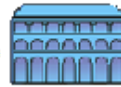




## **SPECIFIC CONTRACT N° 10 "IMPROVED KNOWLEDGE OF THE MAIN SOCIO-ECONOMIC ASPECTS RELATED TO THE MOST IMPORTANT FISHERIES IN THE ADRIATIC SEA (SEDAF)"**



### **DELIVERABLE 4**

## **Report on the identification of the main Adriatic fisheries, with relevant maps, focusing on the shared stocks**

**Responsible  
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*WP1. Fisheries identification*

*Task 1.1 - Fishery identification demersals*

*Task 1.2 - Fishery identification small pelagics*

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## EXECUTIVE SUMMARY

Deliverable D4 concerns the report on the identification of the main Adriatic fisheries, with relevant maps of fishing grounds, focusing also on the shared stocks exploited by more than one country in the study area. In particular, SEDAF D4 mainly involves the revision and analysis of the existing information collected under deliverable D3.

GFCM and STECF publications, grey literature, peer reviewed papers and DCF data had to be the source of information to learn more on the main Adriatic fisheries.

The report of the present deliverable focused basically on the two main fishing activities that in Adriatic Sea are exploiting respectively small pelagics fish and demersal resources.

In the Adriatic sea small pelagics fishery is carried out with two kind of fishing gears, mid-water pelagic pair trawl net towed by two vessels, mostly operated in the northern and central areas by Italian vessels, and purse seines. Until the mid-sixties the main gear which was used to catch small pelagic species was light attraction purse seine and is still in use in the Gulf of Trieste and south of Ancona on the Western side and it is the main gear used in Slovenia, Croatia, Montenegro and Albania.

The bottom otter trawls are used in the Adriatic Sea to fish demersal species like red mullets, hake, octopus, cuttlefish and mantis shrimp, while another bottom gear, the “*rapido*” is used mainly in Italy for the demersal fishery targeting flatfish. Small scale fishery using set nets and traps is active mainly in the coastal areas of the basin, exploiting cuttlefish, common sole, and other demersal resources. Moreover in the Italian coasts bivalves, especially striped venus, are usually caught by vessels equipped with hydraulic dredges. This fishery system operates on sandy bottoms within 1 mile from the coast. Fishing areas of hydraulic dredges are managed by compartmental management consortiums.

The report of the present deliverable also presents two maps showing the distribution of the port where fleets targeting small pelagics and demersal resources are harbored and their main fishing grounds. The spatial pattern of the fishing effort of pelagic pair trawl fleets is concentrated in the western side of GSA 17 mainly because the highest number of boats involved in this kind of fishery is located in the harbor corresponding to this side of the area, while the purse seiners are distributed in wider area.

The report of the present deliverable also summarized the national legislation regarding temporal and spatial fishery restrictions in Adriatic Sea enforced in Italy, Slovenia, Croatia, Montenegro and Albania.

The datasets collected have been analysed in terms of fishing capacity and landings, the latter both as weights and values. The main outcome of the report is the list of the most important fleet segments for each typology of fishery (i.e. small pelagic and demersal) in each country and GSA. The fleet segments have been selected on the basis of two rankings based respectively on landing in weight and value. A threshold of 75% of the total production of the country in weight and in value has been chosen as criteria to include or not a particular fleet segment. In particular the fleet segments summarized in the following table have been chosen for further analyses in the framework of WP2:

Country/GSA	Fishery	Fleet segments selected
<b>Italy GSA 17</b>	Small pelagics	TM_VL2440; TM_VL1824; TM_VL1218
<b>Croatia GSA 17</b>	Small pelagics	PS_VL2440; PS_VL1824
<b>Slovenia GSA 17</b>	Small pelagics	PS_VL1218
<b>Italy GSA 18</b>	Small pelagics	TM_VL2440
<b>Montenegro GSA 18</b>	Small pelagics	PS_VL0612; SB_VL0006; SB_VL0612
<b>Albania GSA 18</b>	Small pelagics	PS_VL1218
<b>Italy GSA 17</b>	Demersal	DRB_VL1218; DTS_VL1824; PGP_VL0612; DTS_VL1218
<b>Croatia GSA 17</b>	Demersal	DTS_VL1218; DTS_VL0612; DTS_VL1824; DTS_VL2440; DFN_VL0612
<b>Slovenia GSA 17</b>	Demersal	DTS_VL1218; DFN_VL0612
<b>Italy GSA 18</b>	Demersal	DTS_VL1218; DTS_VL1824; PGP_VL0612
<b>Montenegro GSA 18</b>	Demersal	DTS_VL1218; DFN_VL0006; DFN_VL0612; DTS_VL0612
<b>Albania GSA 18</b>	Demersal	DTS_VL1224; DTS_VL2440; PGP_VL0612

Moreover in the framework of the present deliverable an analysis on the potential shared stock has been carried out. The multivariate approach confirmed the shared stock listed by GFCM and StockMed project. The outcomes of the present deliverable also evidenced other resources that could be considered as potential shared stocks and are summarized in the following table:

GSA	Fishery	Potential shared stocks
17	Small pelagics	Mugilidae
18	Small pelagics	<i>Scomber japonicas</i> , <i>Trachurus trachurus</i>
17	Demersal	<i>Spicara smaris</i> , <i>Squilla mantis</i> , <i>Conger conger</i> , <i>Octopus vulgaris</i>

## 1. BRIEF INTRODUCTION TO THE ADRIATIC SEA

The Adriatic Sea is a semi-enclosed basin within the larger semi-enclosed sea constituted by the Mediterranean, it extends over 138,000 km<sup>2</sup> and is characterised by the largest shelf area of the Mediterranean, which extends over the Northern and Central parts, where the bottom depth is no more than about 75 and 100 m respectively, with the exception of the Pomo/Jabuka Pit (200-260 m) in the Central Adriatic. The Southern Adriatic has a relatively narrow continental shelf and a marked, steep slope; it reaches the maximum depth of 1,223 m. The Southern Adriatic basin contributes to the entire Mediterranean water mass circulation with its flow of deep-waters, which are formed in the Southern Adriatic pit by the mixing of highly saline waters from the Levant basin with dense waters from the Northern Adriatic and by local convection from surface cooling (Vilibic & Orlic, 2002).

In the Adriatic Sea all types of bottom sediments are found, muddy bottoms are mostly below a depth of 100 m, while in the Central and Northern Adriatic the shallower sea bed is characterized by relict sand. The Eastern and Western coasts are very different; the former is high, rocky and articulated with many islands, the Western coast is flat and alluvial with raised terraces in some areas. The hydrography of the region is characterized by water inflow from the Eastern Mediterranean (entering from the Otranto channel along the Eastern Adriatic coast) and fresh water runoff from Italian rivers. These features seasonally produce latitudinal and longitudinal gradients in hydrographic features along the basin.

For the purpose of fisheries management the fisheries of the Adriatic basin are divided in two Geographical Sub-Areas (GSA): the GSA 17 (North and Central Adriatic) and the GSA 18 (Southern Adriatic). Croatia, Bosnia-Herzegovina, Italy and Slovenia border the GSA 17 (North and Central Adriatic), Albania, Italy (South-Eastern coast) and Montenegro are included in the GSA 18 (fig. 1).

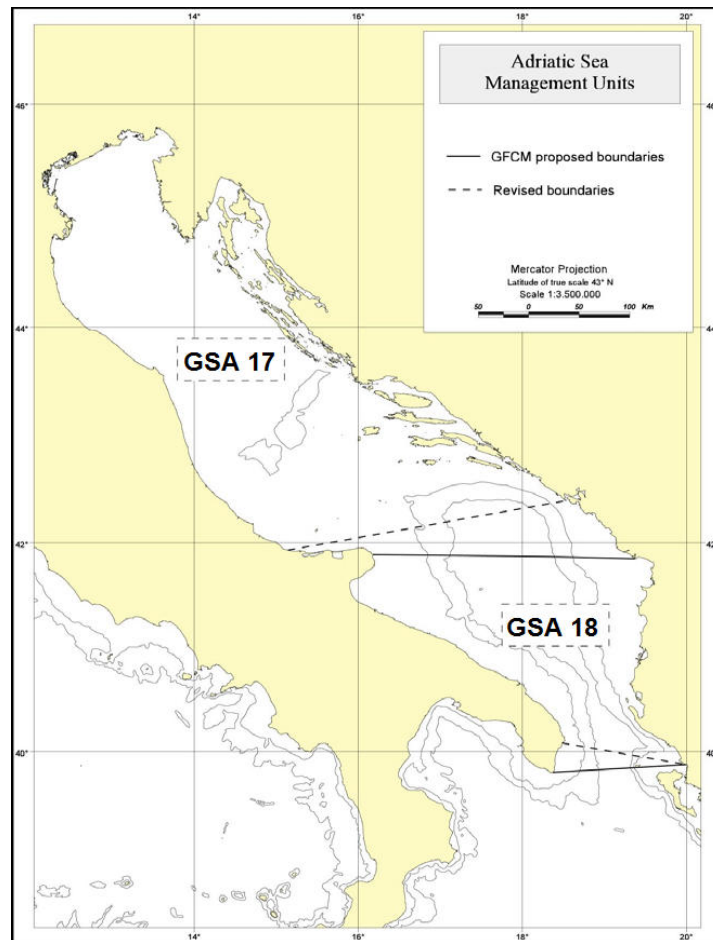


Fig. 1 – Map showing the boundaries of the Adriatic Sea Geographical Sub-areas 17 and 18 (formerly Geographical Management Units 37.2.1.a and 37.2.2.b) as originally indicated by the GFCM (solid line) and with the proposed (and currently adopted) revision (modified by AdriaMed, 2001).

## 2. MAIN FISHING GEARS

### 2.1 Small pelagics fisheries

Two kind of fishing gears are currently used to catch small pelagic species (mainly anchovy and sardine) in the Adriatic sea: the most used by the Italian fleet is the “*volante*” a mid-water pelagic trawl net towed by two vessels, mostly operated in the northern and central areas. In 2012 average tonnage of Italian *volante* vessels was 78 GT while average engine power was about 359 kW. These vessels fish only by daytime and land their product every evening: the fishing trips last about 11-14 hours. Catches up to 15 tons per couple of boats per day have been recorded in the late seventies and early eighties and at present, maximum catches are about 4 tons per day.

Until the mid-sixties the main gear which was used to catch small pelagic species was light attraction purse seine and is still in use in the Gulf of Trieste and south of Ancona on the Western side and it is the main gear used in Slovenia, Croatia, Montenegro and Albania. The Italian purse seine vessels in 2012 had an average tonnage of 73 GT and an average engine power of 301 kW; they operate mainly in the central Adriatic and in the Gulf of Trieste; they fish by night in good weather conditions attracting fish with lights. Their activity is often, but not always, suspended during the colder months.

### 2.2 Demersal fisheries

Classical bottom otter trawls are used to fish demersal species like red mullets, hake, octopus, cuttlefish and mantis shrimp, while another bottom gear, the “*rapido*” is used for the demersal fishery targeting flatfish. This gear is a dredge composed by an anterior rigid metallic framework, a wooden table acting as depressor and maintaining the mouth in close contact with the sea bottom, and a series of iron teeth that penetrate in the sediment. *Rapido* trawl is used to catch common sole and gastropods; this gear is used offshore to fish mainly scallops and queen scallops. Along the Croatian coast bottom trawl fisheries is mainly regulated by spatial and temporal fisheries regulation measures, and about 1/3 of territorial sea is closed for bottom trawl fisheries over whole year. Also bottom trawl fishery is closed half year in the majority of the inner sea. In Croatia a kind of dredge is allowed only to catch mollusks (Pectinidae) and up to 10% of finfish. Moreover in the Italian coasts bivalves, especially striped venus, are usually caught by vessels equipped with hydraulic dredges. In 2012, out of around 700 dredge boats registered in Italy, 668 were operative along the Adriatic coast. This fishery system operates on sandy bottoms within 1 mile from the coast. Fishing areas of hydraulic dredges are managed by compartmental management consortiums.

### 3. FLEET CAPACITY IN THE AREA

The regional fleet including all fleet segments, i.e. from small-scale fishery vessels to large trawlers reached its maximum numerical size between the 1990s and the year 2000. However, since the 1980s two trends appear to have taken place: the number of fishing vessels has been decreasing along the Italian coast and in Montenegro (small-scale fishing vessels not included) while the opposite has been observed in the cases of Croatia and Albania. The size of the Adriatic fishing fleet (Albania, Croatia, Italy, Montenegro and Slovenia) in 2012, on the basis of data collected under deliverable D3, was about 8,000 registered/licensed fishing vessels. Most of the small scale fixed gear fishery is performed by small units of less than 12 m and most polyvalent vessels fall within the small vessel class. Most demersal and pelagic trawlers, purse seiners belong to the medium-size category (12-24 m) even though they are also present with various percentages in the small vessels segment. The data showed in the following paragraphs are provided by the datasets compiled in the framework of deliverable D3 of the present project. In order to provide a more representative picture of the fleet capacities and catches the most recent available year for each country has been discussed. Calculations contained in this paragraph are made based on the information available at the date of 30<sup>th</sup> September 2014.

#### 3.1 Small pelagics fisheries

The map in figure 2 shows the distribution of the port where fleets targeting small pelagics are harbored and their main fishing grounds. The spatial pattern of the fishing effort of the two main gears exploiting small pelagic species has been drafted using the data coming from MAREA-StockMed project (Deliverable-D11), from Falco et al., 2007 and from the information collected from the project participants in each country. It is worth noting that the main area of activity of pelagic pair trawl fleets is concentrated in the western side of GSA 17 mainly because the highest number of boats involved in this kind of fishery is located in the harbor corresponding to this side of the area.



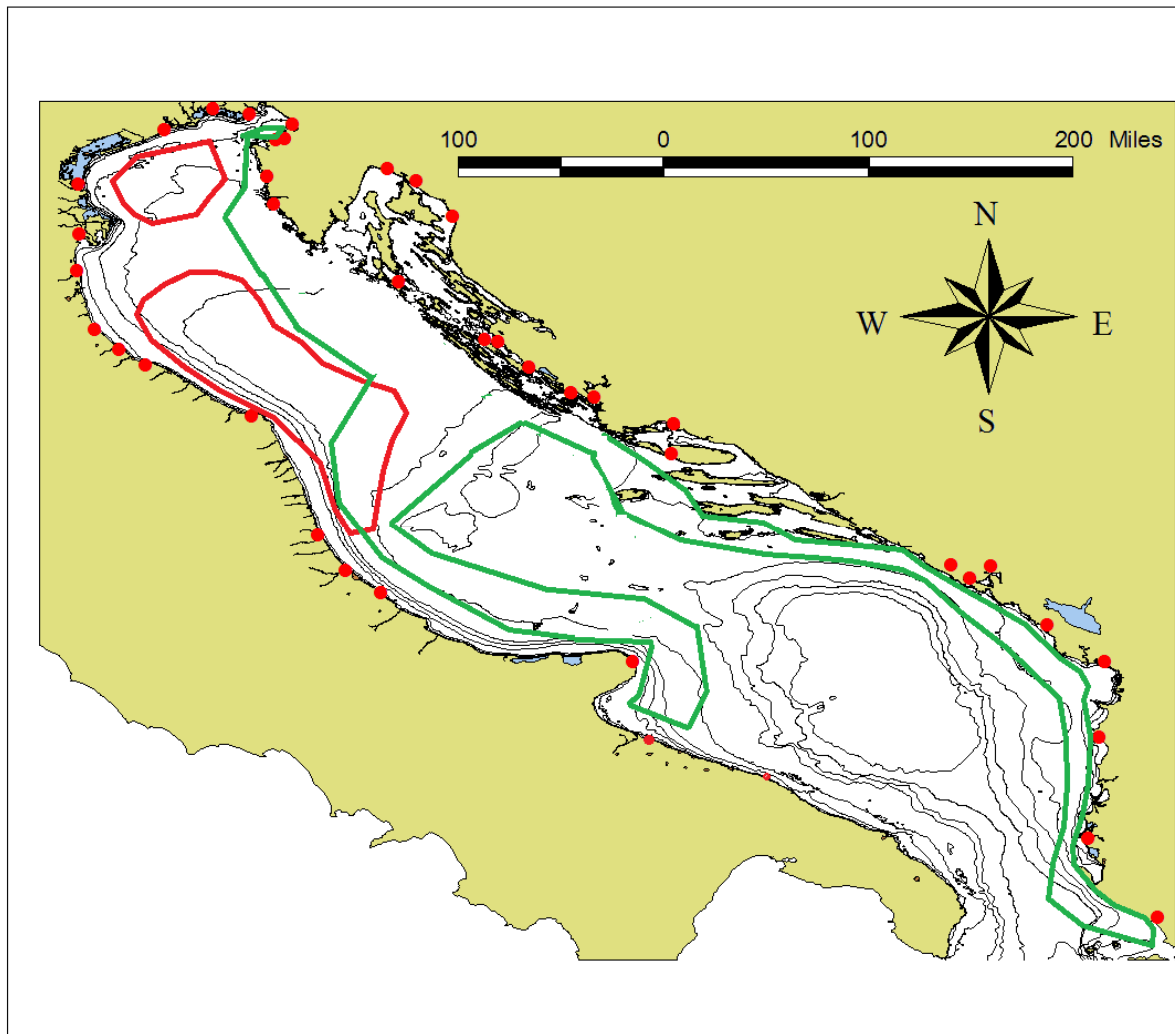


Fig. 2 – Location of the harbors with fleet targeting small pelagic and main fishing grounds of pairs of mid-water trawlers (red line) and purse seiners (green line).

According to the data collected under deliverable D3 the Italian small pelagics fleet operating in GSA 17 was composed in 2012 of 56 pairs of mid-water trawlers and about 32 purse seiners (*'lampara'* vessels operating at night with the use of light attraction), with the former having higher tonnage and engine power than the latter ones (Table 1, fig. 3). The Italian pelagic fleet of GSA 17 is distributed in ports along the Adriatic coastline from Trieste to Vieste and operates both in GSA 17 and 18. The actual number of vessels authorized to potentially be operative to use these gears in the fleet register through the fishing license is much higher.

Croatian small pelagics fleet operating in GSA 17 was composed in 2011 of 32 pelagic trawlers and about 237 purse seiners, with the former having lower tonnage and engine power than the latter ones (Table 1, fig. 3). The fleet operates all year round (with the exception of the closed period between 15 December and 15 January) only in GSA 17. It is important to mention that although the

territorial waters of Croatia are also in GSA 18, the fishing activity of Croatian small pelagics fleets in this area is practically null.

Slovenian small pelagics fleet operating in GSA 17 was composed in 2012 of 4 purse seiners and 1 vessel using polyvalent passive gears only targeting small pelagics (Table 1, fig. 3). The pair trawlers stopped operation in early 2012 as a result of the implementation of the measure for permanent cessation of fishing activities. The purse seine fleet operates exclusively in shallow waters of the northern part of GSA 17 and by means of a specific derogation the activity is carried out also in water shallower than 50 meters.

The Italian small pelagics fleet operating in GSA 18 was composed in 2012 of 14 pairs of mid-water trawlers and about 6 purse seiners, with the former having higher tonnage and engine power than the latter ones (Table 1, fig. 3). A “*bianchetto*” (fry) fishery, targeting juvenile clupeid fishes, had also some importance in Italy, being concentrated in the Apulian coast (Gulf of Manfredonia). The fishery had a long tradition with products fetching high prices in domestic markets. The fishery was conducted mainly with bottom trawls with fine cod-end meshes (5 mm). About 200 vessels were involved in this fishery in early 1990s, with catches in the order of 6 tons per day for a fishing season of approximately two months. As a consequence of the entry into force of Regulation (EC) No 1967/2006, the catch of juvenile pilchard (*bianchetto*) is no longer allowed as of May 31, 2010.

The Montenegrin small pelagics fleet operating in GSA 18 was composed in 2013 of 1 pair of mid-water trawlers, 16 purse seiners and 12 beach seiners (Table 1, fig. 3). The small-scale beach seine fishery, present in several parts of the Eastern Adriatic coast, is traditional for centuries in the Boka Kotorska Bay.

Albanian small pelagics fleet operating in GSA 18 was composed in 2013 of 2 purse seiners belonging to the fleet segment 12-18 meters having in total 52 GT and 209 kW (Table 1, fig. 3).

Table 1 – Fleet segments targeting small pelagic species operating in the Adriatic Sea

Country/GSA (Year)	Fleet segments	Number of vessels	Sum of total GT	Sum of total engine power (kW)
Italy GSA 17 (2012)	PS_VL0612	1	7	61
	PS_VL1218	12	116	1,448
	PS_VL2440	19	1,937	6,975
	TM_VL1218	35	962	6,544
	TM_VL1824	23	1,639	8,102
	TM_VL2440	54	5,914	23,443
Croatia GSA 17 (2011)	PS_VL0006	1	1	61
	PS_VL0612	47	258	3,812
	PS_VL1218	50	1,026	8,334
	PS_VL1824	64	4,819	20,011
	PS_VL2440	70	9,685	34,427
	PS_VL40XX	5	1,640	6,250
	TM_VL0006	4	6	260
	TM_VL0612	17	160	1,673
	TM_VL1218	10	133	1,116
	TM_VL1824	1	102	111
Slovenia GSA 17 (2012)	PGP_VL0006	1	1	3
	PS_VL1218	4	47	473
Italy GSA 18 (2012)	PS_VL2440	6	700	2,964
	TM_VL2440	28	2,352	12,106
Albania GSA 18 (2013)	PS_VL1218	2	52	209
Montenegro GSA 18 (2013)	PS_VL0006	3	3	19
	PS_VL0612	10	34	452
	PS_VL1218	2	23	168
	PS_VL1824	1	75	582
	SB_VL0006	16	12	51
	SB_VL0612	5	14	62
	TM_VL2440	2	259	625
Total		493	31,977	140,342

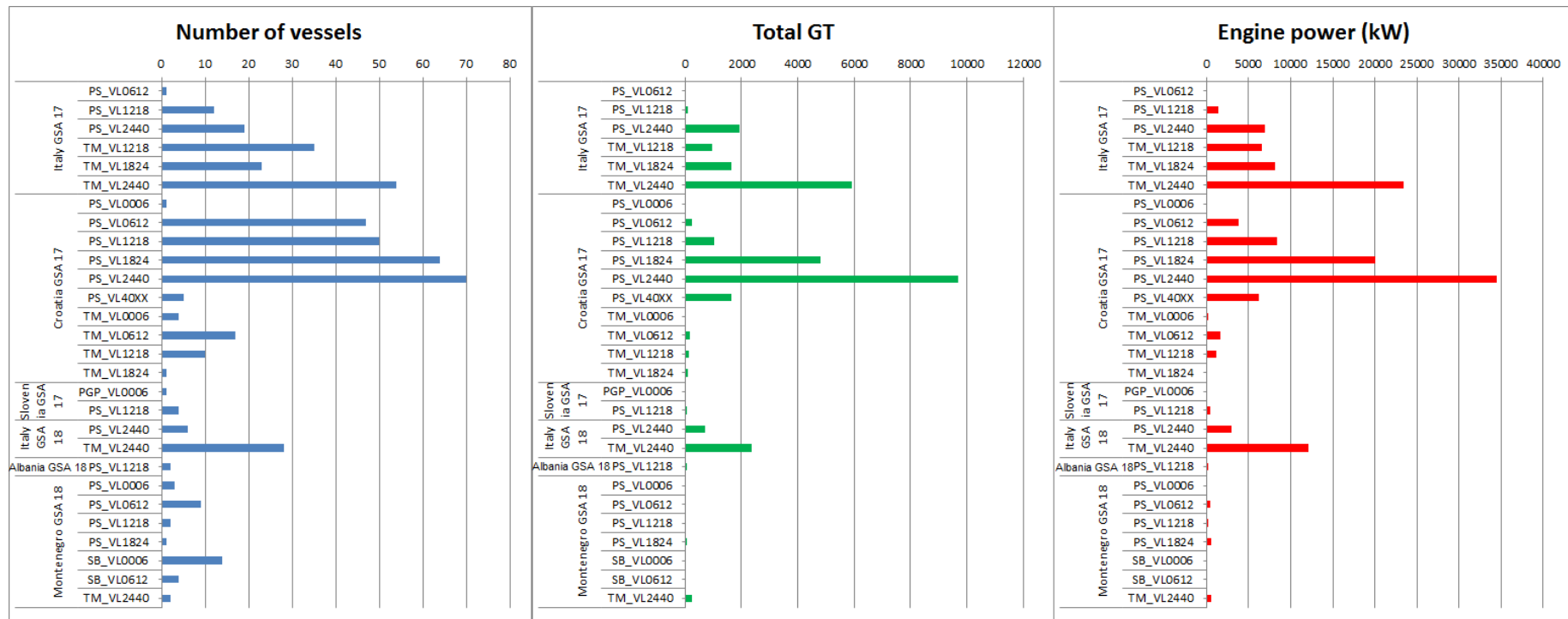


Fig. 3 – Number of vessels, Total GT and engine power (kW) of the fleet segments targeting small pelagic species operating in the Adriatic Sea.

### 3.2 Demersal fisheries

The map in figure 4 shows the distribution of the ports where fleets targeting demersal species are harbored and their main fishing grounds. Also in this case the spatial pattern of fishing effort of the main gears exploiting demersal species has been drafted using the data coming from MAREA-StockMed project (Deliverable-D11), grey literature (Fabi et al., 2009; ISPRA, 2013), scientific paper (Scarcella et al., 2014) and from the information collected from the project participants in each country. Italian otter trawlers operate from the national territorial waters to the international waters, while Albanian and Montenegrin trawl fleets operate mainly within 12 miles.

According to the data collected under deliverable D3 the Italian fleet operating in GSA 17 was composed in 2012 of 719 trawlers (mainly otter trawlers), 67 *rapido* trawlers, 592 dredgers (mainly using hydraulic dredge for bivalves) and 1826 vessels using polyvalent passive gears only (Table 2). In term of tonnage around 60% of the Italian demersal fleets operating in GSA 17 is constituted by otter trawlers, followed by dredgers, *rapido* trawlers and vessels using polyvalent passive gears only. In term of engine power (kW) the demersal trawlers represents the main fleet constituting 46% of the total engine power of the Italian demersal fleet operating in GSA 17 followed by *rapido* trawlers, dredgers and vessels using polyvalent passive gears only.

Croatian demersal fleet operating in GSA 17 was composed in 2013 of 456 demersal trawlers, 29 dredgers, 1598 vessels using polyvalent passive gears only (mainly drift and/or fixed net) and about 452 vessels using mixed passive and active gears (Table 2, fig. 5). In term of tonnage around 62% of the Croatian demersal fleet operating in GSA 17 is constituted by otter trawlers, followed by vessels using polyvalent passive gears only and dredgers. Differently in term of engine power, more than 50% is represented by vessels using polyvalent passive gears only followed by otter trawlers representing 36% of the total kW of Croatian demersal fleet. It is important to mention that although the territorial waters of Croatia are also in GSA 18, the fishing activity of Croatian demersal fleets in this area is practically null.

Slovenian demersal fleet operating in GSA 17 was composed in 2012 of 17 demersal trawlers and 65 vessels using polyvalent passive gears only (mainly drift and/or fixed net; Table 2). In term of tonnage around 60% of the Slovenian demersal fleets operating in GSA 17 is constituted by otter trawlers, followed by vessels using drift and/or set nets. In term of engine power (kW) the vessels using drift and/or set nets represents 49% of the total kW of the Slovenian fleets, followed by demersal trawlers accounting for the 48%.

The Italian demersal fleet operating in GSA 18 was composed in 2012 of 414 demersal trawlers, 76 dredgers and 505 vessels using polyvalent passive gears only (Table 2, fig. 5). In term of tonnage

and engine power, demersal trawlers represent more than 75% of the total, followed by vessels using polyvalent passive gears only (mainly long liners) and dredgers.

The Montenegrin demersal fleet operating in GSA 18 was composed in 2013 of 19 demersal trawlers, 61 vessels using polyvalent passive gears only (mainly drift and/or fixed net and long-lines). In term of tonnage and engine power, demersal trawlers represent more than 65% of the total, followed by vessels using drift and/or set nets and long liners.

The Albanian fleet operating in GSA 18 was composed in 2013 of 3 demersal trawlers, 324 vessels using polyvalent passive gears only and 30 vessels using active and passive gears (Table 2, fig. 5). In term of tonnage and engine power, vessels using active and passive gears represent more than 60% of the total, followed by vessels using polyvalent passive gears only and demersal trawlers.

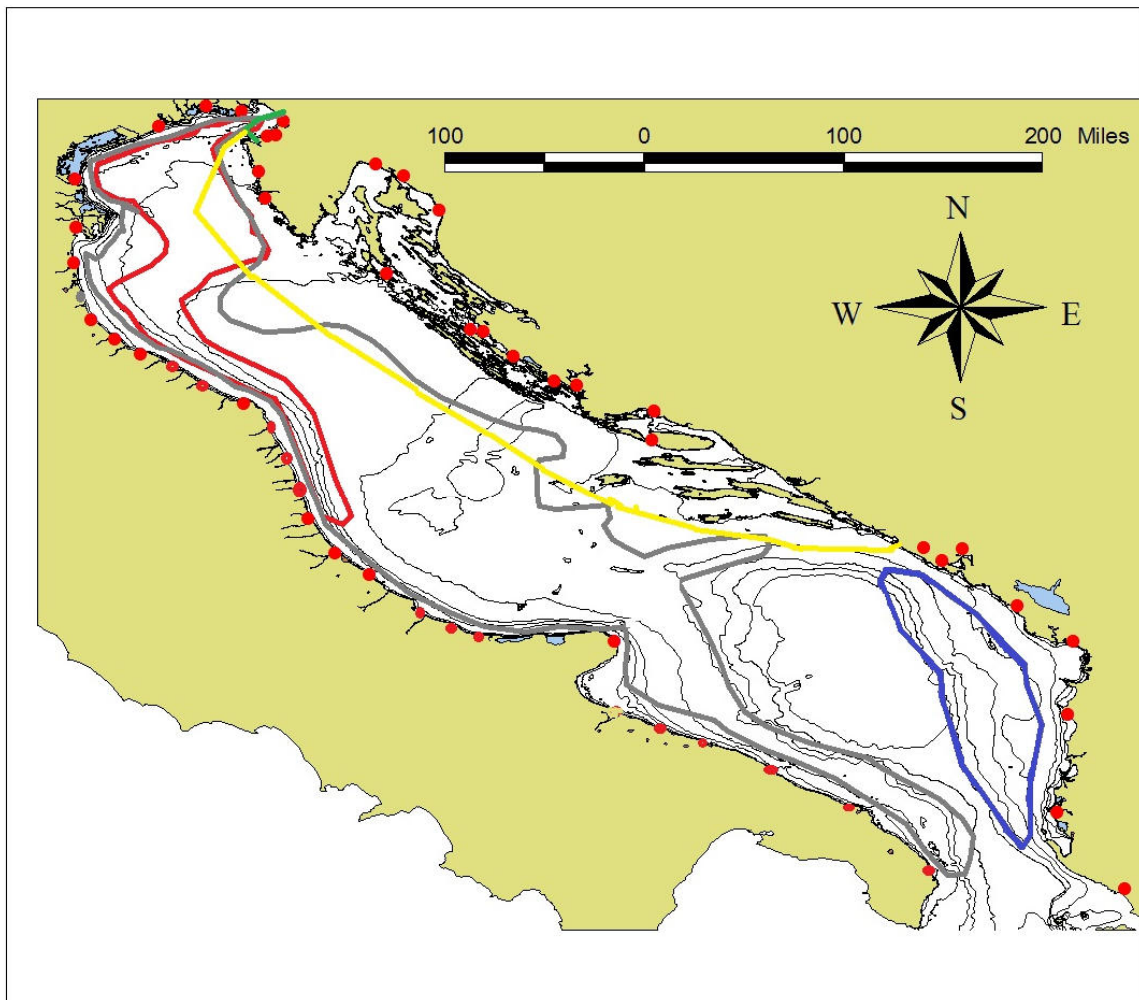


Fig. 4 – Location of the harbors with fleet targeting demersal species and main fishing grounds of rapido trawlers (red line), Italian otter trawlers (grey line), Slovenian trawlers (green line), Croatian trawlers (yellow line), Montenegrin trawlers in the northern east side of GSA 18, Italian trawlers up to the limit of international waters of GSA 18, Albanian trawlers (blue line).

Table 2 – Fleet segments targeting demersal species operating in the Adriatic Sea

Country/GSA (Year)	Fleet segments	Number of vessels	Sum of total GT	Sum of total engine power (kW)
Italy GSA 17 (2012)	DRB_VL0612	1	7	180
	DRB_VL1218	591	8,192	64,015
	DTS_VL0612	125	615	9,549
	DTS_VL1218	352	7,130	49,815
	DTS_VL1824	198	14,151	56,672
	DTS_VL2440	44	4,878	16,433
	PGP_VL0006	705	704	9,457
	PGP_VL0612	1,110	2,664	56,480
	PGP_VL1218	11	165	2,351
	TBB_VL1218	11	305	2,325
	TBB_VL1824	27	1,579	8,655
	TBB_VL2440	29	2,890	11,553
Croatia GSA 17 (2013)	DFN_VL0006	329	314	4,116
	DFN_VL0612	760	2,668	45,807
	DFN_VL1218	21	293	3,969
	DRB_VL0006	1	1	9
	DRB_VL0612	11	87	1,239
	DRB_VL1218	15	219	2,500
	DRB_VL1824	1	55	242
	DRB_VL2440	1	123	590
	DTS_VL0006	7	8	37
	DTS_VL0612	190	1,432	16,506
	DTS_VL1218	203	3,703	31,000
	DTS_VL1824	40	2,242	9,943
	DTS_VL2440	16	2,582	7,384
	FPO_VL0006	37	40	1,065
	FPO_VL0612	108	306	5,927
	HOK_VL0006	89	86	2,013
	HOK_VL0612	241	1,002	24,654
	HOK_VL1218	9	154	3,472
	MGO_VL0006	270	175	4,610
	MGO_VL0612	75	270	4,942
	MGO_VL1218	1	10	55
	PGO_VL0006	3	3	141
	PGO_VL0612	1	3	55
	PGP_VL0006	8	9	166
	PGP_VL0612	20	67	1,181
	PMP_VL0006	33	29	497
	PMP_VL0612	41	146	2,817
	PMP_VL1218	4	42	576

Continue

Country/GSA (Year)	Fleet segments	Number of vessels	Sum of total GT	Sum of total engine power (kW)
Slovenia GSA 17 (2012)	DFN_VL0006	28	27	432
	DFN_VL0612	30	97	1,908
	DFN_VL1218	2	26	272
	DTS_VL0612	5	37	609
	DTS_VL1218	12	211	1,968
	FPO_VL0006	1	1	11
	HOK_VL0006	3	3	21
	HOK_VL0612	1	11	96
Italy GSA 18 (2012)	DRB_VL0612	1	4	71
	DRB_VL1218	75	815	7,474
	DTS_VL0612	36	230	2,012
	DTS_VL1218	286	5,417	37,337
	DTS_VL1824	73	3,875	19,676
	DTS_VL2440	19	1,866	6,959
	HOK_VL1218	26	495	4,816
	PGP_VL0006	173	173	626
	PGP_VL0612	306	663	7,717
Albania GSA 18 (2013)	DTS_VL0612	3	20	327
	PGP_VL0006	240	193	4,870
	PGP_VL0612	84	241	4,317
	PMP_VL1218	30	711	22,372
Montenegro GSA 18 (2013)	DFN_VL0006	28	26.64	146.59
	DFN_VL0612	19	52.29	893.12
	DFN_VL1218	1	9.96	83
	DTS_VL0612	4	43.12	518.7
	DTS_VL1218	9	140.17	1689.15
	DTS_VL1824	4	210.65	977
	DTS_VL2440	1	203	885
	HOK_VL0006	7	7.8	76.36
	HOK_VL0612	6	28.65	717.72
Total		7,252	75,187	592,876



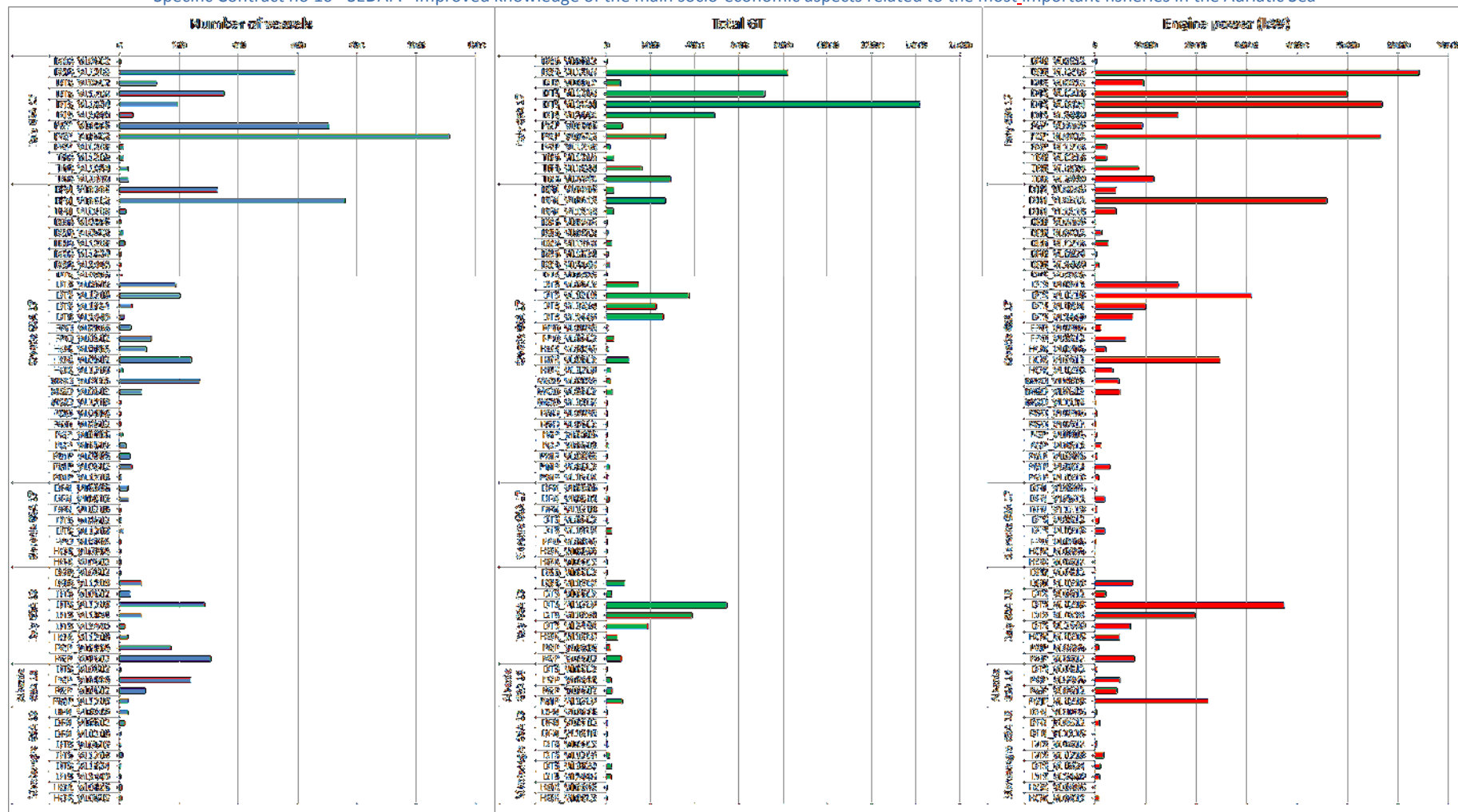


Figure 5 – Number of vessels, Total GT and engine power (kW) of the fleet segments targeting demersal species operating in the Adriatic Sea.

### 3.2.1 Italian national legislation regarding temporal and spatial trawl restrictions in Adriatic

In accordance with Council Regulation (EC) No 1967/2006 Of 21 December 2006 in Italy it is forbidden to trawl at less than 3 nautical miles (nm) from the coast or inside the 50m isobath when this distance is reached at a smaller distance from the shore. Moreover in the Adriatic Sea a closure of 45 days in late summer have been enforced in 2011 - 2013 for the Italian trawl fleet. Before 2011 the closure period was around 30 days in summer, usually August.

The Italian fisheries legislation (Art. 98 of Presidential Decree 1639/1968) set out the possibility of limiting or prohibiting fishing operations in certain marine areas that have been recognized as spawning or nursery areas for economically important marine species or in areas that have been depleted due to over-exploitation. This law establishes the setting up of “Fisheries Restricted Areas” specifically for fishing activities and predates by about 15 years the legislation on Marine Protected Areas (1982). There are many provisions that directly or indirectly limit the areas where fishing is permitted, but establishing Fisheries Restricted Areas remains the most rapid and suitable tool for protecting commercial fish species. Figure 6 shows the locations of the Fisheries restricted areas set up as per art. 98 of Presidential Decree 1639/1968 (Cataudella and Spagnolo, 2011).



Figure 6 - Location of the main Fisheries restricted areas – BPAs. Original Italian names are reported (Modified by Cataudella and Spagnolo, 2011).

Fisheries restricted areas and their protection characteristics in the Adriatic Sea are individually examined below:

1) Miramare Biological Protection Area. This area was set up around the Marine Protected Area (MPA) of Miramare near Trieste, to ensure the fishery management of species spreading out of the

MPA, where any form of fishing is prohibited. The Miramare Biological Protection Area affects a coastal area about 1 mile wide and several kilometers long. In this area, fishing with set gillnets and encircling nets, as well as fishing for mantis shrimp and cuttlefish with traps, is allowed. The permission of fishing with these gears is linked to the biological characteristic of catch species and territorial characteristic of the area (Orel, 1988). Due to Slovenian territorial waters being so close by, and to there being no international waters, in the sea waters bordering the Friuli Venezia Giulia region the fishing area available is limited. With this lack of fishing areas, a total fishing ban would have concentrated small-scale fishing in a confined area with the same resources being exploited all the time. The zone is also a gathering area for young red mullet (*Mullus barbatus*), sea bream, squid and cuttlefish, which, because of their early development stage and small size, are not captured by approved selective gears.

2) Porto Falconera – Caorle Biological Protection Area. This area was set up to protect the resources that are concentrated in an area with rocky organogenic outcrops, locally called “tegnue”. In the area, the complete fishing ban is in force because the resources cover a limited distribution area that, without total fishing ban, would suffer a strong and continuous fishing pressure.

3) Chioggia Tegnue Biological Protection Area. This area is of particular biological interest and has been the subject of several measures. It is currently divided into two separate areas. The first Biological Protection Area ensures protection to four small areas with rocky organogenic outcrops opposite Caorle, with fish populations that require greater protection from overexploitation (Stefanon, 2002). In order to further reduce exploitation of resources as they move from one area to another, the second regularly shaped Biological Protection Area was then set up. It is wider and includes four small areas of hard substrate. Only fishing using gillnets is allowed in this area as well as recreational fishing with hooks, and limited to the connecting channels between the four rocky areas. The use of selective set gillnets and traps ensures that protection is provided for young fish of all species, and contributes to reducing illegal trawling in an area of high fishing pressure.

4) Biological Protection Area off Ravenna. This protects a large area opposite the Ravenna coast that starts at the 10 metres isobath and extends more than 10 miles out to sea. This area, where bottom trawling is prohibited but fishing with selective gear is allowed, was set up to provide greater protection for species (red mullet, sea bream, cuttlefish, squid, red gurnard) the juveniles of which concentrate around the coastal area.

5) Barbare Biological Protection Area. This biological protection area is located almost 30 miles offshore from Ancona, on beds at around 70 metres, and is characteristic in that it contains several oil platforms. Due to their depth they represent special areas containing hard substrate species.

Trawling and deep long-line fishing are prohibited in this area, whereas fishing with traps and gillnets on the seabed, that are more selective gears, is allowed. For pelagic resources purse seines and surface long-lines can be used.

6) Pomo Biological Protection Area. This biological protection area is located more than 50 miles offshore opposite the Abruzzo coast, in international waters. This Biological Protection Area was set up after Italian and Croatian research activities, which agreed that it was necessary to create a large scale biological protection area to protect young hake. The juveniles of this species gather on these muddy beds to feed on the abundant supply of small crustaceans that constitute their main food. The need for protection was accepted internationally by AdriaMed (Scientific cooperation to support responsible fisheries in the Adriatic Sea), the General Mediterranean Fisheries Commission (GFCM) and the EU. While awaiting more effective international legal tools to protect this area with ad hoc regulations, Italy has in the meantime approved this biological protection area.

7) Tremiti Biological Protection Area. The location of this biological protection area was decided in order to enhance the protection already provided by Marine Protected Area of the Tremiti islands. The Biological Protection Area starts at the external limit to the North of the MPA and extends to beyond the 100 meter depth isobath. The creation of the Biological Protection Area allows fishing to be regulated by reducing exploitation. Trawling is allowed in winter time from the 1<sup>st</sup> November to 31<sup>st</sup> March while fishing activity using selective gears and purse seines is always permitted.

8) Apulia sea Biological Protection Area. The Adriatic Sea opposite the Apulia coasts has both rocky and muddy beds. Fishing pressure with trawl nets is high and fish species gather in the few areas where obstacles on the seabed make it difficult to fish with trawl nets. The Apulia Biological Protection Area is located in an area where bottom trawling is limited due to the strong risks of net snags. In this Biological Protection Area fishing activity using selective gillnets and traps is allowed.

### 3.2.2 *Croatian national legislation regarding temporal and spatial trawl restrictions*

In Croatia there are temporal and spatial trawl fishing restrictions (temporary or permanent prohibition in certain areas). This is a complex system created as a consequence of long-lasting evolution process in balancing exploitation needs with necessity for the protection of demersal resources. In particular trawl fishing is permanently prohibited within 1 nautical mile from mainland and island coast, 2 nautical mile around islands Palagruža, Galijula, Lastovo, Lastovnjaci, Vrhovnjaci, Glavat, Kopište, Mljet, Vis, Barjak Mali, Barjak Veli, Ravnik, Budikovac, Paržan Veli, Paržan Mali, Greben, Sušac, Svetac, Biševo and Brusnik, and 3 NM around Blitvica and Jabuka.

Trawl fishing is also prohibited in numerous bays and channels, e.g. Cres bay, Osor bay, Vinodol and Velebit channel, Novigrad sea, part of Zadar And Pašman channels, Kaštela bay, most part of the Split and Brač channels, part of the Hvar channel, part of the Neretva channel and part of the Koločep channel. Moreover, in numerous parts of the fishing sea the trawl fishing is prohibited for certain part of the year or of the week. Figure 7 shows more in detail the complex system of trawl fishing regulation in terms of time and space in Croatia waters.

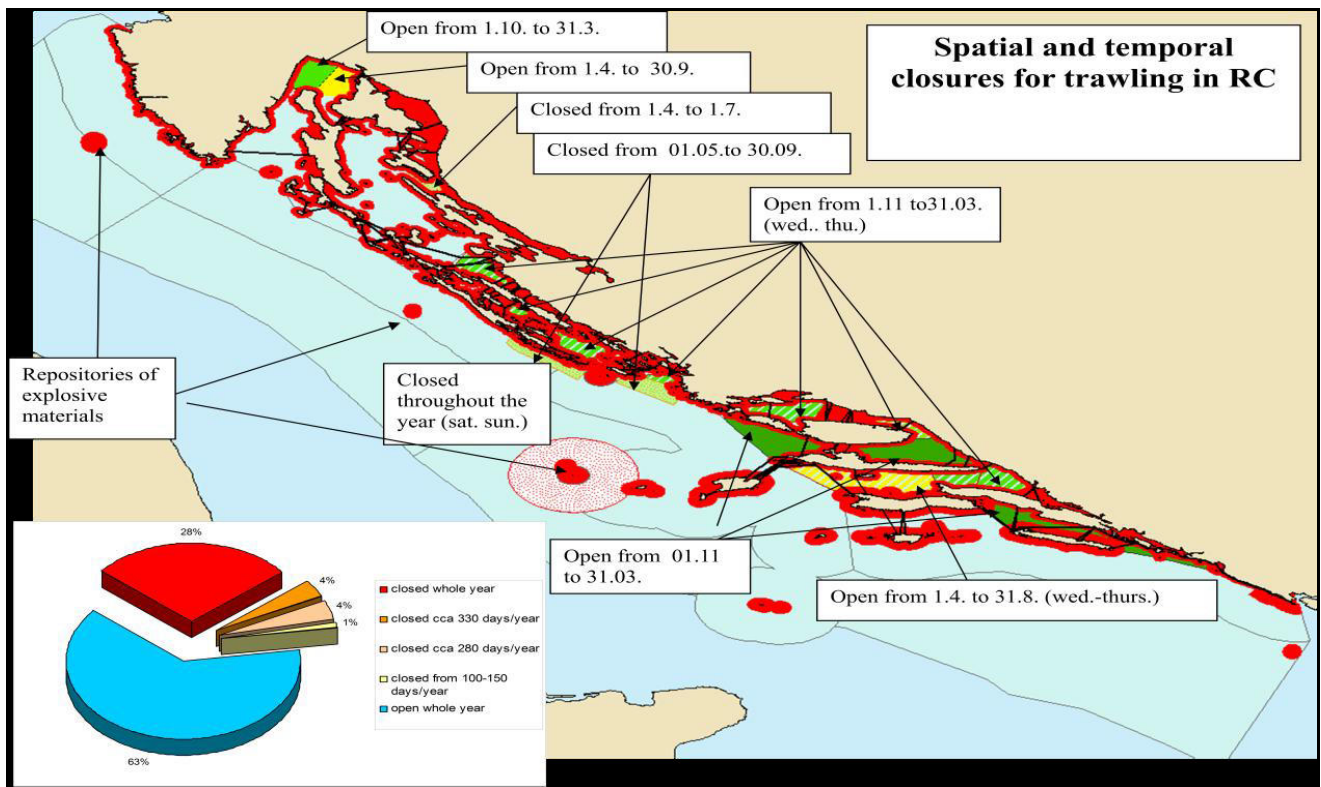


Fig. 7 - Trawl fishing regulation in terms of time and space in the Croatian waters

### 3.2.3 Slovenia national legislation regarding temporal and spatial trawl restrictions

In Slovenia trawling may only be employed in zone B (territorial waters; Fig. 8) of Slovenia's sea fishing area; this area has, in practice, been significantly reduced, since it has been necessary to exclude the area comprising protected areas, navigation lanes and areas that cannot be used for reasons of conflict with other types of fishing gear. This area has been further reduced because fishing using this type of gear must be carried out at the distance from the coast stipulated in Council Regulation (EC) No 1967/2006.

There are no protected areas in the territorial sea of the Republic of Slovenia in the marine area outside 300 meters of the coast. In this area the sea bed is covered in silt and there are no phanerogams, coralligenous habitats or maërl beds on the sea bed.



According to the data from the Marine Biology Station from Piran, in the territorial sea of the republic of Slovenia, due to turbidity, phanerogams are distributed in littoral waters not deeper than 10 meters. Ten meters isobate is usually closer to the shore than 300 meters. Coralligenous bottom is limited to few spots of rocky bottom very close to the shore (e.g. Piran). Both protected areas are off the reach of vessels using purse seines. Maërl beds are not present in Slovenian waters at all.

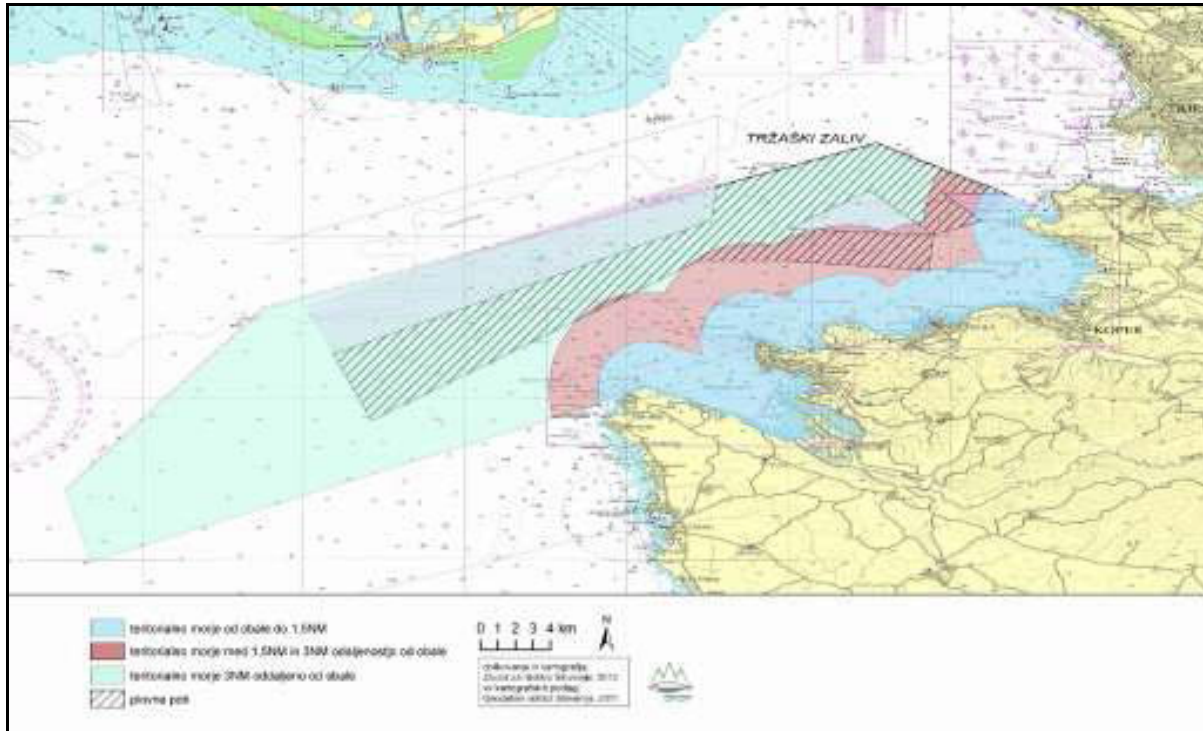


Figure 8: Territorial Sea of the Republic of Slovenia. Zone B: From coast line to 1,5 NM (blue), from 1,5 NM to 3,0 NM (red), and traffic separation scheme (hatched).

#### 3.2.4 Montenegro national legislation regarding temporal and spatial trawl restrictions

The Law on Marine Fisheries and Mariculture as well as different rulebooks lay down rules for the spatial management of the living marine resources with the possibility to introduce protected areas. With aim of the protection of biodiversity in shallow littoral zones, fishing with bottom trawls and pelagic trawls is prohibited at a distance less than 3 nautical miles from the coast, or at the depth of 50 m, if the isobath of 50 m is located at a distance of less than 3 nautical miles (Article 25, Law on marine fisheries and mariculture, Official Gazette of Montenegro 56/09).

Fishing with bottom and pelagic trawls and purse seines of large-scale commercial fisheries in the area of Boka Kotorska Bay is prohibited, except for scientific research purposes (Article 24, Law on marine fisheries and mariculture, Official Gazette of Montenegro 56/09).

Mouth of River Bojana and 9 small rivers are prohibited for marine fishery. Line in mouth of rivers is determined by Rulebook on terms determining the line where freshwater becomes marine water

in mouths of rivers and determining the boundaries of fishery prohibited zones (Official Gazette of Montenegro 39/13).

At this moment there are no Marine Protected Areas (MPA) in Montenegro. However the pilot study for MPA "Katič" was conducted during 18 months program (July 2009 – December 2010). Planned MPA "Katič" covers a coastal stretch of approximately 10 km between municipalities of Budva and Bar. The Management Plan for the MPA is made in order to define the development strategies.

### 3.2.5 Albania national legislation regarding temporal and spatial trawl restrictions

The responsible authorities for monitoring fishing activities and fishing efforts include the fishery inspectors, the monitoring section in the Fishery Department and the Inter-institutional Maritime Operational Centre (IMOC). A VMS and a radar/satellite system for Automatic Identification System (AIS) of the marine vessel activity has been installed within the IMOC. In table 3 the areas protected from fishing in Albania are summarized.

Table 3 – Spatial regulation in Albania coast

Articles of law	Areas protected from fishing	Legend	Area (km <sup>2</sup> )	Percentage of territorial waters (%)
Reg. No. 1, 07.03.2014: Article 5/1	Buffer zone with 2 km radius from mouth of Buna River and 1 km radius from the mouth of other Albanian rivers where the fishing is prohibited	River mouths	31,0	0,52%
Article 16, Chapter III, DCM Nr. 402 date 8.5.2013 "concerning management measures for the sustainable exploitation of fishery resources in the sea"	The use of towed gears shall be prohibited within 3 nautical miles of the coast or within the 50 m isobath where that depth is reached at a shorter distance from the coast.		2114,0	35,51%
Reg. No. 1, 07.03.2014: Article 4/16	Buffer zone in the distance of 1 NM shoreline or 50 m isobaths, outside part of Karaburuni shore from Kepi I Gjuhezes until Rrugët e Bardha (Palase)	Outside Karaburuni		
Reg. No. 1, 07.03.2014: Article 4/18	It is prohibited to fish with trail net (trawl or pelagic) in the Vlora Bay (limited on the north from the basic line of the Bay of Karaburun up to Treport).	Vlora bay		
Reg. No. 1, 07.03.2014: Article 5/1	buffer zone with 2 km radius from the mouth of sea lagoon communication channels	Lagoon channels		
Reg. No. 1, 07.03.2014: Article 4/17	300 m buffer zone from shore line where fishing of every kind of nets by circulating is prohibited		145,6	2,45%
Article 16, Chapter III, DCM Nr. 402 date 8.5.2013 "concerning management measures for the sustainable exploitation of fishery resources in the sea"	buffer zone 1.5 miles from shoreline (no use of pelagic trawlers)		1076,0	18,07%

Article 16, Chapter III, DCM Nr. 402 date 8.5.2013 “concerning management measures for the sustainable exploitation of fishery resources in the sea”	Buffer zone of 0,3 nautical miles from shoreline (use of hydraulic dredges)	220,0	3,69%
Article 16, Chapter III, DCM Nr. 402 date 8.5.2013 “concerning management measures for the sustainable exploitation of fishery resources in the sea”	Buffer zone of 300 m from shoreline (no use of purse seiners )	136,0	2,28%



#### 4. LANDINGS OF TARGET SPECIES

In table 4 the ten most important species for the whole area (GSAs 17 and 18) are ranked considering the data available from Albania, Croatia, Italy, Montenegro and Slovenia in terms of landing in weights and in values. Calculations contained in this paragraph are made based on the information available at the date of 30<sup>th</sup> September 2014.

Table 4 – Ranking of the most important species for the Adriatic sea in terms of landing in weights and in values.

Ranking	Taxa	Landings in weights (Tons)	Taxa	Landings in values (euro)
1°	ANE	27,921.7	SVE	41,937,781
2°	SVE	19,943.4	ANE	40,282,350
3°	PIL	15,160.4	HKE	39,422,377
4°	HKE	5,986.6	SOL	27,370,032
5°	MUT	4,626.0	NEP	26,728,678
6°	MUL	4,212.3	CTC	26,142,726
7°	MTS	3,779.7	MTS	24,893,037
8°	GAS	3,603.1	MUT	18,414,147
9°	CTC	3,395.5	MZZ	18,127,288
10°	MZZ	2,547.5	PIL	10,275,833

##### 4.1 Small pelagics fisheries

According to the data collected under deliverable D3 the Italian small pelagic fleet operating in GSA 17 in 2012 was targeting mainly anchovies, accounting up to 93% and 96% in landing weights and landing values in each fleet segment, with the only exception of TMVL\_18-24 where sardine represented 55% and 48% respectively in term of landing weights and landing values. The other species represented a small amount both in term of landing weights and landing values constituting always less than 15% (Table 5). The species listed in Table 5 are ranked on the base of the total landing in weights and values by country.

The Croatian small pelagic fleet operating in GSA 17 in 2011 was targeting mainly anchovies and sardines. Due to the unavailability of landing weights and landing values for the combination of fleet segment and all the captured species is not possible to quantify which species is more important in each fleet segment (Table 5). However from expert judgment it is possible to state that sardine is the main species in term of landing weights followed by anchovies.

The Slovenian small pelagic fleet operating in GSA 17 in 2012 was targeting mainly anchovies and sardines. Due to the unavailability of landing weights and landing values by the combination of fleet segment and all the captured species is not possible to quantify which species is more important in each fleet segment (Table 5).

However in the framework of WP4 it was possible to perform the analyses carried out using BEMTOOL, because the data on target species were available by fleet segment.

The Italian small pelagic fleet operating in GSA 18 in 2012 was targeting mainly anchovies, accounting for more than 84% in landing weights and landing values in each fleet segment. Sardine was the second most important species in TM\_VL2440, while in PS\_VL2440 the second most important species was the chub mackerel (Table 5).

The Montenegrin small pelagic fleet operating in GSA 18 in 2013 was targeting mainly sardines, accounting up to 52% in landing weights in each fleet segment. Sardine was less important in PS\_VL1824 and TM\_VL2440, where respectively anchovy and chub mackerel resulted the most important species in term of landing weights (Table 5).

The Albanian small pelagic fleet operating in GSA 17 in 2012 was targeting mainly anchovies, sardines and chub mackerel. Due to the unavailability of landing weights and landing values by the combination of fleet segment and all the captured species is not possible to quantify which species is more important in each fleet segment (Table 5).

Also in this case, in the framework of WP4 it was possible to perform the analyses carried out using BEMTOOL, because the data on assessed species were available by fleet segment.

## 4.2 Demersal fisheries

According to the data collected under deliverable D3 the Italian demersal fleet operating in GSA 17 in 2012 was targeting mainly striped venus using dredges; mantis shrimp, hake and red mullet using otter trawl; gastropods, cuttlefish and mantis shrimp with vessels using polyvalent passive gears only and common sole, gastropods and pectindae using *rapido* trawl (Tables 6 and 7). The species listed in Tables 6 and 7 are ranked on the base of the total landing in weights and values by country.

The Croatian demersal fleet operating in GSA 17 in 2013 was targeting mainly common sole using set nets; oysters and scallops using dredges; common octopus and Norway lobster using traps; hake and red mullet using otter trawl and hake and gurnards using long lines (Tables 6 and 7).

The Slovenian demersal fleet operating in GSA 17 in 2012 was targeting mainly common sole, common Pandora and gilthead sea bream using set nets; whiting and musky octopus using otter

trawl; bogue and annular sea bream using traps and European conger and gilthead sea bream using long lines (Tables 6 and 7).

The Italian demersal fleet operating in GSA 18 in 2012 was targeting mainly striped venus using dredges; hake and red mullet using otter trawl; hake and gurnards using long lines and hake, cuttlefish and common octopus with vessels using polyvalent passive gears only (Tables 6 and 7).

The Montenegrin demersal fleet operating in GSA 18 in 2013 was targeting mainly Atlantic bonito, greater amberjack, red mullet, common sole, cuttlefish and hake using drift nets and/or set nets; hake, deep-water pink shrimp, black-bellied angler, squid, cuttlefish, common octopus and curled octopus red mullet using demersal trawl; hake, tub gurnard, mackerels and European conger using hooks and long lines (Table 6).

Due to the unavailability of landing weights and landing values by the combination of fleet segments and all the captured species is not possible to identify target species by fleet segment of Albanian demersal fleet operating in GSA 18. However in the framework of WP4 it was possible to perform the analyses carried out using BEMTOOL, because the data on assessed species were available by fleet segment.

Table 5 – Landing in weights and values (when available) of the main target small pelagics species exploited by fleet segments in each country/GSA.

		Sum of landing in weights (tons)						Sum of landing in values (euro)					
Country/GSA (Year)	Species	PS_VL0612	PS_VL1218	PS_VL2440	TM_VL1218	TM_VL1824	TM_VL2440	PS_VL0612	PS_VL1218	PS_VL2440	TM_VL1218	TM_VL1824	TM_VL2440
Italy GSA 17 (2012)	<i>Engraulis encrasicolus</i>	9.9	183.2	3,213.6	4,498.0	2,880.1	10,368.0	27,314.0	483,128.0	5,495,818.0	4,405,337.0	2,557,411.0	14,897,657.0
	<i>Boops boops</i>		5.4						4,836.0				
	<i>Trachurus trachurus</i>	0.5	15.9					1,193.0	35,585.0				
	<i>Scomber scombrus</i>	0.2						1,733.0					
	Mugilidae	0.8	37.7		1,457.7	1,211.1	1,012.7	2,255.0	74,624.0		1,076,327.0	694,579.0	772,010.0
	Osteichthyes			80.8						86,334.0			
	<i>Sardina pilchardus</i>	4.7	146.6	156.3	1,514.6	5,138.2	7,169.6	9,020.0	253,857.0	126,849.0	1,232,099.0	3,021,998.0	4,961,159.0
		Sum of landing in weights (tons)											
Country/GSA (Year)	Species	PS_VL0006	PS_VL0612	PS_VL1218	PS_VL1824	PS_VL2440	PS_VL40XX	TM_VL0006	TM_VL0612	TM_VL1218	TM_VL1824	TM_VL2440	
Croatia GSA 17 (2011)	<i>Engraulis encrasicolus</i> , <i>Sardina pilchardus</i>	7.0	295.0	6,238.0	19,764.0	33,652.0	3,779.0	0.5	3.0	2.0	13.0	0.2	
		Sum of landing in weights (tons)		Sum of landing in values (euro)									
Country/GSA (Year)	Species	PS_VL1218		PS_VL1218									
Slovenia GSA 17 (2012)	<i>Engraulis encrasicolus</i> , Mugilidae, <i>Sardina pilchardus</i> , <i>Liza aurata</i>	90.4		211,977.0									
		Sum of landing in weights (tons)		Sum of landing in values (euro)									
Country/GSA (Year)	Species	PS_VL2440	TM_VL2440	PS_VL2440	TM_VL2440								
Italy GSA 18 (2012)	<i>Engraulis encrasicolus</i>	1,437.6	5,179.7	2,816,154.0	9,432,117.0								
	<i>Trachurus trachurus</i>		78.8		79,613.0								
	<i>Scomber scombrus</i>	126.7	68.2	136,270.0	75,512.0								
	<i>Sardina pilchardus</i>	31.6	782.4	16,623.0	434,560.0								
		Sum of landing in weights (tons)											
Country/GSA (Year)	Species	PS_VL1218	PS_VL1218										
Albania GSA 18 (2013)	<i>Engraulis encrasicolus</i> , <i>Sardina pilchardus</i> , <i>Scomber scombrus</i>	80.0	360.0										
		Sum of landing in weights (tons)											
Country/GSA (Year)	Species	PS_VL0006	PS_VL0612	PS_VL1218	PS_VL1824	SB_VL0006	SB_VL0612	TM_VL2440					
Montenegro GSA 18 (2013)	<i>Atherina hepsetus</i>					1.7	0.3						
	<i>Seriola dumerili</i>			1.3		0.8	0.4						
	<i>Engraulis encrasicolus</i>	8.2	17.5	1.6	0.2	9.5	9.1	0.1					
	<i>Auxis rochei</i>			2.8		4.4		0.1					
	<i>Boops boops</i>	1.7	15.5	0.7	0.1	0.2	2.9	0.0					
	<i>Sarda sarda</i>			1.0	0.1	3.9	2.5						
	<i>Trachurus trachurus</i>	1.4	15.5	0.3	0.0		0.8	0.1					
	<i>Scomber scombrus</i>		12.4				1.3	0.5					
	<i>Scomber japonicus</i>	1.4	15.5	0.7	0.1		1.3						
	<i>Mugil cephalus</i>			0.8		0.2							
	<i>Sardina pilchardus</i>	14.5	25.5	2.3	0.1	13.8	12.9	0.1					
	<i>Trachinotus ovatus</i>					0.1							
	<i>Sardinella auratta</i>	0.4	2.1	0.3		5.7							
	<i>Oblada melanura</i>	0.3				0.6							

## MAREA MEDITERRANEAN HALIEUTIC RESOURCES EVALUATION AND ADVICE

Specific Contract no 10 - SEDAF: "Improved knowledge of the main socio-economic aspects related to the most important fisheries in the Adriatic Sea"

Table 6 – Landing in weights of the main demersal species exploited by fleet segments in each country/GSA.

		Sum of landing in weights (tons)													
Country/GSA (Year)	Species	DRB_VL0612	DRB_VL1218	DTS_VL0612	DTS_VL1218	DTS_VL1824	DTS_VL2440	PGP_VL0006	PGP_VL0612	PGP_VL1218	TBB_VL1218	TBB_VL1824	TBB_VL2440		
Italy GSA 17 (2012)	<i>Chamelea gallina</i>	4.9	19,015.0												
	Gastropoda			26.2	75.5	576.5		235.5	964.2		166.9	93.9	1,374.8		
	<i>Squilla mantis</i>			124.2	1,015.2	579.3	76.1	302.9	857.4	1.6	11.8	36.5	143.1		
	<i>Sepia officinalis</i>			69.0	385.3	579.4	57.7	248.7	888.9		26.0	159.8	158.9		
	Osteichthyes			11.2	245.1	283.4	71.2	422.0	695.4	1.2		32.2	24.4		
	<i>Merluccius merluccius</i>			7.7	425.7	1,048.4	296.9								
	<i>Solea solea</i>			21.1	82.7	276.8		150.8	691.9	6.7	36.9	235.4	254.5		
	Veneridae		1,428.6						280.0						
	<i>Mullus barbatus</i>			51.7	693.7	572.5	157.2						23.5		
	<i>Merlangius merlangus</i>			33.7	798.9	486.7	34.7						51.4		
<i>Nephrops norvegicus</i>				147.3	448.9	205.3									
		Sum of landing in weights (tons)													
Country/GSA (Year)	Species	DFN_VL0006	DFN_VL0612	DFN_VL1218	DRB_VL0612	DRB_VL1218	DRB_VL1824	DRB_VL2440	DTS_VL0006	DTS_VL0612	DTS_VL1218	DTS_VL1824	DTS_VL2440	OTHER	
Croatia GSA 17 (2013)	<i>Merluccius merluccius</i>	6.5	32.6	0.5					0.1	134.3	414.0	244.6	202.9	69.5	
	<i>Mullus barbatus</i>						0.5		0.3	193.0	609.0	162.9	64.9	0.0	
	<i>Eledone spp</i>				1.4	2.2	5.5	1.9	0.0	0.1	126.3	239.6	37.5	13.6	
	<i>Parapenaeus longirostris</i>									10.3	70.5	125.5	104.9	0.0	
	<i>Nephrops norvegicus</i>									18.4	43.1	85.6	126.4	0.0	
	Loliginidae, Ommastrephidae									20.6	78.1	87.1	85.0	0.0	
	<i>Ostrea edulis</i>				41.6	46.3	21.2			15.2				72.7	
	<i>Sepia officinalis</i>	14.1	28.5	0.3	7.1	11.9	3.6	0.0	0.2	28.1	48.1			96.8	
	<i>Solea solea</i>	2.5	106.6	15.7	6.3	8.9	1.9	0.0						0.6	
	<i>Octopus vulgaris</i>	5.6	20.0							11.8				67.2	
	<i>Spicara smaris</i>	4.5	16.5						2.0	75.2				9.5	
			Sum of landing in weights (tons)												
Country/GSA (Year)	Species	DFN_VL0006	DFN_VL0612	DFN_VL1218	DTS_VL0612	DTS_VL1218	DTS_VL1824	DTS_VL2440	HOK_VL0006	HOK_VL0612	HOK_VL1218	HOK_VL1824	HOK_VL2440		
Slovenia GSA 17 (2012)	<i>Merlangius merlangus</i>	0.7	2.9		6.7	69.7			0.03	0.03					
	<i>Eledone moschata</i>				4.4	21.0									
	<i>Pagellus erythrinus</i>	2.1	6.6	0.2	0.7	6.5			0.01	0.01					
	<i>Loligo vulgaris</i>				1.4	10.2	0.01			0.01					
	<i>Sepia officinalis</i>	0.4	0.5		0.5	8.8				0.01					
	<i>Sparus aurata</i>	2.5	5.6			1.7		0.13		0.01					
	<i>Solea solea</i>	2.2	5.9				0.01								
	Mugilidae	1.1	3.4			3.6				0.01					
	<i>Platichthys flesus</i>	1.1	2.1			1.5									
	<i>Trachurus trachurus</i>					4.1	0.01			0.01					
<i>Liza aurata</i>	0.2	0.7			2.8										
		Sum of landing in weights (tons)													
Country/GSA (Year)	Species	DRB_VL0612	DRB_VL1218	DTS_VL0612	DTS_VL1218	DTS_VL1824	DTS_VL2440	HOK_VL1218	PGP_VL0006	PGP_VL0612					
Italy GSA 18 (2012)	<i>Merluccius merluccius</i>			34.0	1,631.4	629.3	218.1	297.4	5.2	290.3					
	<i>Mullus barbatus</i>			356.4	1,423.2	256.7	51.4								
	<i>Chamelea gallina</i>	20.6	902.9												
	Osteichthyes			22.8	166.2	281.0	15.5		90.3	104.8					
	<i>Sepia officinalis</i>			29.4	310.5	107.7	21.3		47.8	146.8					
	<i>Squilla mantis</i>			91.3	401.4	85.2	16.5		11.8	25.5					
	Ommastrephidae				350.6	136.9	41.8								
	<i>Parapenaeus longirostris</i>				264.1	176.0	82.8								
	<i>Eledone moschata</i>			13.3	323.3	141.0	34.5								
	<i>Eledone cirrosa</i>			15.2	284.5	129.7	33.2								
	<i>Nephrops norvegicus</i>				186.2	210.6	60.2								
			Sum of landing in weights (tons)												
Country/GSA (Year)	Species	DFN_VL0006	DFN_VL0612	DFN_VL1218	DTS_VL0612	DTS_VL1218	DTS_VL1824	HOK_VL0006	HOK_VL0612	HOK_VL1218	HOK_VL1824	HOK_VL2440			
Montenegro GSA 18 (2011)	<i>Merluccius merluccius</i>	1.3	1.3	0.1	5.1	26.4	10.6								
	<i>Mullus barbatus</i>				4.0	22.3	9.0								
	<i>Sarda sarda</i>	15.7	15.4	0.6											
	<i>Parapenaeus longirostris</i>				3.9	20.6	3.5								
	<i>Conger conger</i>							10.3	10.3						
	<i>Lophius budegassa</i>	1.2	1.2		1.2	7.5	8.1								

## MAREA MEDITERRANEAN HALIEUTIC RESOURCES EVALUATION AND ADVICE

Specific Contract no 10 - SEDAF: "Improved knowledge of the main socio-economic aspects related to the most important fisheries in the Adriatic Sea"

Table 7 – Landing in values of the main target demersal species exploited by fleet segments in each country/GSA.

		Sum of landing in values (euro)													
Country/GSA (Year)	Species	DRB_VL0612	DRB_VL1218	DTS_VL0612	DTS_VL1218	DTS_VL1824	DTS_VL2440	PGP_VL0006	PGP_VL0612	PGP_VL1218	TBB_VL1218	TBB_VL1824	TBB_VL2440		
Italy GSA 17 (2012)	<i>Chamelea gallina</i>	22,753	39,142,875												
	<i>Gastropoda</i>			149,629	172,500	881,202		1,276,295	4,860,461			356,676	184,244	2,073,150	
	<i>Squilla mantis</i>			1,057,897	6,725,680	3,364,245	418,009	2,768,075	7,002,284	15,509	81,316	291,936	751,020		
	<i>Sepia officinalis</i>			525,677	2,971,264	3,469,373	468,486	2,122,557	7,690,645			130,255	747,467	762,953	
	<i>Osteichthyes</i>			68,150	2,289,726	2,187,372	531,326	3,702,251	5,051,021	4,424		79,290	123,651		
	<i>Merluccius merluccius</i>			52,772	3,529,280	8,417,285	2,157,437								
	<i>Solea solea</i>			404,367	1,224,273	3,224,173		2,876,458	12,353,420	93,125	480,533	2,035,679	3,045,989		
	<i>Veneridae</i>		6,417,139						1,461,910						
	<i>Mullus barbatus</i>			172,240	2,533,359	2,557,549	758,872						84,657		
	<i>Merlangius merlangus</i>			67,363	1,794,355	1,384,705	69,764						118,004		
	<i>Nephrops norvegicus</i>				2,762,580	9,622,721	3,606,219								
		Sum of landing in values (euro)													
Country/GSA (Year)	Species	DFN_VL0006	DFN_VL0612	DFN_VL1218	DRB_VL0612	DRB_VL1218	DRB_VL1824	DRB_VL2440	DTS_VL0006	DTS_VL0612	DTS_VL1218	DTS_VL1824	DTS_VL2440	OTHER	
Croatia GSA 17 (2013)	<i>Merluccius merluccius</i>	12,516	55,541	1,376					700	427,647	1,215,235	768,461	751,206	217,410	
	<i>Mullus barbatus</i>						635		927	368,256	1,162,313	292,889	129,838	8,954	
	<i>Eledone spp</i>			5,749	7,870	28,446	4,610	19	448	481,250	747,936	71,866	63,331	32,539	
	<i>Parapenaeus longirostris</i>									47,229	263,342	517,473	631,627	0	
	<i>Nephrops norvegicus</i>									264,379	436,184	708,103	1,460,139	237,053	
	<i>Loliginidae, Ommastrephidae</i>									31,388	104,245	117,012	119,444	0	
	<i>Ostrea edulis</i>				72,645	95,230	19,523			18,457				38,035	
	<i>Sepia officinalis</i>	23,331	40,109	655	32,742	57,436	12,398	4	1,412	125,904	192,472			13,202	
	<i>Solea solea</i>	12,243	1,171,002	124,383	71,596	99,674	15,284	305						16,425	
	<i>Octopus vulgaris</i>	7,447	59,615							53,739				371,371	
	<i>Spicara smaris</i>	1,487	8,004						3,010	43,107				17,775	
		Sum of landing in values (euro)													
Country/GSA (Year)	Species	DFN_VL0006	DFN_VL0612	DFN_VL1218	DTS_VL0612	DTS_VL1218	FPO_VL0006	HOK_VL0006	HOK_VL0612						
Slovenia GSA 17 (2012)	<i>Merlangius merlangus</i>	3,968	13,585		46,779	194,323			202	226					
	<i>Eledone moschata</i>				30,790	75,608									
	<i>Pagellus erythrinus</i>	17,157	55,617	1,192	4,800	28,659			94	83					
	<i>Loligo vulgaris</i>				9,572	119,248	76			76					
	<i>Sepia officinalis</i>	2,295	3,651		3,303	53,813				83					
	<i>Sparus aurata</i>	23,613	65,196			18,202			925	10					
	<i>Solea solea</i>	34,628	86,454				21								
	<i>Mugilidae</i>	2,717	11,410			8,547				38					
	<i>Platichthys flesus</i>	4,575	9,270			5,860									
		<i>Trachurus trachurus</i>					8,450	24			24				
	<i>Liza aurata</i>	472	1,666			6,377									
		Sum of landing in values (euro)													
Country/GSA (Year)	Species	DRB_VL0612	DRB_VL1218	DTS_VL0612	DTS_VL1218	DTS_VL1824	DTS_VL2440	HOK_VL1218	PGP_VL0006	PGP_VL0612					
Italy GSA 18 (2012)	<i>Merluccius merluccius</i>			207,173	11,809,150	4,299,306	1,294,369	2,177,049	29,079	1,999,385					
	<i>Mullus barbatus</i>			1,905,951	7,295,214	929,340	198,408								
	<i>Chamelea gallina</i>	62,210	2,709,943												
	<i>Osteichthyes</i>			222,067	1,278,725	914,079	81,270		639,371	868,231					
	<i>Sepia officinalis</i>			338,990	3,185,799	1,087,457	205,599		451,119	1,422,275					
	<i>Squilla mantis</i>			291,345	1,519,999	332,790	60,468		87,538	124,495					
	<i>Ommastrephidae</i>				1,135,601	407,030	118,555								
	<i>Parapenaeus longirostris</i>				2,162,511	1,071,275	388,719								
	<i>Eledone moschata</i>			109,808	2,279,795	854,040	160,045								
	<i>Eledone cirrosa</i>			131,140	1,976,455	763,284	165,793								
	<i>Nephrops norvegicus</i>				3,065,829	3,494,121	1,071,350								

## 5. RANKING OF THE MOST IMPORTANT FLEET SEGMENTS

In order to select the fleet segments that will be further analyzed in the framework of WP2-4 of the present project a ranking of the fleet segment has been carried out for each country in each GSA on the basis of the landing weights and landing values (when available) reported in the framework of deliverable D3 for the most recent years. The fleets were selected for further analyses if the sum of their landing in weights and in values (when available) contribute up to 75% of the total production of the country in weights and in values, demersal and small pelagic fleet were considered separately. The list of the fleet segment selected for each country and GSA has been summarized in table 8. Moreover, in tables 9 and 10 the rankings are summarized of the ten most important species in terms of landed weights and values (when available) in the most recent years available for the fleet segments listed in table 8. Calculations contained in this paragraph are made based on the information available at the date of 30<sup>th</sup> September 2014.

### 5.1 Small pelagics fisheries

According to the data collected under deliverable D3 the Italian small pelagic fleet operating in GSA 17 in 2012 was mainly represented by the following fleet segments: **TM\_VL2440**, **TM\_VL1824** and **TM\_VL1218**; accounting for 90% and 84% of the total landing in weights and in values reported for the entire small pelagic fleet of Italy in GSA17 (Fig. 9).

The Croatian small pelagic fleet operating in GSA 17 in 2011 was mainly represented by the following fleet segments: **PS\_VL2440** and **PS\_VL1824**; accounting for 84% of the total landing in weights reported for the entire small pelagic fleet of Croatia in GSA17 (Fig. 9).

The Slovenian small pelagic fleet operating in GSA 17 in 2012 was mainly represented by the following fleet segment: **PS\_VL1218**; representing almost the entire landing in weights and in values reported for the whole small pelagic fleet of Slovenia in GSA17 (Fig. 9).

The Italian small pelagic fleet operating in GSA 18 in 2012 was mainly represented by the following fleet segment: **TM\_VL2440**; representing more than 77% of the landing in weights and in values reported for the whole small pelagic fleet of Italy in GSA18 (Fig. 9).

The Montenegrin small pelagic fleet operating in GSA 18 in 2013 was mainly represented by the following fleet segments: **PS\_VL0612**, **SB\_VL0006** and **SB\_VL0612**; accounting for more than 80% of the total landing in weights reported for the entire small pelagic fleet of Montenegro in GSA18 (Fig. 9).

The Albanian small pelagic fleet operating in GSA 18 in 2013 was represented only by the fleet segment **PS\_VL1218**.



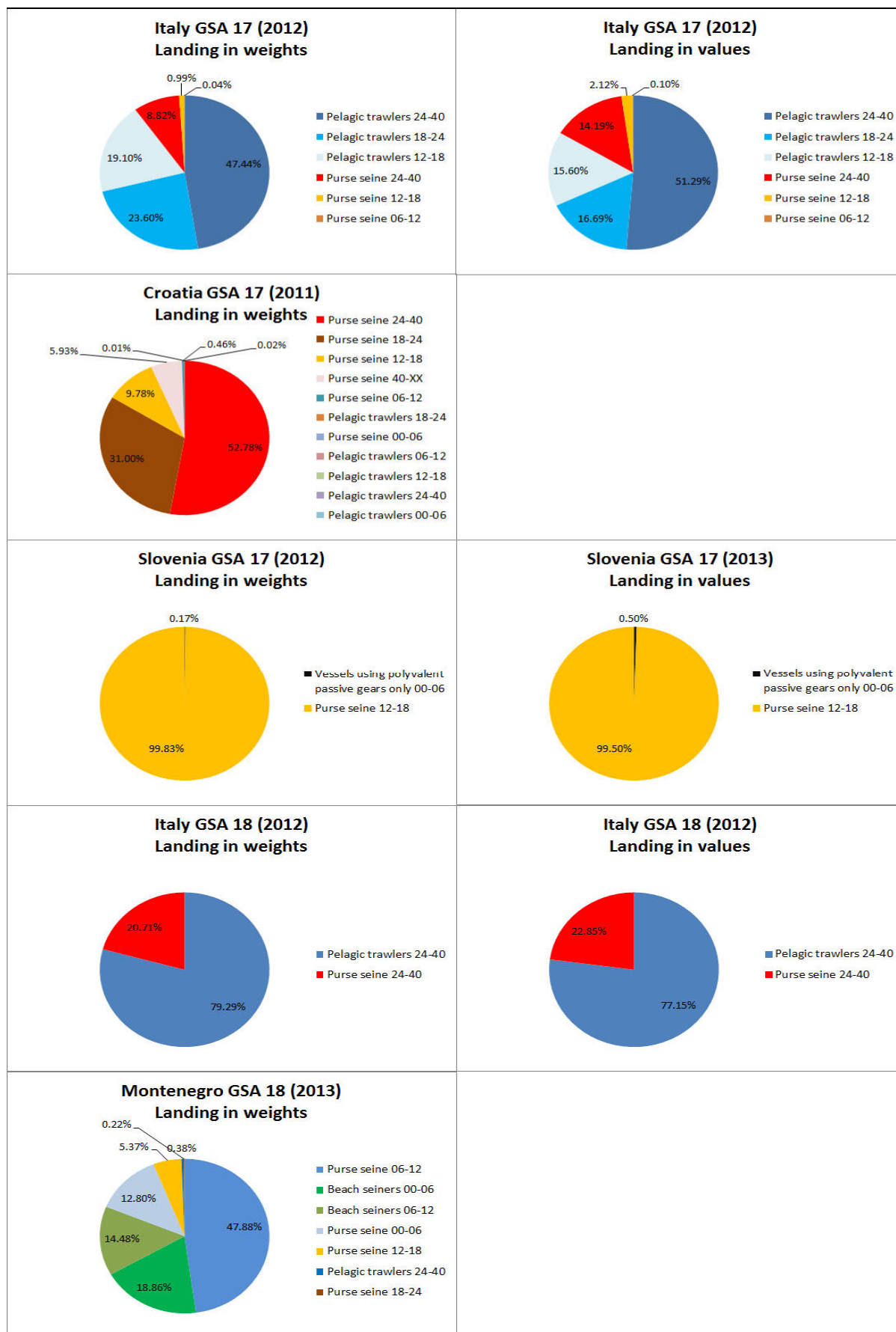


Fig. 9 – Percentages of landing in weights and values of the small pelagic fleet in each country/GSA.



## 5.2 Demersal fisheries

According to the data collected under deliverable D3 the Italian demersal fleet operating in GSA 17 in 2012 was mainly represented by the following fleet segments: **DRB\_VL1218**, **DTS\_VL1824**, **PGP\_VL0612** and **DTS\_VL1218**; accounting for 84% and 80% of the total landing in weights and in values reported for the entire demersal fleet of Italy in GSA17 (Fig. 10).

The Croatian demersal fleet operating in GSA 17 in 2013 was mainly represented by the following fleet segments: **DTS\_VL1218**, **DTS\_VL0612**, **DTS\_VL1824**, **DTS\_VL2440** and **DFN\_VL0612**; accounting for 82% and 80% of the total landing in weights and in values reported for the entire demersal fleet of Croatia in GSA17 (Fig. 10).

The Slovenian demersal fleet operating in GSA 17 in 2012 was mainly represented by the following fleet segments: **DTS\_VL1218** and **DFN\_VL0612**; accounting for 85% and 79% of the total landing in weights and in values reported for the entire demersal fleet of Slovenia in GSA17 (Fig. 10).

The Italian demersal fleet operating in GSA 18 in 2012 was mainly represented by the following fleet segments: **DTS\_VL1218**, **DTS\_VL1824** and **PGP\_VL0612**; accounting for 77% and 79% of the total landing in weights and in values reported for the entire demersal fleet of Italy in GSA18 (Fig. 10).

The Montenegrin demersal fleet operating in GSA 18 in 2013 was mainly represented by the following fleet segments: **DTS\_VL1218**; **DFN\_VL0006**; **DFN\_VL0612**; **DTS\_VL0612**; accounting for 79% of the total landing in weights reported for the entire demersal fleet of Montenegro in GSA18 (Fig. 10).

The Albanian demersal fleet operating in GSA 18 in 2013 was mainly represented by the following fleet segments: **DTS\_VL1224**, **DTS\_VL2440** and **PGP\_VL0612** ; accounting for more than 90% of the total landing in weights and in values reported for the entire demersal fleet of Albania in GSA18 (Fig. 10).

Table 8 – Selected fleet segments for each country/GSA and fishery

Country/GSA (Year)	Fishery	Fleet segments selected
Italy GSA 17 (2012)	Small pelagics	TM_VL2440; TM_VL1824; TM_VL1218
Croatia GSA 17 (2011)	Small pelagics	PS_VL2440; PS_VL1824
Slovenia GSA 17 (2012)	Small pelagics	PS_VL1218
Italy GSA 18 (2012)	Small pelagics	TM_VL2440
Montenegro GSA 18 (2013)	Small pelagics	PS_VL0612; SB_VL0006; SB_VL0612
Albania GSA 18 (2013)	Small pelagics	PS_VL1218
Italy GSA 17 (2012)	Demersal	DRB_VL1218; DTS_VL1824; PGP_VL0612; DTS_VL1218
Croatia GSA 17 (2013)	Demersal	DTS_VL1218; DTS_VL0612; DTS_VL1824; DTS_VL2440; DFN_VL0612
Slovenia GSA 17 (2012)	Demersal	DTS_VL1218; DFN_VL0612
Italy GSA 18 (2012)	Demersal	DTS_VL1218; DTS_VL1824; PGP_VL0612
Montenegro GSA 18 (2013)	Demersal	DTS_VL1218; DFN_VL0006; DFN_VL0612; DTS_VL0612
Albania GSA 18 (2013)	Demersal	DTS_VL1224; DTS_VL2440; PGP_VL0612

Table 9 – Ranking of the ten most important species by country/GSA and fleet segment exploited by the small pelagics fleet of the Adriatic Sea. \* = Data not available by species.

Landing in weights		Italy GSA 17 (2012)			Croatia GSA 17 (2011)		Slovenia GSA 17 (2012)	Italy GSA 18 (2012)	Montenegro GSA 18 (2013)			Albania GSA 18 (2013)
Ranking		TM_VL2440	TM_VL1824	TM_VL1218	PS_VL2440	PS_VL1824	PS_VL1218	TM_VL2440	PS_VL0612	SB_VL0006X	SB_VL0612	PS_VL1218
1°	ANE	PIL	ANE		ANE, PIL	ANE, PIL	ANE, MUL, PIL, MGA*	ANE	PIL	PIL	PIL	PIL, ANE, MAC*
2°	MUL	ANE	PIL					PIL	ANE	ANE	ANE	
3°	PIL	MUL	MUL					HOM	BOG	SAA	BOG	
4°								MAS	MAS	BLT	BON	
5°									HOM	BON	MAC	
6°									MAC	AHH	MAS	
7°									SAA	AMB	HOM	
8°										SBS	AMB	
9°										BOG	AHH	
10°										MUF		

Landing in values		Italy GSA 17 (2012)			Croatia GSA 17 (2011)		Slovenia GSA 17 (2012)	Italy GSA 18 (2012)	Montenegro GSA 18 (2013)			Albania GSA 18 (2013)
Ranking		TM_VL2440	TM_VL1824	TM_VL1218	PS_VL2440	PS_VL1824	PS_VL1218	TM_VL2440	PS_VL0612	SB_VL0006X	SB_VL0612	PS_VL1218
1°	ANE	PIL	ANE		ANE, PIL	ANE, PIL	ANE, MUL, PIL, MGA*	ANE				PIL, ANE, MAC*
2°	PIL	ANE	PIL					PIL				
3°	MUL	MUL	MUL					HOM				
4°								MAS				

Table 10 – Ranking of the ten most important species by country/GSA and fleet segment exploited by the demersal fleet of the Adriatic Sea. N.B.: Albanian data were not available by fleet segment.

Landing in weights		Italy GSA 17 (2012)				Croatia GSA 17 (2011)				Slovenia GSA 17 (2012)		Italy GSA 18 (2012)				Montenegro GSA 18 (2013)			
Ranking		DRB_VL1218	DTS_VL1824	PGP_VL0612	DTS_VL1218	DTS_VL1218	DTS_VL0612	DTS_VL1824	DTS_VL2440	DFN_VL0612	DTS_VL1218	DFN_VL0612	DTS_VL1218	DTS_VL1824	PGP_VL0612	DTS_VL1218	DFN_VL0006	DFN_VL0612	DTS_VL0612
1°	SVE	HKE	GAS	MTS		MUT	MUT	HKE	HKE	SOL	WHG	PAC	HKE	HKE	HKE	HKE	BON	BON	HKE
2°	CLV	CTC	CTC	WHG		HKE	HKE	MUT	NEP	HKE	EDT	SOL	MUT	MZZ	OCC	MUT	PAC	PAC	MUT
3°		MTS	MTS	MUT		OCM	OCM	DPS	DPS	CTC	SQR	SBG	MTS	MUT	CTC	DPS	AMB	AMB	DPS
4°		GAS	MZZ	HKE		SQU	SPC	SQU	SCR		CTC	MUL	OMZ	NEP	MZZ	ANK	MAS	MAS	ANK
5°		MUT	SOL	CTC		DPS	CTC	NEP	MUT	SBG	PAC	WHG	EDT	DPS	GUU	OCC	GUU	GUU	JRS
6°		WHG	SIL	MZZ		CTC	BOG	JAX	OCM	OCC	HOM	GUU	CTC	EDT	COE	SQR	SLM	SLM	SQR
7°		NEP	MUL	OMZ		GRO	GRO	OCM	MNZ	RSE	MUL	FLE	EOI	OMZ	MUL	CTC	PIL	MUL	OCC
8°		OMZ	CLV	EDT		WHG	SQU	MNZ	JAX	SPC	MUT	SLM	DPS	EOI	MUR	EOI	MUL	PIL	EOI
9°		EDT	MOL	HOM		NEP	WHB	WHG	LEZ	GRO	MGA	MAC	BOG	MON	MTS		BLT	BLT	BOG
10°		MZZ	GPA	NEP		MNZ	NEP	LEZ	GUX	SLM	BPI	SSB	MON	CTC	SRG		CTC	HKE	

Landing in values		Italy GSA 17 (2012)				Croatia GSA 17 (2011)				Slovenia GSA 17 (2012)		Italy GSA 18 (2012)				Montenegro GSA 18 (2013)			
Ranking		DRB_VL1218	DTS_VL1824	PGP_VL0612	DTS_VL1218	DTS_VL1218	DTS_VL0612	DTS_VL1824	DTS_VL2440	DFN_VL0612	DTS_VL1218	DFN_VL0612	DTS_VL1218	DTS_VL1824	PGP_VL0612	DTS_VL1218	DFN_VL0006	DFN_VL0612	DTS_VL0612
1°	SVE	NEP	SOL	MTS		HKE	OCM	HKE	NEP	SOL	WHG	SOL	HKE	HKE	HKE				
2°	CLV	HKE	CTC	HKE		MUT	HKE	NEP	HKE	RSE	SQR	SBG	MUT	NEP	CTC				
3°		CTC	MTS	CTC		OCM	MUT	DPS	DPS	SBG	EDT	PAC	CTC	CTC	OCC				
4°		MTS	MZZ	NEP		NEP	NEP	MUT	MNZ	TUR	CTC	GUU	NEP	DPS	MZZ				
5°		SOL	GAS	MUT		DPS	CTC	MNZ	MUT	SLO	PAC	BSS	EDT	MUT	GUU				
6°		MUT	SIL	MZZ		SQR	SQR	SQU	SQU	OCC	SBG	TUR	DPS	MZZ	SRG				
7°		TGS	BSS	TGS		CTC	OCC	OCM	OCM	DEC	BPI	WHG	MON	MON	MUR				
8°		MZZ	CLV	SQR		MNZ	DPS	LEZ	LEZ	HKE	MUT	SSB	EOI	EDT	PAC				
9°		OMZ	SBG	WHG		SQU	SPC	JAX	GUX	SCR	MUL	MUL	SQR	EOI	MTS				
10°		MON	SSB	OMZ		SKA	SKA	WHG	JAX	CTC	HOM	MAC	MTS	TGS	SBG				

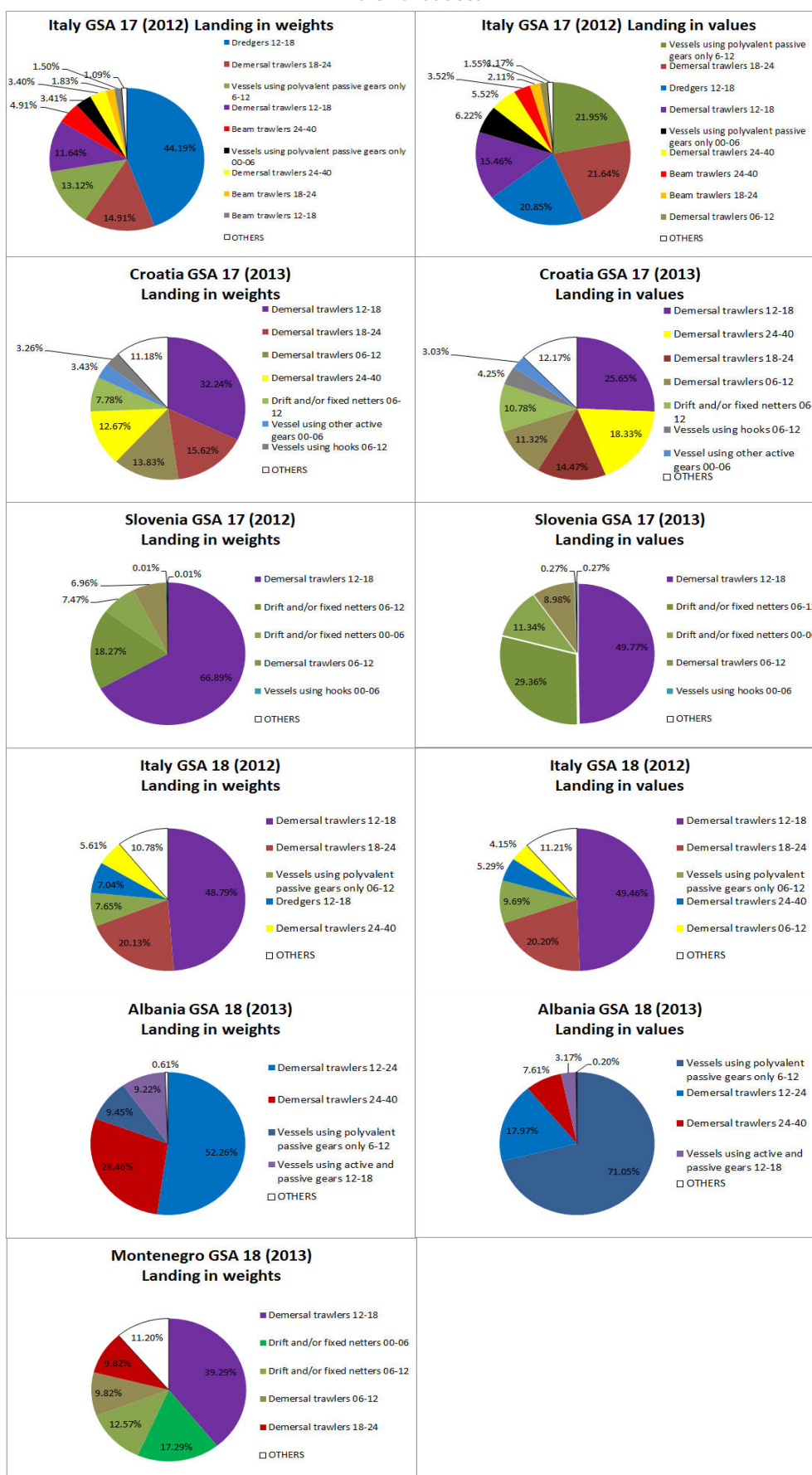


Fig. 10 – Percentages of landing in weights and values of the demersal fleet in each country/GSA.

## 6. ANALYSIS ON SHARED STOCKS

According to the SAC Glossary the “shared stocks” are the “Stocks fished by two or more countries”. In the Adriatic Sea, despite the fact that the relevance of shared fishery resources is widely recognised, the list of priority shared fishery stocks would require a more deeper examination both in terms of consistency and homogeneity. In this area, the recognition of the shared-stock status of the priority species was proposed to the national management authorities of Albania, Croatia, Italy Montenegro and Slovenia and then endorsed at the 28<sup>th</sup> Session of the GFCM in 2003 (FAO, 2003, Table 11). Following, GFCM has preliminary identified some critical areas where stock of main commercial species are considered as shared amongst EU or/and not EU countries (FAO, 2006), the Adriatic stocks are listed in table 12.

Some of the Adriatic species listed in table 12 have been analysed in the past years on the basis of a research programmes carried out in the framework of the AdriaMed Project (financed in parallel by FAO-AdriaMed and by the Italian Ministry of Agriculture and Forestry Policies), aimed at exploring the genetic population units by using a DNA molecular markers (Guarniero et al., 2004). The sampling and genetic methodologies adopted were standardised as much as possible for all species by the use of MEDITS and SoleMon samplings and microsatellite marker analyses (AdriaMed, 2013). *Sardina pilchardus*, *Engraulis encrasicolus*, *Merluccius merluccius*, *M. barbatus*, *Pagellus erythrinus*, *Sepia officinalis*, *Loligo vulgaris*, *Eledone cirrhosa*, *Eledone moschata*, *Parapenaeus longirostris* and *Nephrops norvegicus* highlighted high levels of genetic homogeneity in the Adriatic clearly suggesting the occurrence of single population (Tinti et al., 2002; Garoia et al., 2004a; 2004b; Guarniero et al., 2003; Guarniero et al., 2004). Low genetic polymorphism and weak genetic divergences were occasionally found, probably related to specific bio-ecological and behavioural features. *Solea solea*, studied in the framework of SoleDiff project (AdriaMed, 2013), showed a certain divergence within the Adriatic Sea with a low but significant differentiation between central-north and south, with a longitudinal strong gene flow in central-northern side (Marcone, 2012). The study also confirmed what was observed by Guarniero et al. (2002). This study, taking into account differences in the control region sequence marker of sole specimens from five areas of the central Mediterranean, suggested that two near-panmictic populations of common sole could exist in the Adriatic Sea. The former population would inhabit the entire GSA 17 (northern Adriatic Sea). The latter unit seems to be spread along the Montenegro-Albanian coasts (eastern part of the GSA 18). The hydrogeographical features of this

semi-enclosed basin might support the overall pattern of differentiation of the Adriatic common sole populations.

*Lophius budegassa* appeared to be genetically heterogeneous in the area (Garoia et al., 2003; Guarniero et al., 2004).

Table 11 - Relevant common species whose stocks are shared by at least two Adriatic countries.

Species	Area of Occurrence			Stockmed results
Adriatic Sea basins	Northern Adriatic	Central Adriatic	Southern Adriatic	
Geographical Sub-area	17		18	
<i>Eledone cirrhosa</i>		●	●	
<i>Eledone moschata</i>	●	●	○	
<i>Loligo vulgaris</i>	●	●	●	
<i>Lophius budegassa</i>	○	●	●	
<i>Lophius piscatorius</i>		●	●	
<i>Merlangus merlangus</i>	●	○		
<i>Merluccius merluccius</i>	●	●	●	∞
<i>Mullus barbatus</i>	●	●	●	∞
<i>Nephrops norvegicus</i>	●	●	●	∞
<i>Pagellus erythrinus</i>	●	●	●	≠
<i>Parapeneus longirostris</i>		○	●	≠
<i>Sepia officinalis</i>	●	●	●	
<i>Solea vulgaris</i>	●	●	○	≠
<i>Engraulis encrasicolus</i>	●	●	●	∞
<i>Sardina pilchardus</i>	●	●	●	
<i>Sprattus sprattus</i>	●	○		
<i>Scomber scomber</i>	●	●	●	

●: common occurrence; ○: scarce; blank: negligible; ∞ identified as shared in STOCKMED project; ≠ identified as different In STOCKMED.

In the present report the fleet segments of the five countries involved in the project and currently sharing the stocks listed in table 12, have been further analysed with a multivariate approach taking into account their landing in weights by species. The fleet segments showing a similar landing composition in term of species, named as mix fleets, have been further investigated in order identify the species influencing more such similarities, such species could be considered as potential shared stocks.

Unfortunately due the unavailability of landing in weights by fleet segment for Albania demersal fisheries it was not possible to carry out such analysis and qualitative analyses based on the data available, aiming at defining the potential shared demersal stocks in GSA 18, has been carried out. However in the framework of WP4 it was possible to perform the analyses carried out using BEMTOOL, because the data on assessed species (*M. merluccius*, *P. longirostris*, *M. barbatus* and *N. norvegicus*) were available by fleet segment.

Table 12 -SAC shared stocks list of Adriatic countries (FAO, 2006) (green and pink colours indicates stocks identified respectively as shared or separated in the STOCKMED project)

English common name	Scientific name	Countries
Anchovy	<i>Engraulis encrasicolus</i>	Albania, Croatia, Italy, Slovenia and Montenegro
Sardine	<i>Sardina pilchardus</i>	Albania, Croatia, Italy, Slovenia and Montenegro
Atlantic mackerel	<i>Scomber scomber</i>	Albania, Croatia, Italy, Slovenia and Montenegro
Sprat	<i>Sprattus sprattus</i>	Croatia, Italy, Slovenia
Horned octopus	<i>Eledone cirrhosa</i>	Albania, Croatia, Italy, Montenegro
Musky octopus	<i>Eledone moschata</i>	Albania, Croatia, Italy, Slovenia and Montenegro
European squid	<i>Loligo vulgaris</i>	Albania, Croatia, Italy, Slovenia and Montenegro
Blackbellied angler	<i>Lophius budegassa</i>	Albania, Croatia, Italy, Slovenia and Montenegro
Monkfish or angler	<i>Lophius piscatorius</i>	Albania, Croatia, Italy, Slovenia and Montenegro
Hake	<i>Merluccius merluccius</i>	Albania, Croatia, Italy, Slovenia and Montenegro
Blue whiting	<i>Micromesistius poutassou</i>	Albania, Croatia, Italy, Slovenia and Montenegro
Red mullet	<i>Mullus barbatus</i>	Albania, Croatia, Italy, Slovenia and Montenegro
Norway lobster	<i>Nephrops norvegicus</i>	Albania, Croatia, Italy, Slovenia and Montenegro
Common pandora	<i>Pagellus erythrinus</i>	Albania, Croatia, Italy, Slovenia and Montenegro
Deepwater rose shrimp	<i>Parapenaeus longirostris</i>	Albania, Croatia, Italy, Slovenia and Montenegro
Common cuttlefish	<i>Sepia officinalis</i>	Albania, Croatia, Italy, Slovenia and Montenegro
Common sole	<i>Solea vulgaris</i>	Albania, Croatia, Italy, Slovenia and Montenegro

The multivariate analyses were performed using PRIMER ecological software package developed by the Plymouth Marine Laboratory (Clarke, 1993; Clarke and Warwick, 2001). Prior to any analysis, the landings data by species (variables) were log-transformed to reduce the contribution of prevalent taxa and therefore increase the importance of sporadic species. The Italian and Croatian dredges were also excluded from the fleet segments analysed (samples) due to the peculiar composition of their catches represented only by few species. Afterwards, species contributing at least 10% of the total landing in weights were selected and the Gower excluding 0-0 similarity matrix was calculated. Gower coefficient is well-suited for quantitative data excluding double-zeroes from comparison (Legendre and Legendre, 1998). The unconstrained Principal Coordinates (PCO) plot was used to outline the matrix data. Moreover, a cluster analysis was also performed in order to define the group of fleet segments belonging to different countries showing a similar pattern of the catches. The group identified were further analysed by a multivariate multiple permutations test (SIMPER, Similarity Percentages, PRIMER; Clarke 1993), used to determine the species which were responsible for its similarity.

## 6.1 Small pelagics fisheries GSA 17

PCO plot (74.9% of total variation) in figure 11 well visualized the similarities among the various fleet segments evidencing an assemblage of 9 fleet segments grouped together by the



cluster analysis (named as mix fleets) showing a similar pattern of landing in weights by taxa. The fleet segments of such group are listed in table 13 together with the results of the simpler analysis, which evidences a similarity within the group of 50% and 3 taxa contributing to it, representing potential shared resources.

The potential small pelagics shared stocks evidenced by the multivariate analysis are anchovies and sardines, targeted usually by the small pelagics fleets, followed by the mixed category of Mugilidae. The first two species are also present in the list of shared stocks of GSA 17 reported in table 12. The analysis does not select the other shared small pelagics stocks listed in table 12 (*Sprattus sprattus* and *Scomber scomber*) mainly because of their low occurrence in the landings.

The cluster of fleets exploiting the stocks evidenced by the multivariate analyses are 9 (2 Croatian, 6 Italian and 1 Slovenian). It is important to mention that the Croatian purse seines, not included in the previous cluster, very likely exploit the same stocks but are characterized by different combination of species in the landings.

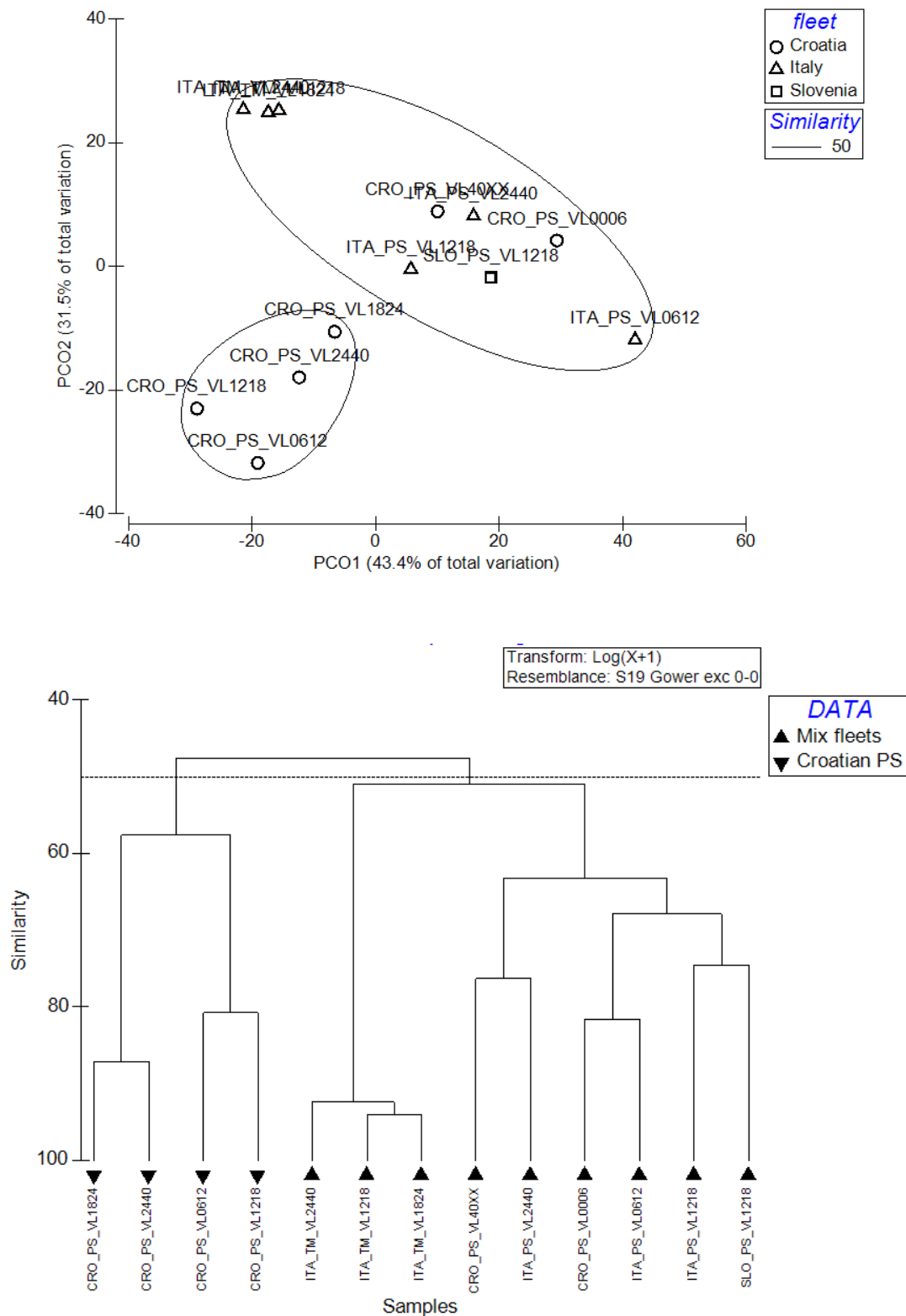


Fig. 11 – PCO ordination plot and dendrogram of the cluster analysis carried out for the small pelagics fleets operating in GSA 17 on the values of landing in weights by species.



Table 13 – Results of the Simper analysis carried out on the mix fleets group identified by the cluster analysis for small pelagic fisheries in GSA17.

Fleet segments of mix fleets group	Simper Analysis on mix fleets group					
	Taxa	Av.Abund	Av.Sim	Sim/SD	Contrib %	Cum. %
CRO_PS_VL0006	ANE	6.46	24.31	3.25	45.51	45.51
CRO_PS_VL40XX	PIL	6.01	20.57	2.70	38.51	84.02
ITA_PS_VL0612	MUL	3.60	8.06	0.80	15.09	99.11
ITA_PS_VL1218						
ITA_PS_VL2440						
ITA_TM_VL1218						
ITA_TM_VL1824						
ITA_TM_VL2440						
SLO_PS_VL1218						

## 6.2 Demersal fisheries GSA 17

PCO plot (53.6 % of total variation) in figure 12 well visualized the similarities among the various fleet segments evidencing an assemblage of 26 fleet segments grouped together by the cluster analysis (named as mix fleets) showing a similar pattern of landing in weights by taxa. The fleet segments of such group are listed in table 13 together with the results of the simper analysis, which evidences a similarity within the group of 73% and 16 taxa contributing to it, representing potential shared resources.

The list of potential demersal shared stocks evidenced by the multivariate analysis is in general agreement with the list of shared demersal stocks of the northern sector of GSA 17 listed in table 12. Furthermore the present analysis selects four species (*Spicara smaris*, *Squilla mantis*, *Conger conger* and *Octopus vulgaris*) that were absent from the list of shared stocks in table 12.

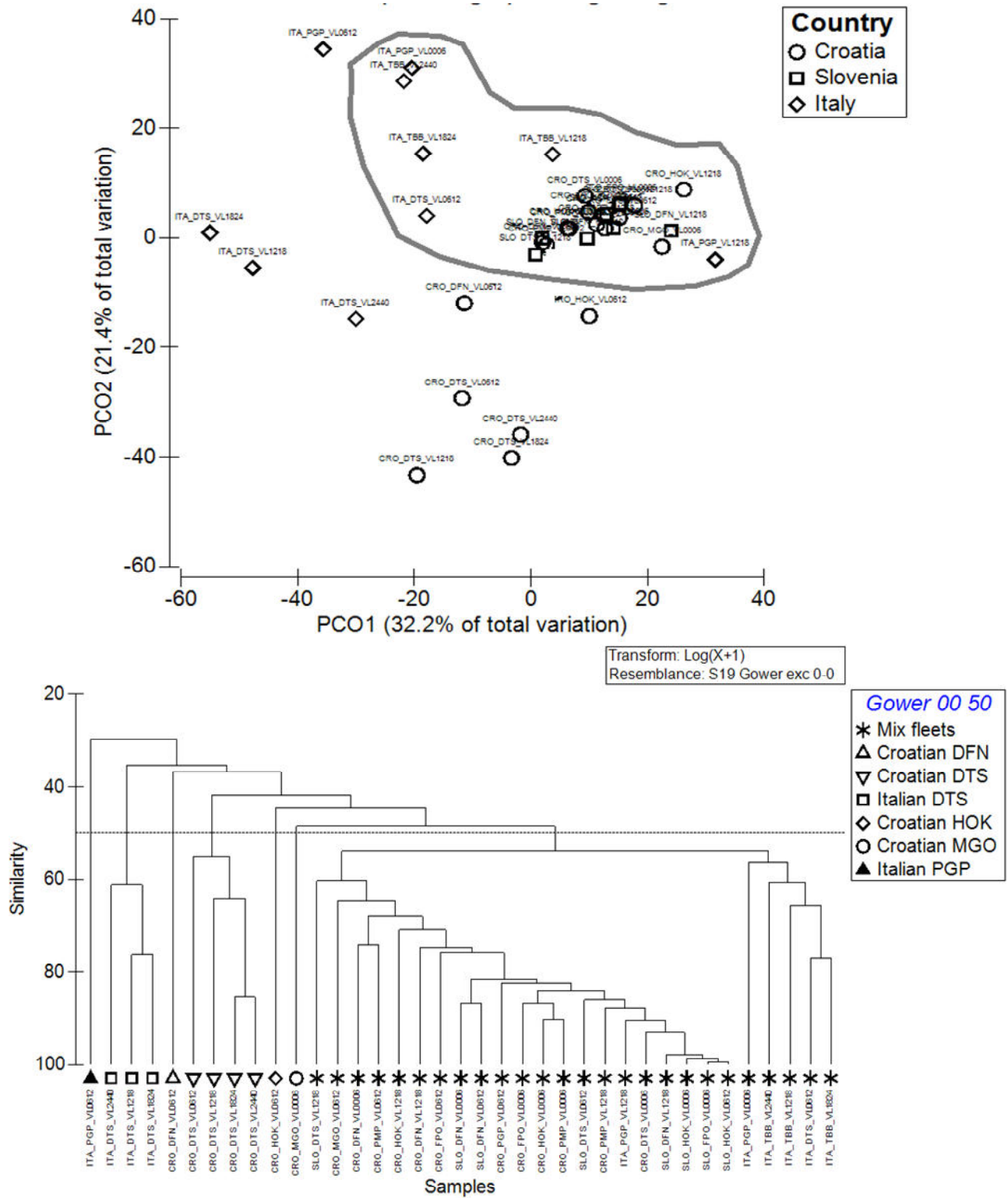


Fig. 12 – PCO ordination plot and dendrogram of the cluster analysis carried out for the demersal fleets operating in GSA 17 (excluding dredges) on the values of landing in weights by species.

The species that are absent in the list of potential shared stock of the present analysis and are present in table 12 are *L. budegassa*, *Lophius piscatorius*, *Micromesistius poutassou* and *N. norvegicus*. Such discrepancy is probably do to the fact that the landings of these species are quite low in Slovenia due the their low occurrence in the fishing grounds exploited by the Slovenian demersal fleet.

The cluster of fleets exploiting the stocks evidenced by the multivariate analyses are 26 (12 Croatian, 6 Italian and 8 Slovenian). It is important to mention that the other fleets not included in the previous cluster likely exploit the same stocks but are characterized by different combination of species in the landings.

Table 13 – Results of the Simper analysis carried out on the mix fleets group identified by the cluster analysis for demersal fisheries in GSA17.

<b>Fleet segments of mix fleets group</b>	<b>Simper Analysis on mix fleets group</b>					
	<b>Taxa</b>	<b>Av.Abund</b>	<b>Av.Sim</b>	<b>Sim/SD</b>	<b>Contrib%</b>	<b>Cum.%</b>
CRO_DFN_VL0006	CTC	1.25	1.73	0.60	13.47	13.47
CRO_DFN_VL1218	SOL	1.25	1.68	0.37	13.04	26.52
SLO_DFN_VL0006	OCC	0.54	1.07	0.28	8.34	34.86
SLO_DFN_VL0612	HKE	0.45	1.06	0.39	8.23	43.09
SLO_DFN_VL1218	SQR	0.48	1.02	0.44	7.96	51.05
CRO_DTS_VL0006	COE	0.30	0.69	0.31	5.40	56.45
ITA_DTS_VL0612	MUL	0.52	0.69	0.35	5.33	61.78
SLO_DTS_VL0612	PAC	0.33	0.62	0.35	4.86	66.64
SLO_DTS_VL1218	SBG	0.35	0.59	0.31	4.61	71.25
CRO_FPO_VL0006	WHG	0.64	0.59	0.25	4.56	75.81
CRO_FPO_VL0612	MTS	0.87	0.45	0.22	3.47	79.28
SLO_FPO_VL0006	EDT	0.67	0.43	0.22	3.34	82.62
CRO_HOK_VL0006	GAS	0.99	0.41	0.17	3.15	85.77
CRO_HOK_VL1218	MUT	0.45	0.28	0.23	2.16	87.93
SLO_HOK_VL0006	SPC	0.32	0.21	0.15	1.63	89.56
SLO_HOK_VL0612	MZZ	0.62	0.20	0.17	1.56	91.12
CRO_MGO_VL0612						
CRO_PGP_VL0612						
ITA_PGP_VL0006						
ITA_PGP_VL1218						
CRO_PMP_VL0006						
CRO_PMP_VL0612						
CRO_PMP_VL1218						
ITA_TBB_VL1218						
ITA_TBB_VL1824						
ITA_TBB_VL2440						

### 6.3 Small pelagics fisheries GSA 18

PCO plot (77.2 % of total variation) in figure 13 well visualized the similarities among the various fleet segments evidencing an assemblage of 9 fleet segments grouped together by the

cluster analysis (named as mix fleets) showing a similar pattern of landing in weights by taxa. The fleet segments of such group are listed in table 14 together with the results of the simpler analysis, which evidences a similarity within the group of 35% and 5 taxa contributing to it, representing potential shared resources.

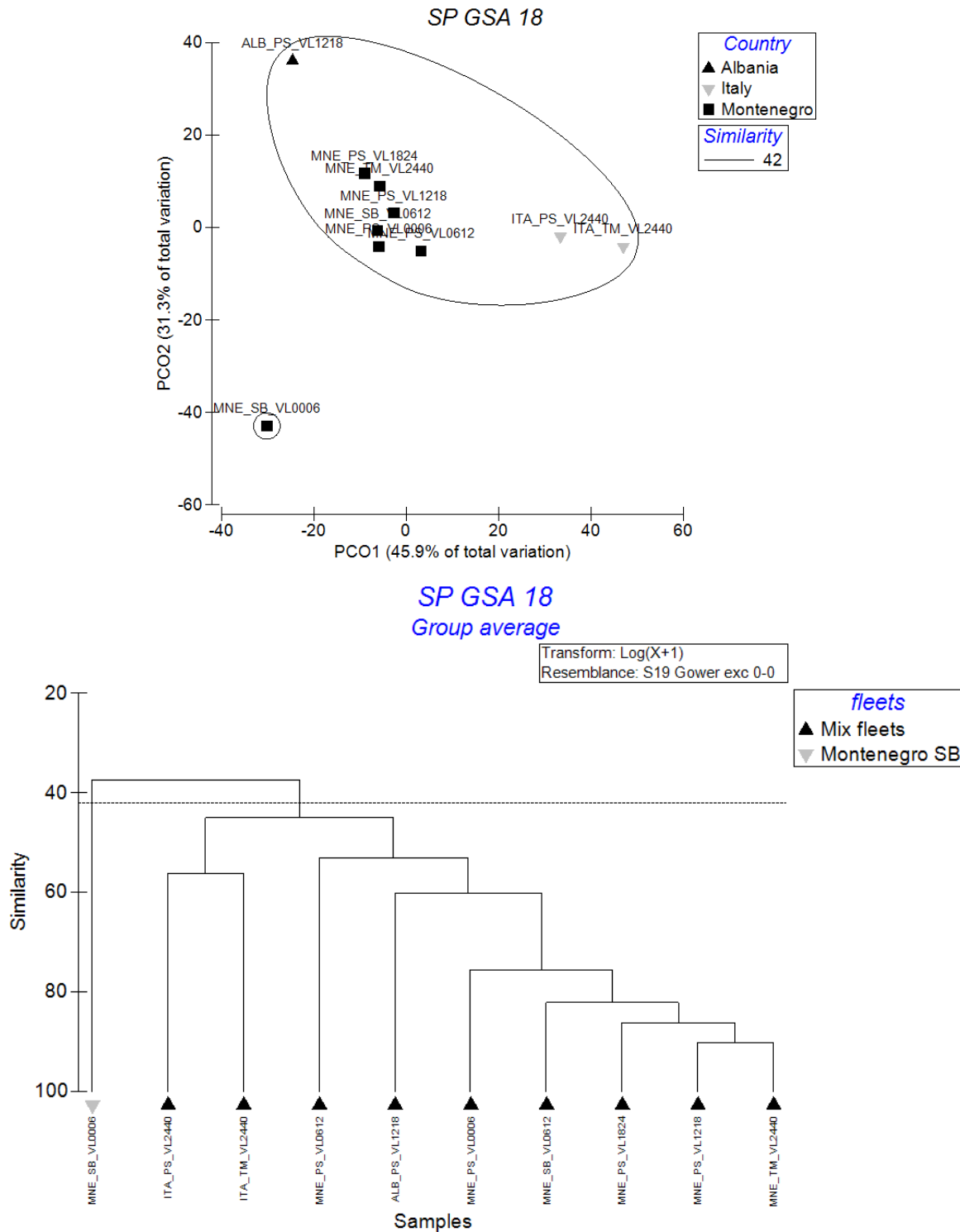


Fig. 13 – PCO ordination plot and dendrogram of the cluster analysis carried out for the small pelagics

fleets operating in GSA 18 on the values of landing in weights by species.

The potential small pelagics shared stocks evidenced by the multivariate analysis are anchovies and sardines, targeted usually by the small pelagics fleets, followed by *Scomber japonicus*, *S. scomber* and *T. trachurus*. It is important to evidence that of the five species outlined by the analyses two (*S. japonicus* and *T. trachurus*) are not present in the list of table 12.

The cluster of fleets exploiting the stocks evidenced by the multivariate analyses are 9 (2 Italian, 6 Montenegro and 1 Albanian). It is important to mention that the small beach seines of Montenegro (MNE\_SB\_VL0006) are not included in the previous cluster, mainly because target also *Boops boops* and *Sardinella aurita*.

Table 14 – Results of the Simper analysis carried out on the mix fleets group identified by the cluster analysis for small pelagic fisheries in GSA18.

Fleet segments of mix fleets group	Simper Analysis on mix fleets group					
	Taxa	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
ALB_PS_VL1218						
ITA_PS_VL2440	PIL	2.80	13.98	1.62	39.73	39.73
ITA_TM_VL2440	ANE	2.82	11.44	1.46	32.50	72.23
MNE_PS_VL0006	MAS	1.50	2.90	0.58	8.24	80.48
MNE_PS_VL0612	MAC	0.84	2.54	0.62	7.23	87.70
MNE_PS_VL1218	HOM	1.04	1.99	0.61	5.65	93.35
MNE_PS_VL1824						
MNE_SB_VL0612						
MNE_TM_VL2440						

#### 6.4 Demersal fisheries GSA 18

Due to the lack of data by fleet segment for Albania was not possible to carry out the same multivariate analyses. However in the framework of WP4 it was possible to perform the analyses carried out using BEMTOOL, because the data on assessed species were available by fleet segment. The information available from outcomes of the AdriaMed publication presented at the GFCM-SAC Sub Committee on Stock Assessment in 2008 (AdriaMed, 2008) have been used to carry out a qualitative examination of the potential shared stocks.

In the AdriaMed (2008) publication the demersal species considered as “fully shared” among Italy, Montenegro and Albania were *E. cirrhosa*, *L. vulgaris*, *M. merluccius*, *N. norvegicus* and *P. longirostris*. The demersal species considered as “partly shared” between Albania and Montenegro, taking in to consideration their bio-ecological behaviour, were *E. moschata*, *M. barbatus*, *P. erythrinus*, *S. officinalis* and *S. solea*.

In table 15 the ranking of the ten most important demersal species is reported coming from the data available in the framework of Deliverable 3 in the three countries. The rankings confirm that most of the species considered in AdriaMed (2008) publication are exploited by the demersal fleets of the three countries.

Table 15 – Ranking of the most important demersal species by county in GSA 18.

	<b>Italy (GSA 18)</b>	<b>Albania</b>	<b>Montenegro</b>
1°	HKE	HKE	HKE
2°	MUT	MUT	MUT
3°	SVE	TGS	DPS
4°	CTC	OCC	ANK
5°	MTS	DEC	OCC
6°	OMZ	BOG	SQR
7°	DPS	CTC	CTC
8°	EDT	SOL	EOI
9°	EOI	SQC	BOG
10°	NEP	SBG	GUG

## 7. CONCLUSIONS

The present deliverable has synthesized the information collected in the framework of WP1 and selected the most important fleet segments to be further analysed in the framework of WP2. In particular 32 fleet segments (11 targeting small pelagics and 21 targeting demersal species) have been selected on the base of the ranking carried out by landing in weights and in values for each country involved in the project. Moreover in the present report a synthesis of the Adriatic small pelagics and demersal fisheries is presented both in term of capacity and production. A comprehensive section with the spatial patterns of fishing ground and national legislation regarding temporal and spatial trawl restrictions in each country is also presented and discussed. One of the objective of the present deliverable was to further analyse the available data in order to identify the fisheries focusing on the shared stocks. In particular the multivariate approach used in the present report evidence the presence in GSA 17 of two main clusters of fleets, targeting respectively small pelagics and demersal species which exploit a certain number of potential shared stocks. Similar results have been evidenced for the small pelagic fisheries in GSA 18.

The results of the analyses evidencing the potential shared stocks in the area are in general agreement with the results of the approach used in StockMed project, which relies on an explicit spatial formulation and the inclusion of expert judgment using a combination of Geographic Information systems (GIS) and Multi-Criteria Analysis (MCA). Moreover scientific evidences summarized in the framework of Mediseh project in terms of nurseries and spawning grounds spatial patterns of the most important commercial target species support the outcomes of the present deliverable. As a matter of fact the main fishing grounds reported in figures 2 and 4 show a certain level of overlap with the spatial distribution of species analysed both in the framework of StockMed and Mediseh project.



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**ANNEX I – FLEET SEGMENT CODIFICATION****FISHING\_TECHNIQUE**

DFN	=	Drift and/or fixed netters
DRB	=	Dredgers
DTS	=	Demersal trawlers and/or demersal seiners
FPO	=	Vessels using pots and/or traps
HOK	=	Vessels using hooks
MGO	=	Vessel using other active gears
MGP	=	Vessels using polyvalent active gears only
PG	=	Vessels using passive gears only for vessels < 12m
PGO	=	Vessels using other passive gears
PGP	=	Vessels using polyvalent passive gears only
PMP	=	Vessels using active and passive gears
PS	=	Purse seiners
TM	=	Pelagic trawlers
TBB	=	Beam trawlers

**VESSEL\_LENGTH classes**

VL0006	=	Vessel less than 6 meters in length.
VL0612	=	Vessel between 6 meters and 12 meters in length.
VL1218	=	Vessel between 10 meters and 18 meters in length.
VL1824	=	Vessel between 18 meters and 24 meters in length.
VL2440	=	Vessel between 24 meters and 40 meters in length.
VL40XX	=	Vessel greater than 40 meters in length.

## ANNEX II –SPECIES CODIFICATION

Three alpha code	Scientific name	Family
AGN	<i>Squatina squatina</i>	Squatinae
AHH	<i>Atherina hepsetus</i>	Atherinidae
ALB	<i>Thunnus alalunga</i>	Scombridae
ALV	<i>Alopias vulpinus</i>	Alopiidae
AMB	<i>Seriola dumerili</i>	Carangidae
ANE	<i>Engraulis encrasicolus</i>	Engraulidae
ANK	<i>Lophius budegassa</i>	Lophiidae
ANN	<i>Diplodus annularis</i>	Sparidae
ARA	<i>Aristeus antennatus</i>	Aristaeidae
ARS	<i>Aristeomorpha foliacea</i>	Aristaeidae
BFT	<i>Thunnus thynnus</i>	Scombridae
BOG	<i>Boops boops</i>	Sparidae
BON	<i>Sarda sarda</i>	Scombridae
BPI	<i>Spicara maena</i>	Centracanthidae
BRF	<i>Helicolenus dactylopterus</i>	Scorpaenidae
BSH	<i>Prionace glauca</i>	Carcharhinidae
BSK	<i>Cetorhinus maximus</i>	Cetorhinidae
BSS	<i>Dicentrarchus labrax</i>	Moronidae
BTH	<i>Alopias superciliosus</i>	Alopiidae
CCP	<i>Carcharhinus plumbeus</i>	Carcharhinidae
CCT	<i>Carcharias taurus</i>	Odontaspidae
CIL	<i>Citharus linguatula</i>	Citharidae
CLV	<i>Veneridae</i>	Veneridae
COE	<i>Conger conger</i>	Congridae
CTB	<i>Diplodus vulgaris</i>	Sparidae
CTC	<i>Sepia officinalis</i>	Sepiidae
CTZ	<i>Trigloporus lastoviza</i>	Triglidae
DGS	<i>Squalus acanthias</i>	Squalidae
DOL	<i>Coryphaena hippurus</i>	Coryphaenidae
DPS	<i>Parapenaeus longirostris</i>	Penaeidae
EDT	<i>Eledone moschata</i>	Octopodidae
ELE	<i>Anguilla anguilla</i>	Anguillidae
EOI	<i>Eledone cirrhosa</i>	Octopodidae
ETX	<i>Etmopterus spinax</i>	Squalidae
GAG	<i>Galeorhinus galeus</i>	Triakidae
GFB	<i>Phycis blennoides</i>	Gadidae
GPX	<i>Epinephelus spp.</i>	Serranidae
GUG	<i>Eutrigla gurnardus</i>	Triglidae
GUP	<i>Centrophorus granulosus</i>	Squalidae
GUR	<i>Aspitrigla cuculus</i>	Triglidae
GUU	<i>Trigla lucerna</i>	Triglidae
HKE	<i>Merluccius merluccius</i>	Merlucciidae
HMM	<i>Trachurus mediterraneus</i>	Carangidae
HOM	<i>Trachurus trachurus</i>	Carangidae
HXT	<i>Heptranchias perlo</i>	Hexanchidae
JAA	<i>Trachurus picturatus</i>	Carangidae
JAI	<i>Raja miraletus</i>	Rajidae
JAM	<i>Leucoraja melitensis</i>	Rajidae
JAY	<i>Raja polystigma</i>	Rajidae
JOD	<i>Zeus faber</i>	Zeidae
JRS	<i>Raja asterias</i>	Rajidae
LBE	<i>Homarus gammarus</i>	Nephropidae
LDB	<i>Lepidorhombus boscii</i>	Scophthalmidae
LOO	<i>Odontaspis ferox</i>	Odontaspidae
LTA	<i>Euthynnus alletteratus</i>	Scombridae
MAC	<i>Scomber scombrus</i>	Scombridae
MAS	<i>Scomber japonicus</i>	Scombridae
MAZ	<i>Scomber spp.</i>	Scombridae
MON	<i>Lophius piscatorius</i>	Lophiidae
MPT	<i>Mustelus punctulatus</i>	Triakidae
MSP	<i>Tetrapturus belone</i>	Istiophoridae
MTS	<i>Squilla mantis</i>	Squillidae
MUR	<i>Mullus surmuletus</i>	Mullidae

Continue

Three alpha code	Scientific name	Family
MUT	<i>Mullus barbatus</i>	Mullidae
MYL	<i>Myliobatis aquila</i>	Myliobatidae
NEP	<i>Nephrops norvegicus</i>	Nephropidae
OCC	<i>Octopus vulgaris</i>	Octopodidae
OXY	<i>Oxynotus centrina</i>	Oxynotidae
PAC	<i>Pagellus erythrinus</i>	Sparidae
PIL	<i>Sardina pilchardus</i>	Clupeidae
PLS	<i>Dasyatis violacea</i>	Dasyatidae
POD	<i>Trisopterus minutus capelanus</i>	Gadidae
POR	<i>Lamna nasus</i>	Lamnidae
QUB	<i>Squalus blainvillei</i>	Squalidae
RBC	<i>Rhinobatos cemiculus</i>	Rhinobatidae
RBX	<i>Rhinobatos rhinobatos</i>	Rhinobatidae
RGL	<i>Gymnura altavela</i>	Gymnuridae
RJB	<i>Dipturus batis</i>	Rajidae
RJC	<i>Raja clavata</i>	Rajidae
RJI	<i>Leucoraja circularis</i>	Rajidae
RJO	<i>Dipturus oxyrinchus</i>	Rajidae
RJU	<i>Raja undulata</i>	Rajidae
RPG	<i>Pagrus pagrus</i>	Sparidae
RPP	<i>Pristis pectinata</i>	Pristidae
RPR	<i>Pristis pristis</i>	Pristidae
SAA	<i>Sardinella aurita</i>	Clupeidae
SBA	<i>Pagellus acarne</i>	Sparidae
SBG	<i>Sparus aurata</i>	Sparidae
SBL	<i>Hexanchus griseus</i>	Hexanchidae
SBR	<i>Pagellus bogaraveo</i>	Sparidae
SCK	<i>Dalatias licha</i>	Squalidae
SDS	<i>Mustelus asterias</i>	Triakidae
SHO	<i>Galeus melastomus</i>	Scyliorhinidae
SHR	<i>Diplodus puntazzo</i>	Sparidae
SJA	<i>Pecten jacobaeus</i>	Pectinidae
SLO	<i>Palinurus elephas</i>	Palinuridae
SMA	<i>Isurus oxyrinchus</i>	Lamnidae
SMD	<i>Mustelus mustelus</i>	Triakidae
SOL	<i>Solea vulgaris</i>	Soleidae
SOS	<i>Solea lascaris</i>	Soleidae
SPC	<i>Spicara smaris</i>	Centracanthidae
SPF	<i>Spicara flexuosa</i>	Centracanthidae
SPK	<i>Sphyrna mokarran</i>	Sphyrnidae
SPL	<i>Sphyrna lewini</i>	Sphyrnidae
SPQ	<i>Sphyrna tudes</i>	Sphyrnidae
SPR	<i>Sprattus sprattus</i>	Clupeidae
SPZ	<i>Sphyrna zygaena</i>	Sphyrnidae
SQE	<i>Todarodes sagittatus</i>	Ommastrephidae
SQM	<i>Illex coindettii</i>	Ommastrephidae
SQR	<i>Loligo vulgaris</i>	Loliginidae
SSB	<i>Lithognathus mormyrus</i>	Sparidae
SUA	<i>Squatina aculeata</i>	Squatinae
SUT	<i>Squatina oculata</i>	Squatinae
SVE	<i>Chamelea gallina</i>	Veneridae
SWA	<i>Diplodus sargus</i>	Sparidae
SWO	<i>Xiphias gladius</i>	Xiphiidae
SYC	<i>Scyliorhinus canicula</i>	Scyliorhinidae
SYT	<i>Scyliorhinus stellaris</i>	Scyliorhinidae
TDQ	<i>Todaropsis eblanae</i>	Ommastrephidae
TGS	<i>Penaeus kerathurus</i>	Penaeidae
TTR	<i>Torpedo marmorata</i>	Torpedinidae
TUR	<i>Psetta maxima</i>	Scophthalmidae
UGU	<i>Scaevargus unicirrhus</i>	Octopodidae
WHB	<i>Micromesistius poutassou</i>	Gadidae