming. The annual oscillations in Côte Azur are comprehensible weaker because they represent oscillations of the oldest fraction of tuna population.

Figure 4.6



From 1996 onwards both regions present the same trend although the degree of their respective increments vary strongly (e.g from 1999 to 2000). The potential reasons under the variability in annual catches could be the following: tuna presence in the regions, tuna abundance in the Mediterranean, availability of tuna (changes in vertical distribution) and number of tournaments or fishermen. The latter could be rejected after discussing this topic with the F.F.P.M. The presence of tuna in this regions respect to other Mediterranean areas can not be resolved at present because this data is not gathering by other federations or organizations. It would have been of great interest to have this information which would help to understand the distribution and abundance of tuna during this time series. The lack of this information also prevents us to assure that these fluctuations are due to fish abundance; however this is the most likely reason during the last years.

The next sets of data are those from 2003 tournament in Languedoc Roussillon region. The tables 4.4. and 4.5. contain in detail the most important information of this tournaments. The differences in catch success differed also greatly among contests as is observed through their differences in CPUE. One reason may be attributed to differences in the period each took place. But this cannot be the only reason because two of the longest tournaments, matched in time and a big difference is also observed, so this may only be discussed on spatial distribution basis

Table 4.4 Information on French Tournaments during 2003

Date	Tournament days	Nº Participants	Fishing days	Inscription Fee	Participants* Fee	Total Catch	CPUE	Kg Bite	Kg consumed	Sale Income (euros)
19/07/03	4	18	72	100	1800	0	0	1600	0	0
25/07/03	16	21	336	15	315	807	2,4	17000	417	1430
27/07/03	1.5	17	25,5	45,74	778	0	0	1250	0	0
28/07/03	4	8	32	91,48	731	0	0	2000	0	0
31/07/03	4	10	40	92	920	131	3,28	0	131	0
02/08/03	4	20	80	100	2000	0	0	0	0	0
02/08/03	3	7	21	100	700	82	3,90	0	82	0
03/08/03	4	21	84	91,48	1921	431	5,13	4250	149	730
05/08/03	4	28	112	125	3500	1031	9,21	5550	176	3843,6
06/08/03	3	13	39	100	1300	0	0	0	0	0
07/08/03	4	18	72	100	1800	0	0	1600	0	0
09/08/03	3	9	27	92	828	401	14,85	1800	0	0
09/08/03	2	13	26	45,74	595	485	18,65	1580	286	995
12/08/03	3	15	45	80	1200	185	4,11	1200	110	375
12/08/03	4	21	84	100	2100	0	0	0	0	0
12/08/03	4	23	92	106,96	2460	643	6,99	6560	0	2073
14/08/03	3	13	39	80	1040	232	5,95	1200	0	534,89
15/08/03	3	19	57	75	1425	490,8	8,61	0	91,2	1398,6
17/08/03	4	17	68	100	1700	175	2,57	4000	0	0
18/08/03	2.5	19	47,5	68,61	1304	469	9,87	2400	343	630
18/08/03	1	3	3	45,74	137	0	0	0	0	0
22/08/03	4	21	84	106,96	2246	1897	22,58	5920	459	5401
25/08/03	11	39	429	15	585	526,8	1,23	2130	176	1200
25/08/03	11	6	66	15	90	565	8,56	3100	160	1620
14/09/03	0	17	0	45,74	778	0	0	0	0	0
TOTAL	-	416	1981	-	32252	7760	-	63140	2580	20231

Tuna recreational fishing season takes place during the whole summer but most of it is concentrated in August (Fig 4.7). The total days of tournaments (Fig. 4.8) also changed between months: 30 in July and 78 in August and none in September (there was only one contest but they couldn't go fishing). The total number of participants (Fig.4.9) also changes between months: 74 in July, 325 in August and 17 in September. The total fishing days was of 1981: 505'5 in July and 1475'5 in August (Fig. 4.10).

Figure.4.7. Percentage of tournaments per month

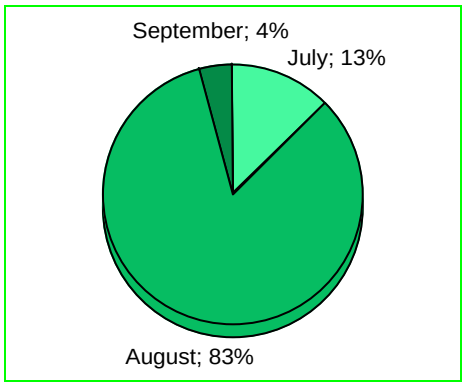


Figure 4.8. Days of Tournaments

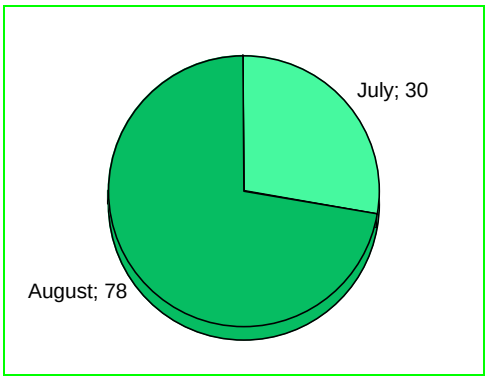


Figure 4.9.Total Participants.

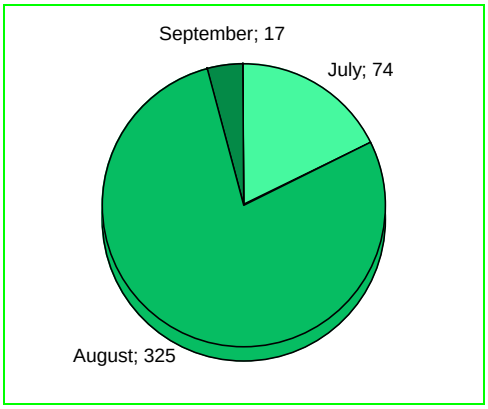
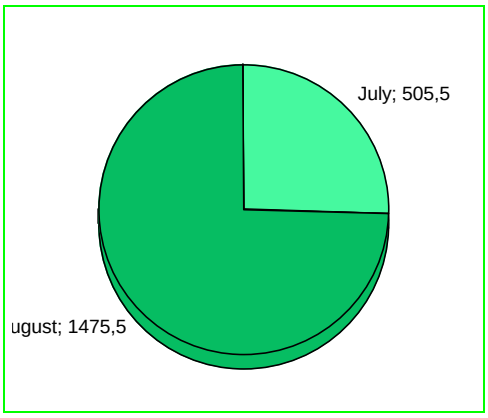
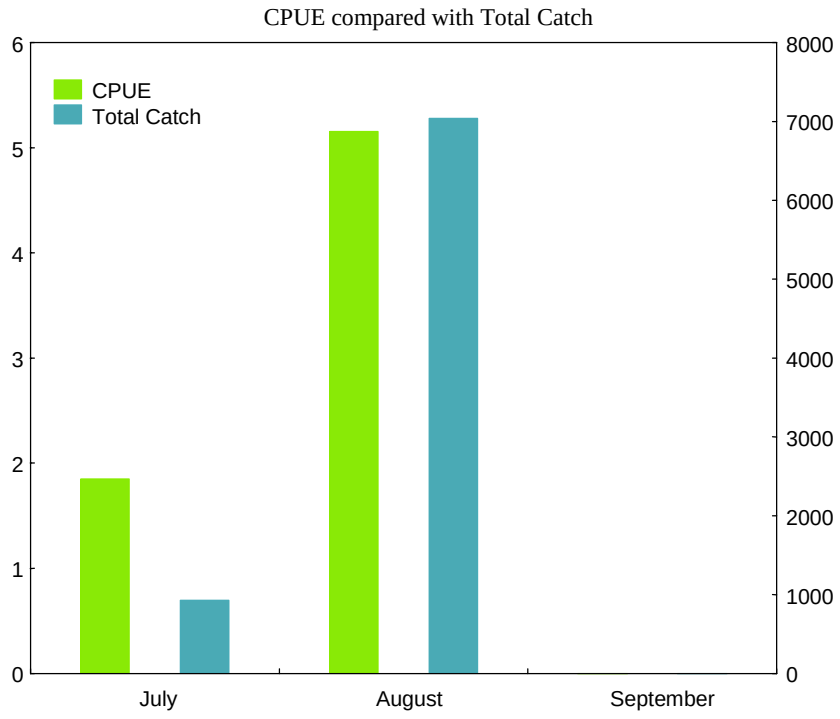


Figure 4.10. Fishing effort (fishing days)



From CPUE results (Catch/ Fishing days), we observe the highest value in August (Fig.4.11). We want to remark the importance of working with CPUE estimations instead of with the total catch also in Recreational fishing assessment. In this case monthly catch variations give us a very different monthly trend comparing with the one shown by monthly CPUE. If we observe total catch results, we have 938 Kg in July and 7049 Kg in August (8 folds more) but CPUE difference is reduced to 3 times. Anyhow, it is clear than in August tuna density in these regions are higher that in any other month.

Figure 4.11. Catch and CPUE by month in French tournaments.



The data received for 2003 tournaments also specified the catch by species and its price in the market (Table 4.5). There is a special arrangement between the Federations and the National Authorities authorises the sale of recreational catches

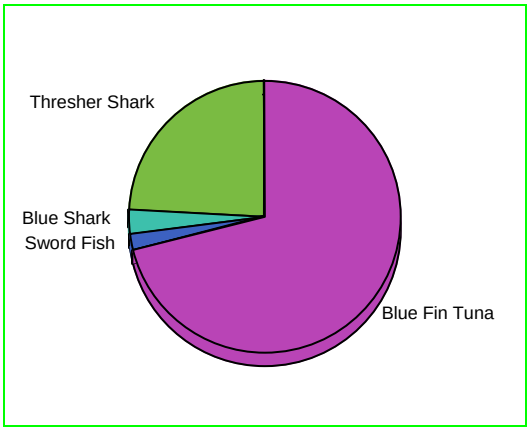
with a non-profit objective (more information in the legislation chapter). BFT represents most of the total catch (Fig4.12) followed by thresher shark.

Blue fin Tuna and Swordfish had a similar price at the market (round 5 euros/Kg) while Thresher shark was a bit cheaper (not reaching 4 euros/Kg) and Blue shark was the cheapest with just a cost of 2 euros/Kg.

Table 4.5 Total catch and price by species in French Tournaments.

Date	BFT Kg	Sword Fish Kg	Blue Shark Kg	Thresher shark kg	BFT €/ Kg	Sword Fish €/ Kg	Blue Shark €/ Kg	Thresher shark €/ Kg
19/07/03	0	0	0	0	-	-	-	-
25/07/03	547	0	0	260	5	-	-	3
27/07/03	0	0	0	0	-	-	-	-
28/07/03	0	0	0	0	-	-	-	-
31/07/03	131	0	0	0	-	-	-	-
02/08/03	0	0	0	0	-	-	-	-
02/08/03	0	22	60	0	-	-	-	-
03/08/03	431	0	0	0	5	-	-	-
05/08/03	889	0	12	130	4,5	-	2	3
06/08/03	0	0	0	0	-	-	-	-
07/08/03	0	0	0	0	-	-	-	-
09/08/03	0	0	0	0	-	-	-	-
09/08/03	485	0	0	0	5	-	-	-
12/08/03	185	0	0	0	4,5	-	2	3
12/08/03	0	0	0	0	-	-	-	-
12/08/03	141	0	44	403	4,5	-	2	3,35
14/08/03	40	0	0	192	-	-	-	3
15/08/03	91,2	0	0	399,6	-	-	-	3,5
17/08/03	0	0	0	0	-	-	-	-
18/08/03	469	0	0	0	5	-	-	-
18/08/03	0	0	0	0	-	-	-	-
22/08/03	1351	98	34,5	207	4,5	5	2	4
25/08/03	117	0	59	302	4,5	5	2	3,97
25/08/03	565	0	0	0	4	-	-	-
14/09/03	0	0	0	0	-	-	-	-
TOTAL	5442	120	210	1894	-	-	-	-

Figure. 4.12. Percentage of Catch by Species



This percentage does not change significantly between months (Table 4.6). All sword fish and blue shark was catch in august, while Blue fin tuna and Thresher shark was mainly catch in august but also in July.

Table 4.6. Different species percentage per month.

%	BFT	Sword Fish	Blue Shark	Thresher Shark
July	72	0	0	28
August	71	2	3	24
September	-	-	-	-

The catch from French tournaments is sold or/and consumed and the data referring to this information is illustrated in figures 4.13. and 4.14. The price per kg varies among species the cheapest price in the market is given for blue shark and the highest for BFT and Sword Fish and thresher shark with a market price in between the previous is the only one that is fully consumed.

Figure 4.13. Consumed and sold Kilograms by species in 2003 French tournaments

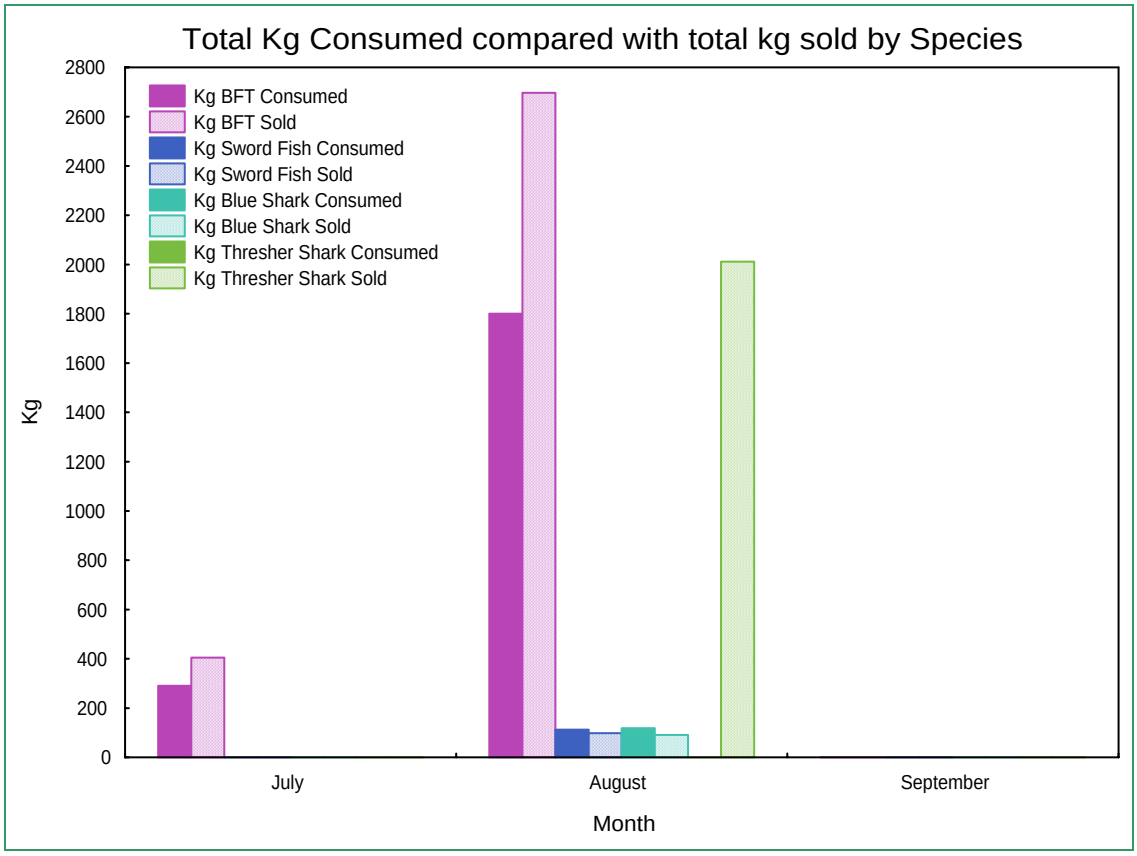
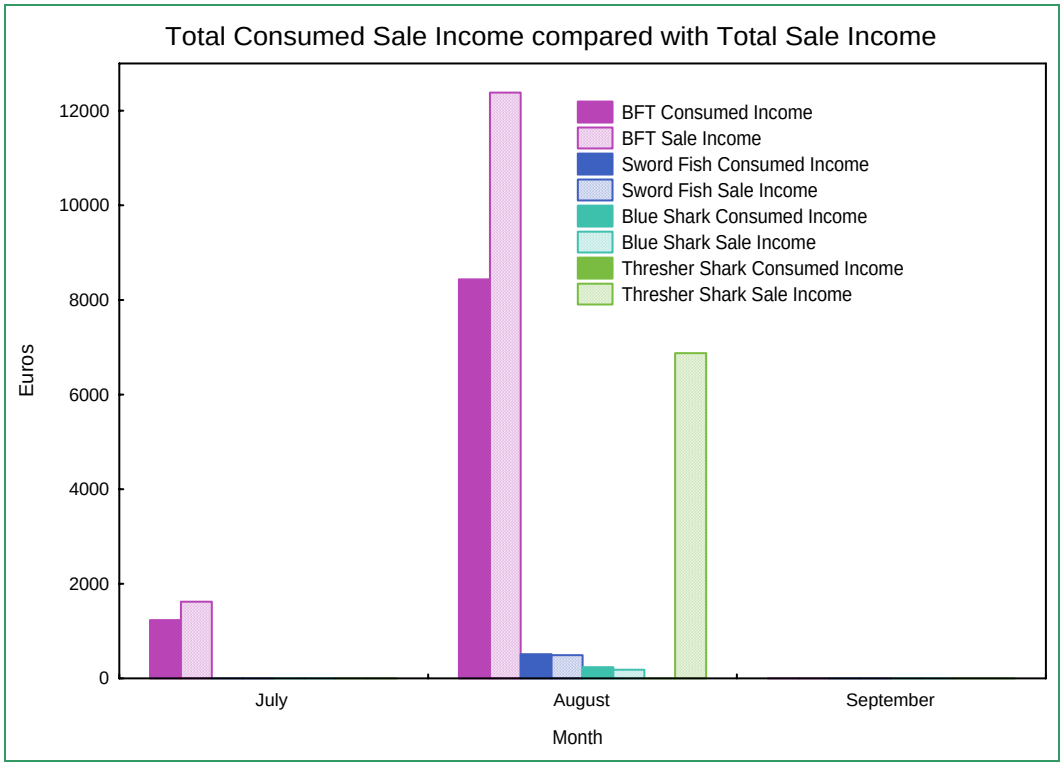


Figure 4.14. Consumed and sold euros by species in 2003 French tournaments



The percentage in kg of fish consumed represents 30’5% of the total this figure in euros is slightly different representing 32’6% of the total price of the catch in the market. The total income from sales during this season sum up 21.552 euros. This figure although it may seem high is for the whole sportive big game activity in 2003. The destination of this profit is detailed in the Volume I of the present report, summarising it is shared between the club organiser of the contest, the local professional fishing committee and the Federation for their charitable institutions.

Summary of Results

Legislation

The present study provides a detail description of every legislative measure in those fields related with Recreational fishing in Spain, France and Italy. The results show the great differences and discrepancies among them not only in the regulatory measures of this activity but also in control and conservative measures. It is of major importance to remark that the objective of legislation should not be limited to focus on the control of the activity, they would also search for tools which may provide information on RF through a direct research.

The small attention paid by the fishery administrations to RF is partially explicable since it has been traditionally considered as a sportive activity instead of an harvesting one. The lack or limited legislative measures increase the difficulty and even prevent the monitoring and assessment of this activity. This has been one of the difficulties found during the numerical analysis of this study which has prevented to provide some desirable estimation. In other cases an indirect approach had to be used giving results with a certain degree of uncertainty, which is a clear mirror of the situation in this fishing segment.

To understand the powerful tool of legislative measures the better is to show the consequences of their absence. The lack of Recreational Fishing licences in France and Italy prevents to know even the size of recreational fishing population. The registration system of the recreational vessels in these countries does not take into account their potential use. Although a Recreational Fishing licence per fisherman exists in Spain there is a lack of Recreational Fishing licence per vessel, which is a common deficiency in all the countries, this, again, prevents to know even the size of recreational fleet in those countries. Although, in Spain through fishermen licences the size of Recreational Fishing fleet was indirectly estimated.

The consequences of the lack of this legislative tool prevent the estimation of Recreational Fishing impact on the stocks and their economic importance. Studies based

on this objective will need to have a representative sample of the Recreational Fishing population activity in order to estimate the population parameters, once those parameters have been estimated they are extrapolated to the size of the population. This will provide information on the total catch, or total expenses of this activity but without the size of the population these results can not be estimated.

Moreover the big differences between countries in Recreational Fishing legislation difficult its accomplishment in each country. For instance if a French recreational fisherman moves to other country, his fishing activity must be conducted according to the laws of that country. It can not be expected that recreational fishermen know the legislation of this activity in other countries even when each own could be also unknown. It would be desirable that Recreational Fishing in the Mediterranean would be under the same or a common legislation. This will facilitate its fulfilment, enforcement, control and monitoring.

A future, common or shared, Recreational Fishing legislation in the Mediterranean will face several difficulties, not only because the current differences between countries will have a different impact on each legislation, but also because it will produce a very different social and economical impact. For example, in this study has been detected illegal selling of Recreational Fishing catch. Although, the prohibition of this illegal practice, is in the legislation of all these countries, its magnitude or volume of this illegal practice will depend to a great extent upon its social acceptance and not only upon economical needs or enforcement. It is of particular interest to mention that in Italy the selling of Recreational Fishing catch is socially recognised in every status of the society. Thus, no matter the economical needs the selling is a common and accepted activity of good reputation. This type of social way of thinking is a big problem even to attempt any measure of control over it. Moreover, when this state of mind takes place in regions not so well off or with labour problems an optimal scenario emerge to develop a real black market on RF.

This is the case of some southern regions in Italy where part of the local economy of some villages depends largely also on this activity. Any administrative measure to control this activity will produce local consequences, either: economical or social and will certainly face difficulties for the enforcement. Although, this can not be an

argument to avoid measures to slow down this activity until it's complete end. At first, the social recognition of selling recreational fishing products as a positive activity must be changed and measures on that direction could be public information and education actions. Selling practices in France and Spain are not socially accepted but some illegal selling exists although it does not seem of significant volume. Nevertheless education and information programs would be desirable in every country.

Each country presents a different reality on Recreational Fishing and especially on its administrative handling. Spain, which presents the most developed legislation may provide the tools to get a close figure of the Recreational Fishing ends lacking of a full efficiency. In France, legislation is limited and less restrictive but presents an effective way of handling Tuna tournaments showing the power of tournaments as an additional information for stock assessment.

The different situations observed in this study and their consequences, positives or negatives, as well as the necessary measures to be implemented to correct the observed deficiencies and their associated benefits are summarised in the table presented below.

Description Present Situation	Legal Situation	Proposition	Potentiality
Recreational fishery, fishermen going at sea respecting the existing rules and no selling the fishes on the market	Spain: individual licenses France & Italy no licenses Catches limits per vessel and fishermen: Sp, Fr (only for tuna) and It Limited gears Sp>Fr>It Low effective control	Vessels licences Increasing control	Economic Development associated to the tourist activities: employment in services, inputs consumption, enlarge tourist attraction of places…
Sport activity: Fishing in competition, complying with Recreational Fishing legislation. Most fishermen belong to a national federation or association or local club. It represents a small fraction of Recreational Fishing activity	Administrative authorisation; in France Affaires Maritimes and in Spain General Marine Fisheries Secreatry (SGPM). Sportive Authorisation for official contest (Spain)	• To collect regular data on these tournaments: participation and catch. • Establish as condition to approve the tournament to provide the data. • Assure that the production is donated or sell (if is the case) in regulated places and the incomes for charity purposes. • Exclude FOC vessels to avoid to escape of rules	Economic Development associated to the tourist activities: employment in services, inputs consumption, enlarge tourist attraction to coastal localities,… Improve the information on the resource
Recreational Tuna fishing activity Recreational fishing targeting on tuna and other big pelagic species.	ICCAT policy implies all the members must provide data from all the fisheries including the recreational fisheries. The Commission does not provide in this moment any specific methodology to obtain this information. At this moment:	• Establish license system by vessel, including the obligation of logbook reporting for all vessels (imcluding < 9 m)	Economic Development associated to the tourist activities: employment in services, inputs consumption, enlarge tourist attraction of places…

Cont. Recreational Tuna fishing activity	• Logbook compulsory in Spain by vessel and catch declaration is compulsory. • Italy catch declaration compulsory only for >10m vessel • French federations collect and report information from tuna tournaments only. • Different catch limits per vessel and fishermen between countries.. Problems: • Low degree of logbook collection in Spain, inexistent in France and deficient in Italy. • Low control	• The lack of reporting should cancel the fishing licence. • Exclude FOC	Improve the control over the resource Improve the information on the resource.
Tourism fishing: economic activity, hiring vessels and/or fishing services to recreational fishermen (for leisure or competition)	The tourism fishing includes a variety of types which are not always well defined or regulated in all the UE-Med Countries. Some of its types lack of a legal frame.	It is a recent activity that requires a specific regulation homogenized at international level. Exclude FOC	Economic Development associated to the tourist activities: employment in services, inputs consumption, enlarge tourist attraction of places… Additional economical input for professional fishermen.
Illegal Recreational: Catch is partially or totally sold on the black market; this situation is common in some areas where there are socio-economical problems and among people without economic problems because this activity is socially accepted in countries like Italy.	Not legal in any EU-Med country. Scarce presence in France and Spain. Common and popular in Italy.	Increase and improve Control. Development of Recreational Associations. Programs on Recreational Fishing education and information.	Degradation of the stock Degradation prices Degradation of sanitary security Damage to recreational fishing sector and its development

Furtive fishing, It is not a recreational fishing but is masked by recreational fishery, with true fishermen going at sea on a regular base like professionals; fishes are usually sold on the black market or directly provided to restaurants without any invoice, only partially used for personal consumption; this situation is common in areas where there are socio-economical problems.	Not legal in any EU-Med country. Some presence in all EU-Med country. Could be relevant in the south EU-Med regions but not assessed and out of the scope of this project.	Provide socioeconomic alternatives to retired people, unemployed, etc. Improve control over activity, market and transport. Urgent control measures on this fishing activity.	Degradation of the stock Degradation prices Degradation of sanitary security Damage to recreational fishing and professional sector development Economic losses Development of illegal activities (drugs…)

Ports

The census on ports and moorings in Spain, Italy and France presented in this report represent a figure very close to the total of them these countries. Data on ports services are complete for France and Spain but for Italy this information could not be obtained. Information on ports activity is significant for Spain (65 ports), illustrative for France (17 ports) and inexistent for Italy as a consequence of the lack of transparency for the tourist harbours in Italy.

In France both regions present similar densities of ports and moorings (per km of coast) and both present an average port size of big capacity (around 700 moorings). In Spain ports densities are quite similar between regions and lower than in France but the difference in moorings density because the average size of ports differ between regions from 331 moorings to 534 on average but all smaller than French ones. Italy present big differences between regions average port size are smaller than in France but two regions present an extreme level of density: Friuli-Venezia Giulia and Liguria.

It is necessary to remark that there is an important nautical activity not associated with harbor infrastructures. In certain regions anchoring or mooring takes place over beaches or in bays which more or less seasonal incidence. It may be expected that this type of free mooring is more frequent in regions of lower development but also it is facilitate by the coast line contour. Areas of free anchoring has been estimated in Italy and represent almost the same proportion of ports areas. Thus the number of ports in Italy does not show the real mooring capacity.

The number of mooring is significantly positive correlated with the number of euros per citizen (purchasing power). But the number of ports is not significant related due to differences in ports sizes. Ports size although is not significant the correlation is high enough to indicate that some relation exist. Mooring prizes is not significantly related with citizen purchasing power or any other variable. Nevertheless the whole analysis on ports seems to show that in richer regions where average ports are bigger the numbers of workers are less and consequently ports expenses are reduced and mooring prices are

lower. This result shows that Spanish mooring prizes are extremely high and this data corroborates the extremely high mooring costs reported by the Spanish recreational fishermen shown in chapter 2.

Ports services are indicators of harbors quality but no relation ship has been found with annual purchasing power (€/citizen) with the exception of the negative relation found with Dry Dock services. This is explained by the price of land occupied by the dry docks, the richer the region the higher the prize, as the price goes up the ports may sell the place and substitute the dry dock by parking infrastructures in inland areas of cheaper value.

The annual fuel consumption has been the variable less reported in the questionnaires sent to sportive ports and this prevents any attempt of statistical analysis. Nevertheless the number of liters per mooring were estimated and averaged by region. This data has been later used in the recreational fishing activity section to compare with the annual liters declared by the recreational fleet and it has been used to tune the recreational average fishing days per year.

It is convenient to underline that the use of two independent data sets with common variables (mooring prize and fuel consumption) helps to know the consistency of the results and the bias of the estimations.

One of the clearest conclusions of this study is to show that the recreational activity is the most important activity in the Mediterranean non trade harbors and not the professional fishery.

Recreational Fishing Activity

The scope of this section has been to understand the recreational fishing in its different features and to provide a general insight of this activity in the western Mediterranean.

The results presented in this section go from the age structure of recreational fisherman to the total annual catch and its associated costs. The success on collecting information

differs between countries and also in the population sampled. In Spain the sampling design covered the whole recreational fishermen population while in France and Italy restricted to recreational tuna fishermen. In spite the Spanish sampling design the results have shown that the sample was also bias towards vessels above the average size and above the mean annual fishing activity.

Recreational fishermen in France and Spain are mostly included in the age segment between 45 and 65 years old with and average around 55. The peak of fishermen found around 55 yrs old may be explained by the age at which the economic stability is reached in our society. Recreational fishing from boat requires minimum expenses above the average means of people at younger ages. An exception is observed in Sicilia where fishermen are significantly younger than in other regions, this result jointly with others observations points that the fishing activity in this region is not fully recreational.

The size structure of the recreational fleet in Spain gives a mean vessel size around 8 meters of length but the population mean could be slightly smaller because the potential bias of the sample. The bigger average size of French fleet which is around 10,5 meters is explained because the sample is of tuna vessel but Sicilian fleet also on tuna vessel the average size is too small (6 m). Sicilian waters are characterized by a dense aggregation of small tuna in this waters which can be caught easily by small vessels. The big catch of undersize tuna in this region as well as others Italian region have been corroborated by direct ports and bays sampling in this study.

In Spain the number of fishermen per vessel (crew size) could be estimated and the average was 2,6 fishermen per vessel. The annual fishing days was around 50 days in Spain and it was lower in France and Italy around 40 days. The perception that questionnaires have been filled by fishermen of activity above the mean was evident at the time of adjusting port's fuel consumption and vessel consumption. This tuning decreased the fishing days to 30-35 days per year.

The sportive activity of recreational fishermen represents a small fraction of their fishing activity (2,7%). The most frequent fishing modalities from French and Italian sample obviously is Big game and in France Big game shumming is the most common

practice. The Spanish sample which is closer to represent the whole recreational activity shows that anchored line fishing is the most frequent fishing.

In the legislative section a detailed description of the allowed fishing modalities in each country is reported. From fishing questionnaires the catch species composition by each fishing modality has been estimated. No significantly differences among countries have been found for Big game catch species composition but the other modalities present differences between countries. Although, different potential causes for these differences have been commented in the report none of them are conclusive to be mentioned in this summary.

The Spanish questionnaires represent the whole recreational fishing activity and the average daily catch per vessel gives an approximate figure to the daily CPUE of this fleet. The estimation has been 4,99 Kg per day this figure multiplied by the average annual fishing days gives the annual catch for each vessel. To estimate the annual total catch of Spanish Mediterranean fleet first, the size of the fleet has been estimated by dividing the number of recreational fishing licenses from boat by the average crew of each vessel. The total annual catch estimated for the Spanish recreational fleet was close to 6.600 tons. Another objective of this project was to estimate the costs associated for each kilogram of harvested fish and the total annual expenses of the recreational fishing fleet. Because the bias of the sample costs and catch could be overestimated but its rate (costs per kilogram) should be buffered and rather close to the real value. The costs per harvested kilogram was 81 € if the initial expenses of buying a vessel are not considered in the estimation. The estimation when the latter expense is included the costs per kilogram rise to 129 €. The total annual expenses of the recreational fleet varies from 534 millions of euros to 845 millions of euros depending if the expenses of buying vessels are included or excluded. Although, both figures are positive bias due to the bias of the sample they are roughly indicative of the economical magnitude of this activity.

This figure it is very relevant to be compared with the professional total production in the Spanish Mediterranean (380 millions € in 2003). The professional fish is more economic (obviously the market price is lowest that the cost of recreational fish), the professional activity probably produce more economic impact in the local communities (in activities as transport, market, logistics, processing, etc.), but the direct contribution

to GNP of the Recreational Activities is most important in the Mediterranean that in the Professional Activity.

The economic measures (as tax) can provide Safety Limits of Recreational Fisheries impact on the resources but the economic measures should move in between certain limits. From the bioeconomic point of view maintain some “non-fishing costs” or “fishing costs” not lower of certain limits can contribute to reduce incentives to fish and reduce (if is necessary) the pressure over the resource. Although, unnecessary extreme “non-fishing costs” may have a non desirable effects by reducing the Recreational Fishing and associated economy. A low “non-fishing costs” observed in Italy can indicate a certain economical use of this fishery.

The analysis of ports activity and recreational activity together showed that 46% of Spanish moorings are occupied by the recreational fleet. Although fuel consumption indicated that recreational fishing vessel in summer time could represent 56% of total mooring (including free bay mooring and overcapacity of ports). Fuel consumption from both data sets indicates once again the bias of the Spanish sample towards the most active fishermen and points towards that the annual average fishing days should be around 30 instead of the 50 reported in the questionnaires

The Tuna Case

The practice of tuna fishing and related species is a very particular case of recreational fishing and has been analysed independently. The total catch of Tuna recreational fisherman has been estimated in two countries, in Spain by an indirect approach and in Italy through a direct sampling developed in every port and bay. The indirect approach is possible to be applied in Spain and not in France because in Spain for the practice of Big game fishing (BGF) a special authorisation is required per vessel. This permits to have the size of the Spanish recreational BGF fleet. Moreover, the data on French tuna tournaments in the last decade is shown and is illustrative of the power tool of tournaments data as additional information in population assessment.

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Spanish tuna activity gives an average daily catch of tuna per vessel around 10,11 Kg. Tuna recreational fishermen spent 43% of time fishing on tuna. The reported average fishing days per vessel was 24, 9 days but to remove the bias of the sample it has been applied the same correction done for the Recreational Fishing and annual fishing day targeting on tuna diminish to 17,43. The annual total catch varies from 649 tons to 455 depending on the annual fishing days per vessel consider in the estimation. Anyhow the latter figure it is extremely high because we have considered that every vessel with the special fishing tuna authorization fish on tuna 17, 43 days per year which is quite unlikely. This show the need of tuna catch declaration by the Recreational Fishing including the catch cero, otherwise any further study will be once again obliged to use indirect approaches which would give distorted results.

The annual fleet expenses was close to 42 millions of euros and the expenses of each kilogram of tuna caught by a Spanish recreational vessel was around 92 €.

The direct sampling on Italian tuna fleet sized the fleet around 4233 vessels and a total tuna catch of 265 tons. Thus the daily catch would be 1,25 Kg a rather low and unlikely catch. On the contrary from the information reported on Italian questionnaires the daily catch per day and vessel is 9,76 Kg., this daily catch is still lower that the one reported by the Spanish fishermen but quite close and reliable. Thus we presume that the 265 tons estimated by port by port sampling is unreliable. The annual catch estimated with the 9,76 Kg. day/vessel would be around 1942 tons for the Italian recreational tuna fleet. The annual expenses of the whole fleet would be close to 42 millions of euros and the cost of catch a Kg. of Tuna by an Italian vessel 21,5 euros.

The Italian sampling port by port allows to identify the regional differences in the tuna recreational fleet as well as the regional differences in tuna distribution. Port by port sampling shows that 10.990 Kg. of tuna < 6 Kg is caught by the recreational fleet. This catch represents the 4% of the total catch estimated by the direct census. Applying the 4% of the total catch estimated from fishermen questionnaires the total catch of the young of the year become 77680 kg. At present, the weight limit for tuna is 6.4 Kg so almost 79 tons are of illegal sizes in Italian catches. To prevent this catches in regions where the aggregation of young tuna is particularly high the implementation of

restrictions on recreational fishing modalities and hook sizes is an urgent measure to be taken.

The French FFPM reported data on 11 years on tuna tournaments. Tuna sportive fishing season takes place during the whole summer but most of it is concentrated in August. The percentage in kg of fish consumed represents 30.5% of the total catch. The total income from sales during this season sum up 21.552 euros in 2003 (tuna caught during contests is sold for charity donations). This figure although it may seem high is for the whole sportive big game activity in 2003. The catch time series showed that 1996 onwards both regions (PACA and Languedoc-Rousillon) presented the same temporal oscillations. The potential reasons under the variability in annual catches could be the following: tuna presence in the regions, tuna abundance in the Mediterranean, availability of tuna (changes in vertical distribution), the number of tournaments or fishermen have been rejected after discussing this topic with the F.F.P.M. The presence of tuna in this regions respect to other Mediterranean areas can not be resolved at present because this data is not gathering by other federations or organizations. Assuming that annual trends of French tournaments is given tuna trends in the Mediterranean the present situation would indicate the worst observed in the last eleven years and at a level which would point the bad state of tuna population.

ANNEX. - PROFESSIONAL FISHING TARGETING TUNA AND TUNA-LIKE SPECIES IN THE MEDITERRANEAN RECREATIONAL FISHING. (Contribution of the Spanish Oceanographic Institute)

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- December 2004 -

1. Fisheries

- Fleets: number of vessels and characteristics
- Gears: description
- Areas and fishing season
- Strategy and fishing technologies
- Characteristics of the catch

2. Catch-Effort.
   - Historical series of catch by species, gear and ICCAT area.
   - Catch, effort, CPUE, average weight by gear, species and month.

3. IEO programme of on-board samplers:
   - Space-time distribution of the resource.
   - Catch per effort unit.
   - Length distributions of the catch.

4. Profesional and Recreational Fishing
   - Recreational fishing tournaments.
   - Biological information from the recreational fishing.
   - Preliminar comparisson of recreational and artisanal profesional fishery.

5. Biology.

6. Stock status.

7. Regulation and Directives.

8. Bibliography.

Introduction

The following describes Spanish fisheries for bluefin tuna and albacore in the Mediterranean and the area of the Straits of Gibraltar, with the aim of providing a global vision of the space and time distribution of these species, which are also targeted by recreational fishing. We intend to enhance our knowledge of the ranges in size distributions, fishing yields etc. in every area and period. Thus, the ultimate goal is to establish a comparison between professional artisanal fishing and recreational fishing, when it comes to particular traditional fishing systems such as troll line or hand line.

The large pelagic species being targeted by Spanish fleets operating in the Mediterranean and the South Atlantic area are bluefin tuna (*Thunnus thynnus*), albacore (*Thunnus alalunga*), swordfish (*Xiphias gladius*) and small tunas, such as frigate tuna (*Auxis spp*.) Atlantic bonito (*Sarda sarda*) and little tunny (*Euthynus alletterattus*). Marlins such as *Tretapturus albidus* or *Tetrapturus belone* are not targeted species, although they have a faint representation in surface longline fisheries targeting swordfish as well as in trolling line.

The follow-up of fisheries for tunas and tuna-like species is carried out by the Instituto Español de Oceanografía by means of the Information and Sampling Network in Ports, as well as the On-Board Observers Programme in the Mediterranean.

During 2003 and 2004, we reported about the landings of catch belonging to the different fisheries at the ports of Tarifa, Algeciras, Águilas, Cartagena, Castellón and San Carlos de la Rápita. Some information was also gathered from different fishermen's associations. The on-board programme was carried out mainly in the Mediterranean, more precisely, on vessels operating with drifting surface longline gears alternatively targeting at swordfish, bluefin tuna and albacore.

In the area of the Straits of Gibraltar, landings and samplings were obtained on vessels using live baits and hand lines.

Data on fishing situations, fishing effort and catch by species were obtained from each trip. The samplings of the length of target species were carried out by obtaining the fork length (ICCAT standard) of each specimen captured.

The fishing systems described below refer to hand line, surface longline, bait boats and seine. However, for comparison purposes, we will only take into account the hand line and the trolling line, which are the most widely used tackles in recreational fishing.

Fisheries

Fleets

HAND LINE

Bluefin tuna is captured by hand line (HAND- ICCAT code) from April to the end of the year in relatively coastal areas (20 miles) in the South Mediterranean, Valencia and Catalonia. All these zones, characterised by bottom elevations (100 meters depth), are areas of bluefin congregations with a FL of 120-235 cm. There are two fishing seasons, Spring and Autumn, called "from straight" and "back", respectively. The gear has a nylon monofilament main line with a section of 180-200 mm and with n° 17/0 curved hook (Japanese type), baited with mackerel (Scomber sp.) or sardine. Fishing can be done by hand or with the help of a manual brake. The fleet which pursue this type of fishing is very heterogeneous, and is currently composed of 189 boats with the following mean characteristics: 12.38 TRB, 87.35 HP and 8.71 m of length. **Figure 1**.

Gear description and fishing technology:

It is an artisanal gear composed of a hand-held line with weighted end and nº 17/0 curved hook of Japanese type (curved hook). Fishing by hand line is carried out by several artisanal boats from August to October. Main fishing grounds are those at Roquetas and the Strait of Gibraltar. This fishing modality was recently implemented in Estepona.

A hook baited with *Scomber scombrus* or *Sardinela aurita* is attached to a line of about 10- 20 fathoms in length which, in turn, is attached to a main line of about 500 m in length. The gear, once rolled, is stored in wooden boxes.

Currently fishing strategies involve double rigging, though sometimes three or four lines are employed by using buoys or auxiliary skiff. Two baited lines are shot close to tuna feeding grounds or *secos* (sea bottom plates). Each line is attached to a buoy or to the fishing boat and dead bait is thrown from the boat –*brumeo*-, in order to attract tuna. Once hooked, tuna is brought onboard by means of a hand-held harpoon and a pulley. Figure 2-3

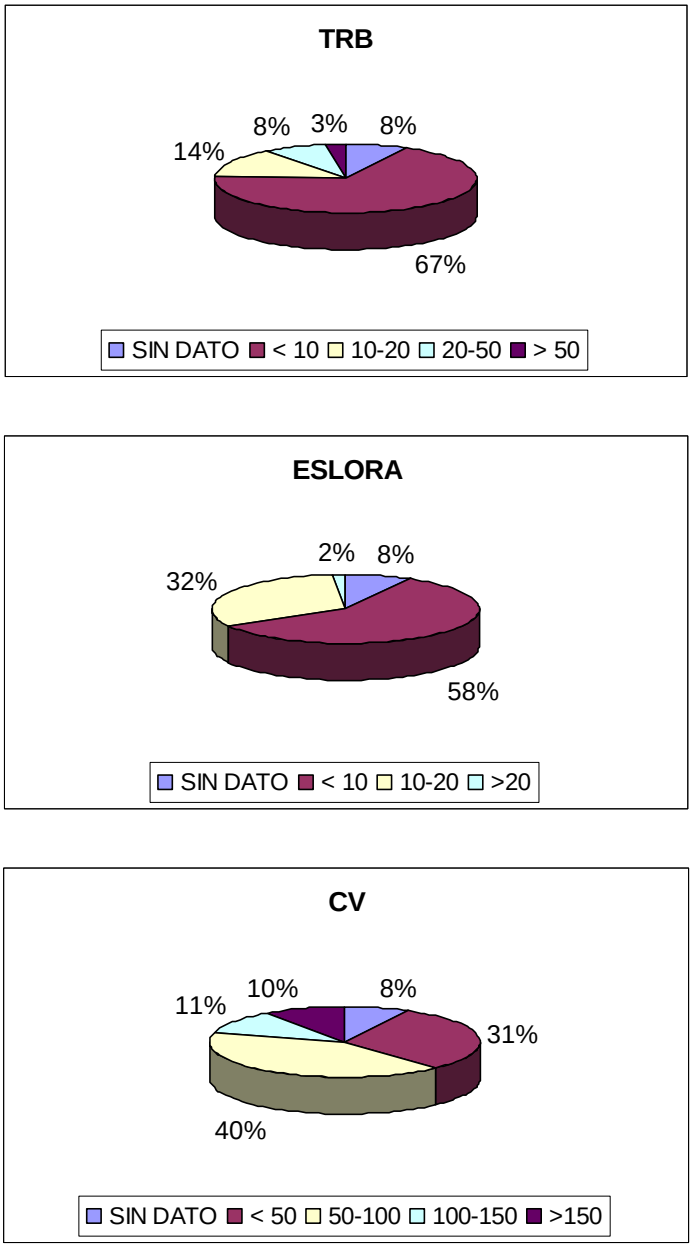


Figure 1 . Hand Line Fleet (Mediterranean)

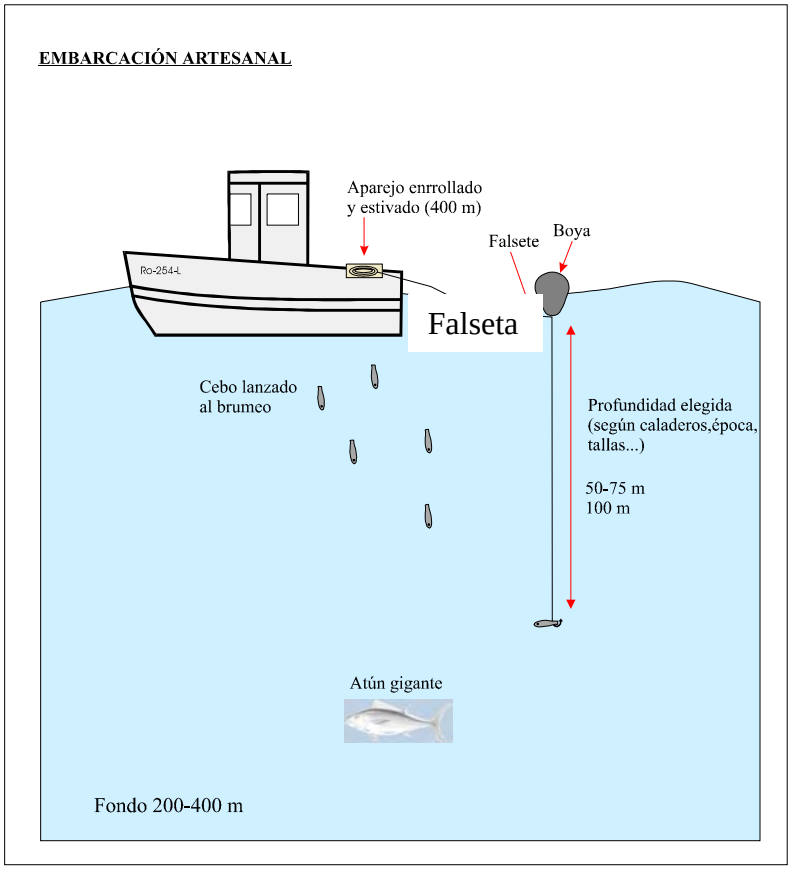


Figure 2.- Bluefin tuna fishing by hand line. “Al Brumeo”.

Figure 3 .- Vessel type currently hand-line fishing in the area of the Strait of Gibraltar

Fishery in Straits of Gibraltar

During its post-spawning migration, the bluefin tuna crosses the Straits of Gibraltar and traditionally, it is caught by Mediterranean Spanish and Moroccan traps. In 1996, the fishing activity with hand line and string/rod with live baits started developing in the middle of the Straits. As it is well known, traps operate during July and August.

The hand line fishery is also performed during July and August. The fleet is made up of 45 artisanal vessels with 10 GRT, 200 HP and 12 m length, on average.

The fishing area (**Figure 4**) is to be found in the middle of the Straits, on bottoms from 200 to 240 fathoms, or even deeper. The tackle used is a plastic and nylon braid line of 3,5 mm diameter and 400-500 meters long, attached to a nylon monofilament fishing line of 2 mm gauge, knotted to a large hook (12 cm line and 5 cm bend). The jack mackerel (*Trachurus trachurus*) is used as bait (25-30 cm total length).

This fishing activity consists in letting out the line (generally 3 per vessel) to 200-240 fathoms depth. The tackle is attached to a 20 kg stone by means of a thin thread called "falseta". When the stone reaches the bottom, the line is pulled up, breaking the "falseta" and freeing the baited hook. The catch is generally obtained in the middle of the day (12-13 hours) and the sizes of the captured specimens range between 170 and 300 cm length FL. The average catch for the past 5 years has been close to 100 tones.

BAIT BOAT

The bait boat fishery relies on a fleet made up of 13 vessels based at the port of Tarifa (100 GRT, 200 HP and 12 m length) and 17 vessels based at Algeciras (100 GRT, 120 HP and 15 m length). Another 15 vessels from ports of the North of Spain also participate on a seasonal basis. These vessels are better equipped (83 GRT, 437 CV and 25 m length), but their involvement in this fishing activity is diminishing due to the development of the local fishery. **(Figure 5 y 6)**

The fishing area is the middle of the Straits of Gibraltar and the activity begins in August and ends in March. The catch is made up of a wide range of sizes, depending on the months. (60-245 cm FL).

Tuna are detected by the sonar and the probe and the number of fish and the depth of the shoals is also estimated. Then, water is mixed with live bait, generally jack mackerel or sardine, among others, and the sea surface is irrigated. The string has the same structure as the hand line, although it is provided with a bended lower hook (4.5 x 3.5 cm size). It is let out with a live bait by means of a plumb device. Usually, 3 or 4 strings are used per vessel.

Young tuna swim up to the surface and are caught by baited lines. Big specimens are caught at 20 fathoms depth. The average catch of bluefin tuna in the past 5 years with this fishing system in the study area reached 320 t. Mainly, fish are caught between 17 and 19h, depending on the time of year, but never in the morning.

Figure 7 shows the bluefin tuna catch obtained by fisheries operating during post-spawning migration ("de revés") through the area of the Straits of Gibraltar. Note that the catch obtained by the trap of Ceuta has decreased from the year 1991 onwards. This could suggest that the number of fish has also dropped. However, the development of hand line and bait boat fisheries could question this hypothesis.

Length distribution

Figure 8 shows the length distribution of the bluefin tuna catch obtained by hand line (June-August) and bait boat (August-March) fisheries during the year 2002. The observation of size ranges let us identify the hand-line bluefin tuna catch with the spawning tuna caught by the Atlantic traps near the Straits during the "derecho" (genetic) migration. The range corresponding to the hand line fishery is slightly higher because the fish caught by this system are those that crossed the Moroccan coast at the beginning of the season and have a higher average weight.

Figura 4.- Áreas de pesca del atún rojo en migración trófica “de revés”. Morfología del fondo.

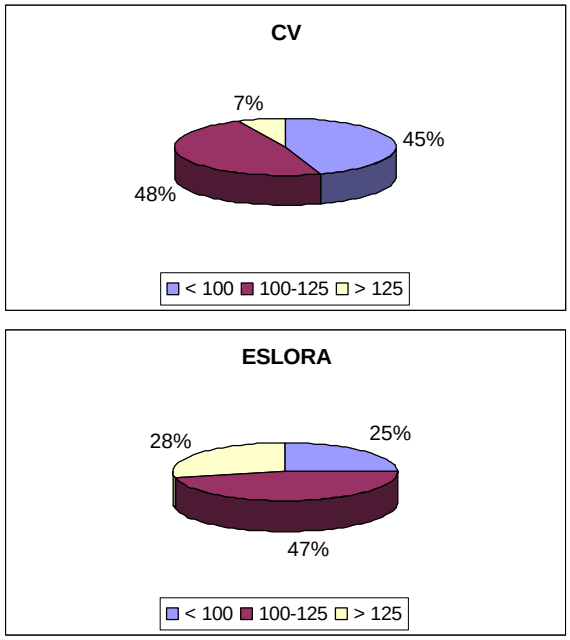


Figure 5 . Fleet of Baitboad (Algeciras)

Figure 6. Spanish vessel Baitboad for tuna fishing

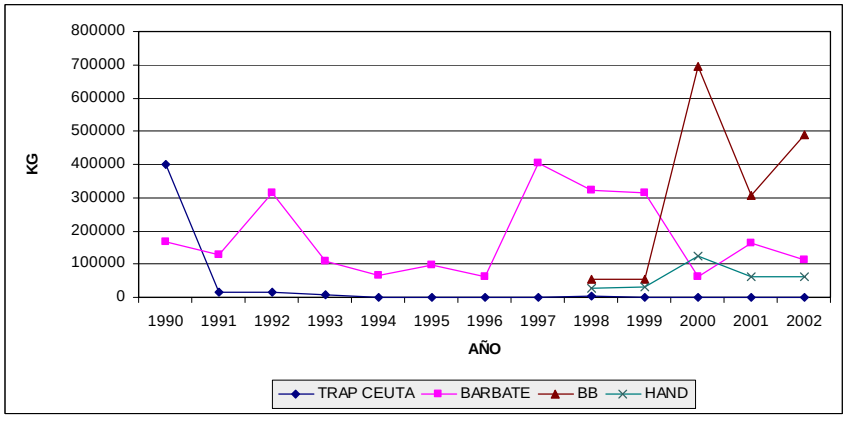


Figure 7. Annual catches of bluefin tuna during feeding migration caught by trap, hand line and bait boat in the Strait of Gibraltar for the period 1990- 2002.

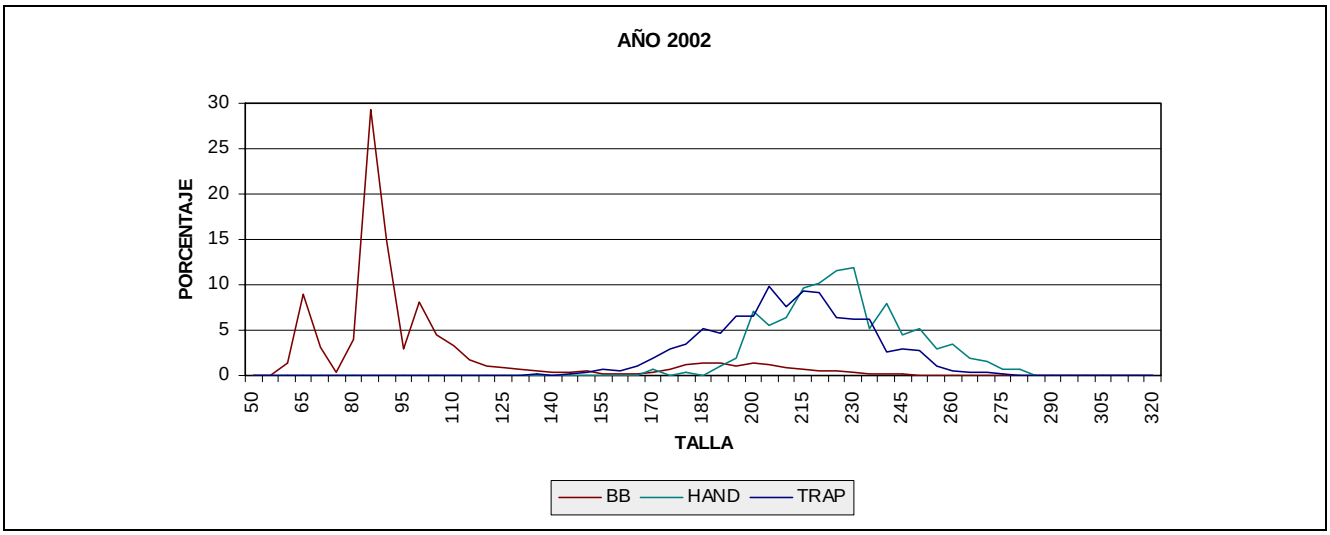


Figure 8. Length distributions of bluefin tuna caught by bait boat, hand line and trap (feeding migration) in the Strait of Gibraltar for year 2002.

PURSE SEINE

Bluefin tuna fishing by purse seine is affected from April to October between 42° N-38° N latitude and from the coast through 05° E longitude (**Figura 9**). The fleet is composed of 6 boats whose mean characteristics are: 101.89 TRB, 792 HP and 26.79 m length (year 1998). **Figure 10**

The net is 1400 m long and 180-200 m high. It is a large single-panel multi-sectioned net, mounted to a float rope and a foot rope. The foot rope has a steel wire running through the pursing rings by means of which the bottom of the net is closed. **Figure 11**

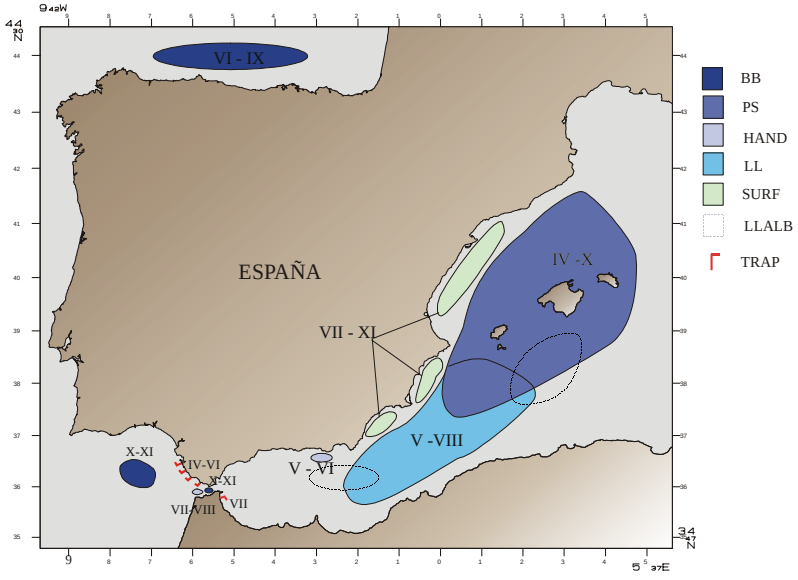


Figure 9. Areas and fishing seasons of tuna and related species.

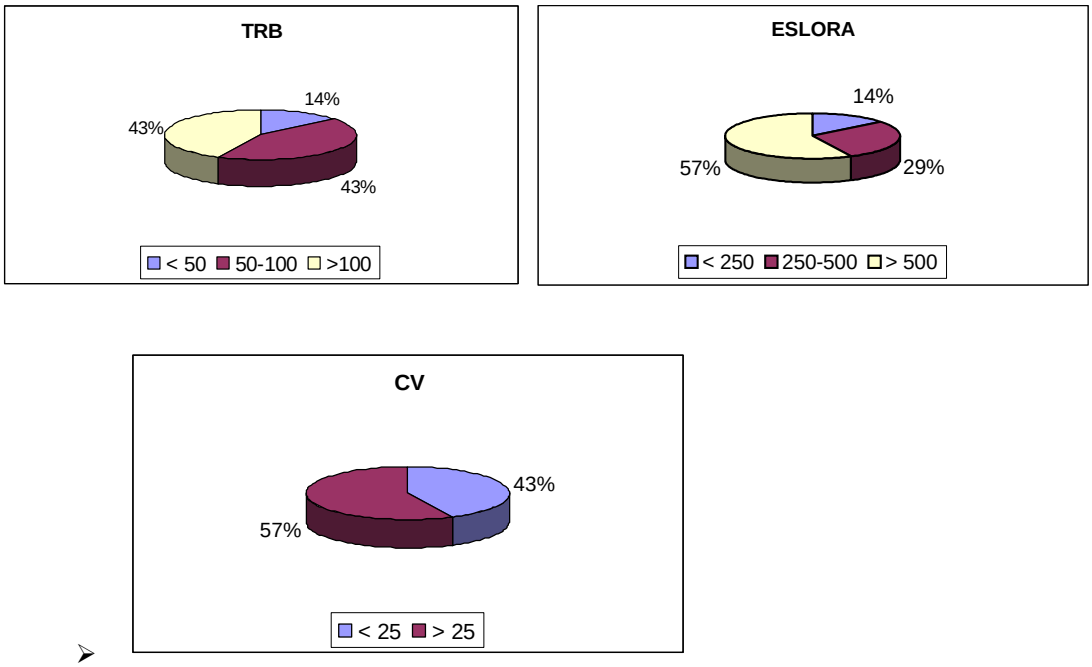


Figure 10. Fleet of Purse seine

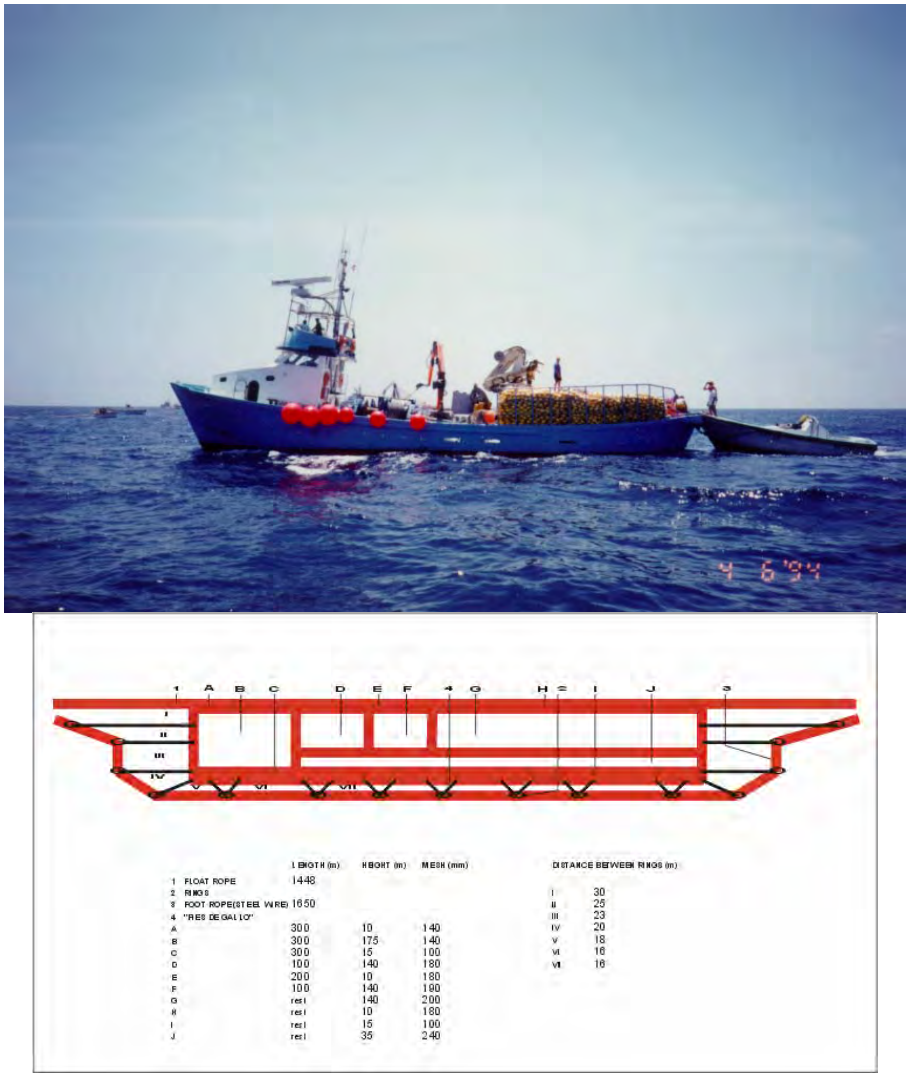
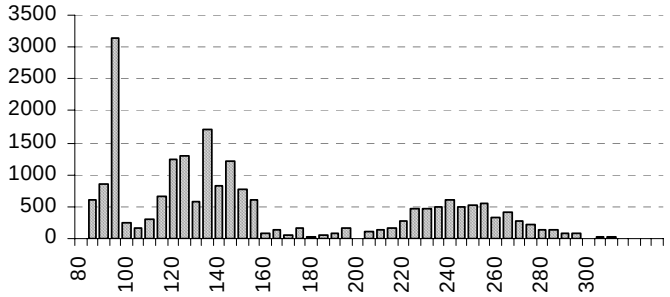


Figure 11.- Spanish vessel of purse seine fishing of bluefin tuna and Scheme.

The length distribution of 21 052 bluefin tuna caught by purse seine in the Mediterranean Sea is shown in the following figure



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SURFACE LONG-LINE (LL)

Bluefin tuna is a by-catch species on the surface long-lines for swordfish. Nevertheless, during May, June and July, there are some boats which, in the Balearic areas, target part of their effort on bluefin tuna catches. They introduce several modifications on their gear: bigger lines, bigger distance between ganging and number 17 curved hooks (Japanese type) baited with squid.

MEDITERRANEAN	
Gear	BB
Target species	ALB
Other species captured	BFT
Fishing area	
Fishing season	IX - XI
Number of vessels	15 - 20
Average size of the vessel	L (25); HP (); GRT (150)
Landing ports	
Lengths range maximum/minimum (fork length in cm).	60 - 90

Chart with the characteristics of the Spanish fishery for bluefin tuna with line (live bait) in the Mediterranean.

MEDITERRANEAN	
Gear	TROL
Target species	ALB
Other species captured	BFT
Fishing area	MED
Fishing season	IX - XI
Number of vessels	20 - 25
Average size of the vessel	L (25); HP (); GRT (100)
Landing ports	
Lengths range maximum/minimum (fork length in cm).	60 - 80

Chart with the characteristics of the Spanish fishery for bluefin tuna with trolling line in the Mediterranean.

SWORDFISH, Xiphias gladius

The Spanish fishery for swordfish in the Mediterranean is characterized by the heterogeneity of fleets and tackles. There are 145 vessels targeting the swordfish in the Mediterranean with an average length of 11 m, 145 HP and 25 TRB, although they vary greatly. The average characteristics of the tackles and their variation range are represented on **table 1 and figure 14**. The fishing activity is carried out throughout the year, summer and autumn being the most active seasons. Nowadays, the fishing area (**Figure 15)** covers the peninsular coast to 6º longitude to the east and south to the sea border between Algeria and Morocco. The evolution of the fishing strategy is such, that a certain number of vessels target bluefin tuna from May to July. Also, some vessels can capture albacore in different seasons on an occasional basis.

Exceptionally in August and part of September, some vessels modify their technology to use the semipelagic longline gear called “piedribola” (**figure 14**), because the swordfish changes its behaviour immediately after the reproduction period. The

swordfish is also captured as by-catch with surface longline gears targeting bluefin tuna or with surface longline gears aiming at albacore, as well as other surface gears aiming at small tuna, although to a lesser extent.

The swordfish catch by the Spanish fleet in the Mediterranean in 2001 reached 1475 tn, which amounts to 10% of the total caught by all countries and gears.

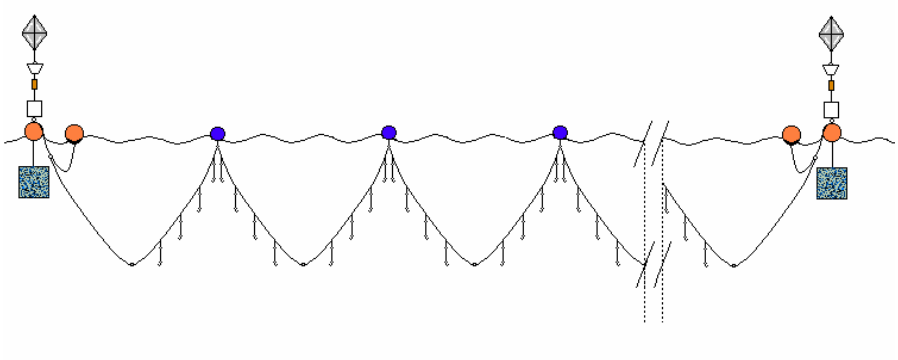
Figure 16 shows the yearly catches of swordfish for the period 1998/2001, associated to data on effort, CPUE and average weight for the same years.

Figure 17 shows the catch, effort, CPUE and average weight per month of the swordfish catch with surface longline.

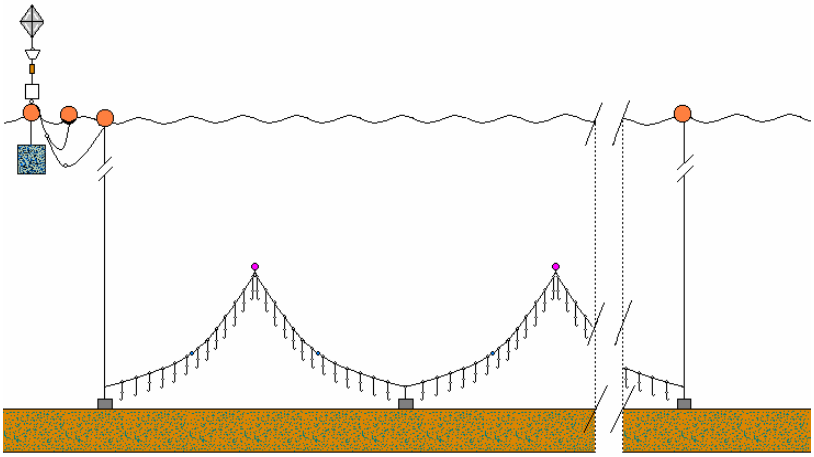
The specific composition of the catch includes % of marlin species, mainly *Tetrapthtrus belone and Tetrapthurus albidus*, targeted also by recreational fishing.

	SWOLL
Nº of portions	25
Nº of units / portion	28
Nº of hooks / unit	6
Total hooks number (max).	2000
Distance between two hooks	➢
Main line length	41184m
Sedal length	11m
Size of hooks	2
Hooks material	Steel
Main line material	Nylon
Main line cross section	2mm
Sedal material	Nylon
Sedal cross section	1.3mm, 1.4mm, 1.6mm*
Float type	Empty plastic bottles Plastic balls
Buoys type	Duoble ball Empty plastic bottles
Reflective type	Standard (with reflective, radar and intermittent light operating with battery).

Table 1 =Characteristics of surface longline aiming at swordfish in the Mediterranean.

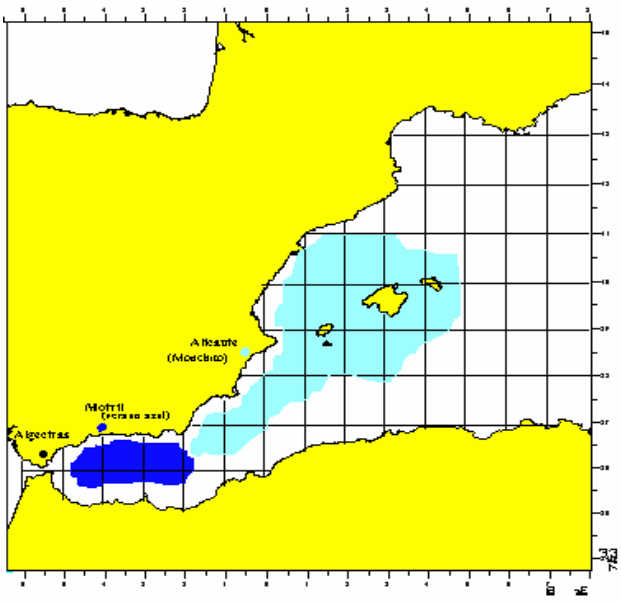


THE SURFACE LONGLINE APPLIED TO THE SWORDFISH



PIEDRA – BOLA (floating longline)

Figure 14. Diagram of the surface longline gear targeting swordfish in the Mediterranean.



➢ **FIGURE 15. AREA OF SWORDFISH FISHING WITH SURFACE LONGLINE**

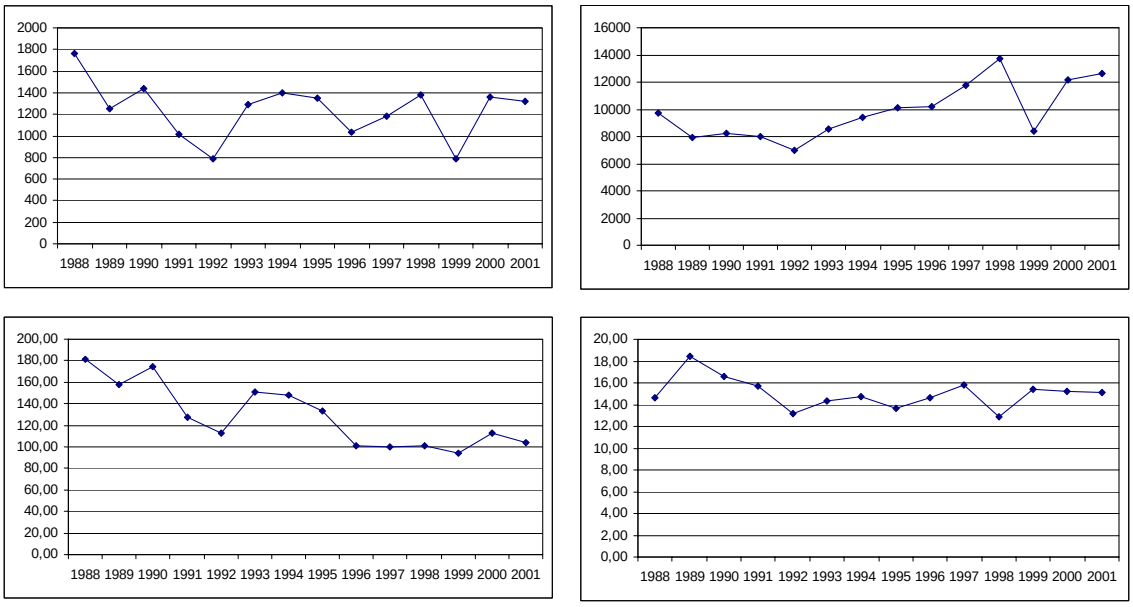


Figure 16. Catch, effort, CPUE and average weight of the swordfish caught with surface longline in the Mediterranean between 1988-2001.

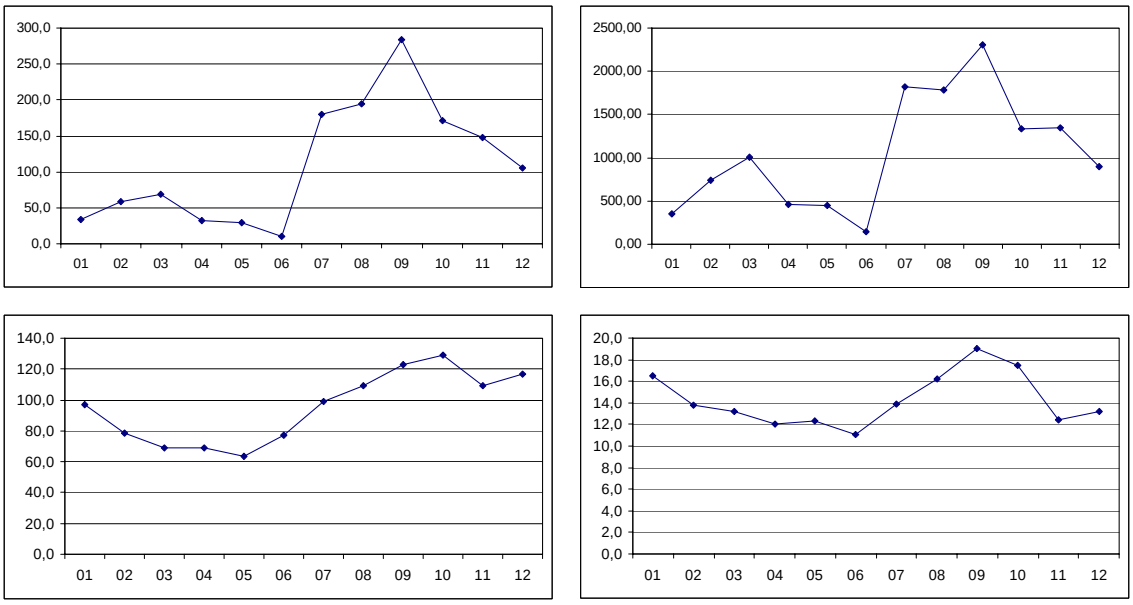


Figure 17. Catch, effort, CPUE and average weight per month of the swordfish caught with surface longline in the Mediterranean between 1998-2001.

ALBACORE, Thunnus alalunga

The albacore *(Thunnus alalunga)* is caught in the western Mediterranean by Spanish vessels which fish seasonally using surface long-line fishing. This is a seasonal type of fishery which even occasionally fishes sword fish as an alternative when the catches of this species are rare or when there is a significant abundance of albacore. In some years the fishing period is divided into two determined seasons: spring and autumn.

The number of embarkations which participate is variable depending on the year. The average fleet characteristics for the year 2000 were 29 TRB 11m of stem-to-stern length and 144 C.V. horsepower. The gear consisted of a single nylon filament main line of 1,1 mm calibre. The branches have a longitudinal section of 6m and 3m. The separation between the branches reaches 12m and the maximum number of authorised hooks is 10,000.

The fishing areas are distributed over well-differentiated zones in the area of the Balearic Archipelago and another one between Cape de Gata and the Alboran Island. The Spanish catches of albacore by means of surface long-line fishing in the Mediterranean were found to be between 200 tons and 25 tons depending on the year, with the average for the last 3 years of 50 tons.

Bait boat and trolling line fishing is only occasional during October and November, involving different numbers of vessels from Northern Spain (Camiñas and Rey, 1986). Bait boat fisheries are usually found in the Spanish-Algerian basin and in the Alboran Sea. Trolling line fisheries are generally to be found in the north of the Balearics, as well as in the Balearic thermohaline front. Albacore fishing with surface longline gears comes as a temporary alternative to the swordfish fishing and its activity may vary depending on the year. Longline fishery is fundamentally found in the south of the Balearics in the month of June and in areas of the north of Ibiza and east of Cape Gata from July to October. Surface fishing gears (line fishing, drift nets (Sarda sarda fishing) and other artisanal gears) catch this species to a lesser extent if compared to other fisheries. **Figure 18** shows the most significant fishing areas visited by the different fisheries targeting albacore in particular seasons.

The fleet and the standard characteristics of the vessels for each fishing system are very heterogeneous. The longline fleet is made up of vessels with a length ranging from 4 to 20 metres and between 1,3 and 120 GRT, performing trips which can last from 1 to 8 days. The bait boat and trolling line fleet is made up of vessels originally from the Cantabrian coast, between 16 and 27 metres length and between 180 and 500 HP. Thus, the fleet of longline gears is typically artisanal and heterogeneous. **Table 2 and Figure 19** show the structure, size, materials and hanging of the surface longliner targeting the albacore in west Mediterranean.

Table 3 and Figure 20 show a list of annual catches of albacore for each fishing gear between 1990/2000.

Figures 21, 22 and 23 show the length distributions of the albacore catch obtained by each gear for the year 1999, as well as the average lengths.

The differences between fishing and biological information among the different years and fishing gears is directly bound to the activity of the fishing fleet and the changes which have been occurring in the fisheries of tuna longliners in the Mediterranean for the past few years.

Larval research campaigns carried out by IEO during 2001 in the area of the Balearics (García et al, 2002) resulted in the catch of 50 albacore larvae, which confirms the importance of this area of the western Mediterranean as an oceanographic and environmental scenario for the reproduction of this species.

Gear	LLMB
Main line lenght (km)	60
Main line diameter (mm)	1.8
Total number of hooks	3556
Branch lines length (m)	5.5-7.2
Branch lines diameter (mm)	0.8-0.9
Distance between branch lines	14.4
N°`branch line between two float lines	8-11.
Distance between two floats	194
Float line length (m)	5.5-6.3
Lines material	Nylon
Hook: size (length *width, mm)	6 (37.1*15.0)
Hook material	Steel
Bait	Sardina pilchardus, Scomber japonicus

Table 2. Characteristics of surface longline gears targeting albacore used by the Spanish fleet.

Año	BB	LLMB	SURF	TROL	Total
1990	83	-	-	-	83
1991	499	-	-	48	547
1992	171	-	-	50	221
1993	231	-	-	59	290
1994	81	-	-	129	210
1995	163	-	-	306	469
1996	205	-	80	119	404
1997	-	141	2	202	345
1998	33	20	24	45	122
1999	96	73	41	73	283
2000	88.4	49.3	4.9	-	142.6
Media	165.0	70.8	30.4	114.6	283.3

Table 3. Annual catches of albacore by fishing gear. BB= Bait boat, LLMB= Surface longline for albacore; SURF= Surface gears, TROL= Trolling line.

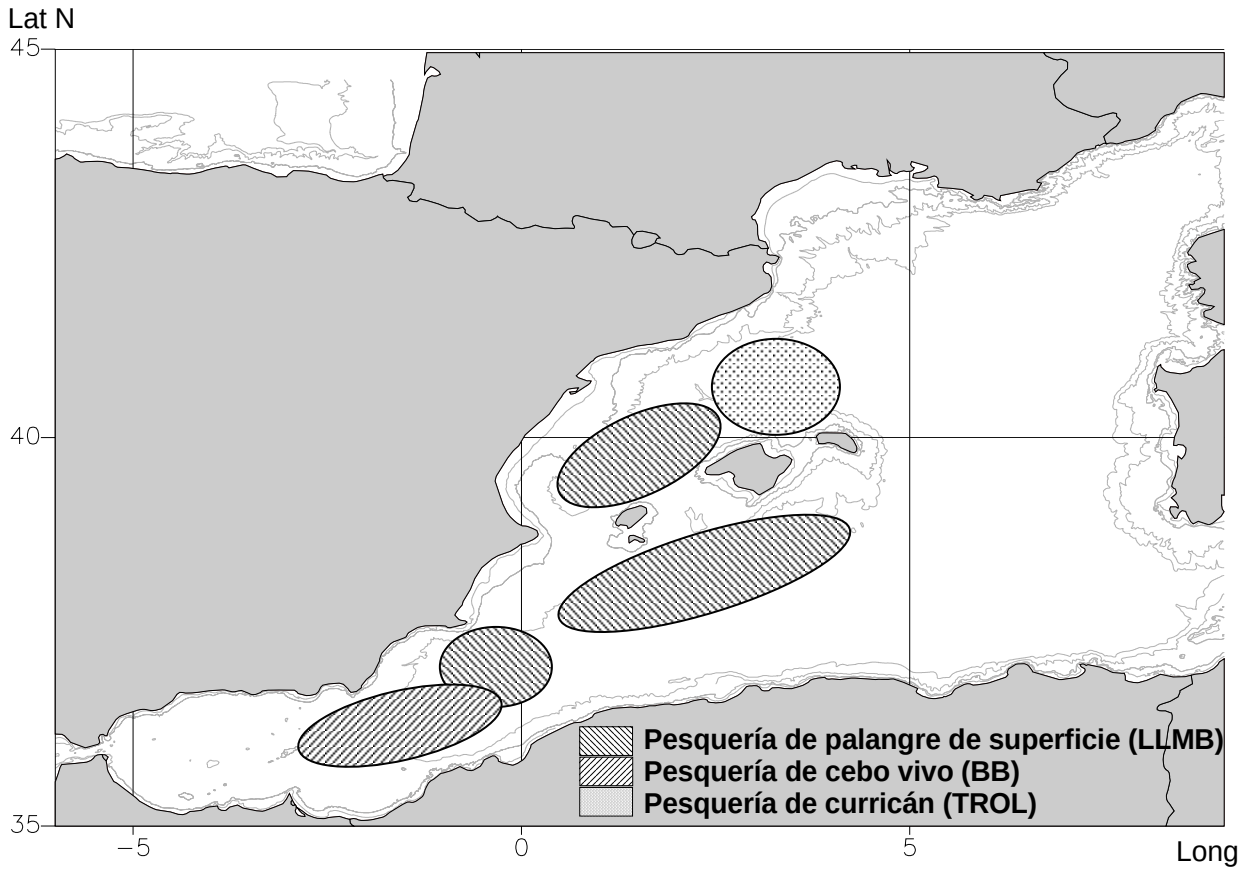


Figure 18. Fishing areas of the longline Spanish fleet targeting the swordfish: grids 5ºX5º of stratum 4 (Mediterranean) – ICCAT.

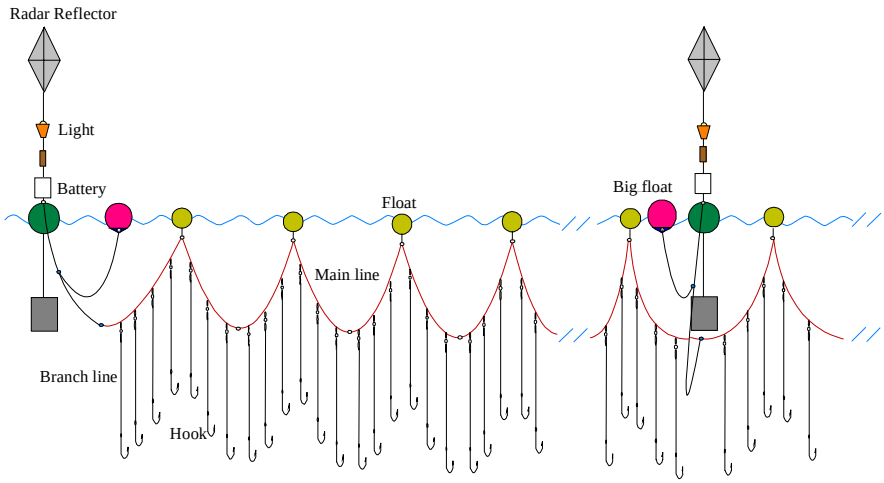


Figure 19. Diagram of surface longline targeting the albacore used by the Spanish fleet.

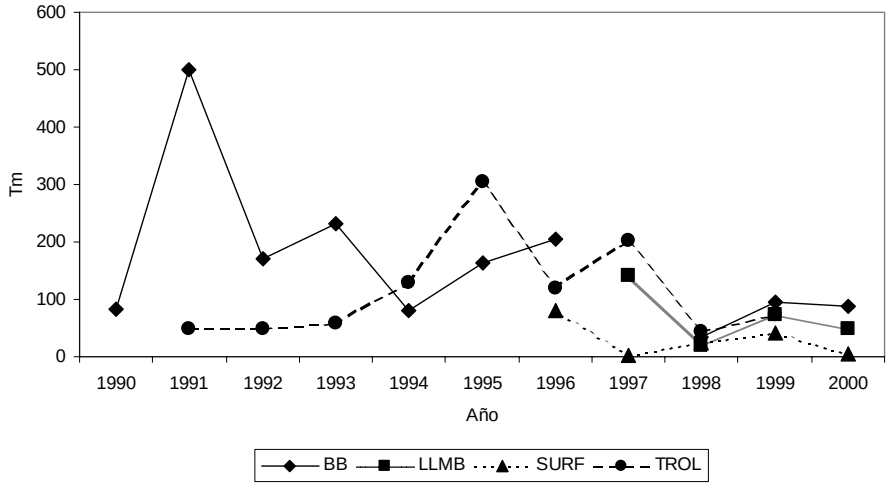


Figure 20. Annual catches distributions of albacore by fishing gear (1999-2000).

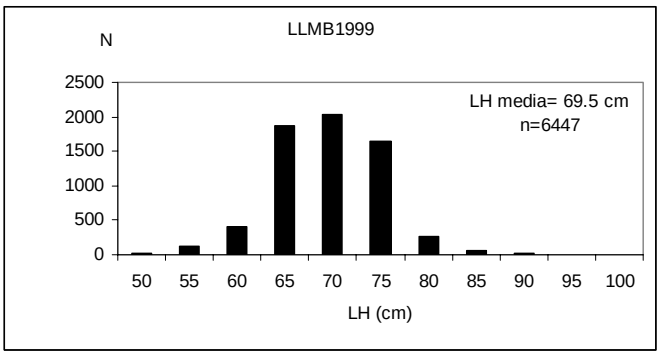


Figure 21. Lengths distribution (FL, cm) of the albacore catches with surface longline in Western Mediterranean.

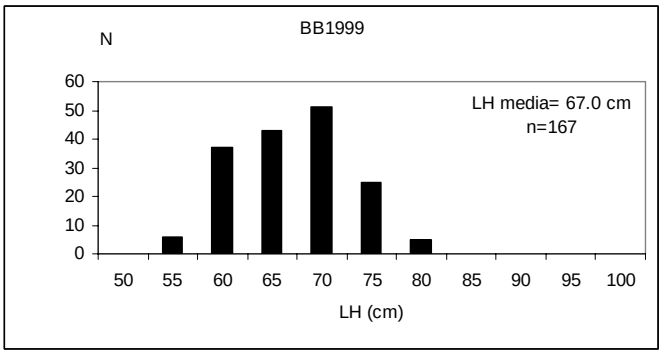


Figure 22. Lengths distribution (FL, cm) of the albacore catches with bait boats in Western Mediterranean.

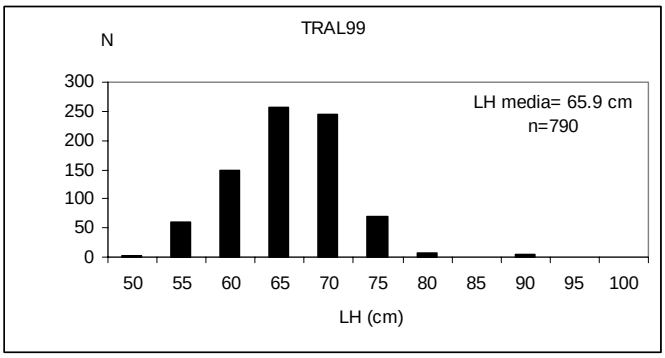


Figure 23. Sizes distribution (FL, cm) of the albacore catches with trolling line in Western Mediterranean.

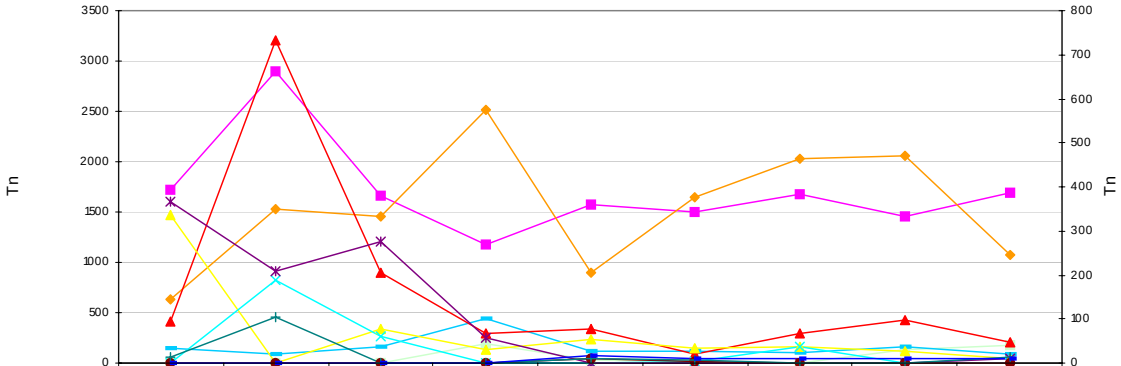
Catch - Effort.

Introduction

The statistic reports from task I of ICCAT have been carried out on the basis of the official data of landings by species, port and month. By means of weighting the samplings obtained at ports and on board by the RIM of IEO in terms of total catch by species, gear and space-time stratum, Task II of ICCAT was achieved. Task II includes data on effort by gear and space time stratum or ICCAT area.

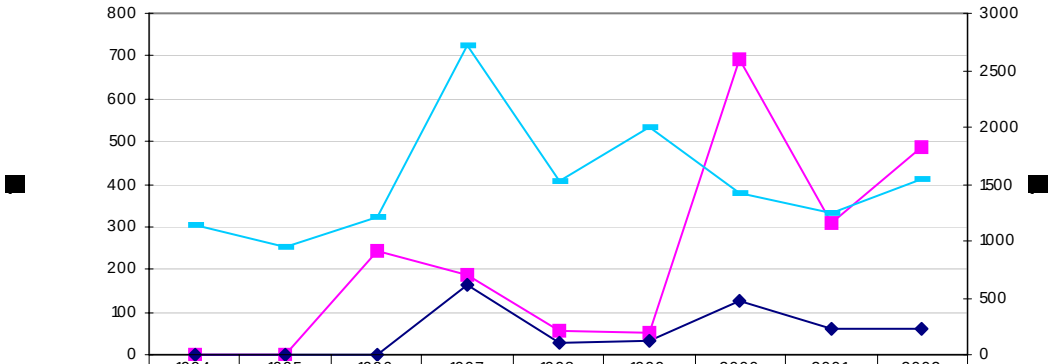
Historical series

Figure 24 shows the annual catch of bluefin tuna obtained by the different Spanish fisheries in the Mediterranean between 1994 and 2002. The data regarding the annual catch of bluefin tuna obtained by the Spanish fisheries in the Straits of Gibraltar and the Southern Atlantic region are shown in figure 25.



	1994	1995	1996	1997	1998	1999	2000	2001	2002
PS	1725	2896	1657	1172	1573	1504	1676	1453	1686
TRAP	0	1	1	1	5	1	0	1	0
LLALB	0	0	0	194	22	13	7	138	171
LLHB	35	19	37	101	25	28	22	37	21
LLJAP	143	349	332	576	206	376	463	470	244
HAND	93	732	206	69	76	21	67	98	48
SURF	336	0	76	30	55	35	38	28	11
OTH	0	188	60	1	0	4	36	0	0
UNC	366	207	274	57	0	0	0	0	11
BB	0	0	0	0	11	4	0	0	1
TROL	13	103	0	0	9	8	0	0	12
SPOR	0	0	0	0	18	9	11	11	9

Figure 24. Catches of bluefin tuna by gear in the Mediterranean.



	1994	1995	1996	1997	1998	1999	2000	2001	2002
BB	0	0	245	189	54	53	694	307	487
HAND	0	0	0	161	28	33	126	61	63
TRAP	1136	941	1207	2723	1525	2005	1416	1240	1548

Figure 25. Catches of bluefin tuna by gear in the Southern Atlantic region.

Catch, effort, CPUE and average weight of Bluefin tuna by fishery and month.

With the aim of enhancing our knowledge of the evolution of the fishing characteristics over the season for every fishing gear targeting bluefin tuna, we have gathered **figures 26 to 27**, which show the catch, effort, CPUE and average weight of bluefin tuna in fisheries from the Straits of Gibraltar and the Southern Atlantic region (hand line).

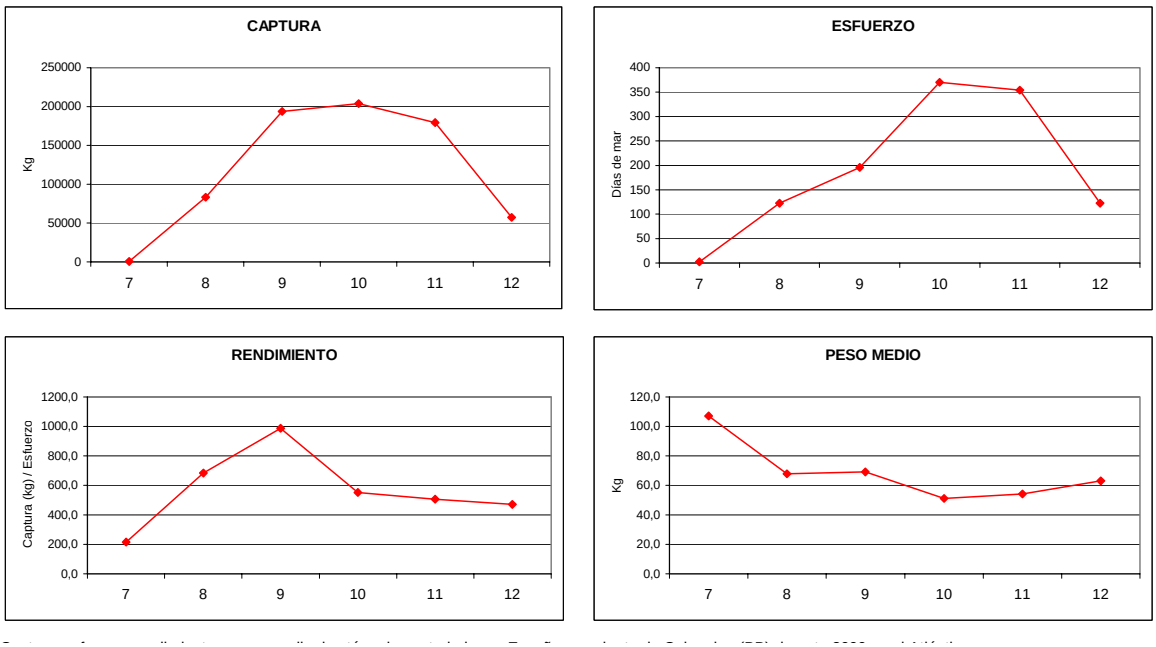


Figure 26.- Catch, effort, yield and average weight of bluefin tuna controlled by Spain and caught by hand line (HAND) in the Straits of Gibraltar.

Program of on-board samplers.

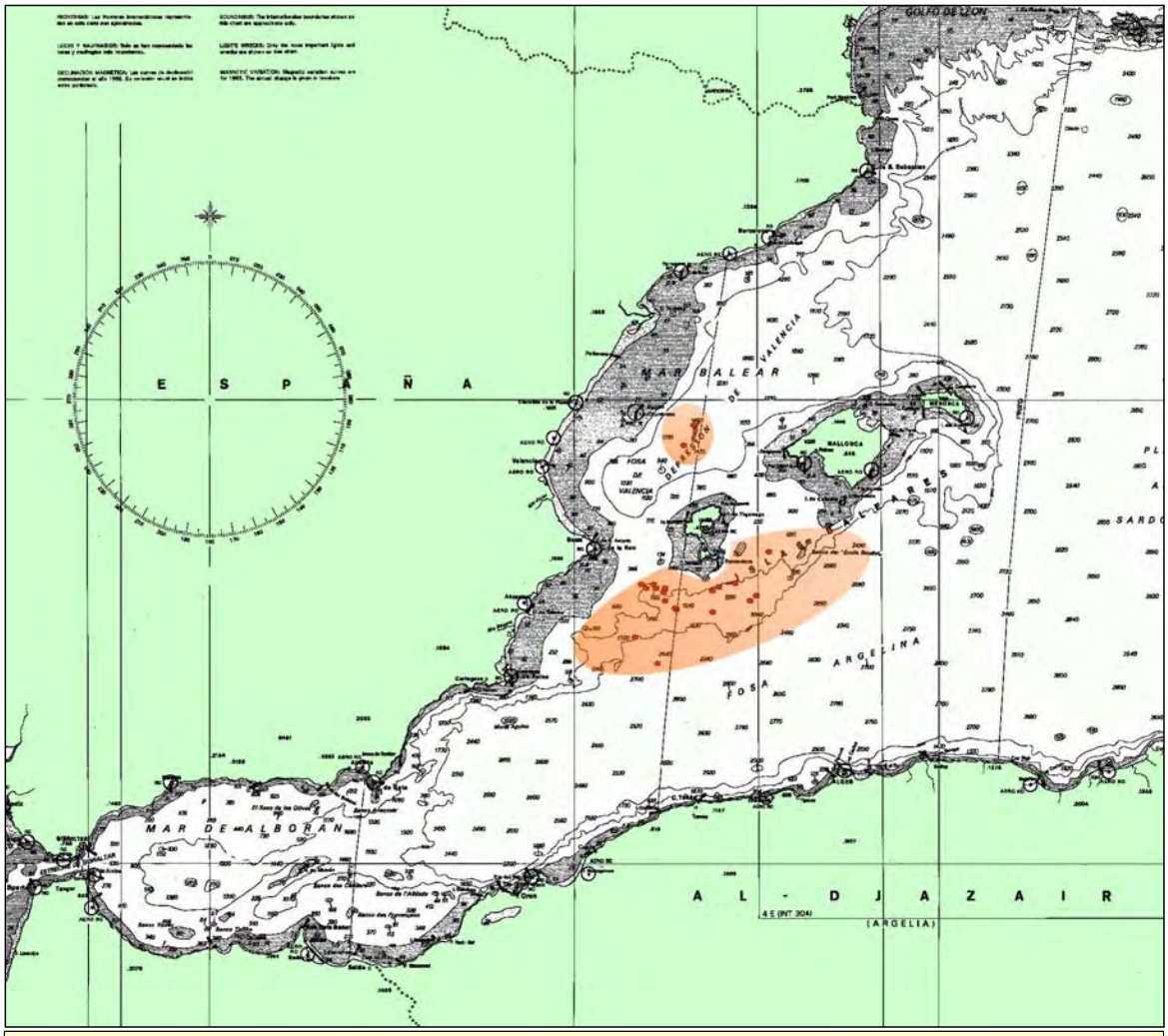
The On-Board Sampling Programme was carried out between 2003-2004 on vessels targeting bluefin tuna, albacore and swordfish. Both bluefin tuna and albacore are targeted by recreational fishing according to the area and the time of year. The sampling period on board lasted from May to September, which is the high time for fishing activities targeting these tuna species and also, an optimal period for recreational fishing. The vessels on which the sampling was carried out were, alternatively, trolling lines, line with live bait and hand line in the area of the Straits of Gibraltar, as well as drift surface longliners targeting bluefin tuna and longliners for albacore in the Mediterranean. We were unable to carry out the work directly on board of bait boats (BB) and trolling lines (TROLL) in the Mediterranean, due to their low availability and/or activity.

Figures 27 to 31 (one sample/month by gear) present data on fishing areas, catch per effort unit and length distributions by species and gears during several months over the studied period in the main areas: Western Mediterranean (Southern Mediterranean Region, Levante and Balearics) and Straits of Gibraltar. These data are provided with the aim of comparing the catch obtained by recreational fishing in vicinity areas and during similar periods.

Area	Gear	Species/month	1	2	3	4	5	6	7	8	9	10	11	12
South-Atlantic region and Straits	BB	BFT							X					
	HAND	BFT							X					
Mediterranean	LLMB	ALB						X						
	LLMB	BFT						X						
	LL	BFT						X						
	HAND	BFT												
	PS	BFT												
	BB	BFT												
	TROL	BFT												

Follow – up of the fishing activity

ÁREA DE PESCA, DISTRIBUCIÓN DE TALLAS Y CAPTURA DE ATÚN ROJO CON PALANGRE DE TIPO JAPONÉS DE ALGUNOS BARCOS PESQUEROS OBSERVADOS.
JUNIO 2003



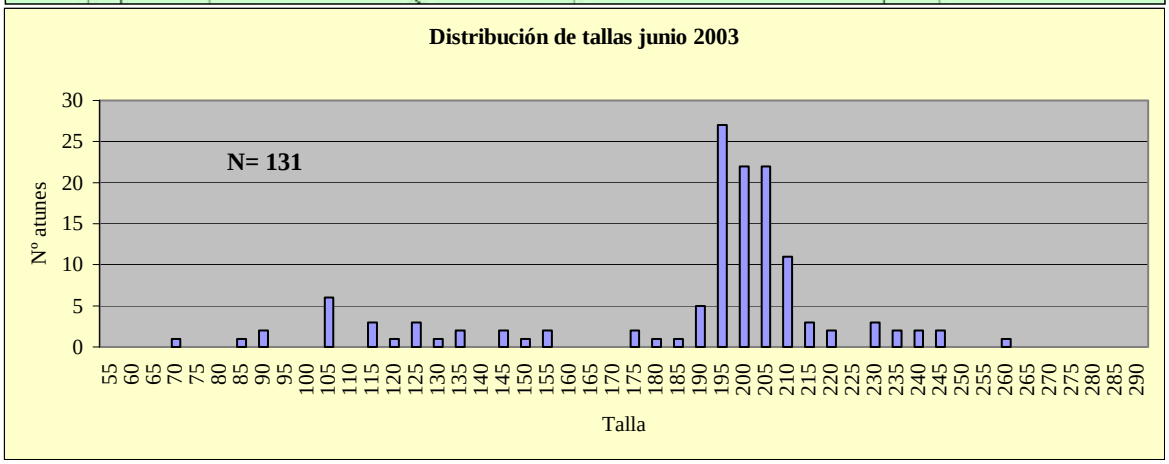
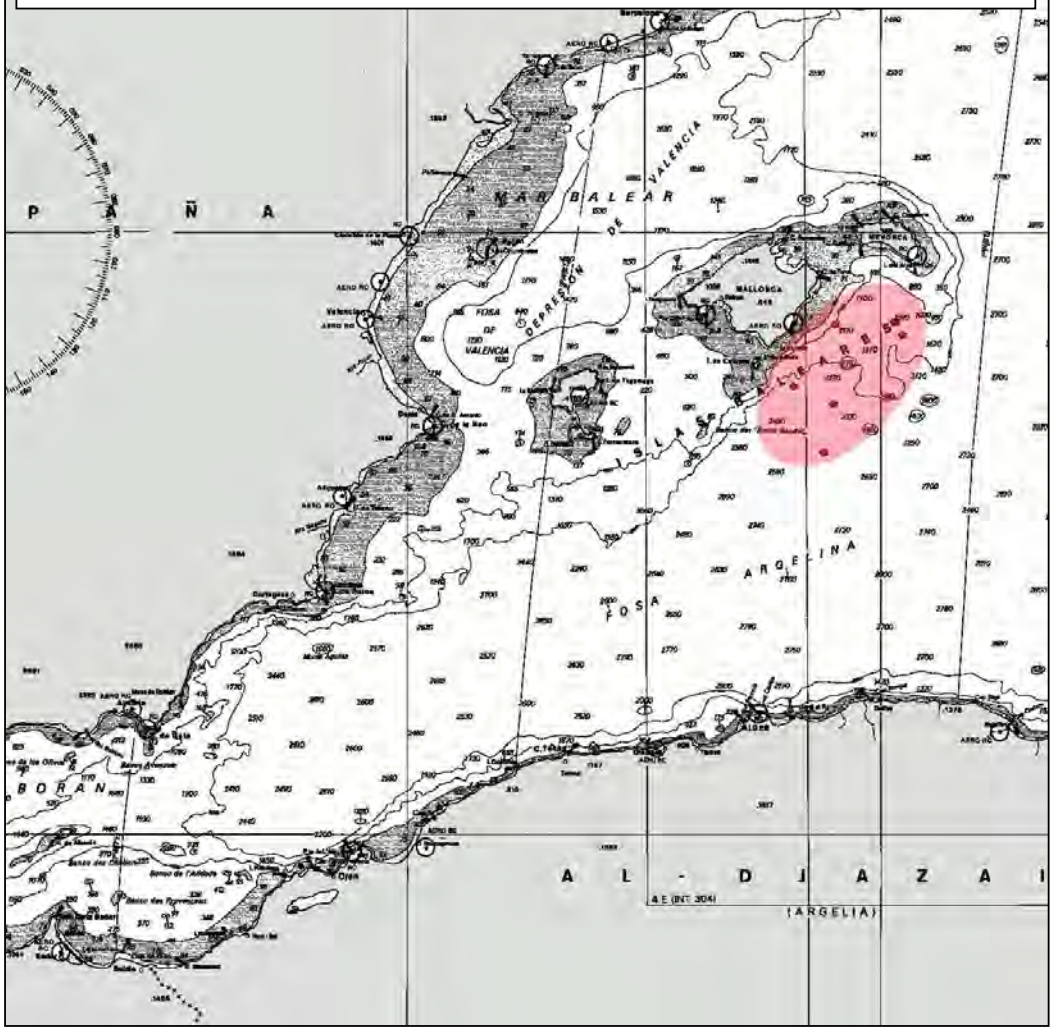


Figure 27

ÁREA DE PESCA, DISTRIBUCIÓN DE TALLAS Y CAPTURA DE ATÚN ROJO EN CIERTOS BARCOS PESQUEROS OBSERVADOS DE PALANGRE DE ATÚN BLANCO (IEO – C. O. de Málaga)
JUNIO 2003



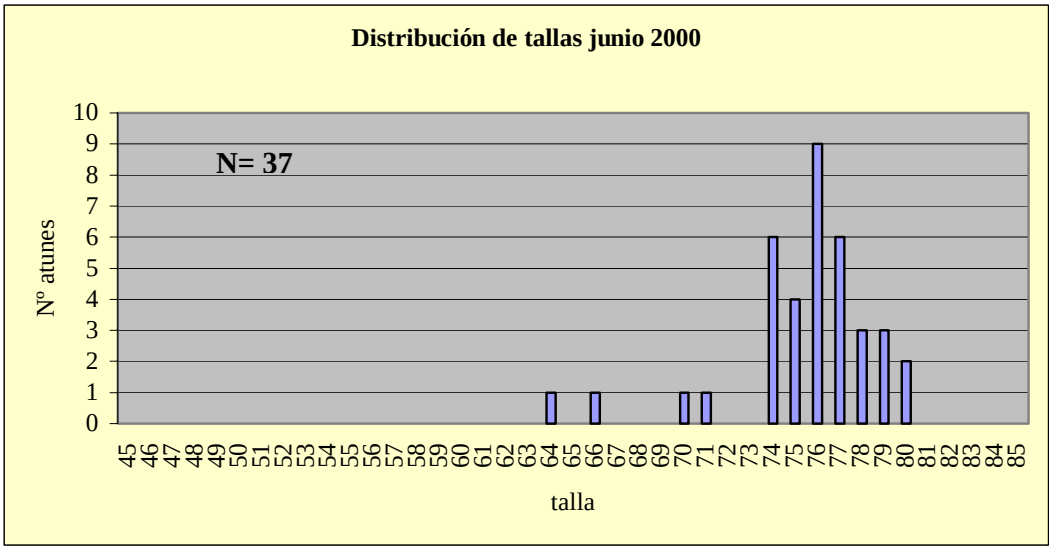
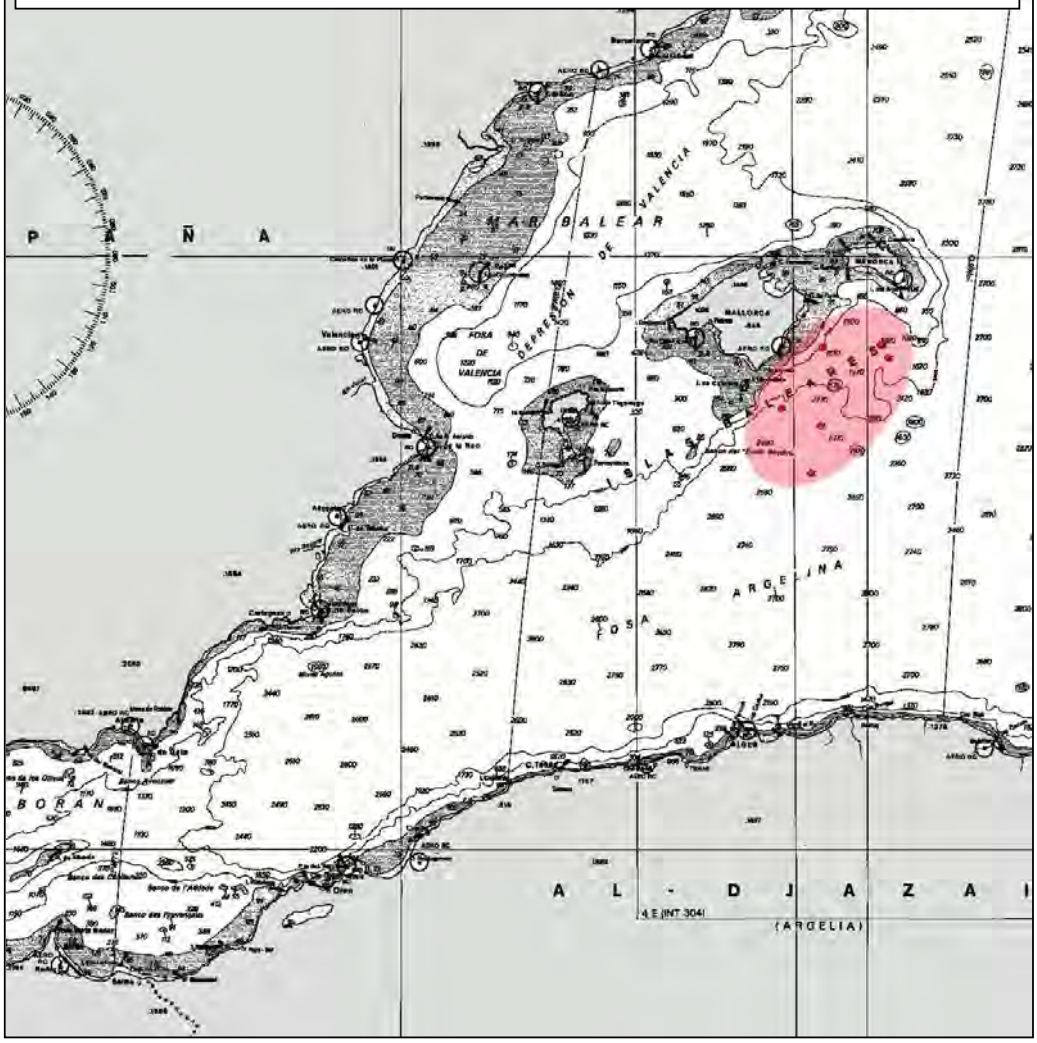


Figure 28

ÁREA DE PESCA, DISTRIBUCIÓN DE TALLAS Y CAPTURA DE ATÚN BLANCO EN BARCOS PESQUEROS OBSERVADOS.
JUNIO 2003



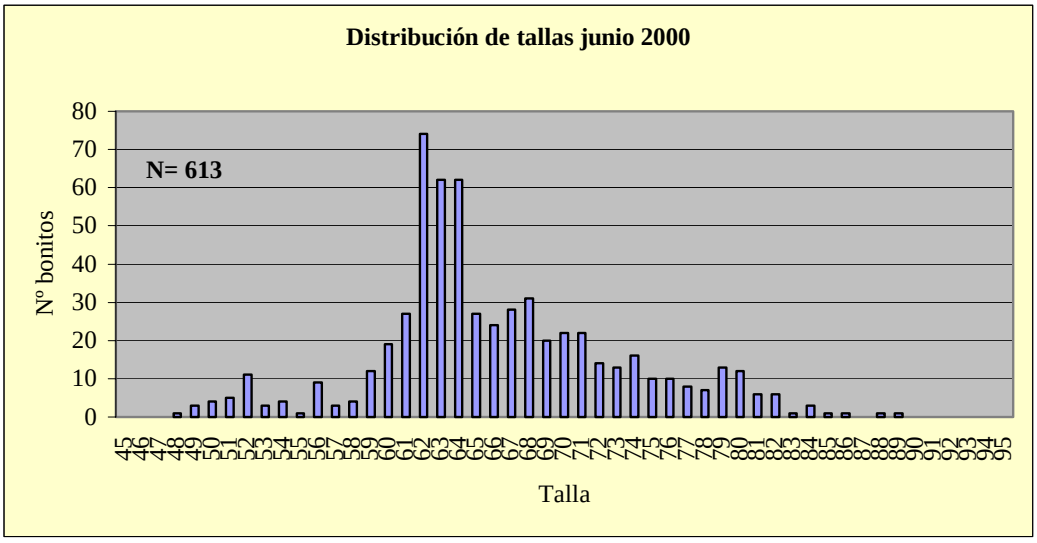
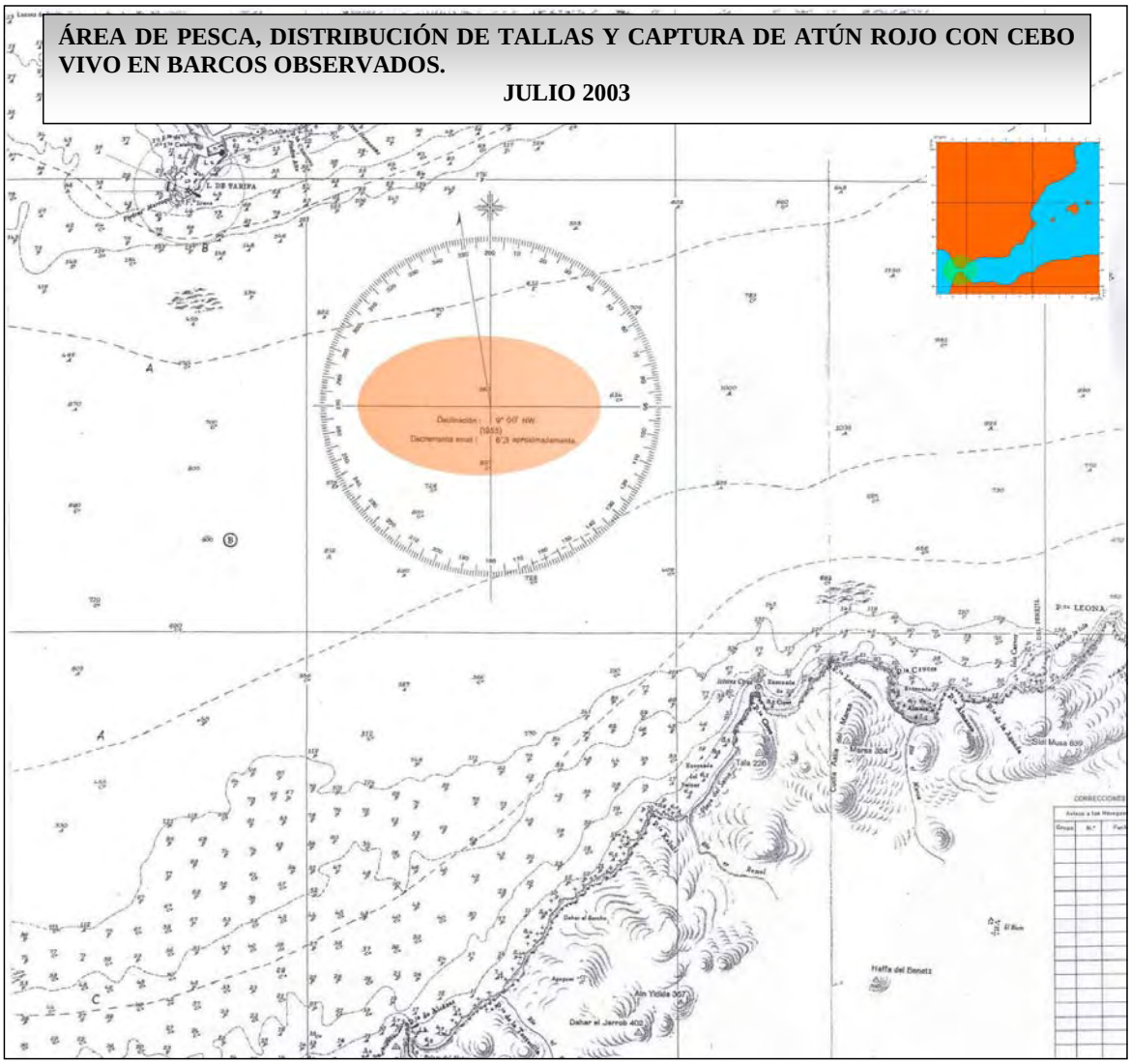


Figure 29


ÁREA DE PESCA, DISTRIBUCIÓN DE TALLAS Y CAPTURA DE ATÚN ROJO CON CEBO VIVO EN BARCOS OBSERVADOS.
JULIO 2003

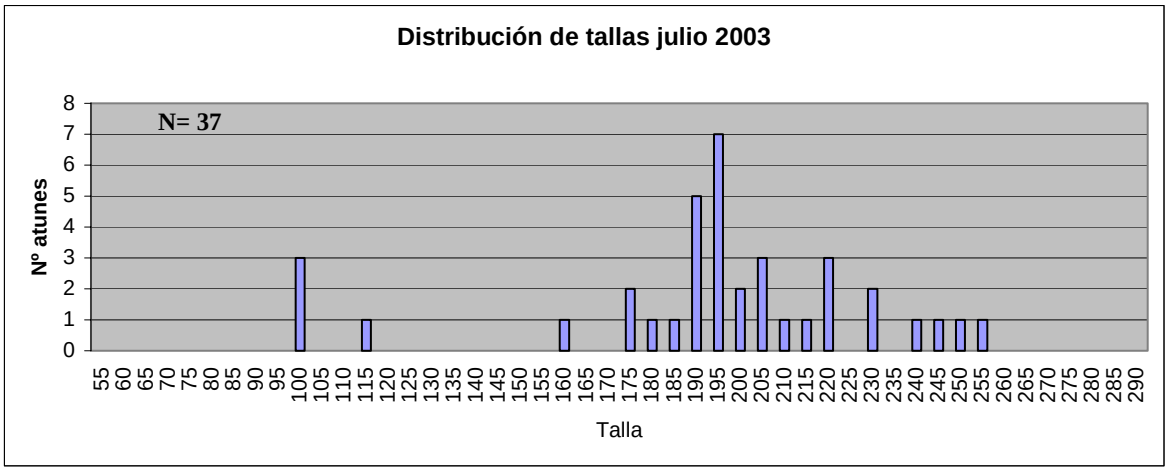
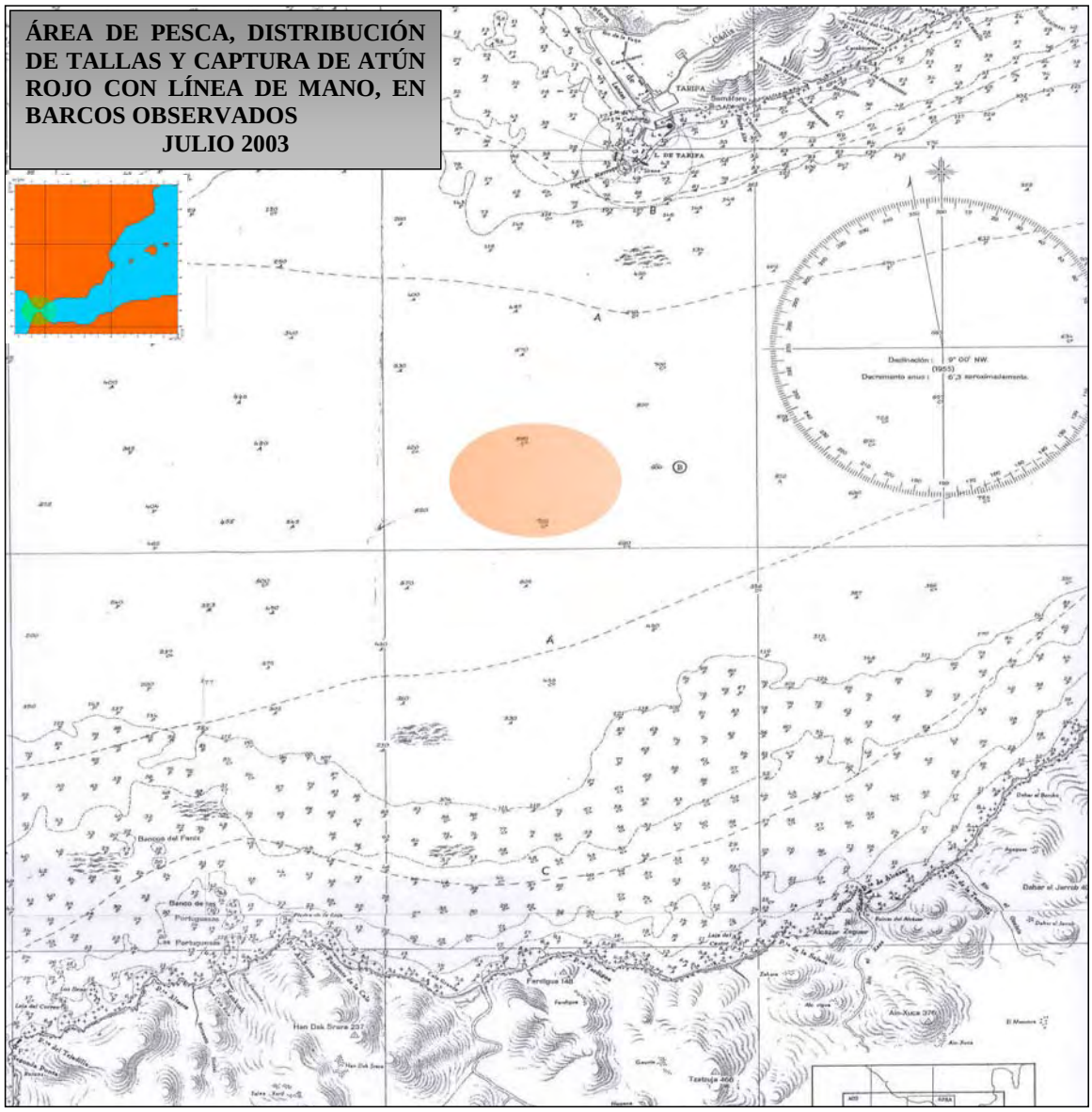
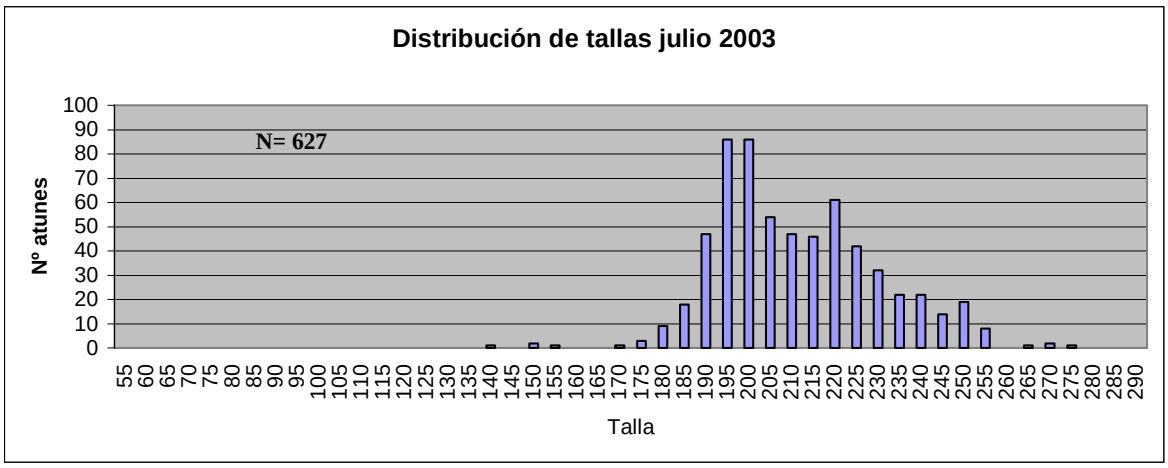

Distribución de tallas julio 2003
N= 37
Nº atunes
Talla
0
1
2
3
4
5
6
7
8
55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290

Figure 30


ÁREA DE PESCA, DISTRIBUCIÓN DE TALLAS Y CAPTURA DE ATÚN ROJO CON LÍNEA DE MANO, EN BARCOS OBSERVADOS
JULIO 2003


Distribución de tallas julio 2003
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Nº atunes
Talla
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60
70
80
90
100
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Figure 31

Professional and Recreational Fishing

Data on Sport Fishing Competition.

In order to find a source for comparing in the future the characteristics, yields and length distributions of the tuna catch (especially bluefin tuna and albacore) obtained by professional and sport fishing respectively, we conducted a follow-up study on sport fishing competitions held in different maritime regions.

The results of the competitions that took place this year (2004) were very low compared to previous years, according to the surveys conducted. As a result, it is necessary to continue developing this strategy in the future and to conduct comparative studies between professional and sport fishing using the same fishing systems, such as trolling line and hand line (brumeo) mainly.

Table 2 and Figures 32, 33 and 34 show the data obtained by IEO from the mentioned competitions.

SPORT FISHING COMPETITIONS.
BALEARICS, CATALONIA and MURCIA

Puerto	Fecha	Nº barcos	Área pesca	Captura					
				Atún rojo		Albacora		Otros	
				Nº	Peso (Kg)	Nº	Peso (Kg)	Nº	Peso (Kg)
Español	11 julio, 2 días	40 (12-15 barcos pescando)	50 mn	15	157,7	145	1165,4	14	110,1
Pollença	9-10 oct-04	20	50 mn	1		5	>4		
Barcelona	2-4 sep-04	17	50 mn	6	30	2	>4		
Puerto de Playa Aro		20	50 mn	0	0				
Garraf	10/10/2004	25	50 mn	2	14				
Murcia (Cartagena)		15		2	12				
L'Escala	Finales de agosto	30		17	1700				

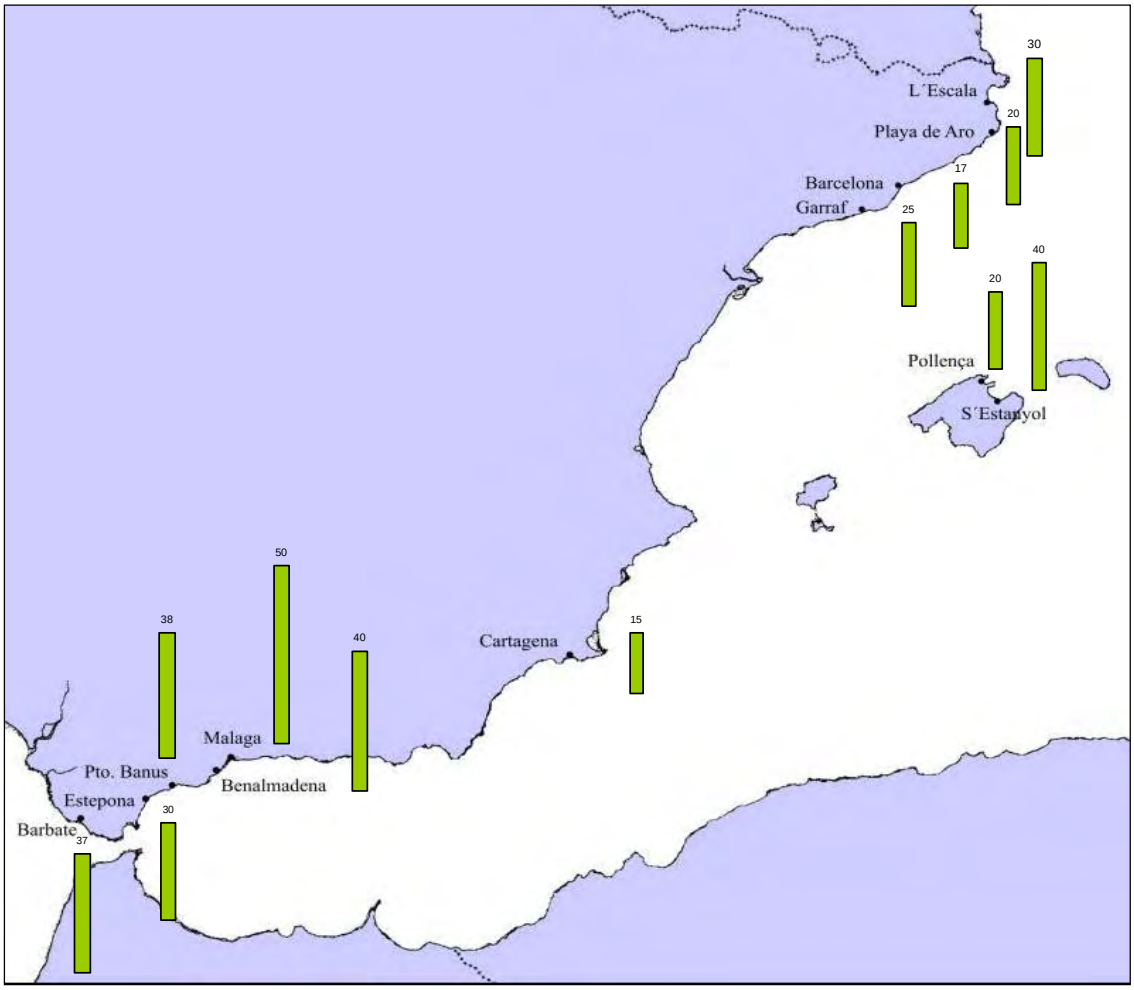
Data supplied by IEO- C.O. de Málaga
50% de los campeonatos= 0

SOUTHERN MEDITERRANEAN AND SOUTHERN ATLANTIC REGION
DATA ON SPORT FISHING COMPETITIONS

Puerto	Fecha	Nº barcos	Área pesca	Captura					
				Atún rojo		Albacora		Otros	
				Nº	Peso (kg)	Nº	Peso (kg)	Nº	Peso (kg)
Málaga	Agosto 3 días	50	50 mn	0	0	0	0	0	0
Benalmádena	Agosto 3 días	40	Hasta 40 mn	5 12 1	de 6.4 kg de <17 kg>6.4 kg de 17 kg	2		1	39
Puerto Banús	Septiembre 3 días	38	Hasta 40 mn	1 6	de 12 kg de < 12 kg	1	17		
Estepona	Mayo Curricán	30	Hasta 40 mn	3	de 100 = 300				
Barbate	Julio 2 días	37	Hasta 40 mn	Desierto capturas = 0					
Soto Grande	No se celebró								
Ceuta	No se celebró								

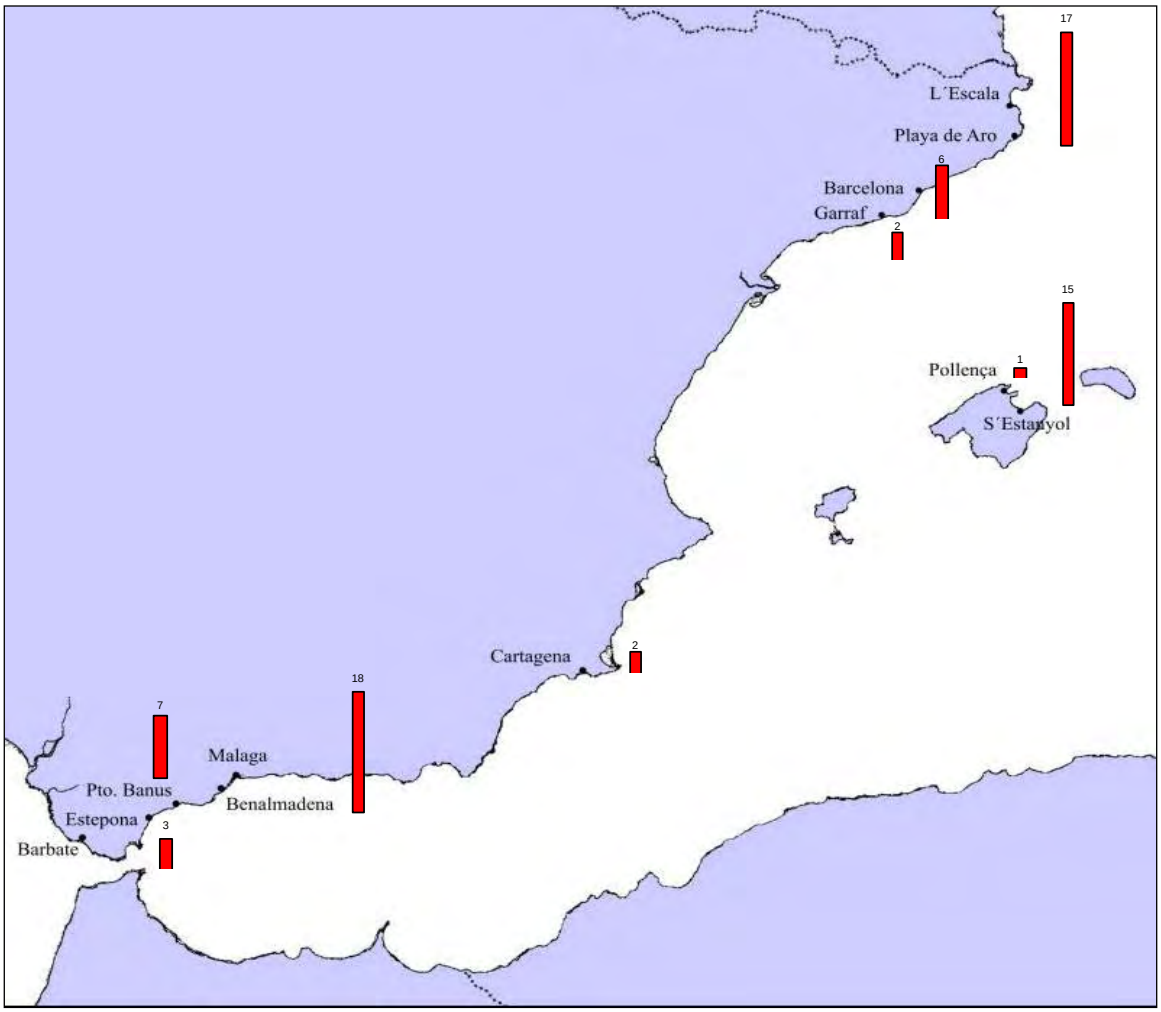
Data supplied by IEO- C.O. de Málaga
Notes: Brumeo was not used as a fishing gear

Table 2. Data on the catch by species and fleets obtained by IEO from sport fishing competitions held in the different Maritime Regions during 2004.



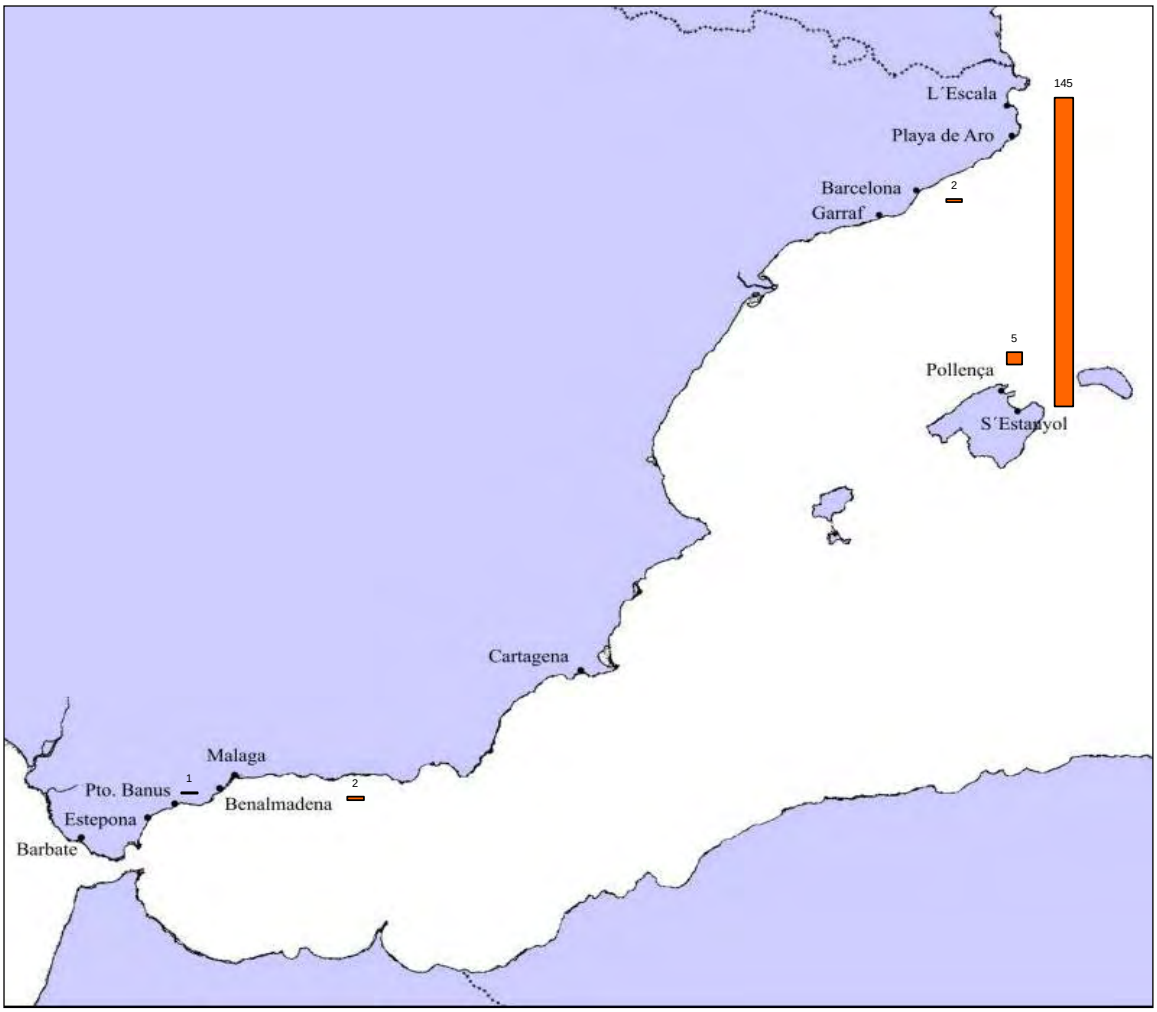
Puerto	Fecha
L'Escala	Finales de agosto
Playa de Aro	
Barcelona	2 - 4 septiembre (3 días)
Garraf	10 octubre (1 día)
Pollença	9 - 10 octubre (2 días)
L'Estanyol	11 julio (2 días)
Cartagena	
Málaga	Agosto (3 días)
Benalmádena	Agosto (3 días)
Pto. Banús	Septiembre (3 días)
Estepona	Mayo
Barbate	Julio (2 días)

Fig 32. Relación del número de barcos participantes en concursos de pesca deportiva en 2004 (IEO - C. O. de Málaga)



Puerto	Fecha	Atún rojo
L'Escala	Finales de agosto	17
Playa de Aro		0
Barcelona	2 - 4 septiembre (3 días)	6
Garraf	10 octubre (1 día)	2
Pollença	9 - 10 octubre (2 días)	1
L'Estanyol	11 julio (2 días)	15
Cartagena		2
Málaga	Agosto (3 días)	0
Benalmádena	Agosto (3 días)	18
Pto. Banús	Septiembre (3 días)	7
Estepona	Mayo	3
Barbate	Julio (2 días)	0

Fig. 33. Relación de capturas de atún rojo observadas en concursos de pesca deportiva en 2004 (IEO - C. O. de Málaga)



Puerto	Fecha	Atún blanco
L'Escala	Finales de agosto	0
Playa de Aro		0
Barcelona	2 - 4 septiembre (3 días)	2
Garraf	10 octubre (1 día)	0
Pollença	9 - 10 octubre (2 días)	5
L'Estanyol	11 julio (2 días)	145
Cartagena		0
Málaga	Agosto (3 días)	0
Benalmádena	Agosto (3 días)	2
Pto. Banús	Septiembre (3 días)	1
Estepona	Mayo	0
Barbate	Julio (2 días)	0

Fig. 34. Relación de capturas de atún blanco observadas en concursos de pesca deportiva en 2004 (IEO - C. O. de Málaga)

4.2 Fishing and biological information provided by recreational / sport fishing.

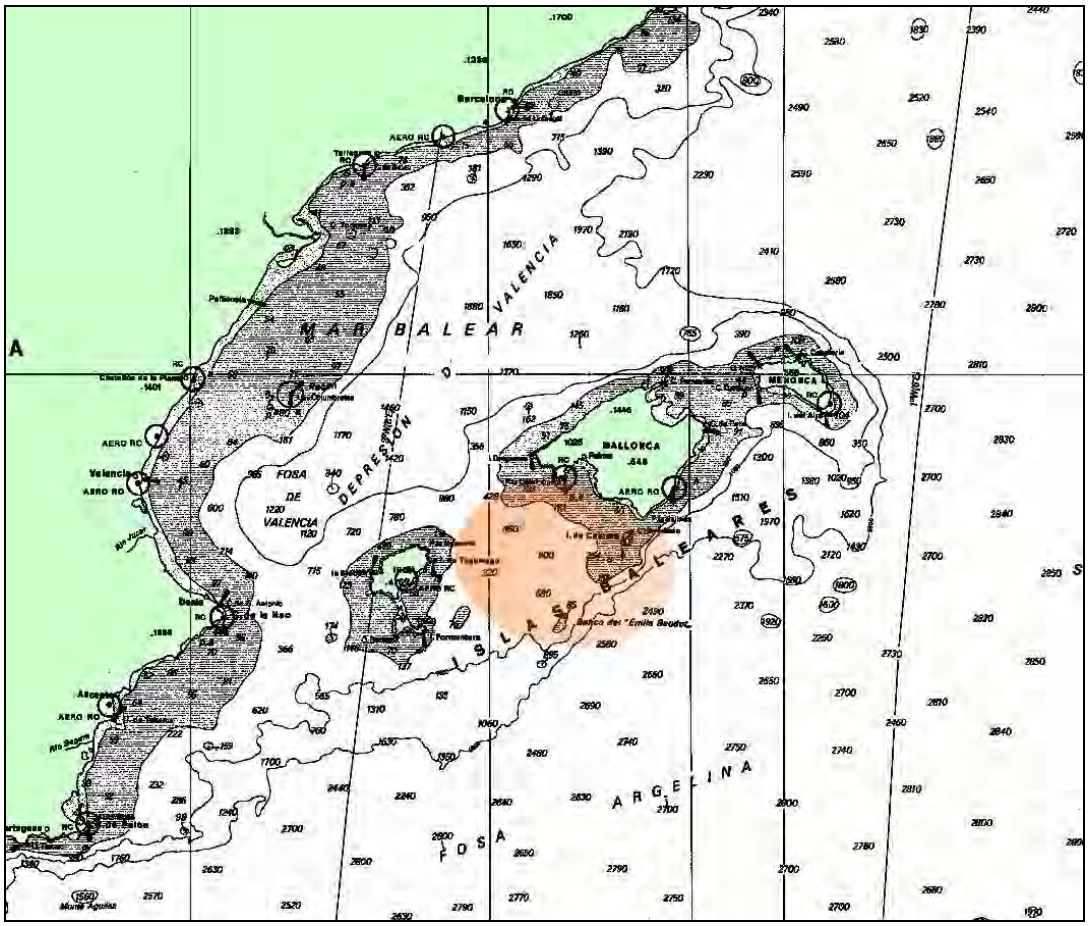
During the sport fishing competition targeting tunas and held in Estanyol (Mallorca) from 3 to 5 of June 2004, data on fleet composition, tackle description, fishing effort, catch by species and vessel and size distributions were obtained. We also gathered biological samples from gonads and spine radii for future studies on sexual maturity and growth.

40 vessels participated in the competition and 12-15 of them obtained some catch.

In global terms, 145 specimens of albacore (*Thunnus alalunga)* were caught, along with 15 specimens of bluefin tuna (*Thunnus thynnus)* and an intedetermined number of llampugas (*Corifaena hypurus)*. As far as marlins and small tunas are concerned, only a few specimens were caught. Figure __ shows the length distribution of the total catch of albacore.

Figure 35 displays the length distribution for albacore caught by the trolling recreational vessels during the tournament in Stanyol. **Figure 36** shows the comparison between length distributions from trolling (recreational) and surface longline (profesional) directed to albacore.

ÁREA DE PESCA, DISTRIBUCIÓN DE TALLAS Y CAPTURA POR UNIDAD DE ESFUERZO DE ATÚN BLANCO EN BARCOS DEPORTIVOS (CURRICÁN) OBSERVADOS.



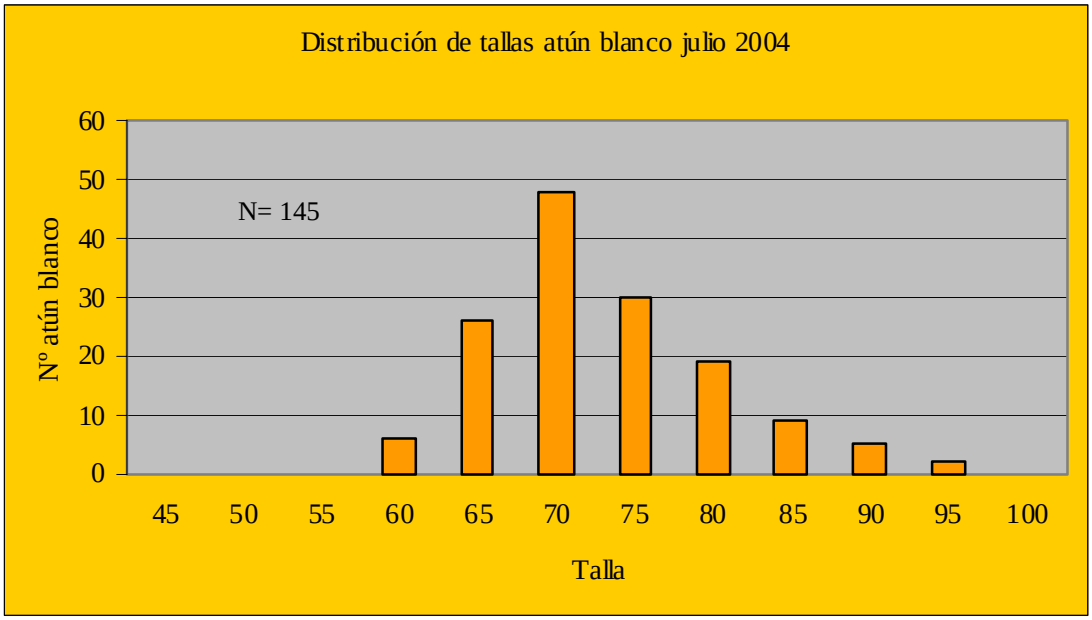
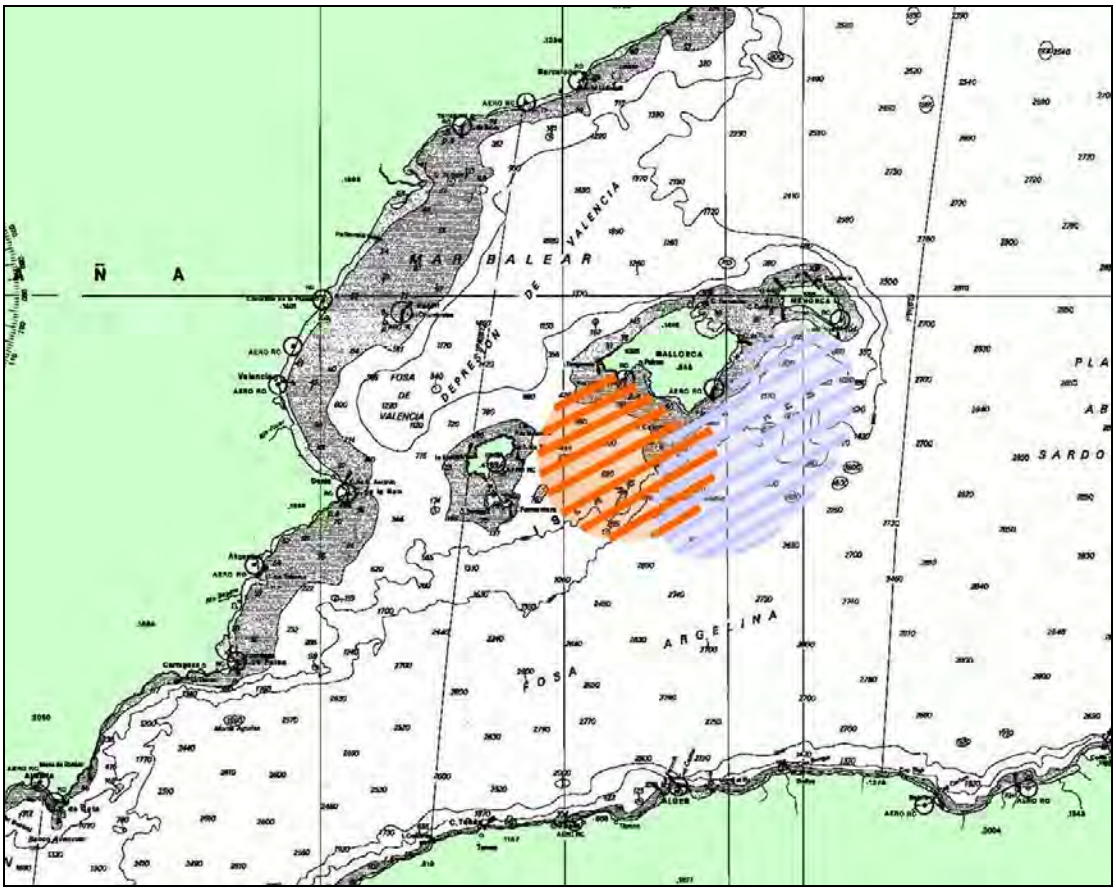


Figure 35.

ÁREA DE PESCA, DISTRIBUCIÓN DE TALLAS Y CAPTURA POR UNIDAD DE ESFUERZO DE ATÚN BLANCO EN BARCOS DEPORTIVOS CON CURRICÁN (relleno naranja) Y BARCOS PALANGREROS PROFESIONALES (relleno morado) OBSERVADOS.


MAR BALEAR
DEPRESION DE VALENCIA
FOSA DE VALENCIA
MALLORCA
ARGELINA
FOSA
SARDO

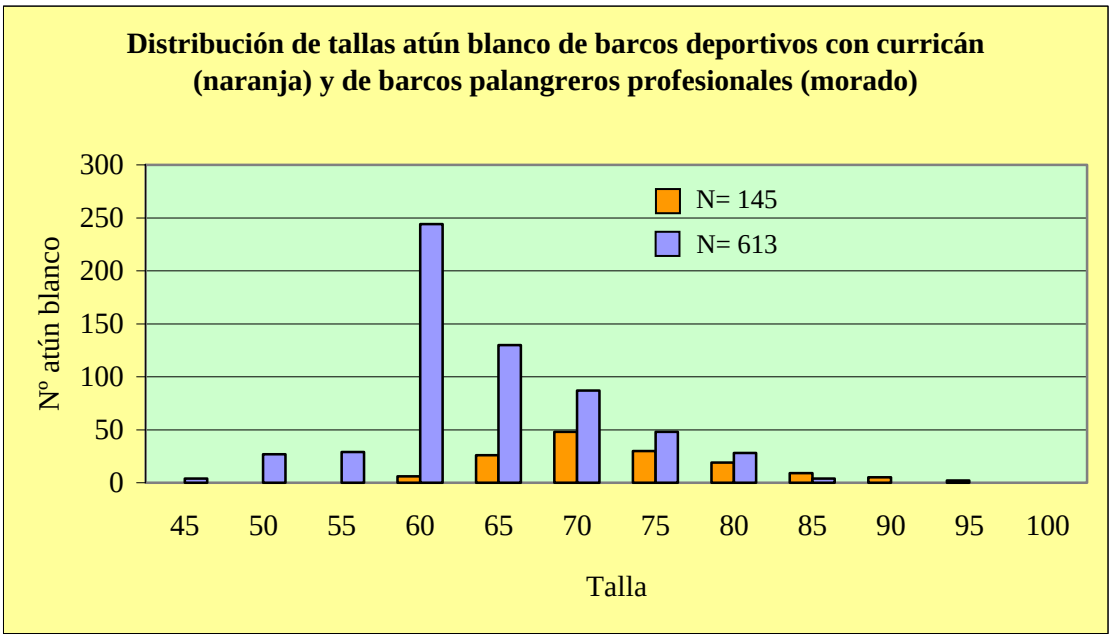

Distribución de tallas atún blanco de barcos deportivos con curricán (naranja) y de barcos palangreros profesionales (morado)
Nº atún blanco
300
250
200
150
100
50
0
N= 145
N= 613
45
50
55
60
65
70
75
80
85
90
95
100
Talla

Figure 36

Biology

Bluefin tuna is a cosmopolitan species widely distributed throughout the Atlantic Ocean and Mediterranean Sea. Present fisheries for Atlantic bluefin tuna are distributed from the Gulf of Mexico to Newfoundland in the West Atlantic, from roughly the Canary Islands to south of Iceland in the East Atlantic, and throughout the Mediterranean Sea. Historically, catches of bluefin were made from a broad geographic range in the Atlantic and Mediterranean.

Atlantic bluefin tuna can grow to over 300 cm and reach more than 650 kg. The oldest age considered reliable is 20 years, based on an estimated age at tagging of 2 years and about 18 years at liberty, although it is believed that bluefin tuna may live to older ages.

Bluefin tuna are, thus, characterized by a late age at maturity (thus, a large number of juvenile classes) and a long life span, which make it well adapted to variations in recruitment success, but more vulnerable to fishing pressure than rapid growth species such as tropical tuna species.

Bluefin tuna in the West Atlantic generally reach a larger maximum size compared to bluefin caught in the East Atlantic. Bluefin in the west are assumed to first spawn at age 8 compared to ages 4 to 5 in the east. Distribution expands with age; large bluefin are adapted for migration to colder waters. Bluefin tuna are opportunistic feeders, with fish, squid, and crustaceans common in their diet.

In the West Atlantic, bluefin tuna are thought to spawn from mid-April into June in the Gulf of Mexico and in the Florida Straits. Juveniles are thought to occur in the summer over the continental shelf, primarily from about 3 °N to 4ı°N and offshore of that area in the winter. In the East Atlantic, bluefin tuna generally spawn from late May to July depending on the spawning area, primarily in the Mediterranean, with highest concentrations of larvae around the Balearic Islands, Tyrrhenian Sea, and central and eastern Mediterranean where the sea-surface temperature of the water is about 20°C.

Sexually mature fishes have also been recently observed in May and June in the eastern Mediterranean (between Cyprus and Turkey).

Albacore is a temperate tuna widely distributed throughout the Atlantic Ocean and Mediterranean Sea.

Albacore spawning areas in the Atlantic are found in subtropical western areas of both hemispheres and throughout the Mediterranean Sea. Spawning takes places during austral and boreal spring-summer. Maturity is considered to occur at about 90 cm FL (age 5) in the Atlantic, and at smaller size (62 cm, age 2) in the Mediterranean. Until this age they are mainly found in surface waters, where they are mainly targeted by surface gears.

Some adult albacore are also caught using surface gears but, as a result of their deeper distribution, they are mainly caught using longlines. Young albacore are also caught by longline in temperate waters.

Italy and Greece are the countries mainly involved in the Mediterranean albacore fisheries, using driftnets, longline and purse seine. Albacore appears also as by-catch in French purse-seiners, coastal Spanish fleets and gamefishing. The Spanish surface (trolling and baitboat) fleets catch albacore in the western Mediterranean in autumn after the season in the Bay of Biscay is over.

Swordfish is a cosmopolitan species found in the Atlantic Ocean and the Mediterranean Sea. Several recent genetic studies suggest that Mediterranean swordfish form a unique stock that is reproductively isolated from the Atlantic stocks. Several fisheries and biological studies suggest that there is limited movement from the Mediterranean to areas immediately adjacent in the North Atlantic. Genetic studies have confirmed this pattern.

Swordfish feed mainly in the pelagic zone and its prey is comprised mostly of cephalopods and pelagic fish species. Spawning occurs in the central Mediterranean Sea and around the Balearic Islands and probably in other locations. Swordfish are sequential spawners and in the Mediterranean, reproduction occurs during the spring-summer months.

Young swordfish grow very rapidly, reaching more than 80 cm by the end of their first year of life. Females grow faster than males and reach a larger maximum size. Female swordfish may first reach sexual maturity in their third year of life at a length of about 125 cm, and half of all females are mature by the time they reach 140 cm. Age at first maturity is substantially younger than that assumed for females of the Atlantic stocks (age 5). Males may first reach maturity one year earlier.

Stock status

Bluefin tuna

In 1982, the Commission established a line for separating the eastern and western Atlantic management units based on discontinuities in the distribution of catches at that time in the Atlantic and supported by limited biological knowledge. However, the overall distribution of the catch in the 1990s is much more continuous across the North Atlantic than was seen in previous decades. Tagging evidence indicates that movement of bluefin across the current east/west management boundary in the Atlantic does occur.

An assessment was done in 2002. Results of this assessment were similar to the results obtained in 1998 in terms of trends, but were more optimistic in terms of current depletion. The new assessment indicates that the spawning stock biomass (SSB) in 2000 was about 86% of the 1970 level (first year of data in the assessment).

The assessment indicates two peaks in spawning biomass and an increase in fishing mortality rates, especially for older fish after 1993. There appears to have been a general trend of increasing recruitment in the early 1980s followed by a period without trend.

The 2000 level of fishing mortality was almost 2.5 times higher than that which maximizes yield per recruit.

Estimates in recent years should be judged with caution since such VPA estimates are generally imprecise due to the fact that many of the inputs to the assessment are uncertain. These include doubts about the historical catches (mainly in recent years), the absences of size composition for many fisheries, and the unknown adequacy of available CPUE indices as measures of overall stock abundance. These uncertainties make it easier to interpret trends in relative abundance rather than absolute levels of the stock.

Albacore

On the basis of the biological information available, for assessment purposes the existence of three stocks is assumed: northern and southern Atlantic stocks (separated at 5ºN) and a Mediterranean stock.

In general, the Mediterranean catches are highly uncertain. Estimated albacore catches, mainly by Italy and Greece, are still minor (less than 4,000 t) and do not show any significant trend over time. However, there is a lack of information concerning reported catches by many nations in recent years.

The trend of fishing effort of the various gears fishing for albacore in the Mediterranean sea is still not possible to estimate, due to short time series and inadequate coverage of artisanal gears. Furthermore, information on size composition of the catch is also very limited.

Due to the lack of proper data, an assessment of the Mediterranean stock has never been carried out by the ICCAT Committee.

Swordfish

Assessment results indicated the presence of a stable situation in terms of recruitment, and total and spawning biomass. These findings suggest that the current exploitation pattern and level of exploitation are sustainable, in the short-term. Average catch over the past decade has been about 14,000 t per year and it is expected that annual catches of about this magnitude will keep the stock at about the present level, at least over the short-term.

The Committee noted the large catches of small size swordfish, i.e., less than 3 years old (many of which have probably never spawned) and the relatively low number of large individuals in the catches. Fish less than 3 years old represent 50-70% of the total yearly catches.

Given the uncertainties in the assessment, ICCAT recommends that the current levels of exploitation not be exceeded under the current exploitation patterns.

Regulation and Directives

Bluefin tuna

A regulatory recommendation stating that Contracting Parties should limit the fishing mortality to recent levels came into force in 1975 for one year and was extended indefinitely in 1982 for the East Atlantic.

The ICCAT Commission recommended in 1998 that bluefin tuna catches in the East Atlantic Ocean and Mediterranean Sea should be reduced to 32,000 t in 1999 and 29,500 t in the year 2000 (Ref. 98-05). This recommendation entered into force in August 1999 with exceptions noted for Morocco and Libya. Catches were 32,454 t in 1999 and 33,752 t in 2000.

In 1975, a minimum size of 6.4 kg with a 15% tolerance, in number of fish, was recommended for the entire Atlantic (including the Mediterranean, [Ref. 74-01]). The 6.4 kg size regulation had been poorly enforced for the East Atlantic and Mediterranean fisheries. Subsequently the ICCAT Commission established a minimum size with no tolerance of 1.8 kg (prohibition of retention, landing and sale). This was amended by the Commission to 3.2 kg in 1998, to be implemented in 1999 [Ref. 98-04]. The available data indicate that 36% of the number of fish in the Mediterranean catch was less than 3.2 kg in 2000 and 40% less than 6.4 kg. In the East Atlantic it was 2% and 29%, respectively. While it is known that catches of age 0 fish are still occurring, the Committee does not have sufficient catch-at-size data to fully evaluate this.

There is a regulation that entered into force on 1 June 1994 that prohibits large pelagic longliners of more than 24 m in length from fishing in the Mediterranean during the months of June and July (Ref. 93-07 and Ref. 02-08). The objective of this regulation is to limit fishing mortality.

In 1999 the prohibition of purse seine fishing in the Mediterranean (except for the Adriatic) was amended to include the period from 16 July through 15 August. Additionally, purse seining in the Adriatic was prohibited for the month of May. This regulation was modified in 2002, so that prohibition of purse seiner fishing now only applies from 16 July through 15 August for the whole Mediterranean Sea (Ref. 02-08). This prohibition was designed to protect juveniles.

In 1997 the ICCAT Commission prohibited the use of airplanes or helicopters supporting fishing operations in the Mediterranean in the month of June.
High catch of small individuals still occurs and the Committee recommends that every effort be made so that the current measures on the size limit of 6.4 kg are adhered to. Reduction of fishing on juveniles could contribute substantially to increases in both biomass and yield. The Committee reiterated that effective measures be taken to implement Recommendation (Ref. 02-08), avoiding catches of age 0 and 1 fish.

In 2002, the Commission recommended new measures. One new measure fixed the Total Allowable Catch for the East Atlantic and Mediterranean bluefin tuna at 32,000 t for the years 2003, 2004, 2005 and 2006 (Ref. 02-08).

Also, the Commission modified the minimum size tolerance from 3.2 kg to 4.8 kg for the Mediterranean.

The tolerance between the 3.2 kg and 6.4 kg limits for the East Atlantic and the 4.8 kg and 6.4 kg limits for the Mediterranean was also modified and reduced to 10% (Ref. 02-08).

Table.- Summary of current regulation measures for bluefin tuna

Measure	ICCAT Reference
Fishing mortality not to exceed circa 1975 level	Ref. 74-01
No landing, retaining aboard or selling of fish <3.2 kg in the East Atlantic and Mediterranean	Ref. 98-04
No longlining in Med. in June- July by vessels >24m	Ref. 02-08
No purse seining 16 July -15 August in the Mediterranean Sea	Ref. 02-08
No landing, retaining aboard or selling of fish <4.8 kg in the Mediterranean Sea	Ref. 02-08
No landing of fish <6.4 kg, with a 10% tolerance in number of individuals	Ref. 02-08
TACs are fixed to 32,000 t for the 2003-2006 years	Ref. 02-08
No use of driftnets for pelagic fisheries in the Mediterranean Sea	Ref. 03-04

Albacore

At present ICCAT has no specific regulatory measures for Mediterranean albacore fisheries.

Swordfish

Although ICCAT has no specific regulatory measures for Mediterranean swordfish fisheries, several countries have imposed technical measures, such as closed areas and seasons, minimum landing size regulations and license control systems.

The EC introduced a driftnet ban in 2002 and in 2003 ICCAT adopted a recommendation for a general ban of this gear in the Mediterranean (Ref. 03-04).
DIRECTIVES (SCRS-ICCAT)

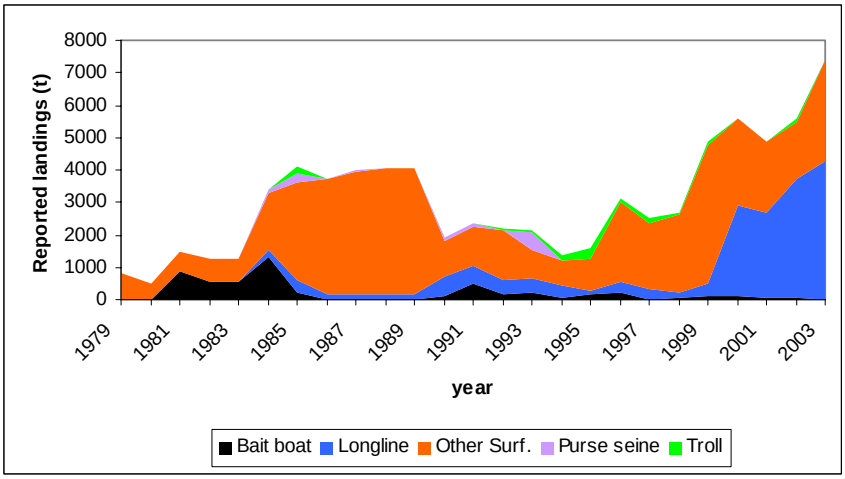


Figure.- Nominal catches of albacore in the Mediterranean Sea by gear. International Commission for the Conservation of the Atlantic Tuna data base.

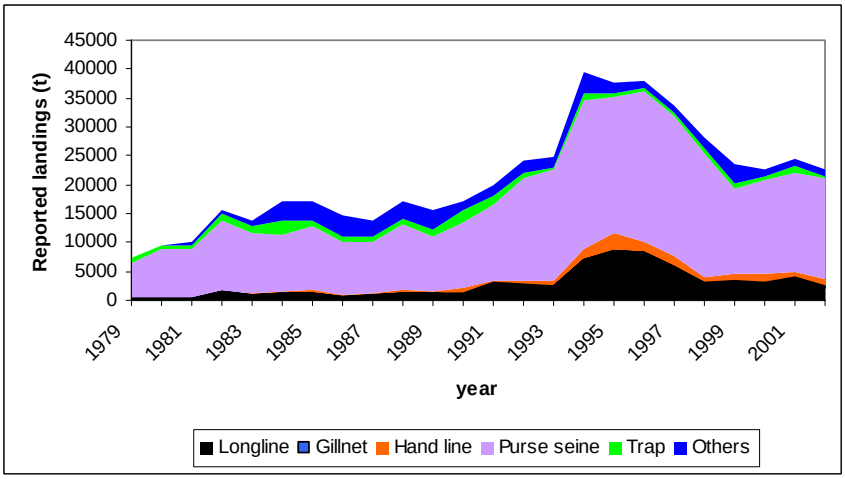


Figure.- Nominal catches of bluefin tuna in the Mediterranean Sea by gear. International Commission for the Conservation of the Atlantic Tuna data base.

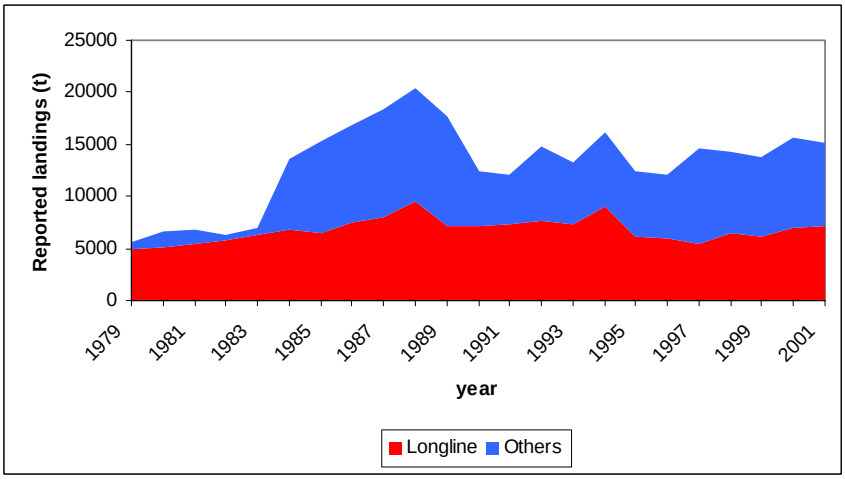


Figure.- Nominal catches of swordfish in the Mediterranean Sea by gear. International Commission for the Conservation of the Atlantic Tuna

data base.

74-01 BFT RECOMMENDATION
BLUEFIN SIZE LIMIT & FISHING MORTALITY

TITLE: ***Recommendation by ICCAT Concerning a Limit on Bluefin Tuna Size and Fishing Mortality***
(Entered into force: **August 10, 197**5)
(Fishing mortality limit extended for indefinite period -- E. Atlantic only: **July 20, 198**2)

The Council recommends:

*FIRS*T: That the Contracting Parties take the necessary measures to prohibit any taking and landing of bluefin tuna *(Thunnus thynnus)* weighing less than 6.4 kg.

Notwithstanding the above regulation, the Contracting Parties may grant tolerances to boats which have incidentally captured bluefin weighing less than 6.4 kg, with the condition that this incidental catch should not exceed 15 percent of the number of fish per landing of the total bluefin catch of said boats or its equivalent in percentage by weight.

*SECON*D: That as a preliminary step, the Contracting Parties that are actively fishing for bluefin tuna *(Thunnus thynnus)* or those that incidentally catch it in significant quantities shall take the necessary measures to limit the fishing mortality of bluefin tuna to recent levels for a period of one year.

96-2 BFT RECOMMENDATION – SUPPLEMENTAL MEASURES, E. ATLANTIC BLUEFIN: MEDITERRANEAN CLOSED SEASON

TITLE: ***Supplemental Recommendation by ICCAT on East Atlantic Bluefin Tuna Concerning the Mediterranean Closed Season***
(Entered into force: **August 4, 199**7)

CONSIDERING the efforts made by Contracting Parties to reduce the catches of bluefin tuna, in accordance with the Recommendations adopted by the Commission in 1994 and 1995.

CONSIDERING the necessity to take measures regarding the gears used during periods when their impact is most notable on juveniles and spawners;

RECALLING the Recommendation adopted by the Commission in 1993 prohibiting the fishing of bluefin tuna by large longliners, in order to protect the spawners during the spawning period in June and July;

THE INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS (ICCAT) RECOMMENDS:

FIRST: prohibiting purse seine fishing in the Mediterranean Sea during the period from August 1 to 31.

SECOND: prohibiting of the use of airplanes or helicopters supporting fishing operations in the Mediterranean Sea in the month of June.

This Recommendation is supplemental to the regulatory measures currently in effect for Atlantic bluefin tuna in the Mediterranean Sea.

96-15 RESOLUTION – LARGE-SCALE PELAGIC DRIFTNETS

TITLE: ***Resolution by ICCAT on Large-Scale Pelagic Driftnets***
(Transmitted to Contracting Parties: **February 3, 199**7)

CONSIDERING that in November, 1993, and November, 1994, ICCAT adopted Resolutions in support of the Resolutions of the United Nations General Assembly, 44/225, 45/197 and 46/215, concerning large-scale, high seas, pelagic driftnets and their impact on the living marine resources of the world's oceans and seas, requesting its Contracting Parties to support these Resolutions;

CONSIDERING that it was brought to the attention of the Contracting Parties of the Commission that in 1995 such large-scale, high seas, pelagic driftnet fishing continued in the areas of ICCAT competence and that this activity in some fisheries was increasing;

CONSIDERING that the Commission continues to express its concern about the possibility that certain stocks under ICCAT mandate, as well as other marine resources, are being adversely affected by such fishing; and

CONSIDERING that the Commission has reaffirmed its commitment as regards the concept of responsible fishing, such as established within the framework of the FAO Code of Conduct,

THE INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS (ICCAT):

REAFFIRMS the importance it gives to compliance with the Resolutions of the United Nations 44/225, 45/197 and 46/215,

EXPRESSES its appreciation for the individual and collective efforts made by some of its members to apply and support the objective of these Resolutions.

REITERATES its serious concern about the potential negative impacts that large-scale pelagic driftnet fishing can have on the marine resources of the Atlantic Ocean and Mediterranean Sea, and its intention to carefully monitor the repercussions of this fishing on these stocks.

APPEALS to all its Contracting Parties to apply these Resolutions in their entirety and inform the Commission and the Secretary General of the United Nations on the regulatory measures adopted with a view towards assuring their application, in accordance with the Decisions of the United Nations 47/443 and 48/445.

APPEALS to all its Contracting Parties to commit themselves immediately as concerns their application, assuring that their nationals and their fishing vessels comply with Resolution 46/215, to provide all the necessary data relative to these fisheries in order that the scientists can study the effects of the utilization of these gears, and imposing adequate sanctions on their nationals and on their fishing vessels that act contrary to the terms of Resolution 46/215.

CHARGES the Compliance Committee and the Permanent Working Group for the Improvement of ICCAT Statistics and Conservation Measures (PWG) to monitor compliance with the U.N. Resolutions within the ICCAT Convention Area with a view to adopting adequate measures.

97-2 BFT RECOMMENDATION – SUPPLEMENTAL MEASURE: AGE 0 BLUEFIN TUNA

TITLE: ***Recommendation by ICCAT on a Supplemental Management Measure Concerning Age Zero Bluefin Tuna***
(Entered into force: **June 13, 199**8)

CONSIDERING the Recommendations adopted by the Commission in 1974, 1994, and 1996 concerning
bluefin tuna minimum size;

IN ORDER TO ensure adequate enforcement and monitoring of the prohibition on harvest of age zero bluefin tuna;

THE INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS (ICCAT) RECOMMENDS THAT:

In addition to the prohibition on retaining on board, landing and sale of age zero bluefin (weighing less than 1.8 kg**)*** by fishing vessels of Contracting Parties and non-contracting parties, entities or fishing entities, each Contracting Party and non-contracting party, entity or fishing entity shall take the necessary measures to prohibit the landing, possession, or sale in markets in nations bordering the Convention area of Atlantic bluefin tuna of age zero (weighing less than 1.8 kg) *;

This Recommendation is supplemental to the minimum size regulations currently in effect for bluefin tuna.

*** NOTE:** The phrase “age zero bluefin (weighing less than 1.8 kg)” has been changed to “fish less than 3.2 kg” (see Recommendation 98-4,

adopted by the 1998 Commission Meeting, and which entered into force on June 21, 1999).

02-08 BFT RECCOMMENDATION

TITLE: ***A multi- year conservation and management plan for bluefin tuna in the east Atlantic and Mediterranean***

TAKING INTO ACCOUNT that the Standing Committee on Research and Statistics (SCRS) considers that, according to the quality of the data and the results of the 2002 assessment, it was not in a position to formulate or propose short-term management recommendations, and regretting the increasing degree of uncertainty in the statistics on catch and sizes;

NOTING that the SCRS has however pointed out that the current catches or higher catches can be sustained if total fishing mortality or fishing mortality on juveniles could be considerably reduced;

CONVINCED of the urgent need to improve scientific knowledge on the stock of East Atlantic bluefin
tuna;

INSISTING on the need to immediately improve the protection of juveniles and to adjust the minimum sizes for East Atlantic bluefin tuna;

TAKING INTO ACCOUNT the 2001 *Criteria for the Allocation of Fishing Possibilities;*

CONVINCED that this policy constitutes a decisive step in defining a management strategy for tunas over
the medium-term and will result in stability in the management of these fisheries;

NOTING that the new allocation criteria should be applied in a progressive manner;

DESIRING to achieve a fair and equitable allocation of the Total Allowable Catches (TACs) among all the Parties that fish bluefin tuna in the East Atlantic;

DESIRING to assure the implementation of effective measures aimed at halting the decline in the stock of East Atlantic bluefin tuna;

CONSIDERING that the implementation of a multi-year program of conservation and management over the medium term will assist the management of the bluefin tuna fishery, reducing fishing mortality and the fishing mortality on juveniles.

THE INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNA (ICCAT) RECOMMENDS THAT:

1. Contracting Parties and Cooperating non-Contracting Parties, Entities or Fishing Entities whose vessels actively fish bluefin tuna in the East Atlantic implement a multi-year conservation and management program for 2003 to 2006.

Catch limits

2. Total allowable catches (TACs) are fixed at 32,000 t for the years 2003, 2004, 2005 and 2006.

3. To establish a fair and equitable allocation of parts of the quotas in the bluefin tuna fishery in the East Atlantic and Mediterranean, an allocation scheme, for a period of four years starting in 2003, shall be established as follows:

	2003	***2004***	***2005***	***2006***
Algeria	1,500	1,550	1,600	1,700
China (People's Republic)lgeria	74	74	74	74
Croatia	900	935	945	970
European Community	18,582	18,450	18,331	18,301
Iceland (1)	30	40	50	60
Japan	2,949	2,930	2,890	2,830
Korea	pm	pm	pm	pm
Tunisia	2,503	2,543	2,583	2,625
Libya	1,286	1,300	1,400	1,440
Morocco	3,030	3,078	3,127	3,177
Chinese Taipei	pm	pm	pm	pm
Others	1,146	1,100	1,000	823

*pm: Fishing possibilities attributed to Korea and Chinese Taipei based on their traditional shares of 1.5% and 1.5% will only be
activated in a given year when they individually have fished their current level of underages.
(1) Underages in the Icelandic fishery in any given year shall be transferred to the European Community.

4. Notwithstanding paragraph 2 of the 1996 *Recommendation Regarding Compliance in the Bluefin Tuna and North Atlantic Swordfish Fisheries* which is also applicable to the South Atlantic swordfish fishery, any unused part (if this is specified in the pertinent management recommendation) or excess of the annual quota/catch limit shall be deducted from or added to, according to the case, the respective quota/catch limit during or before the adjustment year in the following manner:

	Year of Catch	**Adjustment Year**
East Atlantic/ Mediterranean Bluefin Tuna	2003	2005
	2004	2006
	2005	2007
	2006	2008

5. The provisions of the *Recommendation Regarding Compliance in the Bluefin Tuna and North Atlantic Swordfish Fisheries* adopted at the 1996 Commission meeting and the provisions established in paragraph 3 shall be applied for the implementation of the individual quotas under paragraph 3 and for any Contracting Party and Cooperating non-Contracting Party, Entity or Fishing Entity. Each year shall be considered as an independent management period such as this term is used in the *Recommendation Regarding Compliance in the Bluefin Tuna and North Atlantic Swordfish Fisheries.*

6. The TAC and the catch limits for 2006 in paragraph 1 shall be reviewed and, if necessary, revised based upon the results of stock assessments in 2005 by the SCRS. Should adjustments to the TAC for 2006 be required following this assessment, the relative shares of the Parties for 2006 shall remain unchanged from those in the current recommendation.

Closed fishing seasons

7. Bluefin tuna fishing shall be prohibited in the Mediterranean by large-scale pelagic longline vessels over 24m in length during the period from 1 June to 31 July.

8. Purse seine fishing in the Mediterranean shall be prohibited during the period between 16 July and 15 August in order to protect juveniles.

Minimum size

9. Contracting Parties and Cooperating non-Contracting Parties, Entities or Fishing Entities shall take the necessary measures to prohibit the catch, landing or transshipment of bluefin tuna *(Thunnus thynnus thynnus)* weighing less than 6.4 kg.

Notwithstanding this provision, the Contracting Parties and Cooperating non-Contracting Parties, Entities or Fishing Entities shall have the possibility to grant tolerances for landing by vessels that have incidentally caught bluefin tuna weighing less than 6.4 kg with the condition that the total of these incidental catches is less than 10% in number of fish per landing of the total bluefin tuna catches of these vessels or their equivalent in percentage in weight.

It is prohibited to retain on board, land or sell bluefin tuna under 4.8 kg in the Mediterranean.

Data collection

10. The Contracting Parties and Cooperating non-Contracting Parties, Entities or Fishing Entities shall respect the guidelines established for the transmission of annual nominal catch data (Task I) for the vessels that fly their flag, as established in the ICCAT *Field Manual for Sampling and Statistic* *. The Contracting Parties and Cooperating non-Contracting Parties, Entities or Fishing Entities shall adopt the necessary measures to guarantee the reporting of their total landings, transshipments and caging of bluefin tuna carried out by the vessels that fly their flag.

11. The Contracting Parties and Cooperating non-Contracting Parties, Entities or Fishing Entities shall provide the SCRS with specific data on bluefin tuna caught within the framework of the sport fishery in order to assess the impact of sport fishing on this species and to make recommendations.

12. The Commission shall consider and, if necessary, adopt at its 2003 meeting, appropriate effective measures to control expansion of fisheries, in particular in the "others" category, which exceed the catch limits set by this recommendation.

02-09 RECOMMENDATION BY ICCAT TO DEVELOP A PLAN AIMED AT REDUCING THE CATCHES OF JUVENILE BLUEFIN TUNA IN THE MEDITERRANEAN

CONSIDERING that Commission has, since 1975, established various general recommendations aimed at protecting juvenile bluefin tuna weighing less than 6.4 kg, 3.2 kg, and 1.8 kg, setting different tolerance levels according to the minimum size-weight established, as well as defining closed seasons in the Mediterranean (including the Adriatic).

CONFIRMING that the Standing Committee on Research and Statistics (SCRS) in its recent assessment in 2002 estimated that in the year 2000, 36% and 40% of the bluefin tuna caught in the overall Mediterranean were less than 3.2 kg or 6.4 kg, respectively, and that it is possible that catches of ago 0 fish are being under-estimated.

CONSIDERING that the SCRS identifies the lack of size data on many fisheries as one of the sources of uncertainty in its assessments, for which a significant portion had to be estimated by SCRS itself through substitutions among fleets and, therefore, the Committee does not have confidence in the analytical assessments based on such data.

CONFIRMING that since January 2002 some countries in the Mediterranean area have prohibited the use of drift nets to catch bluefin tuna, among other species,

CONFIRMING that the SCRS recommends doing everything possible to assure compliance with the current minimum size/weight limit of 6.4 kg in order to contribute to the increase in the spawning biomass and to the stock yields, and also reiterates the need to adopt effective measures to avoid the catch of age 0 and 1 fish.

CONSIDERING the great variety of gears and fleets that operate in the Mediterranean, industrial as well as artisanal, which constitutes a highly complex framework for scientific monitoring and compliance with the measures in force to protect juveniles in general.

THE INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLATNIC TUNAS (ICCAT) RECOMMENDS THAT:

1. Contracting Parties, Cooperating non-Contracting Parties, Entities or Fishing Entities shall assure the maintenance or development of adequate schemes to provide scientific information in the formats requested by ICCAT and in smallest time-area possible on the size distributions of the catches taken by the various fishing gears, including fish destined for farming.

2. Contracting Parties, Cooperating non-Contracting Parties, Entities or Fishing Entities shall develop in 2003-2004, within the scope of their respective jurisdictions, specific plans directed at reducing their catches of juvenile bluefin tuna in their Mediterranean fisheries with the objective of reaching at least the tolerance levels indicated in the current ICCAT recommendations for the protection of juvenile bluefin tuna which according to SCRS recommendations, would lead to a reduction of at least 60% in the number of fish caught below 6.4 kg in the Mediterranean. Such plans and the results obtained shall be presented to the Commission in 2005.

3. Contracting Parties, Cooperating non-Contracting Parties, Entities or Fishing Entities shall develop in 2003-2004 specific scientific programs to identify the various fisheries that fish bluefin tuna as well as the size distribution of their respective catches, including historical catches in their estimates, if these are available. The results of these scientific projects shall be presented to the SCRS in 2005.

4. Based on this scientific information and other information available, the SCRS shall inform the Commission in 2005 on the availability and improvements in the size data for scientific purposes, for the various Mediterranean gears-fleets. Besides, the SCRS shall evaluate the overall data on the catch levels of juveniles by fishing gear(s), with time-area stratification, if necessary, for more adequate detailed information. This information could be incorporated in the new East Atlantic bluefin tuna assessment aimed at developing possible recovery scenarios.

5. Based on this information from the SCRS, the Commission shall, in 2005, consider additional measures or alternatives for the protection of juvenile bluefin tuna in the Mediterranean.

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