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WP3- Evaluation of the Small-Scale Fishery sector

D3.3.1. REGIONAL REPORT ON SSF STATUS_ITALY

WP3

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INTRODUCTION

Small scale and artisanal fisheries are often attributed with the potential to contribute to food security, economic growth, the development of coastal areas, and the preservation of marine ecosystems (FAO, 2005; Garcia et al., 2008). However, limited data are available at the regional level regarding production or the socioeconomic and ecological implications, which substantially limit opportunities to produce a real assessment of such issues and generate effective management strategies. Within this context, the Italian situation may represent an interesting case study. Since June 2010, the implementation of Council Regulation (EC) no. 1967/2006 introduced a ban of trawling activities within three nautical miles of the coast or within the 50m isobaths where this was closer to the shoreline. As a consequence, artisanal fishing remained almost the only exploitative activity within the coastal area. For example, on the West coast of the Adriatic Sea within the three-mile area, artisanal fisheries and hydraulic dredging for striped venus clams (*Chamelea gallina*) are the only permitted activities (Pranovi et al., 2015). Nevertheless, very few studies have been carried out to characterize the possible ecological effects and management strategies that result from this regulation (Fabi and Grati, 2005; De Mauro et al., 2007).

Similar to other regions throughout the world, the artisanal or small-scale fisheries in the Mediterranean Sea is recognised as a fundamental factor for the cultural and traditional identity of the region, and also represents an important source of employment and income for coastal communities (Farrugio et al., 1993; AdriaMed, 2005). Nevertheless, artisanal fisheries have been scarcely managed or studied (Guyader et al., 2013). For example, the large heterogeneity and variability of artisanal fisheries among different areas has presented an important obstacle to the development of standardized data collection routines that are based in many harbours and small ports (Colloca et al., 2004). The importance of this role has recently increased, at least along the Italian coasts, in relation to the introduction of bans for trawling activities within three miles of the coastline. Consequently, in the western region of the Adriatic Sea artisanal fisheries have remained along with hydraulic dredging, which represent the only ongoing commercial fishing activities (Pranovi et al., 2015). Within this context, it is necessary to increase our knowledge and monitoring of these activities to best implement effective management strategies. Given the difficulty involved in monitoring artisanal fisheries landings, as fishermen sell a large portion of their catch outside of the fish market in areas that are often difficult to reach and/or are far from the landing port, an on-board and on-quay data collection system has been implemented. Our findings confirmed that the artisanal fishing is a multitarget and multigear activity, as has been described for other Adriatic (AdriaMed, 2005; Fabi and Grati, 2005; Matic-Skoko et al., 2011),

Mediterranean (Stergiou et al., 2006; Tzanatos et al., 2005; Forcada et al., 2010) and European areas (Guyader et al., 2013).

Within the Italian fishing fleet, the SSF segment is the most important. A total of 10 296 vessels are involved, accounting for at least 50 % of total employment. In terms of capacity, SSF makes up only 15 % of the national Gross Registered Tonnage (GRT), but covers 65 % of fishing boats in number and 65 % of the total days at sea (Table 1). The average size of these vessels is 2.6 GRT and 25 kW, while the average size of national fleet is 11 GRT and 79 kW. Small-scale vessels are older than other segments of the fleet, 28 years on average.

The small-scale fisheries segment accounts for about 18 % of the national catch and for 26 % of national value of landings. This difference depends on the species targeted by SSF, which are mostly of high value. The vessel owner usually fishes with an additional person. The number of fishers in 2002 was 19358, that is the highest level of employment by fleet segments.

Table 1. Italian fishing fleet by segment, 2002.

Fleet segments	N. of vessels	GRT	kW	Days at sea	Employment
Bottom Trawler	2 353	91 092	509 557	441 421	9 029
Midwater Pair Trawler	126	6 784	41 651	22 264	806
Purse seiner	180	7 836	43 479	20 645	1 321
Dredger	714	7 399	76 780	71 892	1 503
Small-scale fishery	10 296	27 081	255 334	1 657 952	19 358
Multi-purpose	2 051	27 501	270 408	317 927	5 395
Tunas	195	10 650	55 969	28 436	948
Total	15 915	178 344	1 253 177	2 560 539	38 360
% small-scale fishery/total	65	15	20	65	50

The number of small-scale vessels registered in the Adriatic regions is 2983; they account for 29 % of the total number in the segment and cover 23 % of total GRT for Italy (Table 2).

Table 2. Geographical distribution of small-scale vessels, 2002.

Absolute values	Adriatic regions	Tyrrhenian and Ionian regions	Italy
Number of vessels	2983	7313	10296
Total GRT	6336	20746	27081
Total kW (1000)	78	178	255
Days at sea (1000)	511	1147	1658

Employment	4875	14484	19358
Average values			
GRT	2.1	2.8	2.6
kW	26.0	24.3	24.8
Days at sea	171.3	156.8	161.0
Employment	1.6	2.0	1.9

In recent years, the Italian SSF has undergone a huge reduction considering all the capacity and economic indicators. In the period 1998-2002, there has been a reduction of 18 % in total GRT. The total number of vessels has decreased by more than 2000 units (Table 3). This trend is due to the decommissioning scheme under the EC Multi Annual Guidance Plan (MAGP) IV. Between 1998 and 2002 total production decreased, reaching 55562 tons in 2002. There was a less significant reduction in the value of landings, due to the increase in average prices.

Table 3. Main trends in effort indicators of Italian small-scale vessels.

Year	1998	1999	2000	2001	2002
Fleet - number of vessels	12 480	12 482	11 990	10 775	10 296
Fleet - total GT (1000)	33.2	33.1	31.7	28.4	27.1
Fleet - total kW (1000)	304.0	302.8	290.4	264.3	255.3
Days at sea (1000)	2 105	2 116	2 047	1 830	1 658
Employment on board (FTEs1)	25 539	25 387	24 668	20 844	19 358
Invested capital (million Euro)	468	477	522	487	477

SSF shows low capital intensity and it is highly affected by climate conditions, market fluctuations and by the interaction with trawlers fishing the same species, often in the same grounds, which substantially reduce the availability of fish. With respect to revenue, gross cash flow decreased steadily from 1998 to 2002 (-20 %). The reduction is a consequence of external factors. In particular, the rise in costs (mainly fuel prices) had a large impact on fishing activity. Fuel costs, which is the main cost in fishery accounts, increased continually from the spring of 1999 until the last months of 2000. The increase in operational costs has had a negative impact not only on the profitability of the fishery sector, it has also caused a reduction in the crew share (Table 4).

Table 4. Main trends in economic indicators of Italian small-scale vessels (million Euro).

Year	1998	1999	2000	2001	2002

Value of landings	449.6	456.8	495.7	414.8	360.2
Fuel costs	32.1	37.5	39.6	35.5	32.3
Other running costs	50.7	49.9	52.2	45.7	40.7
Vessel costs	30.2	32.0	34.4	32.9	32.7
Crew share	120.1	118.6	129.4	106.5	95.6
Gross cash flow	216.4	218.8	240.0	194.3	158.9
Depreciation	20.5	20.6	22.3	15.3	20.1
Interest	3.9	3.7	3.5	2.8	2.7
Net profit	192.0	194.4	214.2	176.3	136.1
Gross value added	336.5	337.4	369.4	300.8	254.5

However, the economic performance of the small-scale vessels is very different from one area to another (Table 5). In Adriatic regions, both landings and value per effort unit area higher than in the other regions; this difference is due to factors such as the lowest effort and the different composition of the landings.

Table 5. Landings and value of landings for small-scale vessels, year 2002 (M = million).

Absolute values	Adriatic regions	Italy
Volume of landings (t)	24459	55562
Value of landings (M Euro)	148	360
Price (€/kg)	6.05	6.48
Average values		
Landings/vessel (t)	7.5	5.4
Value/vessel (1000 Euro)	45.3	35.0
Landings/days (kg)	42.7	33.5
Value/days (Euro)	258.5	217.2

In GSA17 (Italy; northern and central Adriatic) gillnets were used from April to January to target common sole (*Solea solea*) and from July to December for the mantis shrimp; traps for the gastropod *Tritia mutabilis* were used from November to May (the fishing season laid down by local regulations) and cuttlefish traps were set in spring-summer during the spawning period.

In Italy, gillnet use displayed a marked seasonality, increasing from a minimum in January (499 vessels), peaking in August (894 vessels), and then decreasing in the following months In Italy the fishing effort exhibited a clear seasonality and was especially intense in spring (407 vessels in May), due to the concurrence of the spawning season of cuttlefish (targeted with pots) and

the presence of *T. mutabilis* (targeted with basket traps In the Italian portion of GSA17 three species accounted for more than 10%: cuttlefish, common sole, and the mantis shrimp. The species composition of trap landings underscored the high species selectivity of this group of gears (Fig. 7). S. officinalis and *T. mutabilis* made up respectively 81% and 100% of pot and basket trap landings.

In general, the landing biomass shows a marked seasonality that varied among areas and species. The landings of common sole and mantis shrimp showed similar trends, with maxima in August (56,020 and 71,680 kg, respectively) and minima in April (2,570 and 2,620 kg, respectively). Cuttlefish landings are concentrated in spring, during the inshore spawning migration, and reach a maximum of 266,100 kg in May.

In Italy (GSA17) the mean selling price of S. mantis was fairly constant throughout the year, ranging from 7.8 €kg^{-1} in January to 10.9 €kg^{-1} in July, whereas the value of landings peaked in summer (721,365€ in August). The price of common sole from this area was fairly stable throughout the year with the exception of summer, when the lowest price (7.7 €kg^{-1} in July and 10.6 €kg^{-1} in August) corresponded to the highest value of landings (1,262,234 € in July and 1,553,100 € in August The value of cuttlefish landings in Italy (GSA17) showed a clear seasonality, with a peak in spring (May: 1,503,430€); in contrast, the lowest selling price was recorded at the beginning of the fishing season (March: 5.9 €kg^{-1}) and the highest price at the end (August: 8.9 €kg^{-1})

The analysis of catch composition demonstrated that all the set gears were characterized by high species selectivity (Grati et al., 2010), especially traps, whose target species accounted for more than 65% of their total catch. Even though the present study focused on landings, and did not therefore assess discards, several researchers have highlighted that traps and pots are usually more selective and produce less by catch than other fishing gears, either passive and active (Broadhurst et al., 2007; Suuronen et al., 2012) Notably, SSFs account for a significant quota of total catches and they mostly supply local markets. Price, quality, and safety are main determinants of consumer demand for fish products, and the products offered by SSFs meet all these requirements. The study also highlighted that a lack of exhaustive data and statistics is still a major constraint for most Adriatic coastal countries, since routine monitoring programs are in place in very few countries (Stagličić et al., 2011).

2. SSF in Italy

2.1. Friuli Venezia-Giulia region

In this region there are three fish markets: Grado, Marano Lagunare and Trieste. In the Friuli Venezia Giulia, in contrast to what is seen in the other regions analysed, the landings during the 2015 in all the three fish markets (3293 tons) represents a decrease of 46.7% respect to

the 10 years before. In the period 2005-2015, local fish production fell sharply, losing 58% net in terms of quantities and 42.1% of revenues. No landing category has a positive variation in the period analysed.

SSF (Long line and Tremmel/gillnet) in particular represents half of the total vessel involved in fishing activities (51.6 %). Tremmel/gillnet showed the highest decrease (-49.2 %) in the period analysed.

Table 6. Main statistics about the Friuli Venezia-Giulia fleet in 2015

Fishing system	N° of vessels	Variation 2015/2000	GT	Variation 2015/2000	KW	Variation 2015/2000
Idraulic dredging	42	2,4%	446	7,2%	5.015	-0,9%
Long line	157	-32,9%	225	-31,6%	6.2	-11,5%
TremmelTremmel/gillnet	31	-49,2%	71	-46,6%	1.27	-27,0%
Purse seine	89	-41,4%	215	-40,9%	3.687	-32,0%
Trawling	45	-43,8%	739	-42,7%	6.806	-49,0%
Total	364	-35,9%	1.7	-33,0%	22.98	-29,5%

Veneto region

Caorle and Jesolo represent the two most important ports in the northern part of the Veneto coast, and they hoststhe major fishing fleets of the region apart from Chioggia, which is the largest port in the entire basin.

According to the EU Fleet Register, the fleet in the study area included 216 vessels, among which 79 belonged to artisanal fisheries. The features of this component of the fleet can be summarized as follows: length, 4.30e12.08 m; gross tonnage, 1e2 tons; and crew, 1e2 fishermen. These vessels mainly operate in fishing grounds located between 0.1 and 3 miles from the coastline. The collected data indicated that artisanal fishermen adopt four different fishing techniques: gill nets, tremmel nets, pots, and basket traps that vary seasonally (Table 1).

Table 7. Description of the artisanal fishery, in terms of gears, number of vessels, main target species and fishing season.

Fishing technique	no. vessels	Target species	Fishing season
Gillnets	79	Sole, mantis shrimp and tub gurnard	May-Jun, Sep-Nov
TremmelTremmel nets	79	Flatfish	Jan-Mar, Nov-Dec
Pots	79	Cuttlefish	Apr-Jul
Basket traps	75	Mantis shrimp	Jul-Oct

Gillnets are employed from May to June and from September to November, and these target sole (*Solea solea*), mantis shrimp (*Squilla mantis*), and tub gurnard (*Chelidonichthys lucerna*) (Table 1). The net length ranges between 1.000 and 5.000 m, and the length used mainly depends upon the vessel size. Catches can include up to 78 species (8 target, 27 by-catch, and 43 discarded species, reflecting 78.5%, 13.3%, and 8.2% of the total biomass, respectively). Notably, sole, mantis shrimp, and smooth-hound shark (*Mustelus mustelus*) represented 73% of the commercial biomass (Table 2 and S1). The resulting discarded fraction is dominated by three species: spined murex (*Bolinus brandaris*), grey swimming crab (*Liocarcinus vernalis*), and common eagle ray (*Myliobatis aquila*) (Table S1). Regarding the total CPUE, gill nets represent the second most common fishing technique and the most important species yielded are sole (15.0 kg d^{-1} v^{-1}), smooth-hound shark (7.1 kg d^{-1} v^{-1}) and mantis shrimp (4.3 kg d^{-1} v^{-1}). Tremmel nets are employed in the periods from January to March and November to December, and they target flatfish – turbot (*Scophthalmus maximus*), brill (*Scophthalmus rhombus*), European flounder (*Platichthys flesus*) e and cuttlefish (*Sepia officinalis*) (Table 1 and S2). The net length is between 350 and 2000 m, and mainly depends upon the vessel size. Catches can include up to 37 species (5 target, 21 by-catch, and 11 discarded species, reflecting 74%, 23% and 3% of the total biomass, respectively), among which turbot, cuttlefish, and brill represent 62% of the commercial biomass. The discarded fraction is almost entirely composed of three species grey swimming crab (*Liocarcinus vernalis*), twait shad (*Alosa fallax*), and spined murex (*Bolinus brandaris*). In terms of the total CPUE, tremmel nets represent the fourth most common fishing technique, and the most important species that it yields are turbot (4.5 kg d^{-1} v^{-1}), cuttlefish (2.5 kg d^{-1} v^{-1}), and brill (2.1 kg d^{-1} v^{-1}). Pots are employed from April to the beginning of July, and they target cuttlefish. This activity is regulated by the Port Authority, which establishes annual monitoring of the fishing season and monitors fishing vessels. In 2014, the fishing period was from April to 10 July with an

allowance of 300 pots per fisherman (in cases of three or more embarked fishermen, the maximum limit of pots was 600 per vessel). Catches are composed of 99.6% target species, with a few grey swimming crabs being the discarded species. In terms of the total CPUE, pots represent the best fishing technique, with 71.4 kg d^{-1} v^{-1} of cuttlefish. Basket traps are employed from July to October and they target mantis shrimp. Catches are composed of 86% target species. The discarded fraction represents four species of invertebrates: spined murex, banded dye-murex (*Hexaplex trunculus*), sea snail (*Tritia mutabilis*), and netted dog whelk (*Nassarius nitidus*). In terms of the total CPUE, basket traps represent the third best fishing technique, with 33.9 kg d^{-1} v^{-1} of mantis shrimp. Based on the CPUE data and vessel numbers for each fishing technique, an annual catch of 735 or 1050 tons is estimated (Table 3) for different fishing effort estimates of 150 or 214 days at sea, respectively. Cuttlefish, mantis shrimp, sole, and turbot showed the highest values, ranging from 58 to 440 tons per year (Table 3).

Table 8. CPUE (kg per vessel per day) of commercial species (target and bycatch), estimates of the annual catches and fishing gear; catch 1 refers to the 150 days at sea scenarios, catch 2 refers to the 214 days at sea scenarios; the 95% confidence interval is reported for each estimate (LB = lower boundary and UB= upper boundary); TL = trophic level; G: gillnet; T: tremmel net; P: pot; B: basket trap.

Species	CPUE			1 - total catches (t)			2 - total catches (t)			gear
	LB	(kg v-1 d-1)	UB	LB		UB	LB		UB	
Common cuttlefish *Sepia officinalis*	55.5	74.3	95.3	233.6	311.5	398.8	333.3	444.4	568.9	P-T-G
Mantis shrimp *Squilla mantis*	59.1	72.1	87.3	151.1	190.3	240.3	215.5	271.6	342.8	B-G
Common sole *Solea solea*	11.2	15.7	21.1	62	86.1	114.8	88.5	122.8	163.8	G-T
Smooth-hound shark *Mustelus mustelus*	3.5	7.6	12.3	19.3	41.2	65.8	27.6	58.8	93.9	G-T
Turbot *Psetta maxima*	3.1	4.6	6.2	11.2	16.7	22.4	15.9	23.8	32	T

Tub gurnard *Chelidonichthys lucerna*	2.3	3.3	4.5	11.6	17.1	23.4	16.5	24.3	33.3	G-T
Brill *Scophthalmus rhombus*	1.8	2.6	3.5	6.9	10.4	14	9.9	14.8	20	T-G
Gilthead seabream *Sparus aurata*	1.1	2.6	4.3	6.2	13.8	22.9	8.8	19.7	32.6	T-G
Sand steenbras *Lithognathus mormyrus*	0.6	1.8	3.3	3.4	10	18.2	4.8	14.2	25.9	T-G
Mediterranean scaldfish *Arnoglossus laterna*	0.7	1.7	3	3.7	9.3	16.6	5.3	13.3	23.6	G
Shi drum *Umbrina cirrosa*	0.6	1.4	2.3	3.1	6.7	10.8	4.5	9.6	15.4	T-G
European seabass *Dicentrarchus labrax*	0.3	1.1	2.2	1.2	4.2	8.4	1.7	6	12	T-G
European flounder *Platichthys flesus*	0.3	1.1	2.1	1.2	3.8	7.6	1.7	5.4	10.8	T-G
Spiny dye-murex *Bolinus brandaris*	0.3	0.7	1.1	1.9	3.9	6.3	2.8	5.6	9	T
Golden grey mullet *Chelon auratus*	0.1	0.6	1.5	0.4	2.7	6.2	0.6	3.9	8.9	G
European lobster *Homarus gammarus*	0	0.3	0.9	0	1.6	4.4	0	2.2	6.3	G
Thinlip grey mullet *Chelon ramada*	0	0.3	0.6	0.2	1.2	2.7	0.3	1.7	3.9	G

Brown ray *Raja miraletus*	0.1	0.1	0.2	0.4	0.7	1.1	0.5	1	1.5	G-T
Leaping mullet *Chelon saliens*	0	0.1	0.2	0.2	0.5	1	0.2	0.8	1.5	G
Caramote prawn *Penaeus kerathurus*	0	0.1	0.2	0.3	0.5	0.9	0.4	0.8	1.3	G
Bluefish *Pomatomus saltatrix*	0	0.1	0.2	0	0.3	0.9	0	0.5	1.2	T
Nursehound *Scyliorhinus stellaris*	0	0.1	0.3	0	0.5	1.4	0	0.7	2	T-G
Red scorpionfish *Scorpaena scrofa*	0	0.1	0.2	0	0.4	1.3	0	0.6	1.9	T-G
Atlantic horse mackerel *Trachurus trachurus*	0	0.1	0.1	0.2	0.4	0.7	0.2	0.6	1.1	T-G
Brown meagre *Sciaena umbra*	0	0.1	0.2	0	0.4	1	0	0.5	1.4	T-G
Annular seabream *Diplodus annularis*	0	0.1	0.2	0	0.3	0.7	0	0.4	1.1	G-T
Leerfish *Lichia amia*		<0.1		0	0.2	0.6	0	0.3	0.8	T-G
Common octopus *Octopus vulgaris*		<0.1		0	0.1	0.5	0	0.2	0.7	T
White seabream *Diplodus sargus*		<0.1		0	0.1	0.4	0	0.2	0.5	G-T
Common pandora *Pagellus erythrinus*		<0.1		0	0.2	0.5	0	0.2	0.7	G

Atlantic mackerel *Scomber scombrus*	<0.1	0	0.1	0.2	0	0.1	0.3	G
John dory *Zeus faber*	<0.1	0	0.1	0.1	0	0.1	0.2	G
Thicklip grey mullat *Chelon labrosus*	<0.1	0	0.1	0.2	0	0.1	0.3	T
European squid *Loligo vulgaris*	<0.1	0	0.1	0.2	0	0.1	0.2	T
Whiting *Merlangius merlangus*	<0.1	0	0.1	0.2	0	0.1	0.2	G
Great scallop *Pecten jacobaeus*	<0.1		<0.1			<0.1		G
Red mullet *Mullus barbatus*	<0.1		<0.1			<0.1		G-T
Spotted weever *Trachinus araneus*	<0.1		<0.1			<0.1		G
Salema *Sarpa salpa*	<0.1		<0.1			<0.1		B

Although features of the fleet (on average, 1.5 t of GT and 1.5 crew members) were aligned with those reported for the region (MIPAAF, 2014) and other European ports (Guyader et al., 2013), our estimates of fishing effort were higher than that of official Italian statistics (89 days at sea for 2012). Our estimates, which ranged between 150 and 214 days at sea per year, fell within the upper part of the range reported for various fisheries throughout Europe (Guyader et al., 2013). Finally, as reported for other European fisheries (Guyader et al., 2013), our collected data indicated a high amount of vulnerability as even though 39 target species were targeted, 76% of total catches depended upon only three species: cuttlefish, mantis shrimp, and sole. This partially occurs because, within the context of polyvalence, fishermen seasonally employ two types of fishing gear (pots and basket traps), which results in nearly

monospecific (for cuttlefish and mantis shrimp) exploitation in coastal waters of these temporary resources. These patterns are in contrast with the common idea that artisanal fishing, is a highly dynamic activity that can switch metiers depends upon the abundance of target species and dynamic environmental conditions, so it can therefore be considered a highly resilient activity (Colloca et al., 2004; Tzanatos et al., 2005; García-Rodríguez et al., 2006).

2.3.Emilia-Romagna region

The coastline of the Emilia-Romagna Region of Italy stretches for nearly 130 Km (northern Adriatic Sea, GFCM Geographical Sub-Area 17) from the southern delta branch of the Po river situated in Goro, Province of Ferrara to the port of Cattolica (Province of Rimini). The coast is low and sandy, and all ports are situated in river mouths or artificial canals, with the exclusion of the ports of Goro (FE) and Marina di Ravenna (RA), which are located inside lagoon areas. There are two maritime districts along this coast, the Ravenna northern district and the Rimini southern district. The majority of fishing vessels are based in the nine regional ports.

In 1999 the fishing fleet of Emilia-Romagna comprised 1170 fishing boats, divided into six types of activities (fishing techniques). The vessels that fell into the "small-scale fisheries" category were almost the half the total number of vessels (Table 1). It should be mentioned that according to European Union regulations on the classification of fishing typologies, the item "small-scale fisheries" only comprises vessels with an overall length (LOA) of less than 12 meters and which use passive gears and these do not have permission for pelagic or bottom trawl nets. These vessels are family-run and artisanal from an administrative and technical point of view (IREPA, 1999).

Small-scale fisheries in Emilia-Romagna actually include two fishing systems: one with static gears and one with trawls. Some vessels, however, use both systems.

Indeed, if we are to consider the fishing situation more in detail, we need to mention that, at least from a traditional point of view and as far as family-run non-industrial vessels are concerned, "small-scale fisheries" also include vessels with a gross tonnage of less than 10 GRT, engine power lower than 150 HP, which fish with trawl nets. Moreover, in certain periods of the year, these vessels are authorized to fish within 3 nautical miles from the coast, making an exception to EC Regulation 1626/1994. The management of trawling on this coastal strip from Cattolica (RN) to Trieste (TS) was also subject to special regulations in the past (Froglia et al., 2000).

The data gathered from the harbour offices of Rimini and Ravenna show that in 2002 the total number of vessels authorised for this type of fishing was 206 (Table 2), of which

89 had an overall length of less than 12 metres. This shows that small-scale fishery with trawl nets, especially in the Ravenna district, is still quite important, providing a source of income in wintertime for enterprises owning small vessels; the harsh weather and the moving of most fish species offshore from the coastal area are a considerable limit to the fishing activity of these vessels, which also use passive fishing gears in certain seasons. Over the last few years, there has been a general reduction in this type of activity.

As regards "small-scale fisheries" using static gears, this practice has evolved and has been consolidated over the last fifteen years. Small wooden vessels have been replaced by fibreglass motorboats and on-board equipment, both for fishing and for navigation, has also been modernized.

However, it should be noted that a passive fishing gear system is owned by almost 70% of the vessels recorded in the vessel register for the two districts, according to the size groups illustrated in Table 3. Only a few vessels hold a permit for static gear fishing, about 15% in total (Table 4). The vessels defined as "multi-purpose" ("polyvalent"), meaning those boats that have permission to fish with different gears, are a common feature of the entire Italian fishing fleet (Cannas, 2001). Another relevant aspect of the socio-economic situation in the Region, which is related to the workers employed in small-scale fisheries, is the outstanding importance of Manila clam (*Tapes philippinarum*) cultivation in the northern district, especially inside the Sacca di Goro Lagoon. Here many small-scale fishing vessels have permission to operate as support units to the clam cultivation plants in the area where Manila clam is cultivated.

Passive fixed gear fishing is highly unusual both in terms of seasonality and of distributional areas. In spring almost all the boats fishing cuttlefish (*Sepia officinalis*) use pots and fyke-nets. Fishing of gastropod *Tritia mutabilis* is mainly carried out in the district of Rimini and, further to the south, in the Regions of Marche, Abruzzo and Molise (Piccinetti et al., 1998). This fishery, especially in autumn and winter, is mainly concentrated in the district of Ravenna. In summer, however, especially in the period when bottom and pelagic pair trawling and floating trawls are suspended, static fishing gears are common in the whole Region.

The information available on the fishing effort for each species is quite limited and, to date, there has not been any in-depth analysis of the various fishing methods and fishing grounds.

Lastly, although under the Ministerial Decree 14/09/1999 (Discipline of small-scale fisheries), for some years now efforts have been made to stimulate the setting up of consortia of small-scale fishing enterprises aimed at guiding, coordinating and managing

the small- scale fishery activity, such bodies have not yet been established in Emilia-Romagna.

Table 9. General overview of the fishing sector in Emilia-Romagna in 1999 (Source: IREPA, 2001).

Typology	N° of vessels	GRT	kW	N° of workers	N° of workers/ vessels	Catches (t)	Catches/ vessel (t)	Proceeds (€)	Proceeds/ vessel (€)
Bottom trawl	142	3,935	28,705	479	3.4	5,383	37.9	26,909,680	189,505
Pelagic trawl	52	2,620	16,962	275	5.3	18,469	355.2	13,751,771	264,457
Hydraulic dredge	60	592	6,277	120	2	3,703	61.7	7,986,005	133,100
Small-scale fisheries	488	994	17,998	488	1	4,986	10.2	15,614,861	31,998
Polyvalent	428	3,284	39,794	942	2.2	8,873	20.7	24,311,010	56,801

Table 10. N° of vessels holding a permit to carry out "special fishing" in Emilia-Romagna, 2002.

	Ravenna district	Rimini district	Total Emilia-Romagna
Total number	151	55	206
LOA <12 m	70	19	89

Table 11. Size groups of vessels holding a permit for static gear; Emilia-Romagna, 1999.

LOA (m)	N°	%
≥ 12	183	23.2
6.00 - 1.99	464	58.7
<6.00	142	18
n.a.	1	0.1
Total	790	100

Table 12. Numerical distribution of vessels with a permit to use only static gear, vessels with a permit to use both static gears and other fishing systems and vessels with a permit for static gears and to act as "farm units"; Emilia-Romagna, 1999.

Distric	Static gear permit only	Permit for use of static gears and other fishing systems	Permit for use of static gears and "clam cultivation support units"	Static gear permit total
Ravenna	77	192	279	548
Rimini	50	187	5	242
Total	127	379	284	790

In 2015 total landings amount to 9482 tons, with a 7.3 % increase during the period 2005-2015. Total income for the five fish market amount to 28.5 million €, with an increase of 9.9% in the period 2005-2015. SSF (long lines and tremmel/gillnets and) account for more the half of the total vessels (55.7 %). Statistics about the landings of two main and most valuable catches of the SSF, mantis shrimps and cuttlefishes, are presented in table 13.

Table 13. Main statistics about the Emilia-Romagna fleet in 2015

Fishing system	N° of vessels	Variation 2015/2000	GT	Variation 2015/2000	KW	Variation 2015/2000
Idraulic dredging	54	0,0%	785	0,5%	5.609	0,7%
Long line	133	-21,8%	326	0,9%	8.879	-9,7%
Tremmel/gillnet	216	-24,5%	406	-19,6%	7.832	-15,6%
Trawling	210	-54,8%	5.9	-39,6%	38.01	-41,6%
Purse seine	13	-7,1%	111	-16,5%	1.575	-23,7%
Pelagic trawling	1	0,0%	12	200,0%	185	263,7%
Total	627	-36,7%	7.54	-34,5%	62.09	-32,4%

Table 14. Main statistics about mantis shrimp (*Squilla mantis*) and cuttlefish (*Sepia officinalis*) landings in the Emilia-Romagna region

	Mantis shrimp landings		Cuttlefish landings	
	tons	% total landings	tons	% total landings
Goro	164	15	14.7	1
Porto Garibaldi	399	12	7.3	0.5
Cesenatico	228	5	102	2
Cattolica	23	5	-	-
Rimini	263	22	69	6
Total	1077	11.8	193	2.4

2.4. Marche region

Data reported in this context come mainly from investigations carried out since 1999 on the artisanal fleets operating along the Italian coast of the Adriatic Sea, in the area of Ancona Department extending between the Conero Promontory and Senigallia, about 35 km of shoreline (Fabi et al., 2002a). They can be considered as representative of the artisanal fleets operating along the coast of Marche region, from San Benedetto del Tronto to Pesaro; (Fabi and Grati, 2002). A census at both local maritime offices and landing sites were performed to get information about the vessels involved, the gears used in the different seasons and the main target species.

The artisanal fleets existing in the area consist of 77 artisanal vessels having an average GRT of about 3.0, LOA of 6-12 m, average engine power of about 40 kW and a crew of 1-2 people. They include both fibreglass planing vessels and wooden displacing boats. Most of these vessels moor at three landing places (Senigallia, Ancona and Portonovo), while the remaining ones are dislocated along the coast.

Gillnet for common sole (*Solea vulgaris*), gillnet for other highly valuable species (i.e. *Sciaena umbra*, *Umbrina cirrhosa*, *Dicentrarchus labrax*, sparids) and tremmel net are the most common set nets used in the area. A relevant importance is also assumed by traps (pots and fyke nets) for *Sepia officinalis* and basket traps for *Tritia mutabilis*.

The fleets mainly operate in a coastal area of about 300 km^2 extending between Marotta at north and the Conero Promontory at south and from 0.1 to 3 nautical miles offshore, because at greater distances the set gears could be damaged by trawling. These vessels extend their

fishing grounds outside 3 nm from the coast only during the biological fishing stop (closed fishing season) of trawlers.

Gillnets for common sole

The artisanal fleets targeting common sole use a specific gillnet with mesh size between 64 and 68 mm (stretched). The length of nets ranges from 1,000 to 5,000 m, mainly depending on vessel size and availability of manpower at land for the gear cleaning.

The fleet percentage using this gear varies among seasons, with the lowest values in winter and the highest ones in summer, when almost all operating vessels of the area target the common sole with gillnets.

Nets are usually sunk at dusk and pulled in at dawn for an average permanence of 12 hours at sea. The fishing activity is carried out from Monday to Saturday, depending on the sea conditions, and all year round, following a seasonal pattern characterised by the highest values in summer, when most of the small-scale fishing vessels are involved, and the lowest ones in winter. The extension of the fishing period increased in the last four years.

In 1999-2002 seasonal landings ranged from 0.74 t to 125 t, showing only in the two first years a direct relationship with the amount of employed nets. The average seasonal landings per year increased from 1999 to 2000, remaining practically constant in the subsequent period. *Solea vulgaris* accounted from 24% to 80% of the annual landed catch in weight. Annual landing of this species gradually increased over the four years reaching in 2002 a value corresponding to 2 times that recorded in 1999. At the same time LPUE remained practically constant.

Data on landing composition showed that *Squilla mantis* and *Chelidonichthys lucerna* can be considered respectively second and third target species for this fishery. Other accessory species are *Solea impar*, *Lithognathus mormyrus*, *Chelon ramada*, *Diplodus annularis*, even though they appear in catches occasionally.

The other types of gillnet used in the area are 3-6 m high and have a mesh size ranging from 72 to 100 mm (stretched). The length of nets ranges from 1,000 to 5,000 m.

These nets are occasionally used by a few fishing vessels mooring in the area between Ancona and Portonovo to catch either striped sea breams, sea basses and corbs in particular sea conditions or grey mullets in winter.

The scarce importance of this fishing métier is confirmed by the low number of vessels seasonally practicing it, which ranged from 0 (spring 2002) to 10 (winter 1999) in the overall period.

The fishing grounds are represented by rocky and sand-rocky bottoms located between 0.1 and 2 nm off the Conero Promontory and by a sand-muddy area placed about 5 km at north of Ancona characterised by the presence of sealines connecting off-shore platforms with the coast

Nets are usually sunk at dusk and pulled in at dawn for an average of 12 hours at sea. The fishing activity is carried out from Monday to Saturday, depending on the sea conditions, and follows a seasonal pattern characterised by the lowest values in summer.

Over the period 1999-2002 seasonal landings ranged from 0.01 t (summer '00) to 17 t (fall '01; Figure 11), with a direct relationship with the total amount of employed nets. The average seasonal landing per year showed some fluctuations, reaching a peak (6 t) in 2001 and ranging from 2 to 4 t in the other years. The average seasonal LPUE per year went from 6 to 16 kg/5000m/h.

Tremmel nets for *Litognathus mormyrus*

In the central northern Adriatic Sea tremmel net underwent several modifications in the last few years, mainly consisting in the outer panels and the inner one are 2 and 3 m high respectively and the mesh size is 340 mm (stretched) in the formers and 70 mm in the latter (Table 7). Length of nets ranges from 500 to 1,000 m, mainly depending on vessel size and availability of manpower at land for the gear cleaning.

Tremmel nets are used only by fishers who operate in the area between Ancona and Portonovo to catch striped sea breams in winter and cuttlefishes in spring. Fleet percentage using this net strongly varies among seasons, with the highest values in winter-spring and the lowest ones in summer, when no vessel adopts this gear. The number of vessels yearly devoted to this fishery gradually decreased over the four years, likely due to the scarce abundance of the two target species at sea.

The fishing areas for striped seabream (*L. mormyrus*) are represented by sand-rocky bottoms between 1.5 and 3 nm from the Ancona harbour and between few hundreds of meters and 1.5 nm from the coast in the Portonovo bay. In spring, when *S. officinalis* migrates inshore for reproduction, the local fishers utilise tremmel nets in the same areas but exploit also shallower waters (5-15 m).

Nets are usually sunk at dusk and pulled in at dawn for an average of 12 hours at sea in the catch of *L. mormyrus*, while they are left at sea for 24 hours in the case of *S. officinalis*. The fishing activity is carried out from Monday to Saturday, depending on the sea conditions, and from fall to spring, although the fishing season was shorter in the last two years then in 1999-2000.

Over the years 1999-2002 seasonal landings ranged from 0.1 t (winter '02) to 20 t (winter '99), showing a direct relationship with the total amount of employed nets. The average seasonal landing per year amounted to 10 t in 1999 and decreased afterwards. Also, the average seasonal LPUE per year gradually decreased, reaching in 2002 a value corresponding to 50% of that recorded in 1999.

There is a different seasonal occurrence of the two target species in landings: *L. mormyrus* reaches the highest values in winter and *S. officinalis* in spring.

Lithognathus mormyrus accounted from about 70% of the total landing in weight in winter 1999, afterwards its contribution drastically fell down until to become nil in 2002. A similar trend was also recorded for LPUEs of this species.

In spring, when *S. officinalis* represents the main target species for the tremmel net fishery, the seasonal landings of this cephalopod ranged from 3 to 12 t, corresponding from 60% to 90% of total landings obtained with this type of net. In the remaining seasons the percentage contribution of cuttlefish to the total landings was generally less than 4%.

The average seasonal landing per year increased until 2001 and drastically dropped down in the last year, independently from the reduction of the fishing effort. Conversely, the LPUEs increased in the last two years, even though they were characterised by a higher variability.

By-catch was dominated by *C. ramada* in winter-spring, *S. mantis* in spring, *D. annularis* and *Eledone cirrhosa* in fall. This last species was represented by adults having mature gonads.

Basket traps for *Tritia mutabilis*

Basket trap fishery is practised exclusively in the central and northern Adriatic Sea for catching changeable nassa (*T. mutabilis*). In the investigated area this activity is regulated by Ancona Port Authority, who establishes yearly duration of fishing season and TAC for each vessel.

This fishery is practised by a good portion of vessels operating in the whole area. The fleet percentage varies among seasons, with a gradual decrease from winter to summer, when this fishery is usually forbidden and an increase in fall.

The fishing season commonly extends from fall to late spring. The gears are lowered into the sea at the beginning of this period and definitively recovered at its end. Fishing operations, consisting of emptying, baiting and control of gears, take place at 24-48-hour intervals, over all the week and show a seasonal trend characterised by a gradual increase from fall to spring.

In 1999-2002 seasonal landings ranged from 4 to 340 t. In each year, seasonal landings showed a direct relationship with the total amount of employed gears, with an increase from fall to winter and a decrease in spring. In winter, when the highest fishing capacity is applied, they gradually increased over the years. Total annual landings ranged from 194 t (1999) and 561 t (2002). The average seasonal LPUE remained rather constant on 4-8 kg / 5000m/h. The target species always made up almost entirely the total landing.

Traps for cuttlefish

Two types of traps are used in the area to catch cuttlefishes: fyke nets and pots. The formers consist of plastic rings (5-6) sustaining an external polyamide twisted filament net and internal frustum of cone shaped openings made of the same net. Pots are parallelepiped shaped and consists of an iron frame covered by polyamide twisted filament net; each longer side is provided with an opening permitting the cuttlefishes to enter but not to go out. Fishermen put inside these gears either laurel branches or plastic strips to provide a substrate for cuttlefish egg attachment. Both fyke nets and pots are bounded at about 10 m from each other to a rope anchored to the seabed.

This fishery is practised especially in the northern part of the area where the sea bottom is more suitable. The fleet percentage devoted to it showed some fluctuations among the years around 50 vessels.

The fishing season commonly extends from late winter to late spring. The gears are placed at sea at the beginning of this period and definitively recovered at its end. Fishing operations, consisting of emptying, baiting and control of gears, take place at 24-48 hour intervals from Monday to Saturday, and show a seasonal trend characterised by an increase from winter to spring.

In 1999-2002 seasonal landings ranged from 0.2 to 45 t showing a direct relationship with the total amount of employed gears and great fluctuations among the years. A similar trend was also observed for LPUEs, which ranged between 0.7 kg / 5000m/h and 4.5 kg / 5000m/h. The target species always made up almost totality of landings.

CONCLUSIONS

1. The fishing effort along the Italian coast of GSA17 is quite stable along the year, with small seasonal variation (Table 15). Differences from the annual average show a higher effort during Spring and Summer in terms of fishing days and duration of fishing trips, due to the longer daylight and the usually good weather conditions. The low daily distance observed in Spring probably depends on the most common fishing performed, the use of fyke net for cuttlefish, which are deployed next to the shore.

Table 15. Seasonal variation of the fishing effort along the Italian coast of GSA17

Indicator of effort	Winter	Spring	Summer	Autumn	Average
N° of fishing days (month^{-1})	14.3	17.3	16.4	14.3	15.6
Duration of fishing trips (h)	10.0	12.0	12.0	12.0	11.5
Daily distance (nm)	10.8	8.9	13.4	10.2	10.8

2.Questionnaires compiled by SSF operators provided some updated information about the state-of-the-art for the SSF along the Italian coasts of GSA17. Fishermen use mainly four types of gears (Figure 1): tremmel, gill net, fyke net and traps. Along the years, the two multi-species nets – i.e. tremmel and gill net - constitutes roughly half of the gears used (from 43% in Spring to 61% Winter, 52% in Summer and Autumn). The other two types show a higher seasonal variation, due to their specificity. Traps are mostly used for mantis shrimps, with a minimum of 18% in Spring and a maximum of 35% in Summer. Fyke nets for cuttlefish are mostly used in Spring (39%), when cuttlefish are 52% of total landings (Figure 2), while during the other seasons they constitutes from 11 to 22 % of total gears used.

3. Overall, landings from SSF show a typical seasonal variation, following the abundances of targeted species. Species richness varies from 18 during Winter and Autumn to 16 in Summer and only 11 in Spring when, as said above, half of the landings is represented by cuttlefish. Other important species are the common sole and the gilt-headed seabream, that together constitute roughly 20 % of total landings.

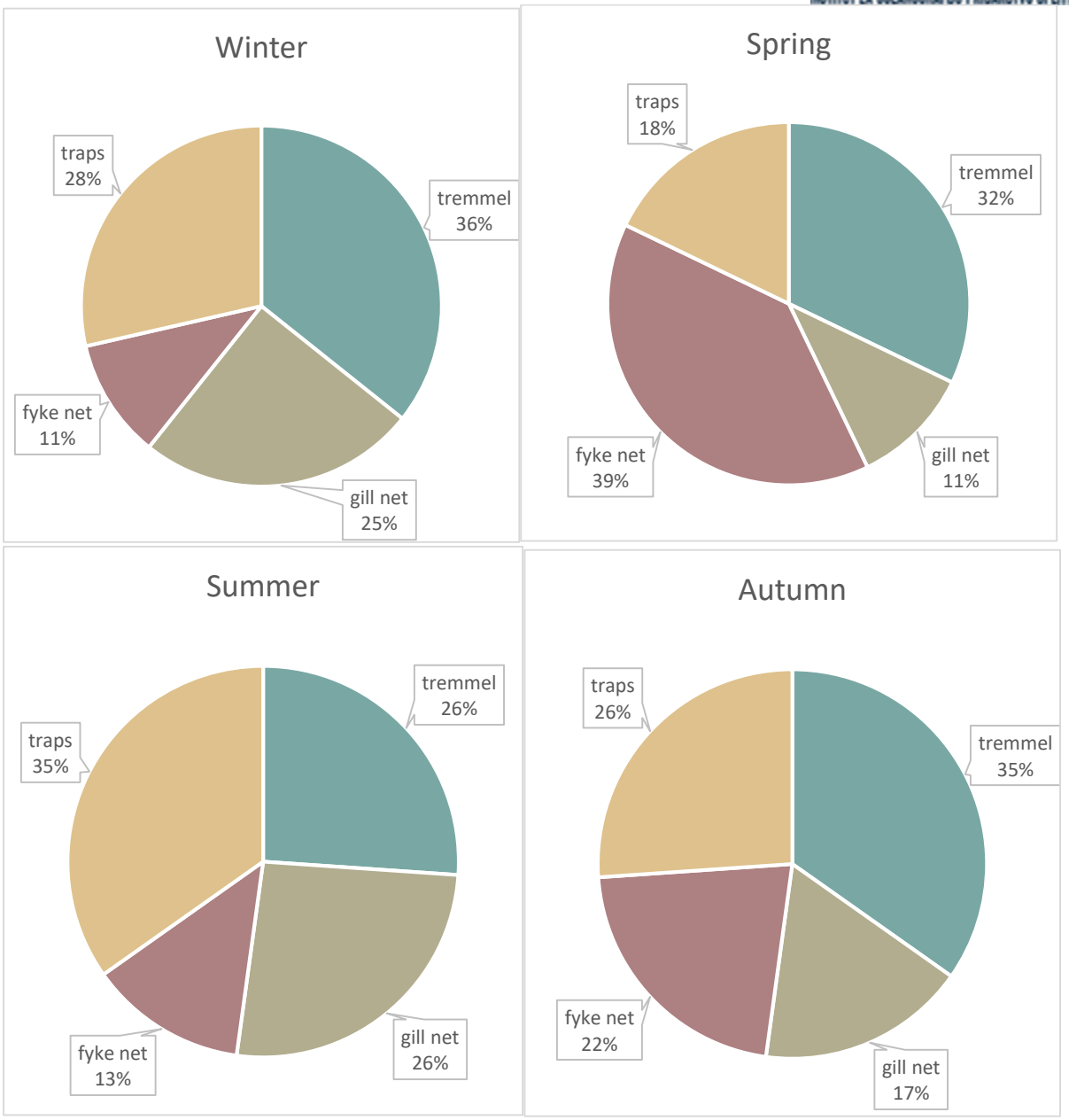

Figure 1. Seasonal variation in the use of fishing gears along the Italian coast of GSA17

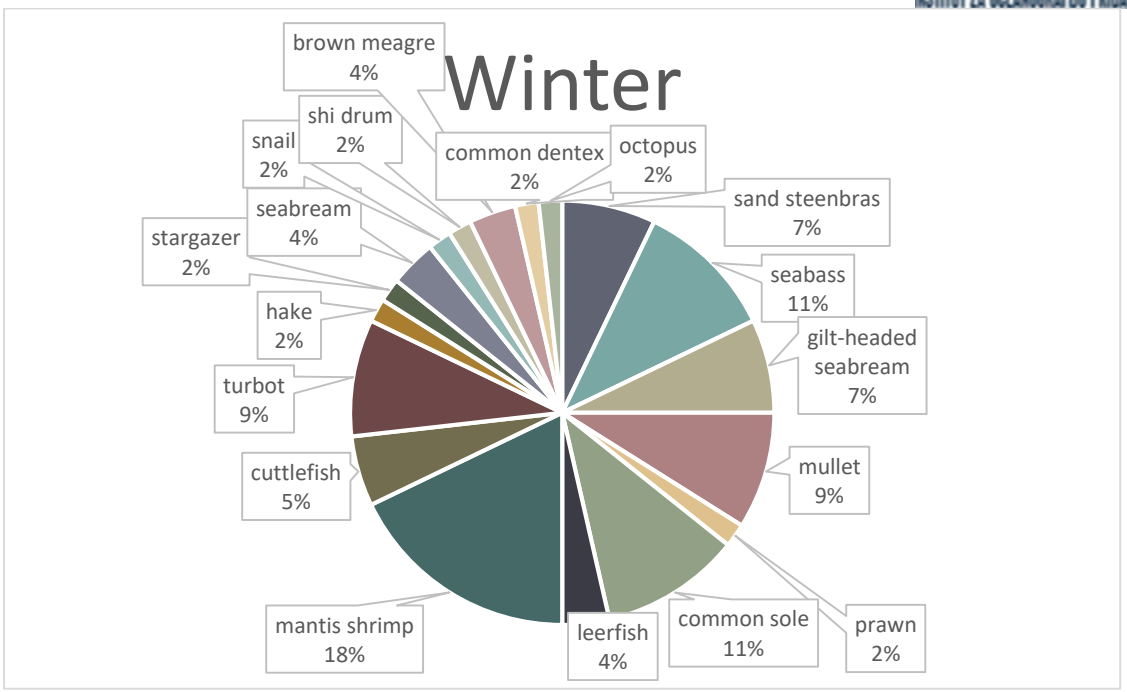

Figure 2. Landings composition along the Italian coast of GSA17 during Winter

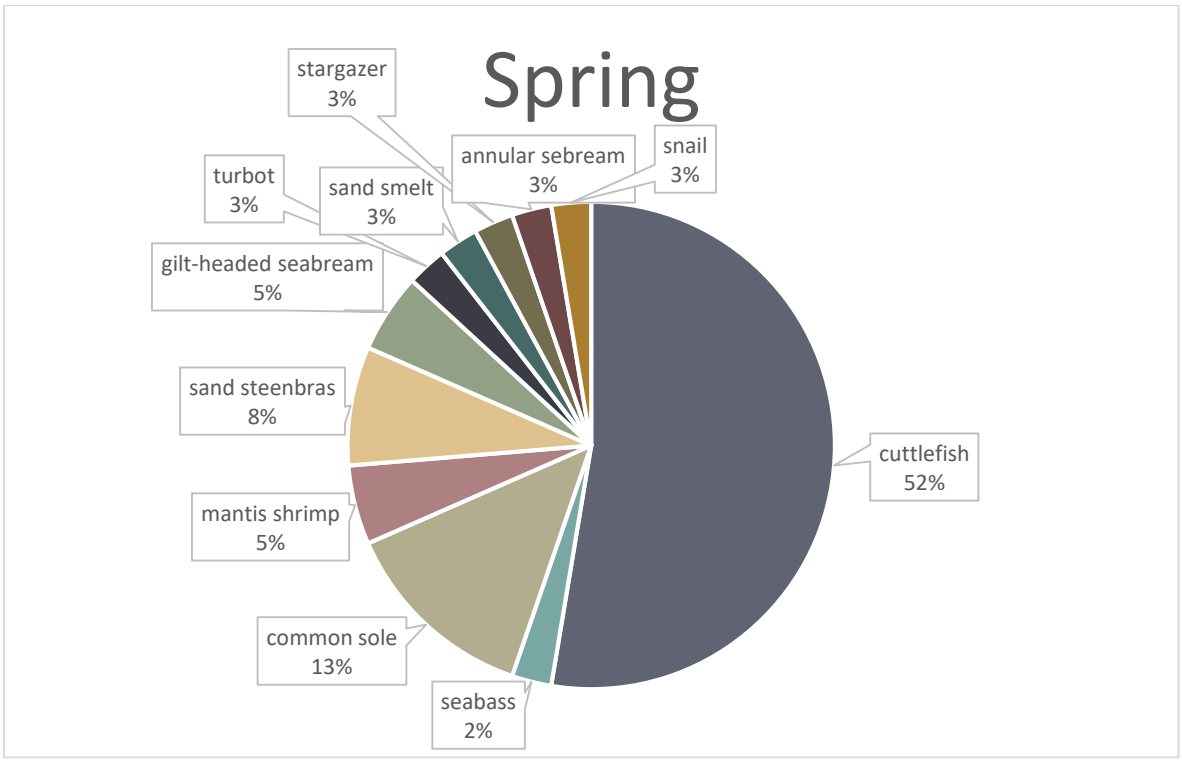

Figure 3. Landings composition along the Italian coast of GSA17 during Spring

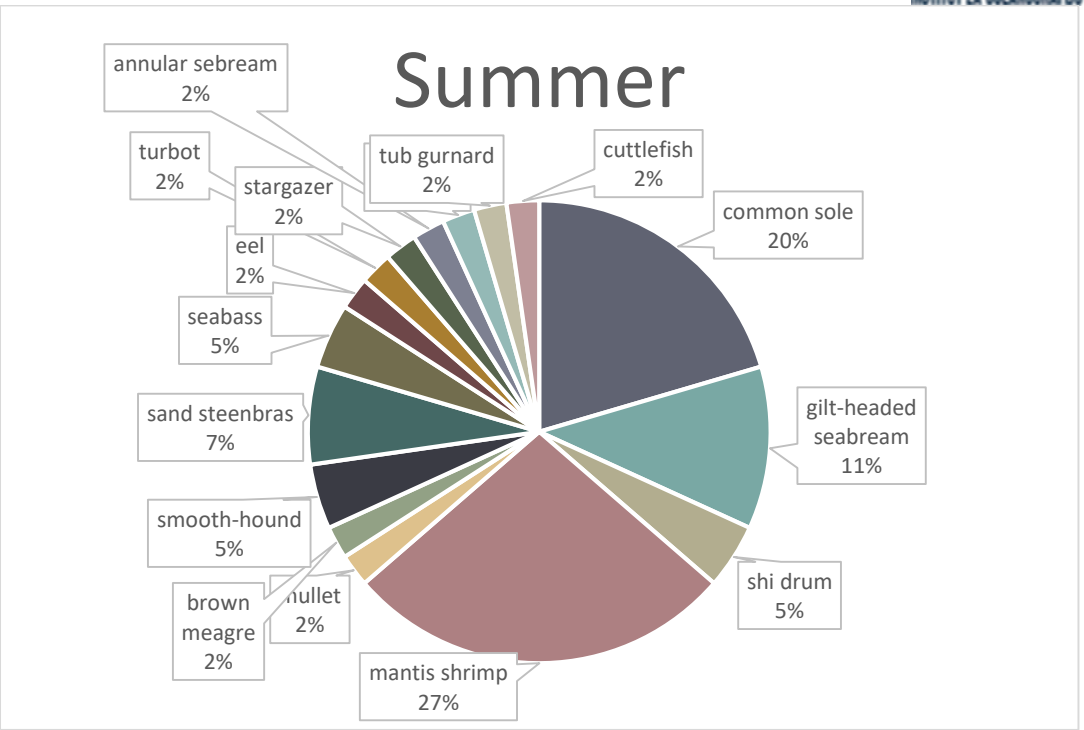

Figure 4. Landings composition along the Italian coast of GSA17 during Summer

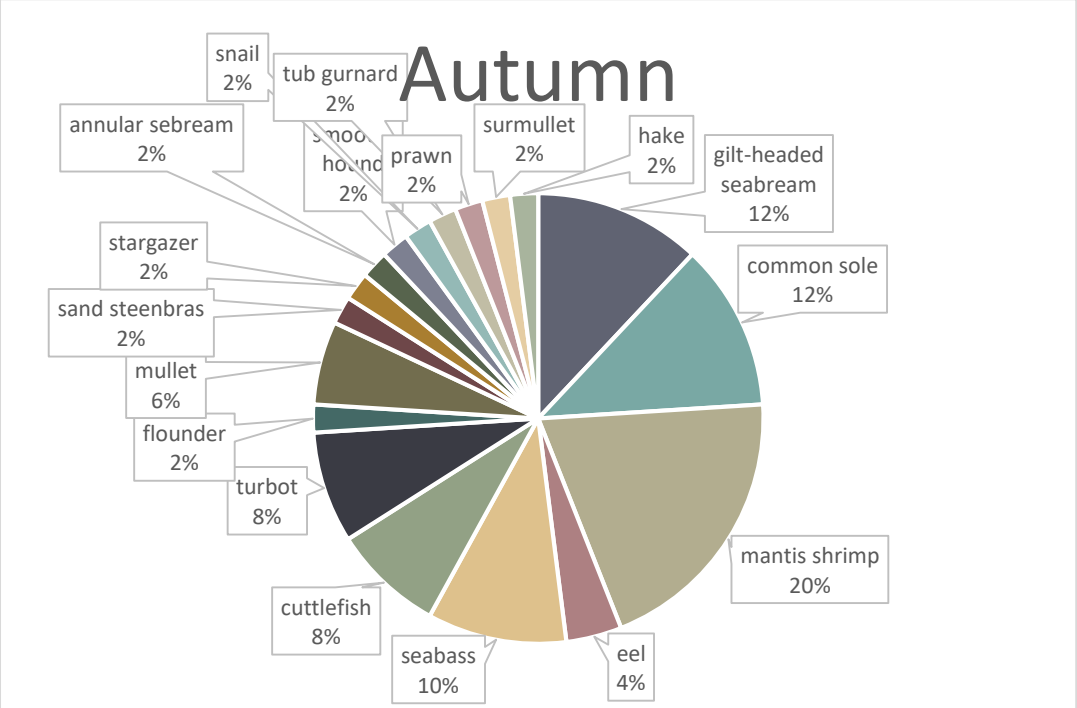

Figure 5. Landings composition along the Italian coast of GSA17 during Autumn

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