D3.1.3

Regional Reports on SSF status

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).

With 7346 vessels and 11996 fishermen employed in 2017, the SSF is the most important fishing segment within the Italian fleet and shows the highest level of employment (Table 1), accounting for about 15 % of the national catch and for 21 % of national value of landings (STECF AER, 2019). This difference depends on the species targeted by SSF, which are mostly of high value. The vessel owner usually fishes with an additional person.

Table 1. Italian fishing fleet by segment for the year 2017

Fleet segments	N. of vessels	GT	KW	Days at sea	Employment
Bottom Trawler	2219	90707	453574	331188	7396
Midwater Pair Trawler	113	7884	39384	17555	598
Purse seiner	304	11928	56491	35327	1914
Dredger	704	9263	76207	39643	1520
Small-scale fishery	7346	14100	205945	909153	11996
Multi-purpose*	39	412	4169	4020	138
Hooks	171	52129	32208	23772	723
% small-scale fishery/total	67	8	24	67	49
Total	10896	186423	867978	1360658	24284

*data updated to 2016

Source: STECF AER (2019)

The number of small-scale vessels registered in the Adriatic regions in 2017 was 1926; they accounted for 26 % of the total number in the segment and covered 23 % of total GT for Italy (Table 2).

Table 2. Geographical distribution of small-scale vessels, 2017

Absolute values	Adriatic regions	Tyrrhenian and Ionian regions	Italy
Number of vessels	1926	3868	7736
Total GT	3264	10731	14100
Total kW (1000)	64	146.58	205
Days at sea (1000)	198	598	909
Employment	2472	7193	11996

Average values			
Total GT	1.69	2.77	1.82
Total kW	33.34	37.90	26.50
Days at sea	102.80	154.60	117.50
Employment	1.28	1.86	1.55

Source: STECF AER (2019)

In recent years, the Italian SSF has undergone a huge reduction considering all the capacity and economic indicators. The total number of vessels, from 1998, has decreased by more than 4500 units. In the period 2013-2017, there has been a reduction of 18.3 % in total GT (Table 3). This trend is due to the decommissioning scheme under the EC Multi Annual Guidance Plan (MAGP) IV. Between 1998 and 2017 total production has almost halved, reaching 28526 tons. 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 for the Italian small-scale fishing vessels, 2013 - 2017

Year	2013	2014	2015	2016	2017
Fleet - number of vessels	7983	7966	7821	7715	7736
Fleet - GT fishing day (1000)	3022	2936	2836	2907	2469
Fleet - kW fishing day (1000)	43264	43783	41908	42787	34957
Days at sea	1031875	978477	1003019	992386	951247
Employment on board	14320	14174	13614	13675	13264
Investment (million €)	9	10	11	9	10

Source: STECF AER (2019)

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 in recent years. The reduction is a consequence of external factors. In particular, the rise in costs (mainly fuel prices) had a large impact on fishing activity. 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 fishing vessels (million Euro), 2013-2017

Year	2013	2014	2015	2016	2017
Value of landings	222.12	231.02	248.10	244.57	234.18
Energy costs	57.61	29.94	27.92	24.67	25.39
Other variable costs	29.99	17.15	17.69	16.54	17.52
Vessel manteinance costs	10.60	11.14	10.69	11.84	11.89
Crew share	33.66	41.27	49.03	38.87	34.99
Value of unpaid labour	40.60	48.49	52.15	58.45	54.18
Operating subsidies	0.08	0.10	0.02	0.00	0.02
Other non-variable costs	9.81	12.17	11.21	10.19	12.97
Value of physical capital	134.36	131.03	131.35	130.63	132.99
Investments	8.05	8.28	9.15	7.78	8.91

all data are reported in million euros

However, the economic performance of the small-scale vessels is very different from one area to another (Table 5). In the Adriatic area, both landings and value per effort unit are higher than in the other regions.

Table 5. Landings and value of landings for small-scale vessels, year 2017 (M = million)

Absolute values	Adriatic regions	Italy
Volume of landings (t)	7861.71	23857.13
Value of landings (M Euro)	55.51	197.73
Average values		
Landings/vessel (t)	4.08	6.17
Value/vessel (1000 Euro)	28.82	51.12
Landings/days (t)	39.71	39.89

Source: STECF AER (2019)

SSF is characterised by a marked seasonality in the gears used and, therefore, in the composition of catches, as highlighted in the work of Grati et al. (2018).

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 *Sepia officinalis* (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%: *S. officinalis*, *S. solea*, and *Squilla mantis*. The species composition of trap landings underscored the high species selectivity of this group of gears. *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 *S. solea* (2,570-56,020 kg on total, 62.7 kg/vessel) and *S. mantis* (2,620-71,680 kg on total, 80.2 kg/vessel) showed similar trends, with the lowest values in April and the highest values in August. *S. officinalis* landings are concentrated in spring, during the inshore spawning migration, and reach a maximum of 266,100 kg (653 kg/vessel) in May.

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 *S. solea* 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 *S. officinalis* 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. 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).

The fishing effort along the Italian coast of GSA17 is quite stable along the year, with small seasonal variation (Table 6). 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 nets for cuttlefish, which are deployed next to the shore.

Table 6. 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

Questionnaires compiled by SSF operators provided some other 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): trammel, gill nets, fyke nets and traps. Along the years, the two multi-species nets – i.e. trammel and gill nets - 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 (Figure 3) and a maximum of 35% in Summer (Figure 4). Fyke nets for cuttlefish are mostly used in Spring (39%), when cuttlefish are 52% of total landings (Figure 3), while during the other seasons they constitutes from 11 to 22 % of total gears used (Figures 2-5).

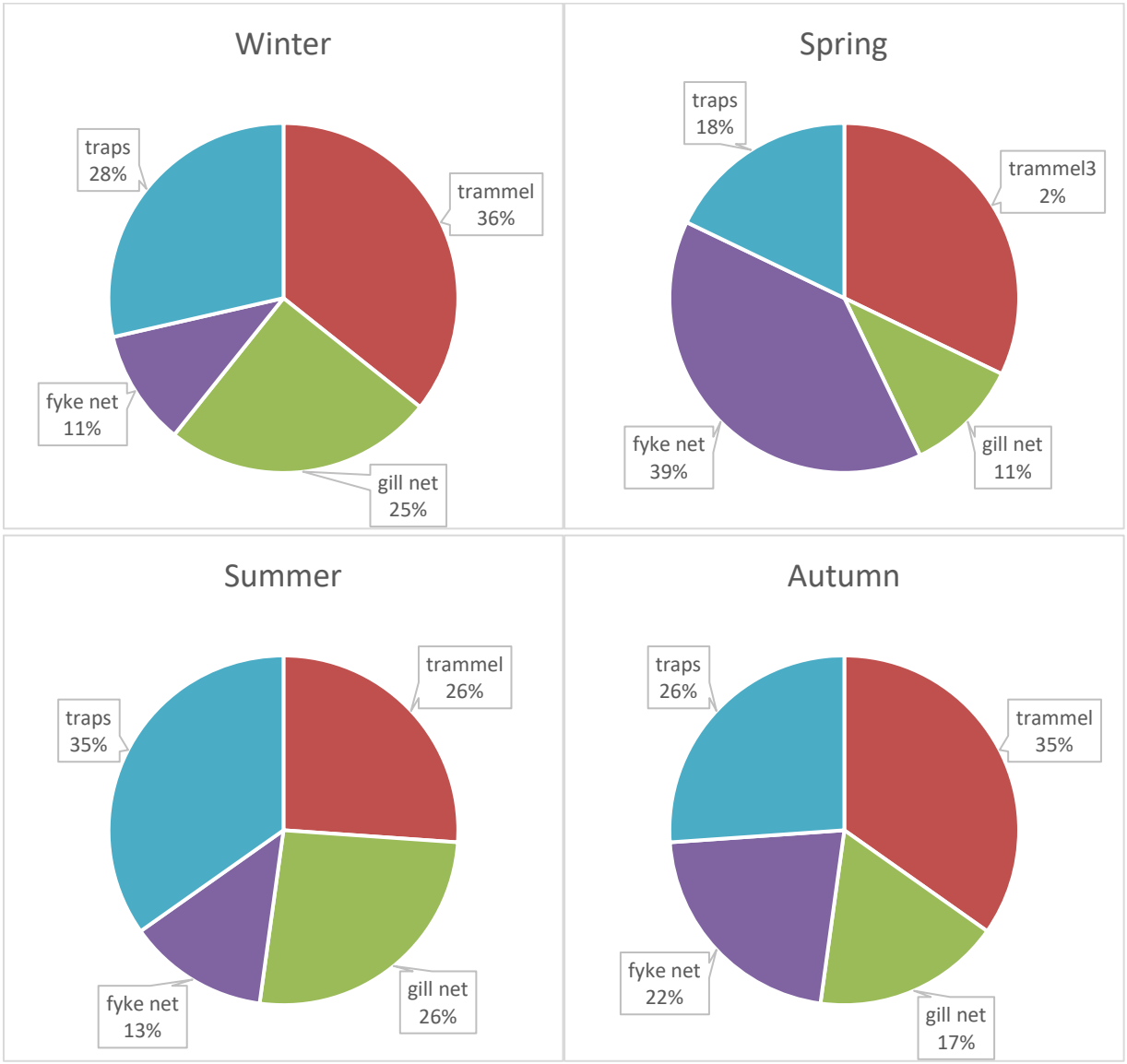


Figure 1. Seasonal variation in the use of fishing gears along the Italian coast of GSA17 (source: questionnaires from Italian SSF operators)

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.

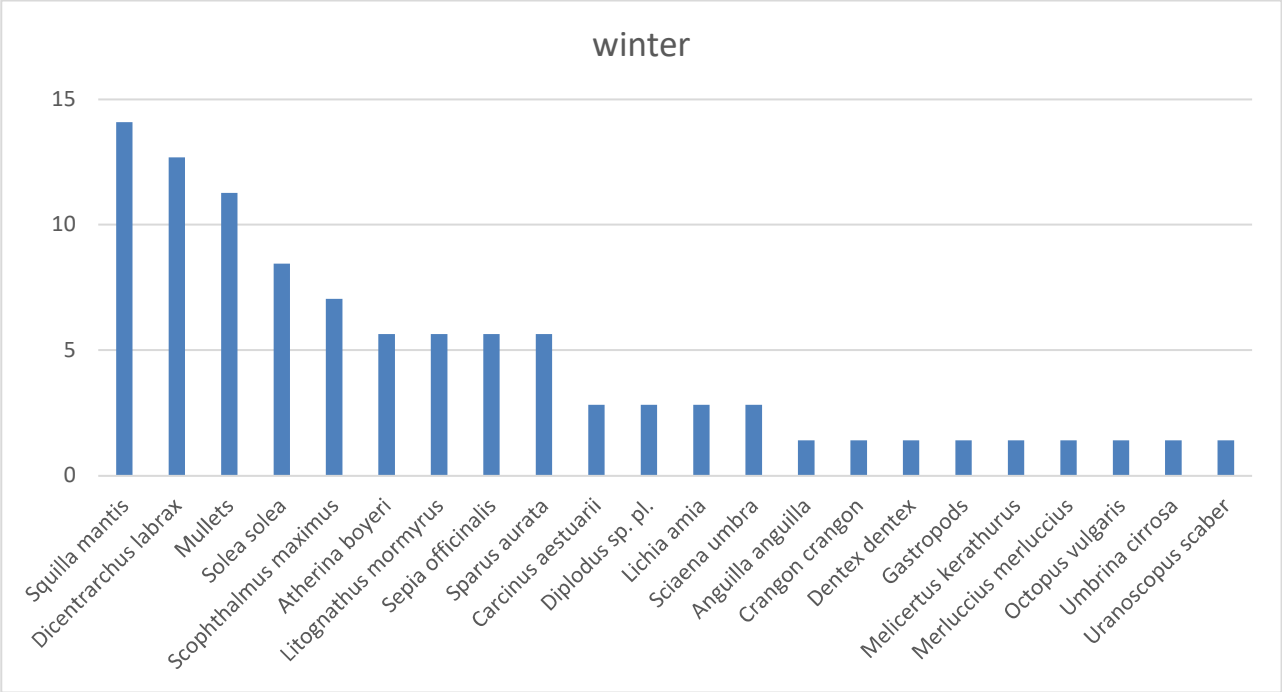


Figure 2. Landings composition (%) along the Italian coast of GSA17 during Winter

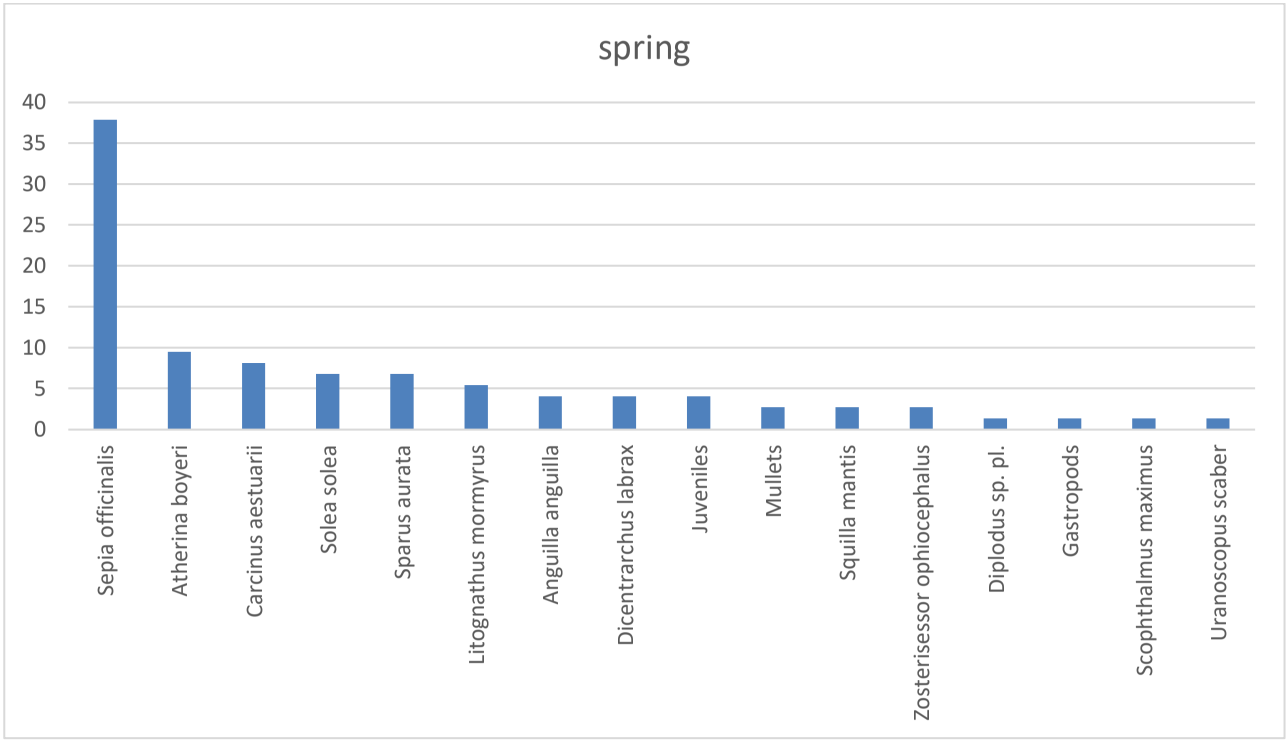


Figure 3. Landings composition (%) along the Italian coast of GSA17 during Spring

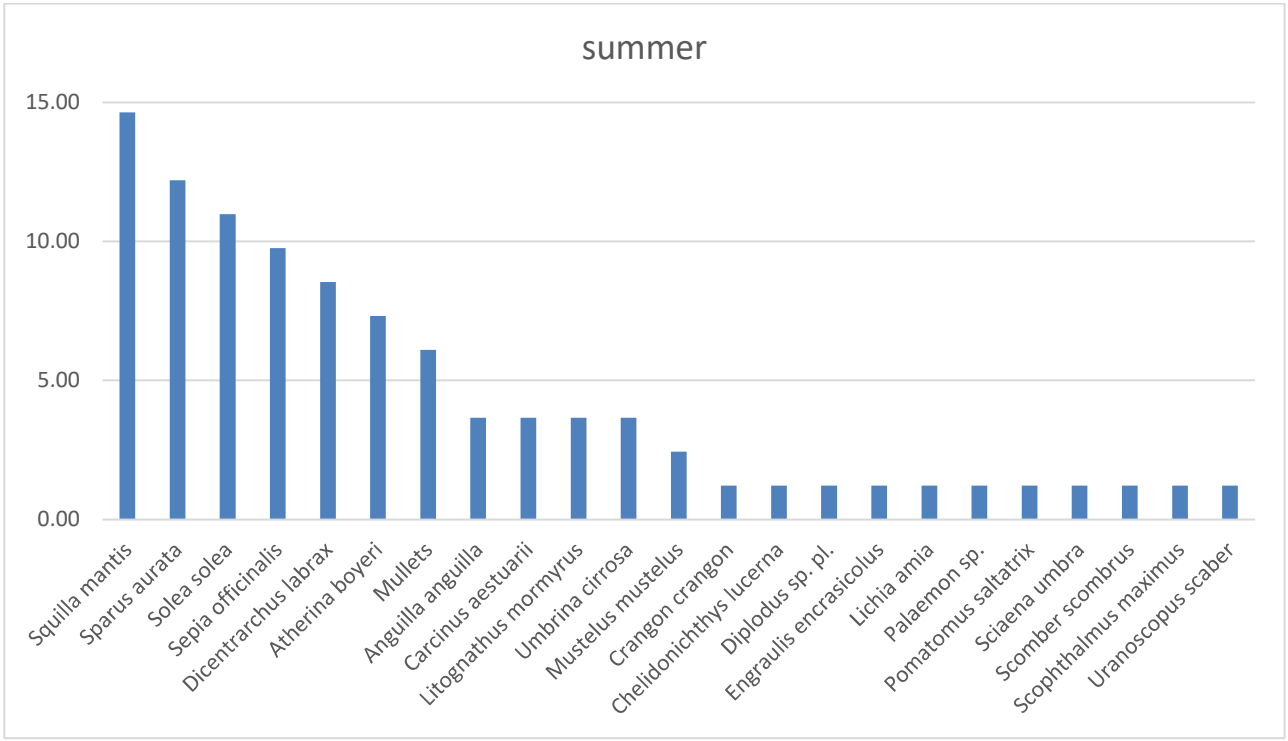


Figure 4. Landings composition (%) along the Italian coast of GSA17 during Summer

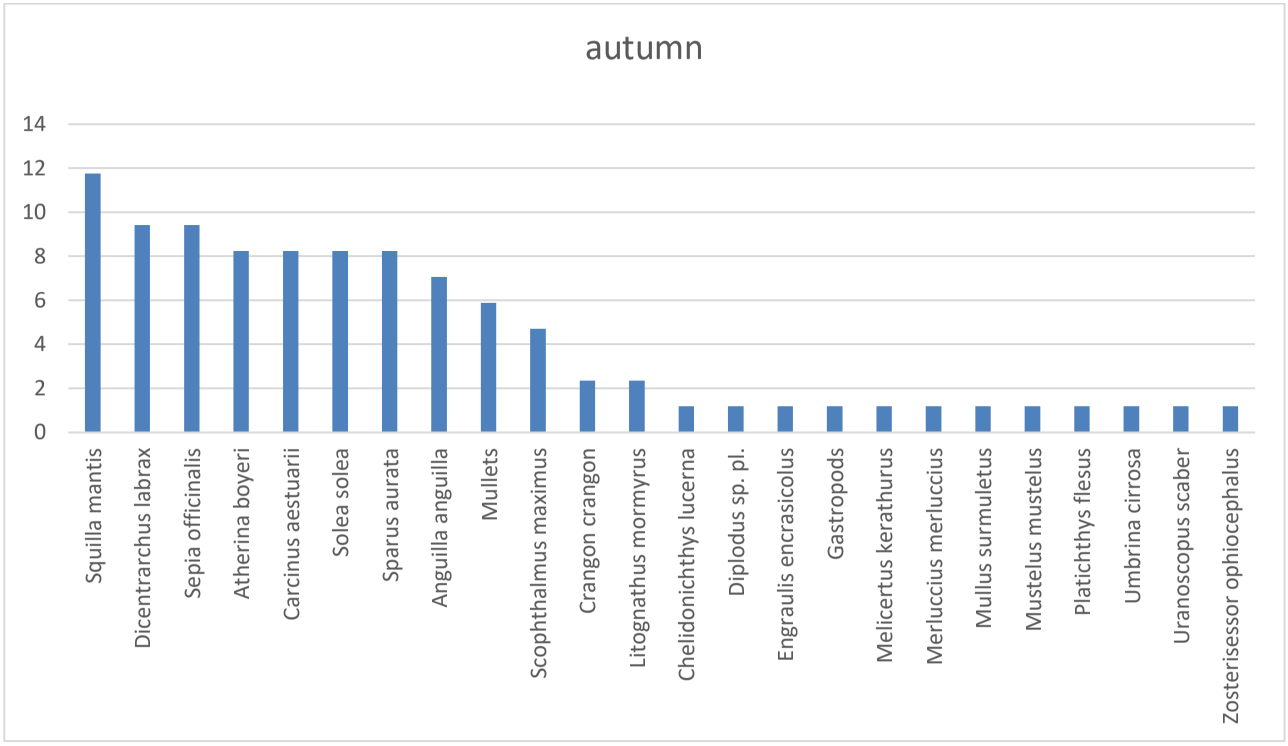


Figure 5. Landings composition (%) along the Italian coast of GSA17 during Autumn

Below are presented the data found about SSF in GSA17, split by Region.

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 (source: Osservatorio Socio Economico della Pesca e dell'Acquacoltura).

In 2018, SSF effort expressed as n° of fishing days (table 7) is closed to the average effort of all fishing compartments.

Table 7. Average number of annual fishing days (2018) in FVG

Fishing compartment	Fishing days
Hydraulic dredges	65.5
Trawlers	134.8
SSF	100.6
Surrounding nets	130.9
Total average	99.1

Source: Mably elaboration of MiPAAF data

In terms of landings, SSF is the most important compartment in this region (Table 8), contributiog with more than one third (36%) of the landings of whole fishing sectors.

Table 8. Distribution of landings (tons per year) in FVG according to the 4 main sectors (2018)

Fishing compartment	Landings (t/y)
Hydraulic dredges	543
Trawlers	711
SSF	886
Surrounding nets	334
Total average	2475

Source: Mably elaboration of MiPAAF data

In table 9 an update (to 2019) composition of the FVG fleet is reported. Data were collected by the "Servizio caccia e risorse ittiche della regione Friuli Venezia Giulia" through the fleet register and interviews with the main cooperatives and consortia of fishermen. 248 vessels (70% of the total) use trammel or gill net. SSF comprises also vessels using long line (26).

Table 9. Main statistics about the Friuli Venezia-Giulia fleet in 2019

Fishing system	N° of vessels	GT	KW
Hydraulic dredging	40	422	4.796
Long line	26	42	1.011
Trammel net/gillnet	248	402	9.647
Purse seine	10	90	1.028
Trawling	26	539	4.751
Total	350	1.495	21.233

Source: Regione FVG, 2019

The FVG SSF mainly uses static gill nets and tremmel nets, in relation to the fishing season and target species. In spring, a variable number of 25-50 SSF operators (variable in relation to the abundance of the resource) use traps for cuttlefish while about 15 SSF operators use another type of trap for mantis shrimp from spring to autumn. Fishing within the Grado and Marano Lagoon is carried out by about 70 fishermen who mainly use trammel nets, traps, shovels and *grasiui* (cane barriers, used for fishing in short stretches of lagoon).

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, 4.30-12.08 m; gross tonnage, 1-2 tons; and crew, 1-2 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, trammel nets, pots, and basket traps that vary seasonally (Table 10).

Table 10. 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	*S. solea*, *S. mantis*, *C. lucerna*	May-Jun, Sep-Nov
Trammel nets	79	Flatfish	Jan-Mar, Nov-Dec
Pots	79	*S. officinalis*	Apr-Jul
Basket traps	75	*S. mantis*	Jul-Oct

Source: Pranovi et al. 2016

Gillnets are employed from May to June and from September to November, and these *S. solea*, *S. mantis* and *Chelidonichthys lucerna* (Table 10). 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, *S. solea*, *S. mantis* and *Mustelus mustelus* represented 73% of the commercial biomass. The resulting discarded fraction is dominated by three species: *Bolinus brandaris*, *Liocarcinus vernalis* and *Myliobatis aquila*. Regarding the total CPUE, gill nets represent the second most common fishing technique and the most important species yielded are *S. solea* (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}). Trammel nets are employed in the periods from January to March and November to December, and they target flatfish – *Scophthalmus maximus*, *S. rhombus*, *Platichthys flesus* and *S. officinalis.* 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 *S. maximus*, *S. officinalis*, and *S. rhombus* represent 62% of the commercial biomass. The discarded fraction is almost entirely composed of three species: *Liocarcinus vernalis*, *Alosa fallax* and *Bolinus brandaris*. In terms of the total CPUE, trammel nets represent the fourth most common fishing technique, and the most important species that it yields are *S. maximus* (4.5 kg d^{-1} v^{-1}), *S. officinalis* (2.5 kg d^{-1} v^{-1}) and *S. rhombus* (2.1 kg d^{-1} v^{-1}). Pots are employed from April to the beginning of July, and they target *S. officinalis*. 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 *L. vernalis* 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 *S. mantis*. Catches are composed of 86% target species. The discarded fraction represents four species of invertebrates: *B. brandaris*, *Hexaplex trunculus*, *Tritia mutabilis* and *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 *S. mantis*. Based on the CPUE data and vessel numbers for each fishing technique, an annual catch of 735 or 1050 tons is estimated for different fishing effort estimates of 150 or 214 days at sea, respectively. *S. officinalis*, *S. mantis*, *S. solea* and *S. maximus* showed the highest values, ranging from 58 to 440 tons per year (Table 11).

Table 11. 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: trammel net; P: pot; B: basket trap.

Species	LB	CPUE (kg v^{-1} d^{-1})	UB	LB	1 - total catches (t)	UB	LB	2 - total catches (t)	UB	gear
Sepia officinalis	55.5	74.3	95.3	233.6	311.5	398.8	333.3	444.4	568.9	P-T-G
Squilla mantis	59.1	72.1	87.3	151.1	190.3	240.3	215.5	271.6	342.8	B-G
Solea solea	11.2	15.7	21.1	62	86.1	114.8	88.5	122.8	163.8	G-T
Mustelus mustelus	3.5	7.6	12.3	19.3	41.2	65.8	27.6	58.8	93.9	G-T
Psetta maxima	3.1	4.6	6.2	11.2	16.7	22.4	15.9	23.8	32	T
Chelidonichthys lucerna	2.3	3.3	4.5	11.6	17.1	23.4	16.5	24.3	33.3	G-T
Scophthalmus rhombus	1.8	2.6	3.5	6.9	10.4	14	9.9	14.8	20	T-G
Sparus aurata	1.1	2.6	4.3	6.2	13.8	22.9	8.8	19.7	32.6	T-G
Lithognathus mormyrus	0.6	1.8	3.3	3.4	10	18.2	4.8	14.2	25.9	T-G
Arnoglossus laterna	0.7	1.7	3	3.7	9.3	16.6	5.3	13.3	23.6	G
Umbrina cirrosa	0.6	1.4	2.3	3.1	6.7	10.8	4.5	9.6	15.4	T-G
Dicentrarchus labrax	0.3	1.1	2.2	1.2	4.2	8.4	1.7	6	12	T-G

Platichthys flesus	0.3	1.1	2.1	1.2	3.8	7.6	1.7	5.4	10.8	T-G
Bolinus brandaris	0.3	0.7	1.1	1.9	3.9	6.3	2.8	5.6	9	T
Chelon auratus	0.1	0.6	1.5	0.4	2.7	6.2	0.6	3.9	8.9	G
Chelon ramada	0	0.3	0.6	0.2	1.2	2.7	0.3	1.7	3.9	G
Homarus gammarus	0	0.3	0.9	0	1.6	4.4	0	2.2	6.3	G
Chelon saliens	0	0.1	0.2	0.2	0.5	1	0.2	0.8	1.5	G
Diplodus annularis	0	0.1	0.2	0	0.3	0.7	0	0.4	1.1	G-T
Penaeus kerathurus	0	0.1	0.2	0.3	0.5	0.9	0.4	0.8	1.3	G
Pomatomus saltatrix	0	0.1	0.2	0	0.3	0.9	0	0.5	1.2	T
Raja miraletus	0.1	0.1	0.2	0.4	0.7	1.1	0.5	1	1.5	G-T
Sciaena umbra	0	0.1	0.2	0	0.4	1	0	0.5	1.4	T-G
Scorpaena scrofa	0	0.1	0.2	0	0.4	1.3	0	0.6	1.9	T-G
Scyliorhinus stellaris	0	0.1	0.3	0	0.5	1.4	0	0.7	2	T-G
Trachurus trachurus	0	0.1	0.1	0.2	0.4	0.7	0.2	0.6	1.1	T-G
Chelon labrosus		<0.1		0	0.1	0.2	0	0.1	0.3	T
Diplodus sargus		<0.1		0	0.1	0.4	0	0.2	0.5	G-T
Lichia amia		<0.1		0	0.2	0.6	0	0.3	0.8	T-G
Loligo vulgaris		<0.1		0	0.1	0.2	0	0.1	0.2	T
Merlangius merlangus		<0.1		0	0.1	0.2	0	0.1	0.2	G
Mullus barbatus		<0.1			<0.1			<0.1		G-T
Octopus vulgaris		<0.1		0	0.1	0.5	0	0.2	0.7	T
Pagellus erythrinus		<0.1		0	0.2	0.5	0	0.2	0.7	G
Pecten jacobaeus		<0.1			<0.1			<0.1		G
Sarpa salpa		<0.1			<0.1			<0.1		B
Scomber scombrus		<0.1		0	0.1	0.2	0	0.1	0.3	G
Trachinus araneus		<0.1			<0.1			<0.1		G
Zeus faber		<0.1		0	0.1	0.1	0	0.1	0.2	G

Source: Pranovi et al. 2016

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 *S. officinalis* and *S. mantis*) 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).

Emilia-Romagna region

Emilia-Romagna Region of Italy has a coastline of about 130 Km. The coast is sandy, and most of the ports are situated in river mouths or artificial canals (except for the ports of Goro – FE and Marina di Ravenna – RA, located inside lagoon areas).

It should be noted that historically also the vessels registered in the Local Office of Gabicce (PU), holding the serial number "03PS", moor in Cattolica carrying out all or part of the activities in the coastal waters of Emilia-Romagna. The data of the Gabicce Navy are therefore shown below along with the Emilia-Romagna SSF fleet.

In 2018 the fishing fleet of Emilia-Romagna comprised 596 fishing boats, divided in four types of activities (fishing techniques): bottom trawlers, pelagic trawlers, hydraulic dredges and vessels fishing with static gears (trap-nets, creels/pots, fyke-nets and gillnets) (Table 12; 13).

Regarding the Fleet Register data, SSF includes more than half of the total number of fishing vessels. From a survey carried out in 2019 on the field, 225 vessels actually carry out the fishing activities with static gears, about 80 are engaged in clam farming activities in the northern area, while the rest of the situation is summarized in the Tab. 14.

As regards SSF using static gears, this practice has evolved and has been consolidated over the last twenty years. Small wooden vessels have been replaced by fibreglass motorboats

and on-board equipment, both for fishing and for navigation, has also been modernized. An updated summary of the technical specifications of the SSF fleet is summarized in Tab. 15.

In spring almost all the boats fishing *S. officinalis* use pots and similar fyke-nets, these gears are all commonly classified as FPO. In autumn and winter fishing activities targeting the gasteropod *Tritia mutabilis* are mainly carried out in the district of Ravenna, in its southern part, and Rimini, as well as in other regions facing the Adriatic Sea as Marche, Abruzzo and Molise (Piccinetti et al., 1998). In summer, and for a smaller number of vessels in all the other seasons, static gears such as gillnets and in fewer cases trammel nets are deployed at sea

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.

Table 12. General overview of the fishing sector in Emilia-Romagna in 2018 (Source: Fleet Register UE).

Port	Serial number	n°	LOA Sum	LOA Mean	GT Sum	GT Mean	kW Sum	kW Mean	Oar-sailing Sum
GORO	5RA	246	2,065.75	8.40	997.49	4.05	12,689.51	71.69	69
PORTO GARIBALDI	1RA	61	852.31	13.97	942.14	15.44	11,193.64	189.72	2
RAVENNA	RA	20	169.52	8.48	101.60	5.08	2,088.09	139.21	5
CERVIA	2RA	37	357.77	9.67	256.00	6.92	3,245.07	98.34	4
CESENATICO	4RM	46	585.80	12.73	664.06	14.44	7,749.86	172.22	1
BELLARIA	8RM	35	303.73	8.68	208.00	5.94	2,798.21	87.44	3
RIMINI	RM	87	1,182.83	13.60	2,824.00	32.46	16,215.81	195.37	4
RICCIONE	7RM	23	165.39	7.19	79.00	3.43	794.64	49.67	7
CATTOLICA	3RM	41	442.74	10.80	416.00	10.15	3,351.00	95.74	6
E-R Total		596	6,125.84	10.28	6,488.29	10.89	60,125.83	121.47	101
GABICCE MARE	3PS	44	506.68	11.52	472.00	10.73	4,273.78	99.39	1
Total		640	6,632.52	10.36	6,960.29	671.63	64,399.61	95.89	102

Table 13. Technical and economical specification of the different fishing techniques in Emilia-Romagna (Source: MIPAAF, 2017).

Fishing techniques	Landings (t)	%	Revenues (mln €)	%	Prices (€/kg)
Bottom trawlers	4.267	24%	23,15	49,4%	5,43
Pelagic trawlers	8.949	51%	5,76	12,3%	0,64

Hydraulic dredges	2.195	13%	5,05	10,8%	2,30
SSF (passive fishing gears < 12 mt)	1.896	11%	11,93	25,5%	6,29
SSF (polyvalent active and passive > 12 lft)	153	1%	0,94	2,0%	6,16
Total	**17459**	100%	**46,82**	100,0%	2,68

Table 14. General overview of the activities of Emilia-Romagna vessels licensed for fishing with static gears as registered in the Fleet Register UE, 2019 (Source: field reserch M.A.R.E. Scarl).

Activities	Total n°	Annual activites n°	Seasonal activities n°
Static gears	225	163	62
Other fishing activities	10		
Not available	26		
Units in use for farming activities	79		
Demolished	14		
Sold	11		
Decommissioned	13		
No fishing activities	1		
Sunk	2		
Total	**381**		

Table 15. Distribution in Emilia-Romagna of fishing vessels using with static gears SSF per home port, 2019 (Source: field research, M.A.R.E. Scarl).

	Serial		LOA		GT		kW		Oar-sailing
Port	number	n°	Sum	Mean	Sum	Mean	Sum	Mean	Sum
GORO	5RA	78	518,4	6,6	100,0	1,3	1607,4	42,3	40
PORTO GARIBALDI	1RA	10	101,3	10,1	69,0	6,9	1264,7	140,5	1
RAVENNA	RA	9	65,0	7,2	18,0	2,0	425,1	85,0	4
CERVIA	2RA	18	142,1	7,9	46,0	2,6	1429,3	95,3	3
CESENATICO	4RM	13	95,8	7,4	28,0	2,2	959,7	80,0	1
BELLARIA	8RM	11	76,8	7,0	20,0	1,8	717,7	71,8	1
RIMINI	RM	28	195,3	7,0	63,0	2,3	1796,5	66,5	1
RICCIONE	7RM	15	90,9	6,1	17,0	1,1	253,9	16,9	5
CATTOLICA	3RM	22	170,3	7,7	50,0	2,3	988,0	61,8	6
E-R Total		**204**	**1455,8**	**7,1**	**411,0**	**2,0**	**9442,2**	**66,5**	**62**
GABICCE MARE	3PS	12	98,8	8,2	38,0	3,2	1290,4	117,3	1
Total		**216**	**1554,6**	**7,2**	**449,0**	**2,1**	**10732,6**	**70,1**	**63**

In 2015 total landings amount to 9.482 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. Statistics about the landings of two main and most valuable

catches of the commercial fisheries, mantis shrimps and cuttlefishes, are presented in Tab. 16. Only a part of the whole landings amount regards the SSF activity.

Tab. 16. Main statistics about mantis shrimp (*Squilla mantis*) and cuttlefish (*Sepia officinalis*) landings in the Emilia-Romagna region.

	***S. mantis* landings**		***S. officinalis* 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

Source: Osservatorio Socio Economico della Pesca e dell'Acquacoltura - Veneto Agricoltura, 2018

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 *S. vulgaris*, gillnet for other highly valuable species (i.e. *Sciaena umbra*, *Umbrina cirrhosa*, *Dicentrarchus labrax*, sea breams) and trammel net are the most common set nets used in the area. A relevant importance is also assumed by traps (pots and fyke nets) for *S. officinalis* and basket traps for *T. 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 *Solea solea*

The artisanal fleets targeting *S. solea* 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 *S. solea* 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 SSF 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. *S. solea* 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 *S. mantis* and *C. 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 *L. mormyrus*, *D. labrax* and sciaenids, in particular sea conditions, or *Chelon* sp. pl. 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 2000) to 17 t (fall 2001), 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.

Trammel nets for *Litognathus mormyrus*

In the central northern Adriatic Sea trammel net underwent several modifications in the last few years. Now it mainly consists in an outer panel and an inner one, 2 and 3 m high respectively, with a mesh size of 340 mm (stretched) in the formers and 70 mm in the latter. 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.

Trammel 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 *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 trammel 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.

L. 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 trammel 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 *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 *S. officinalis*

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.

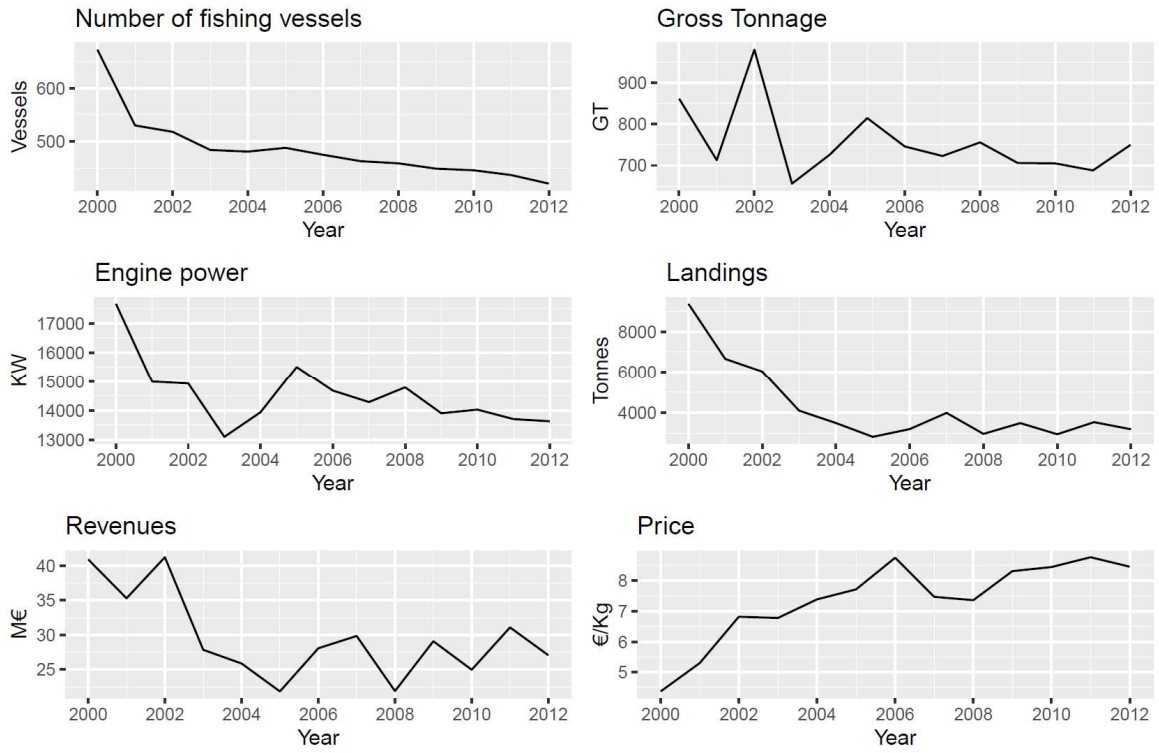
This fishery is practised especially in the northern part of the area where the sea bottom is more suitable. The fleet percentage devoted to it showed some fluctuations among the years around 50 vessels.

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.

More recent data provided from the Italian Institute on Economic Research for Fishery and Aquaculture (IREPA, 2012) allowed to analyse trend of the main indicators of small-scale fishery in Marche region (Figure 6).

Figure 6. Trends of the main indicators of SSF in Marche region (IREPA, 2012)



Using the data available from the fleet register, we obtained statistics about SSF fleet in the four regions, from 2005 to 2018, and an updated characterization of the Italian SSF fleet in the Adriatic Sea.

In the considered period, two regions (Emilia-Romagna and Marche) always showed a higher number of vessels respect to the other two regions involved in the project (Friuli-Venezia Giulia and Veneto). However, all the four regions showed the same temporal pattern, with a decreasing number of vessels of nearly 50% for Friuli-Venezia Giulia and Veneto (Figure 7).

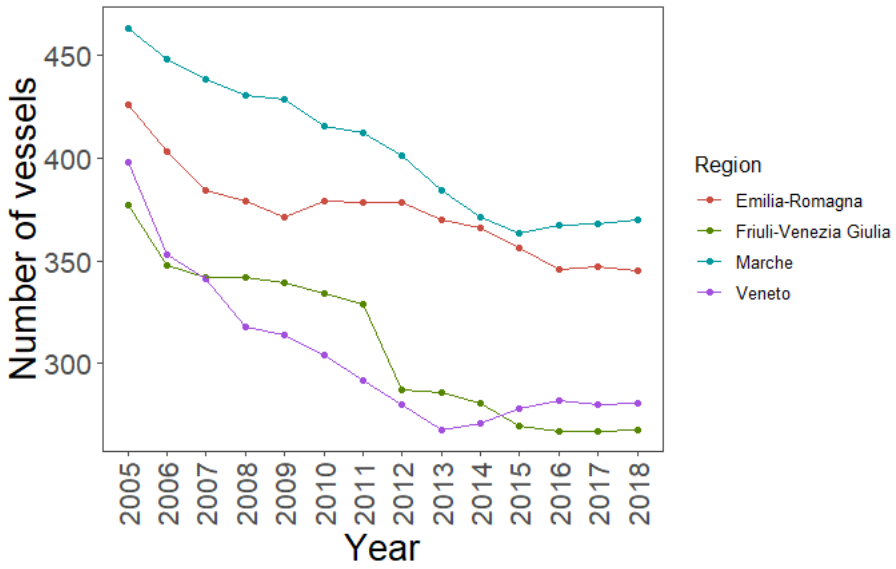


Figure 7. Trends in the number of SSF vessels in the four Italian regions involved in the project in the project for the period 2005-2018.

In this period the characteristics of the SSF fleet in Italy do not show significant differences in terms of length and tonnage of the vessels (Figure 8 and 9).

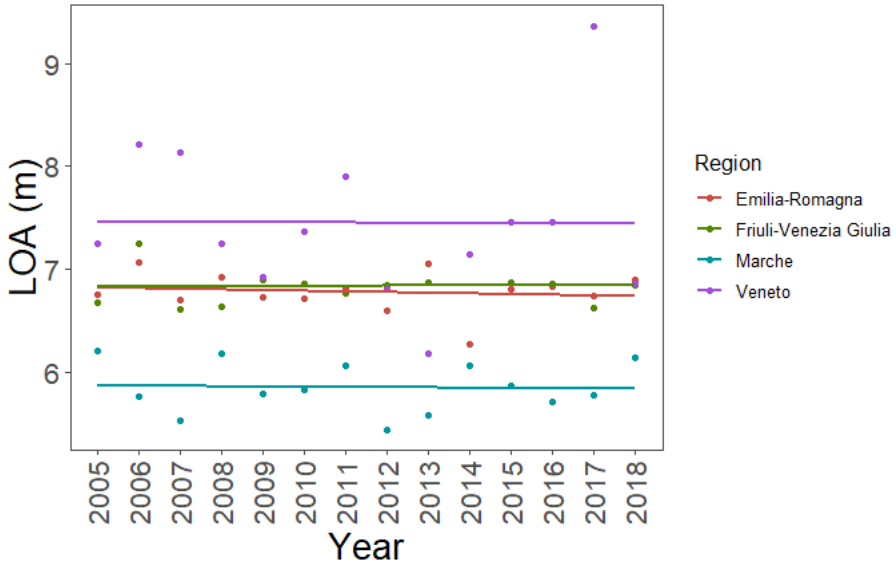


Figure 8. Trends in the mean total length of SSF vessels in the four Italian regions involved in the project in the project for the period 2005-2018.

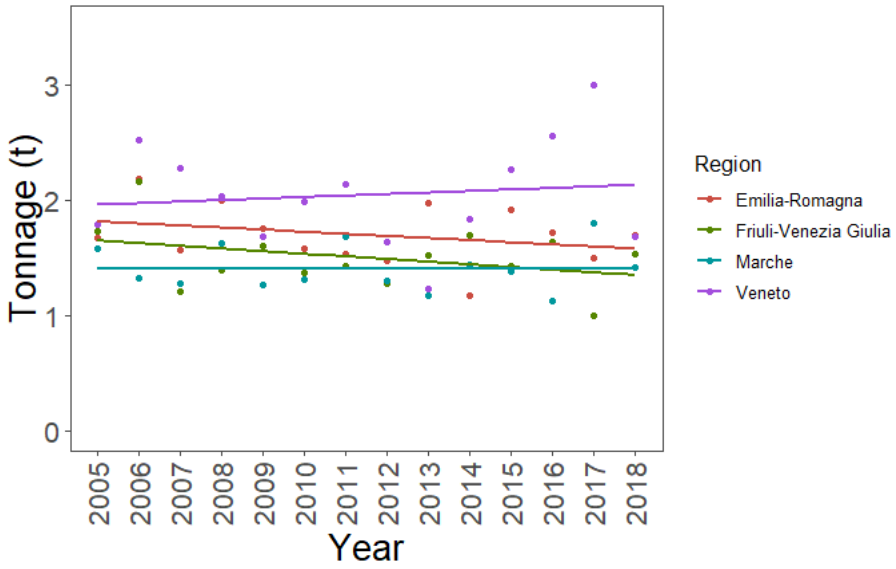


Figure 9. Trends in the mean tonnage of SSF vessels in the four Italian regions involved in the project for the period 2005-2018.

On the other side, a decrease in the power of vessels' engine is visible for Emilia-Romagna and Marche regions, while the opposite happens in Friuli-Venezia Giulia. No significant variations are observed in Veneto (Figure 10).

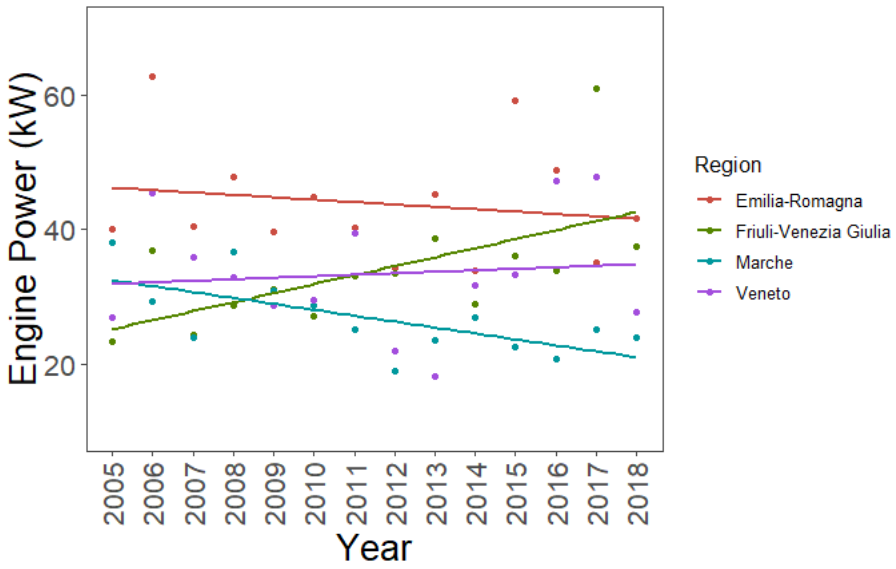


Figure 10. Trends in the mean engine power of SSF vessels in the four Italian regions involved in the project for the period 2005-2018.

The trends in vessels' age show a slightly decrease from 2005 to 2018 in all regions but Friuli-Venezia Giulia, where this pattern is more marked (Figure 11).

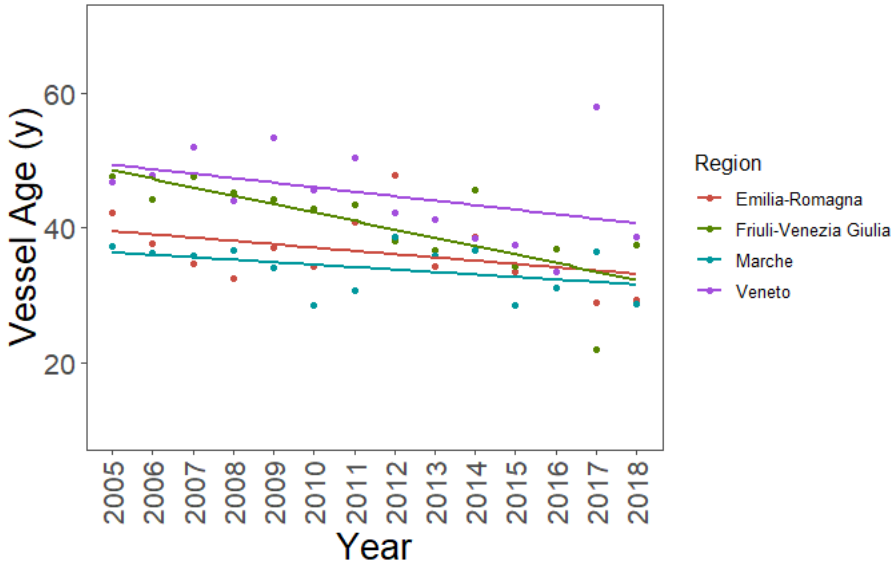


Figure 11. Trends in the mean age of SSF vessels in the four Italian regions involved in the project for the period 2005-2018.

Table 17. Main statistics of SSF fleet in the four Italian regions involved in the project for the year 2019.

Region	LOA (m)	Tonnage (t)	Power (kW)	Age (y)
Emilia-Romagna	6.91	1.71	42.04	34
Friuli-Venezia Giulia	6.83	1.52	37.46	42
Marche	6.13	1.39	22.98	38
Veneto	6.83	1.67	26.96	49
Average GSA17 (Italy)	6.65	1.57	32.10	40

The last available data about SSF Adriatic fleet in Italy for the year 2019 (Table 17) confirm the observed trends for the period 2005-2018 of fleet characteristics for Emilia-Romagna and Marche, while in Veneto lower values of LOA, tonnage and Power are observed. Some differences are found also in Friuli-Venezia Giulia, with lower engine power and older age respect to the trends observed in figures 7-11.

Table 18. Number of SSF fleet in the four Italian regions involved in the project for the year 2020, subdivided for fishing gear.

Region	Port	Gillnets & Entangling Nets	Hooks & Lines	Surrounding Nets	Total
Emilia-Romagna	BELLARIA	11	12	1	24
	CATTOLICA	11	11		22
	CERVIA	14	9		23
	CESENATICO	5	7	4	16
	GORO	129	41	1	171
	PORTO GARIBALDI	9	3	2	14
	RAVENNA	10	6		16
	RICCIONE	12	6	1	19
	RIMINI	5	30	1	36
	Emilia-Romagna total	**206**	**125**	**10**	**341**
Friuli-Venezia Giulia	GRADO	44	15	0	59

	LIGNANO SABBIADORO	1	0	0	1
	MARANO LAGUNARE	123	8	0	131
	MONFALCONE	32	3	0	35
	MUGGIA	11	0	0	11
	SISTIANA	6	0	0	6
	TRIESTE	22	0	1	23
	Friuli-Venezia Giulia total	**239**	**26**	**1**	**266**
Marche	ANCONA	48	23	9	80
	CIVITANOVA MARCHE	26	7		33
	CUPRA MARITTIMA	13	2		15
	FANO	19	14	1	34
	GABICCE MARE	9	4	3	16
	GROTTAMMARE	1			1
	MAROTTA	7	1	1	9
	NUMANA	14	10	3	27
	PEDASO	1			1
	PESARO	5	5	1	11
	PORTO RECANATI	17	3	1	21
	PORTO SAN GIORGIO	31	10	1	42
	SAN BENEDETTO DEL TRONTO	27	10	1	38
	SENIGALLIA	31	8	1	40
	Marche total	**249**	**97**	**22**	**368**
Veneto	BURANO	7	1		8
	CAORLE	36	11	6	53
	CHIOGGIA	35	7	4	46
	IESOLO	25	14	3	42
	PELLESTRINA	6		1	7
	PORTO LEVANTE	8	21		29
	PORTO TOLLE	27	7		34
	SCARDOVARI	44	2	1	47
	VENEZIA	11	5	1	17
	Veneto total	**199**	**68**	**16**	**283**
	Total	686	442	130	1258

The total number of vessels in each region is coherent with the diminishing trend observed for the period 2005-2018 (Figure 7 and Table 18). The fishing gears used by SSF operator show a prevalence of gillnets and entangling nets, followed by hooks and lines. Only a small fraction of the total number of vessels use surrounding nets.

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