

## Annex II

### Sardinia (GSA 11)

#### Summary

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#### 4.2.1 Introduction

Based on the results of Fast-scan and interactions with stakeholders, the ten UoAs listed in Table 4.2.1.1 were identified in the GSA 11. In this list the UoAs using bottom otter trawl nets (OTB) target mainly three different types of target species:

- demersal fish (DEF);
- mixed group of demersal species and deep water species (MDD);
- deep water species (DWS)

These types were aggregated together in Tables 4.2.1.1 and 4.2.3.1, both in terms of landed volume and value. Considering trawlers landings, about 56% come from boats targeting demersal fish.

**Table 4.2.1.1 – List of the UoAs selected for Deeper-mapping in the GSA 11**

| Italian name  | English name         | Scientific name                | Gear               | Group of target species | Mean landing in weight 2015-2016 (Ton) | Mean landing in value 2015-2016 (k Euro) | UoA Identified during the consultation |
|---|----------------------|--------------------------------|--------------------|-------------------------|--|--|--|
| Aragosta  | Common spiny lobster | <i>Palinurus elephas</i>       | Trammel net        | DEF                     | 75                                     | 4,134                                    | X                                      |
| Gamberi rossi   | Giant red shrimp     | <i>Aristaeomorpha foliacea</i> | Bottom otter trawl | MDD+DWS                 | 113                                    | 1,929                                    |  |
| Moscardino muschiato  | Musky octopus        | <i>Eledone moschata</i>        | Bottom otter trawl | DEF+MDD                 | 398                                    | 2,309                                    |  |
| Pesce spada   | Swordfish            | <i>Xiphias gladius</i>         | Drifting longline  | LPF                     | 430                                    | 3,655                                    | X                                      |
| Polpo comune o di scoglio   | Common octopus       | <i>Octopus vulgaris</i>        | Trappole           | DEF                     | 632                                    | 4,156                                    | X                                      |
| Polpo comune o di scoglio   | Common octopus       | <i>Octopus vulgaris</i>        | Trammel net        | DEF                     | 98                                     | 720                                      | X                                      |
| Scorfano rosso  | Red scorpionfish     | <i>Scorpaena scrofa</i>        | Trammel net        | DEF                     | 108                                    | 1,200                                    | X                                      |
| Seppia mediterranea o comune  | Common cuttlefish    | <i>Sepia officinalis</i>       | Trammel net        | DEF                     | 129                                    | 1,171                                    | X                                      |
| Triglie di scoglio  | Surmullet            | <i>Mullus surmuletus</i>       | Trammel net        | DEF                     | 85                                     | 1,270                                    | X                                      |
| Triglie di scoglio  | Surmullet            | <i>Mullus surmuletus</i>       | Bottom otter trawl | DEF+MDD                 | 185                                    | 2,012                                    |  |
| <ul style="list-style-type: none"> <li>- DEF: Demersal fish.</li> <li>- DWS: Deep water species.</li> <li>- LPF: Large pelagic fish.</li> <li>- MDD: Mixed group of demersal species and deep water species.</li> <li>- SPF: Small pelagic fish.</li> </ul> |                      |                                |                    |                         |  |  |  |

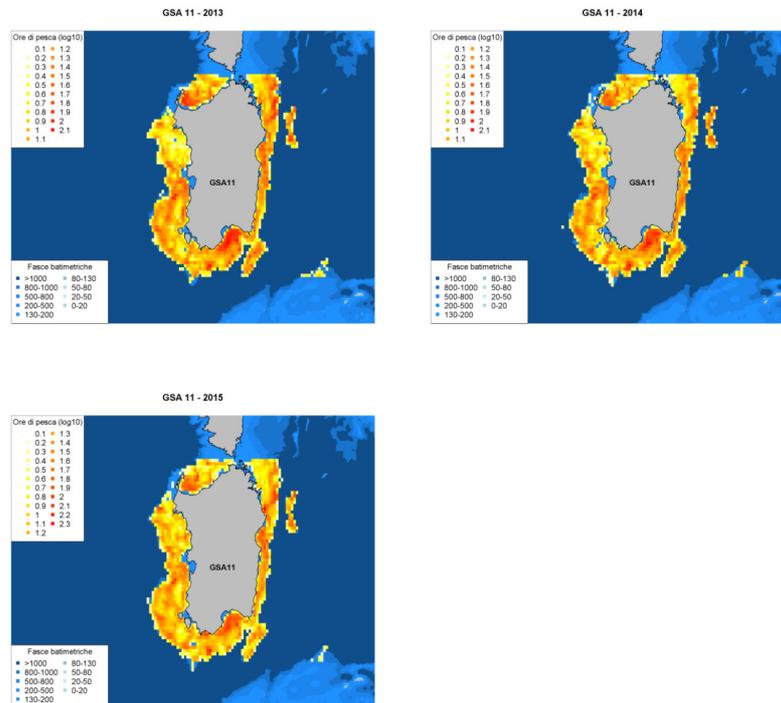
Source: estimates from MIPAAFT/National Fisheries Data Collection Programme

From the data shown in Table 4.2.1.1 it is possible to notice that the selected UoAs are made up of 4 types of gears: trammel net, bottom otter trawl, drifting longline and traps.

The boats that use the passive gears listed above are mostly small (6-12 meters LFT) and distributed in all the ports of the Sardinian coast, in particular in Cagliari and Oristano.

The trawlers are mostly medium-sized (12-24 meters LFT) and distributed mostly in the ports of Cagliari, Olbia and Porto Torres. Figure 4.2.1.1 shows the maps of the fishing activity of trawlers (OTB, period 2013 -2015), estimated from the VMS data. The analyses were carried out with VMS base (Russo et al., 2014) using a grid with 5 km side cells and the values represent the total annual fishing hours per cell of all the trawl boats aggregated also in terms of species target. From the maps it can be seen how the distribution of the trawling activity is more concentrated in the two Gulfs of Cagliari (South) and Asinara (North) respectively. On the two western and eastern coasts, the activity of towed boats does not seem to have undergone substantial

changes in the 3 years considered. On the west coast a more intense activity is recorded in the southern part (largo di Oristano and Carloforte), while in the eastern part off the Gulf of Orosei (MIPAAFT, 2017).



**Figure 4.2.1.1 - Fishing activities of the trawling fleet in the GSA11. The values represent the average fishing hours per cell, calculated from the monthly hours for the years 2013 to 2015 (MIPAAFT, 2017)**

Regarding the management, at various levels, of the resources involved in the activities selected fisheries (UoA) - international (ICCAT), regional (GFCM), Community (EU / EC) and national (MIPAAFT) - see Chapter 3.

#### 4.2.2 Status of target stocks exploited by the selected UoAs

##### **Common spiny lobster (*Palinurus elephas*)**

The common spiny lobster is fished in Sardinia mainly with the trammel net. In terms of the status of the resource, there is no evaluation conducted by the GFCM or the STECF, but an analysis carried out with a production model (CMSY model; Froese et al., 2018) is present in the literature. This analysis shows a state of suffering of the resource, characterized by a biomass lower than 50% of BMSY and a fishing mortality greater than FMSY (Figure 4.2.2.1.).

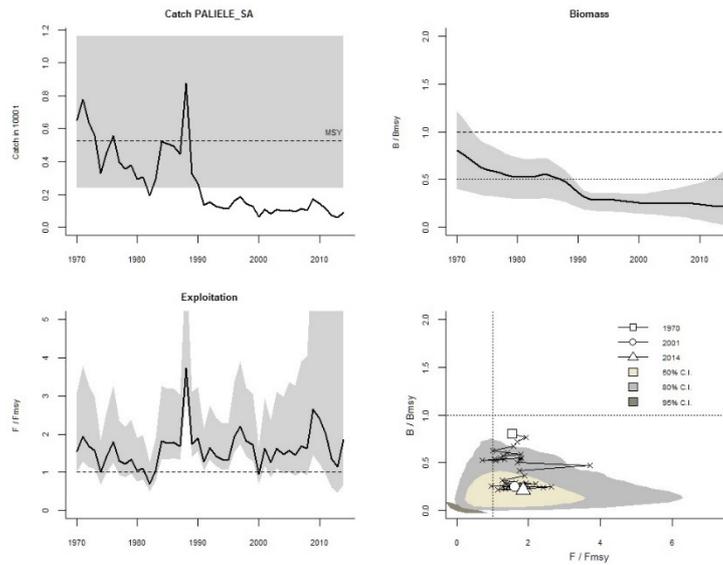
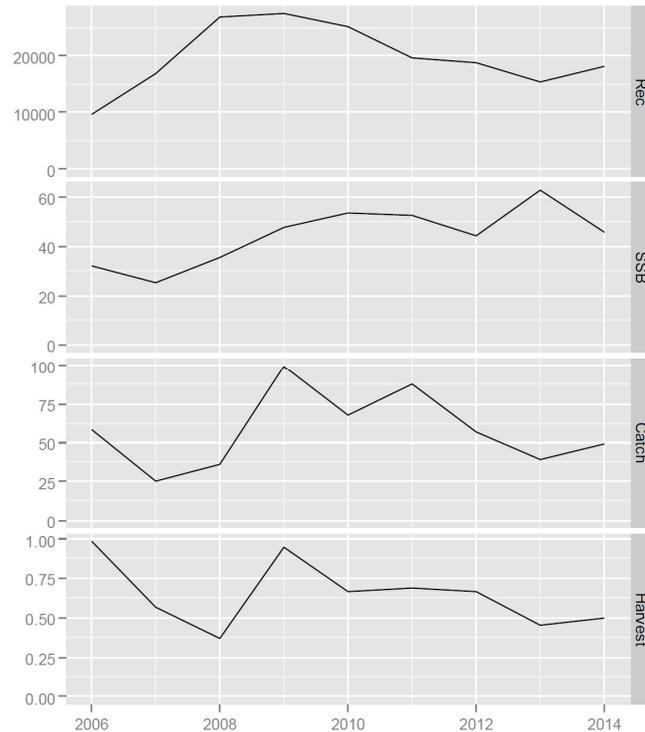


Figure 4.2.2.1 – Results of the evaluation of the common spiny lobster (*Palinurus elephas*) in GSA 11 (Froese et al., 2018).

#### Giant red shrimp (*Aristeomorpha foliacea*)

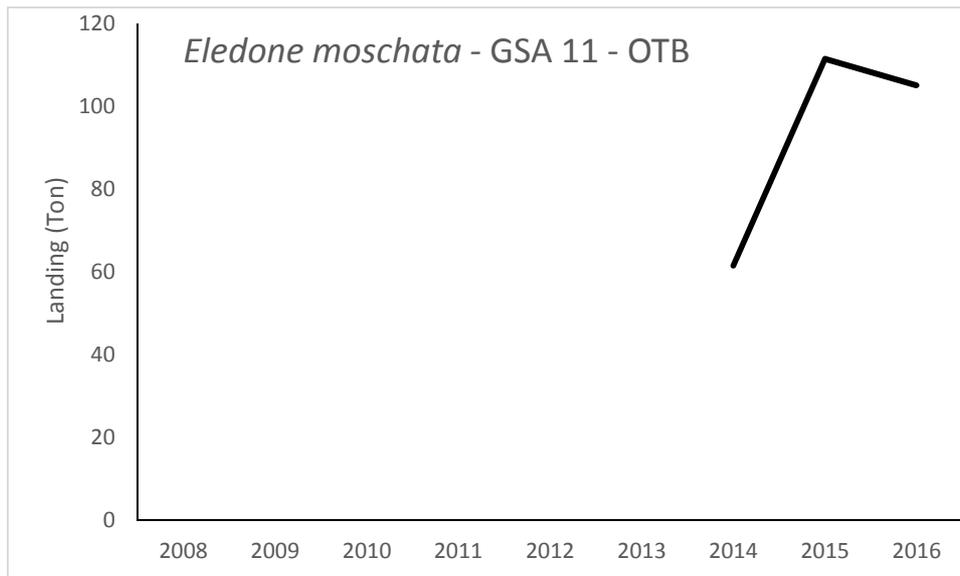
The giant red shrimps are fished in Sardinia mainly with trawl nets having as their target group a mixed group of demersal species and deep-water species (MDD: 80%). This stock was assessed using an analytical model (XSA, STECF 2015). Spawning stock biomass (SSB) showed an increasing trend in the period 2006-2014, ranging from 25 tons in 2007 to 60 tons in 2013 (Figure 4.2.1.2). Recruitment is characterized by an increasing trend from 2006 to 2008 followed by a general decline in the following period. The geometric average of the last three years of fishing mortality (2012-2014), used to diagnose the stock, is equal to 0.53 and therefore higher than the reference value estimated as 0.31 (FMSY = F0.1; STECF 2015).



**Figure 4.2.2.2 – Results of the evaluation of the giant red shrimp (*Aristeomorpha foliacea*) in GSA 11 (STECF, 2015).**

**Musky octopus (*Eledone moschata*)**

The musky octopus is fished in Sardinia mainly with trawl nets having demersal fish as target group (DEF: 77%). At present, the species is not the subject of an analytical evaluation, nor are analytic or empirical abundance and reference points available that can be used to evaluate their exploitation status. The landings data available from the economic data-call (AER, 2018: <https://stecf.jrc.ec.europa.eu/dd/fleet>) show that the bottom otter trawl having as a group of target species demersal fish in GSA 11 has a stable trend from 2008 to 2014 followed by a sharp increase in the next two years (Figure 4.2.1.3). (Figure 4.2.1.3).



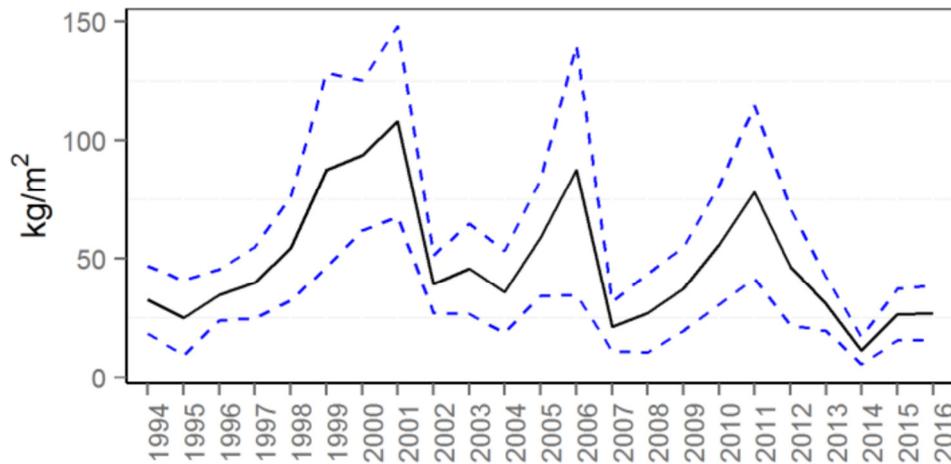
**Figure 4.2.2.3 – Trend of the Musky octopus (*Eledone moschata*) landings fished with bottom otter trawl from 2008 to 2016 in the GSA 11 (AER, 2018).**

#### **Swordfish (*Xiphias gladius*)**

Swordfish is fished in Sardinia mainly with drifting long lines. In terms of the status of the resource, the evaluation is carried out with an analytical model (XSA, ICCAT, 2017) combining the fishing statistics of the entire Mediterranean basin, considering that this species is distributed throughout the area as a single stock. The results of this evaluation are reported in the chapter on the results concerning the GSA 10 (Annex I, Paragraph 4.1.2).

#### **Common octopus (*Octopus vulgaris*)**

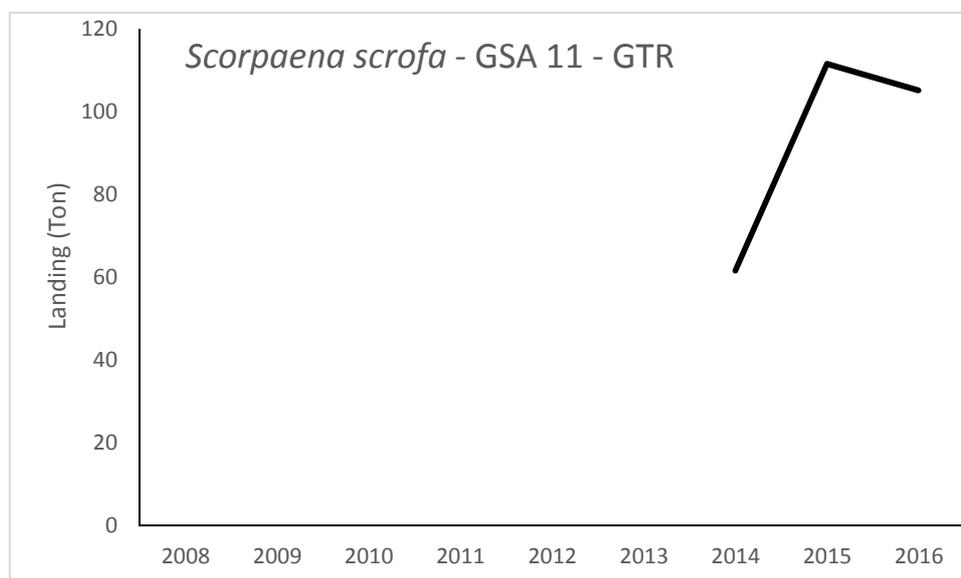
The common octopus is fished in Sardinia mainly with two types of fixed gears, traps and trammel net, in fact this species is present in two UoAs. The species is not currently subject to an analytical evaluation, nor are empirical reference points available that can be used to evaluate their exploitation status. The biomass index for this species, estimated as part of the MEDITS trawling campaign, shows clear fluctuations in the period 1994-2011, followed by a general downward trend (MIPAAFT, 2017; Figure 4.2.1.4).



**Figure 4.2.2.4 – Biomass index trend of common octopus (*Octopus vulgaris*) in GSA11. MEDITS data for the period 1994-2016 (MIPAAFT, 2017).**

### Red scorpionfish (*Scorpaena scrofa*)

The red scorpionfish is fished in Sardinia mainly with the trammel net. At present, the species is not the subject of an analytical evaluation, nor are analytic or empirical abundance and reference points available that can be used to evaluate the exploitation status. The landing data of this species related to boats that operate with trammel in GSA 11 are only available for the years 2014-2016 (AER, 2018: <https://stecf.jrc.ec.europa.eu/dd/fleet>) and show an increasing trend (Figure 4.2.1.5).).



**Figure 4.2.2.5 – Trend of red scorpionfish (*Scorpaena scrofa*) landing fished with trammel net (GTR) in GSA 11 (AER, 2018).**

### Common cuttlefish (*Sepia officinalis*)

The common cuttlefish is fished in Sardinia mainly with the trammel net (GTR). In terms of the status of the resource, there is no evaluation conducted by the GFCM or

the STECF, but an analysis carried out with a production model (CMSY model; Froese et al., 2018) is present in the literature. This analysis shows a state of suffering of the resource, characterized in recent years by a biomass lower than BMSY and a fishing mortality greater than FMSY (Figure 4.2.1.6.).

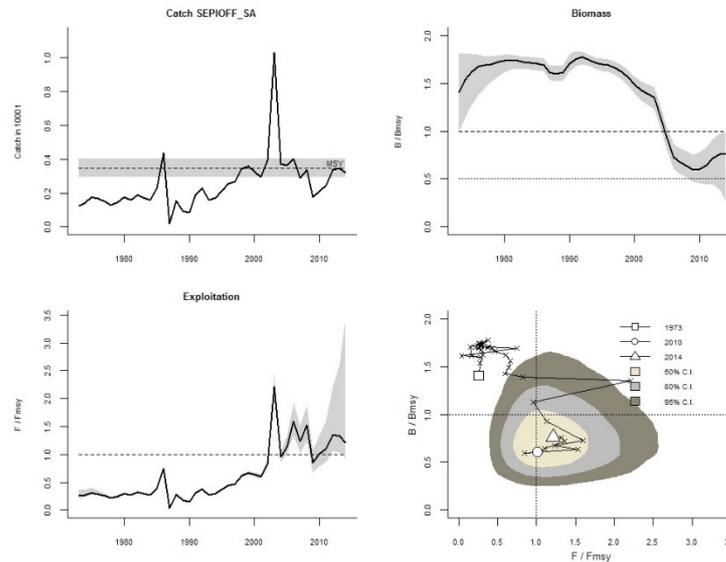


Figure 4.2.2.6 – Results of the evaluation of common cuttlefish (*Sepia officinalis*) in GSA 11 (Froese et al., 2018).

**Surmullet (*Mullus surmuletus*)**

The surmullet is fished in Sardinia mainly with bottom trawl nets that have as target species demersal fish (DEF: 60%) and trammel net, in fact this species is present in two UoAs. The species is not currently subject to an analytical evaluation, nor are empirical reference points available that can be used to evaluate their exploitation status. The biomass index for this species, estimated as part of the MEDITS trawling campaign, shows clear fluctuations throughout the period and a generally stable trend (MIPAAFT, 2017; Figure 4.2.1.6).

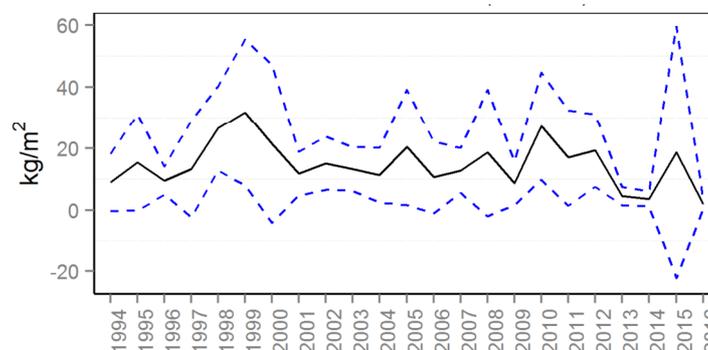


Figure 4.2.2.7 – Biomass index trend of surmullet (*Mullus surmuletus*) in GSA11. MEDITS data for the period 1994-2016 (MIPAAFT, 2017).

#### 4.2.3 List of species exploited by selected UoAs

This section shows the lists of species or groups of species that result in the capture of a specific gears for the respective UoAs selected in GSA 11. Specifically:

Table 4.2.3.1 shows the list of species or groups of species detected for the UoA using the bottom otter trawl (OTB) operating in the GSA 11.

Table 4.2.3.2 shows the list of species or groups of species detected for the UoA using the trammel net (GTR) operating in the GSA 11.

Table 4.2.3.3 shows the list of species or groups of species detected for the UoA using the traps (FPO) operating in the GSA 11.

Table 4.2.3.4 shows the list of species or groups of species detected for the UoA using the drifting longline (LLD) for large pelagic fish (LPF) in the GSA 11.

**Table 4.2.3.1 – List of species detected for the UoA using bottom otter trawl (OTB) in the GSA 11. The species underlined are the species detected for the selected UoAs.**

| Italian name                 | English name                 | Scientific name                 | Mean landing in weight 2015-2016 (Ton) | Percentage (%) |
|------------------------------|------------------------------|---------------------------------|--|----------------|
| Moscardino muschiato         | Musky octopus                | <i>Eledone moschata</i>         | 399.267                                | 14.289         |
| Zerro, menola                | Picarel                      | <i>Spicara smaris</i>           | 315.402                                | 11.288         |
| Nasello                      | European hake                | <i>Merluccius merluccius</i>    | 270.048                                | 9.665          |
| Triglie di fango             | Red mullet                   | <i>Mullus barbatus</i>          | 246.550                                | 8.824          |
| Triglie di scoglio           | Surmullet                    | <i>Mullus surmuletus</i>        | 186.169                                | 6.663          |
| Moscardino bianco            | Horned octopus               | <i>Eledone cirrhosa</i>         | 165.354                                | 5.918          |
| Calamaro mediterraneo        | European squid               | <i>Loligo vulgaris</i>          | 121.686                                | 4.355          |
| Gamberi rossi                | Giant red shrimp             | <i>Aristaeomorpha foliacea</i>  | 112.666                                | 4.032          |
| Totano comune                | Broadtail shortfin squid     | <i>Illex coindetii</i>          | 83.274                                 | 2.980          |
| Gambero viola                | Blue and red shrimp          | <i>Aristeus antennatus</i>      | 73.478                                 | 2.630          |
| Pastinaca                    | Shortnose greeneye           | <i>Chlorophthalmus agassizi</i> | 72.504                                 | 2.595          |
| Altri pesci                  | Marine fishes nei            | <i>Osteichthyes</i>             | 55.285                                 | 1.979          |
| Gattuccio                    | Small-spotted catshark       | <i>Scyliorhinus canicula</i>    | 52.674                                 | 1.885          |
| Pesce san Pietro             | John dory                    | <i>Zeus faber</i>               | 52.572                                 | 1.881          |
| Razza chiodata               | Thornback ray                | <i>Raja clavata</i>             | 50.398                                 | 1.804          |
| Gamberi bianchi o rosa       | Deep-water rose shrimp       | <i>Parapenaeus longirostris</i> | 42.684                                 | 1.528          |
| Rana pescatrice              | Angler(=Monk)                | <i>Lophius piscatorius</i>      | 41.637                                 | 1.490          |
| Seppia mediterranea o comune | Common cuttlefish            | <i>Sepia officinalis</i>        | 39.220                                 | 1.404          |
| Capone cocchio               | Red gurnard                  | <i>Aspitrigla cuculus</i>       | 38.295                                 | 1.371          |
| Boghe                        | Bogue                        | <i>Boops boops</i>              | 35.171                                 | 1.259          |
| Mendola, mennola             | Blotched picarel             | <i>Spicara maena</i>            | 32.972                                 | 1.180          |
| Scorfano rosso               | Red scorpionfish             | <i>Scorpaena scrofa</i>         | 31.222                                 | 1.117          |
| Scampi                       | Norway lobster               | <i>Nephrops norvegicus</i>      | 22.642                                 | 0.810          |
| Tracine                      | Weeverfishes nei             | <i>Trachinidae</i>              | 16.003                                 | 0.573          |
| Serranidae                   | Groupers, seabasses nei      | <i>Serranidae</i>               | 12.863                                 | 0.460          |
| Sarago fasciato              | Common two-banded seabream   | <i>Diplodus vulgaris</i>        | 12.425                                 | 0.445          |
| Musdea bianca                | Greater forkbeard            | <i>Phycis blennoides</i>        | 12.382                                 | 0.443          |
| Scorfano nero                | Black scorpionfish           | <i>Scorpaena porcus</i>         | 11.758                                 | 0.421          |
| Argentine                    | Argentines                   | <i>Argentina spp</i>            | 11.664                                 | 0.417          |
| Pagello fragolino            | Common pandora               | <i>Pagellus erythrinus</i>      | 11.432                                 | 0.409          |
| Gobetto                      | Plesionika shrimps nei       | <i>Plesionika spp</i>           | 11.393                                 | 0.408          |
| Pesce prete                  | Stargazer                    | <i>Uranoscopus scaber</i>       | 10.866                                 | 0.389          |
| Pagro comune                 | Red porgy                    | <i>Pagrus pagrus</i>            | 9.514                                  | 0.341          |
| Rombi altri                  | Turbots nei                  | <i>Scophthalmidae</i>           | 9.314                                  | 0.333          |
| Sugarello maggiore           | Mediterranean horse mackerel | <i>Trachurus mediterraneus</i>  | 8.667                                  | 0.310          |
| Razza bianca                 | White skate                  | <i>Raja alba</i>                | 8.128                                  | 0.291          |
| Orate                        | Gilthead seabream            | <i>Sparus aurata</i>            | 7.779                                  | 0.278          |
| Razze altre                  | Raja rays nei                | <i>Raja spp</i>                 | 7.677                                  | 0.275          |
| Totano viola                 | European flying squid        | <i>Todarodes sagittatus</i>     | 7.002                                  | 0.251          |
| Pagello rovello              | Blackspot(=red) seabream     | <i>Pagellus bogaraveo</i>       | 6.779                                  | 0.243          |
| Sugarello o suro             | Atlantic horse mackerel      | <i>Trachurus trachurus</i>      | 6.034                                  | 0.216          |
| Polpo comune o di scoglio    | Common octopus               | <i>Octopus vulgaris</i>         | 4.863                                  | 0.174          |

**BLUFISH PROJECT**  
**Stage 1.b – Deeper mapping/Annex II - GSA 11**

| Italian name                   | English name                   | Scientific name                  | Mean landing in weight 2015-2016 (Ton) | Percentage (%) |
|--------------------------------|--------------------------------|----------------------------------|--|----------------|
| Sogliola comune                | Common sole                    | <i>Solea solea</i>               | 4.708                                  | 0.168          |
| Budego                         | Blackbellied angler            | <i>Lophius budegassa</i>         | 4.697                                  | 0.168          |
| Pesce pettine o pesce rasoio   | Pearly razorfish               | <i>Xyrichtys novacula</i>        | 4.694                                  | 0.168          |
| Scorfani di fondale            | Blackbelly rosefish            | <i>Helicolenus dactylopterus</i> | 4.583                                  | 0.164          |
| Dentici                        | Common dentex                  | <i>Dentex dentex</i>             | 4.581                                  | 0.164          |
| Melu' o potassolo              | Blue whiting(=Poutassou)       | <i>Micromesistius poutassou</i>  | 4.194                                  | 0.150          |
| Gallinella o cappone           | Tub gurnard                    | <i>Chelidonichthys lucerna</i>   | 3.839                                  | 0.137          |
| Zerro musillo                  | Curled picarel                 | <i>Centracanthus cirrus</i>      | 3.010                                  | 0.108          |
| Razza maculata                 | Spotted ray                    | <i>Raja montagui</i>             | 2.477                                  | 0.089          |
| Gronghi                        | European conger                | <i>Conger conger</i>             | 2.365                                  | 0.085          |
| Pagello mafrone                | Axillary seabream              | <i>Pagellus acarne</i>           | 2.224                                  | 0.080          |
| Ricciole                       | Greater amberjack              | <i>Seriola dumerili</i>          | 2.206                                  | 0.079          |
| Sarago maggiore                | White seabream                 | <i>Diplodus sargus</i>           | 2.039                                  | 0.073          |
| Capone ubriaco                 | Streaked gurnard               | <i>Chelidonichthys lastoviza</i> | 1.856                                  | 0.066          |
| Tanute                         | Black seabream                 | <i>Spondyliosoma cantharus</i>   | 1.837                                  | 0.066          |
| Razza stellata                 | Mediterranean starry ray       | <i>Raja asterias</i>             | 1.772                                  | 0.063          |
| Cernia di scoglio              | Dusky grouper                  | <i>Epinephelus marginatus</i>    | 1.430                                  | 0.051          |
| Musdea                         | Forkbeard                      | <i>Phycis phycis</i>             | 1.334                                  | 0.048          |
| Capone                         | Grey gurnard                   | <i>Eutrigla gurnardus</i>        | 1.285                                  | 0.046          |
| Scorfanò rosa                  | Slender rockfish               | <i>Scorpaena elongata</i>        | 1.003                                  | 0.036          |
| Pannocchie                     | Spottail mantis squillid       | <i>Squilla mantis</i>            | 0.997                                  | 0.036          |
| Salpa                          | Salema                         | <i>Sarpa salpa</i>               | 0.916                                  | 0.033          |
| Aragosta                       | Common spiny lobster           | <i>Palinurus elephas</i>         | 0.838                                  | 0.030          |
| Pesce sciabola                 | Silver scabbardfish            | <i>Lepidopus caudatus</i>        | 0.815                                  | 0.029          |
| Sardine                        | European pilchard(=Sardine)    | <i>Sardina pilchardus</i>        | 0.770                                  | 0.028          |
| Sarago sparaglione o sparlòtto | Annular seabream               | <i>Diplodus annularis</i>        | 0.656                                  | 0.023          |
| Elasmobranchi                  | Sharks, rays, skates, etc. nei | <i>Elasmobranchii</i>            | 0.586                                  | 0.021          |
| Alici                          | European anchovy               | <i>Engraulis encrasicolus</i>    | 0.508                                  | 0.018          |
| Cappellano                     | Poor cod                       | <i>Trisopterus minutus</i>       | 0.498                                  | 0.018          |
| Rombo liscio                   | Brill                          | <i>Scophthalmus rhombus</i>      | 0.469                                  | 0.017          |
| Palombo                        | Blackspotted smooth-hound      | <i>Mustelus punctulatus</i>      | 0.360                                  | 0.013          |
| Murene                         | Mediterranean moray            | <i>Muraena helena</i>            | 0.312                                  | 0.011          |
| Scorfanotto                    | Small red scorpionfish         | <i>Scorpaena notata</i>          | 0.252                                  | 0.009          |
| Granchi                        | Marine crabs nei               | <i>Brachyura</i>                 | 0.241                                  | 0.009          |
| Spigole                        | European seabass               | <i>Dicentrarchus labrax</i>      | 0.216                                  | 0.008          |
| Sarago pizzuto                 | Sharpsnout seabream            | <i>Diplodus puntazzo</i>         | 0.207                                  | 0.007          |
| Mazzancolle                    | Caramote prawn                 | <i>Penaeus kerathurus</i>        | 0.197                                  | 0.007          |
| Altri crostacei                | Marine crustaceans nei         | <i>Crustacea</i>                 | 0.189                                  | 0.007          |
| Mormore                        | Sand steenbras                 | <i>Lithognathus mormyrus</i>     | 0.177                                  | 0.006          |
| Labridae                       | Wrasses, hogfishes, etc. nei   | <i>Labridae</i>                  | 0.151                                  | 0.005          |
| Squali                         | Dogfishes nei                  | <i>Squalus spp</i>               | 0.150                                  | 0.005          |
| Cefali altri                   | Mulletts nei                   | <i>Mugilidae</i>                 | 0.142                                  | 0.005          |
| Lampughe                       | Common dolphinfish             | <i>Coryphaena hippurus</i>       | 0.104                                  | 0.004          |
| Seppioline altre               | Cuttlefish, bobtail squids nei | <i>Sepiidae, Sepiolidae</i>      | 0.098                                  | 0.003          |

**BLUFISH PROJECT**  
**Stage 1.b – Deeper mapping/Annex II - GSA 11**

| <b>Italian name</b> | <b>English name</b>             | <b>Scientific name</b>        | <b>Mean landing in weight 2015-2016 (Ton)</b> | <b>Percentage (%)</b> |
|---------------------|---------------------------------|-------------------------------|---|-----------------------|
| Luccio              | European barracuda              | <i>Sphyraena sphyraena</i>    | 0.093   | 0.003                 |
| Granceola           | Spinous spider crab             | <i>Maja squinado</i>          | 0.082   | 0.003                 |
| Occhi verdi         | Stingrays, butterfly rays nei   | <i>Dasyatidae</i>             | 0.075   | 0.003                 |
| Corvine             | Brown meagre                    | <i>Sciaena umbra</i>          | 0.069   | 0.002                 |
| Squalo capopiatto   | Bluntnose sixgill shark         | <i>Hexanchus griseus</i>      | 0.055   | 0.002                 |
| Tonno rosso         | Atlantic bluefin tuna           | <i>Thunnus thynnus</i>        | 0.035   | 0.001                 |
| Sgombro             | Atlantic mackerel               | <i>Scomber scombrus</i>       | 0.020   | 0.001                 |
| Tonnetto            | Little tunny (=Atl.black skipj) | <i>Euthynnus alletteratus</i> | 0.013   | 0.001                 |
| Palamita            | Atlantic bonito                 | <i>Sarda sarda</i>            | 0.007   | 0.001                 |

Source: estimates from MIPAAFT/National Fisheries Data Collection Programme

**Table 4.2.3.2 – List of species detected for the UoA using trammel net (GTR) in the GSA 11. The underlined species are the species detected for the selected UoAs.**

| Italian name                        | English name               | Scientific name          | Mean landing in weight 2015-2016 (Ton) | Percentage (%) |
|-------------------------------------|----------------------------|--------------------------|--|----------------|
| Altri pesci                         | Marine fishes nei          | Osteichthyes             | 189.131                                | 14.953         |
| <u>Seppia mediterranea o comune</u> | Common cuttlefish          | <u>Sepia officinalis</u> | 128.667                                | 10.172         |
| Scorfanò rosso                      | Red scorpionfish           | Scorpaena scrofa         | 108.286                                | 8.561          |
| <u>Polpo comune o di scoglio</u>    | Common octopus             | <u>Octopus vulgaris</u>  | 97.599                                 | 7.716          |
| <u>Triglie di scoglio</u>           | Surmullet                  | <u>Mullus surmuletus</u> | 85.113                                 | 6.729          |
| <u>Aragosta</u>                     | Common spiny lobster       | <u>Palinurus elephas</u> | 75.205                                 | 5.946          |
| Nasello                             | European hake              | Merluccius merluccius    | 47.073                                 | 3.722          |
| Scorfanò nero                       | Black scorpionfish         | Scorpaena porcus         | 45.890                                 | 3.628          |
| Zerro, menola                       | Picarel                    | Spicara smaris           | 44.140                                 | 3.490          |
| Mendola, mennola                    | Blotched picarel           | Spicara maena            | 42.190                                 | 3.336          |
| Razza chiodata                      | Thornback ray              | Raja clavata             | 32.770                                 | 2.591          |
| Pagello fragolino                   | Common pandora             | Pagellus erythrinus      | 31.226                                 | 2.469          |
| Calamaro mediterraneo               | European squid             | Loligo vulgaris          | 25.520                                 | 2.018          |
| Serranidae                          | Groupers, seabasses nei    | Serranidae               | 23.788                                 | 1.881          |
| Sarago fasciato                     | Common two-banded seabream | Diplodus vulgaris        | 21.344                                 | 1.687          |
| Pesce san Pietro                    | John dory                  | Zeus faber               | 19.646                                 | 1.553          |
| Rana pescatrice                     | Angler(=Monk)              | Lophius piscatorius      | 17.730                                 | 1.402          |
| Boghe                               | Boque                      | Boops boops              | 14.636                                 | 1.157          |
| Orate                               | Gilthead seabream          | Sparus aurata            | 14.482                                 | 1.145          |
| Pagro comune                        | Red porgy                  | Pagrus pagrus            | 13.175                                 | 1.042          |
| Dentici                             | Common dentex              | Dentex dentex            | 12.235                                 | 0.967          |
| Sugarello o suro                    | Atlantic horse mackerel    | Trachurus trachurus      | 11.966                                 | 0.946          |
| Pesce prete                         | Stargazer                  | Uranoscopus scaber       | 11.124                                 | 0.880          |
| Tracine                             | Weeverfishes nei           | Trachinidae              | 10.442                                 | 0.826          |
| Spigole                             | European seabass           | Dicentrarchus labrax     | 9.430                                  | 0.746          |
| Corvine                             | Brown meagre               | Sciaena umbra            | 8.607                                  | 0.680          |
| Palamita                            | Atlantic bonito            | Sarda sarda              | 8.506                                  | 0.672          |
| Murene                              | Mediterranean moray        | Muraena helena           | 8.198                                  | 0.648          |
| Salpa                               | Salema                     | Sarpa salpa              | 7.473                                  | 0.591          |
| Pagello mafrone                     | Axillary seabream          | Pagellus acarne          | 7.199                                  | 0.569          |
| Sarago maggiore                     | White seabream             | Diplodus sargus          | 6.686                                  | 0.529          |
| Gattuccio                           | Small-spotted catshark     | Scyliorhinus canicula    | 6.295                                  | 0.498          |
| Luccio                              | European barracuda         | Sphyraena sphyraena      | 6.291                                  | 0.497          |
| Sarago sparaglione o sparlottò      | Annular seabream           | Diplodus annularis       | 5.832                                  | 0.461          |
| Musdea                              | Forkbeard                  | Phycis phycis            | 5.639                                  | 0.446          |
| Gronghi                             | European conger            | Conger conger            | 5.555                                  | 0.439          |
| Astice                              | European lobster           | Homarus gammarus         | 5.206                                  | 0.412          |
| Granceola                           | Spinous spider crab        | Maja squinado            | 4.929                                  | 0.390          |
| Altri crostacei                     | Marine crustaceans nei     | Crustacea                | 4.804                                  | 0.380          |
| Razza maculata                      | Spotted ray                | Raja montagui            | 4.627                                  | 0.366          |
| Capone                              | Grey gurnard               | Eutrigla gurnardus       | 4.272                                  | 0.338          |
| Tanute                              | Black seabream             | Spondyliosoma cantharus  | 3.552                                  | 0.281          |

**BLUFISH PROJECT**  
**Stage 1.b – Deeper mapping/Annex II - GSA 11**

| Italian name         | English name                    | Scientific name           | Mean landing in weight 2015-2016 (Ton) | Percentage (%) |
|----------------------|---------------------------------|---------------------------|--|----------------|
| Occhiate             | Saddled seabream                | Oblada melanura           | 3.382                                  | 0.267          |
| Sgombro              | Atlantic mackerel               | Scomber scombrus          | 3.064                                  | 0.242          |
| Sarago pizzuto       | Sharpsnout seabream             | Diplodus puntazzo         | 2.710                                  | 0.214          |
| Cernia di scoglio    | Dusky grouper                   | Epinephelus marginatus    | 2.535                                  | 0.200          |
| Labridae             | Wrasses, hogfishes, etc. nei    | Labridae                  | 2.246                                  | 0.178          |
| Ricciole             | Greater amberjack               | Seriola dumerili          | 1.933                                  | 0.153          |
| Sugarello maggiore   | Mediterranean horse mackerel    | Trachurus mediterraneus   | 1.826                                  | 0.144          |
| Scombroidei          | Frigate and bullet tunas        | Auxis thazard, A. rochei  | 1.155                                  | 0.091          |
| Musdea bianca        | Greater forkbeard               | Phycis blennoides         | 1.051                                  | 0.083          |
| Zerro musillo        | Curled picarel                  | Centracanthus cirrus      | 0.994                                  | 0.079          |
| Triglie di fango     | Red mullet                      | Mullus barbatus           | 0.965                                  | 0.076          |
| Capone coccio        | Red gurnard                     | Aspitrigla cuculus        | 0.954                                  | 0.075          |
| Pagello rovello      | Blackspot(=red) seabream        | Pagellus bogaraveo        | 0.919                                  | 0.073          |
| Sogliola comune      | Common sole                     | Solea solea               | 0.750                                  | 0.059          |
| Melu' o potassolo    | Blue whiting(=Poutassou)        | Micromesistius poutassou  | 0.655                                  | 0.052          |
| Capone ubriaco       | Streaked gurnard                | Chelidonichthys lastoviza | 0.596                                  | 0.047          |
| Scorfani di fondale  | Blackbelly rosefish             | Helicolenus dactylopterus | 0.574                                  | 0.045          |
| Scorfanotto          | Small red scorpionfish          | Scorpaena notata          | 0.563                                  | 0.045          |
| Lanzardo atlantico   | Atlantic chub mackerel          | Scomber colias            | 0.397                                  | 0.031          |
| Tonnetto             | Little tunny (=Atl.black skipj) | Euthynnus alletteratus    | 0.384                                  | 0.030          |
| Mormore              | Sand steenbras                  | Lithognathus mormyrus     | 0.209                                  | 0.017          |
| Gallinella o cappone | Tub gurnard                     | Chelidonichthys lucerna   | 0.161                                  | 0.013          |
| Palombo liscio       | Smooth-hound                    | Mustelus mustelus         | 0.149                                  | 0.012          |
| Leccia               | Leerfish                        | Lichia amia               | 0.060                                  | 0.005          |
| Lanzardo             | Chub mackerel                   | Scomber japonicus         | 0.042                                  | 0.003          |
| Rombo chiodato       | Turbot                          | Psetta maxima             | 0.041                                  | 0.003          |
| Rombi altri          | Turbots nei                     | Scophthalmidae            | 0.035                                  | 0.003          |
| Capone gavotta       | Longfin gurnard                 | Chelidonichthys obscurus  | 0.028                                  | 0.002          |
| Zanchetta            | Mediterranean scaldfish         | Arnoglossus laterna       | 0.008                                  | 0.001          |
| Pesce prete          | Stargazer                       | Uranoscopus scaber        | 11.124                                 | 0.880          |
| Tracine              | Weeverfishes nei                | Trachinidae               | 10.442                                 | 0.826          |

*Source: estimates from MIPAAFT/National Fisheries Data Collection Programme*

**Table 4.2.3.3 – List of species detected for the UoA using traps in the GSA 11. The underlined species are the species detected for the selected UoAs..**

| <b>Italian name</b>          | <b>English name</b>     | <b>Scientific name</b>         | <b>Mean landing in weight 2015-2016 (Ton)</b> | <b>Percentage (%)</b> |
|------------------------------|-------------------------|--------------------------------|---|-----------------------|
| Polpo comune o di scoglio    | Common octopus          | <i>Octopus vulgaris</i>        | 631.552                                       | 61.124                |
| Altri pesci                  | Marine fishes nei       | <i>Osteichthyes</i>            | 88.438  | 8.559                 |
| Murene                       | Mediterranean moray     | <i>Muraena helena</i>          | 54.311  | 5.256                 |
| Gronghi                      | European conger         | <i>Conger conger</i>           | 52.778  | 5.108                 |
| Ghiozzi                      | Gobies nei              | <i>Gobiidae</i>                | 47.773  | 4.624                 |
| Scorfano nero                | Black scorpionfish      | <i>Scorpaena porcus</i>        | 36.361  | 3.519                 |
| Serranidae                   | Groupers, seabasses nei | <i>Serranidae</i>              | 28.943  | 2.801                 |
| Tanute                       | Black seabream          | <i>Spondyliosoma cantharus</i> | 21.805  | 2.110                 |
| Seppia mediterranea o comune | Common cuttlefish       | <i>Sepia officinalis</i>       | 20.991  | 2.032                 |
| Murena nera                  | Brown moray             | <i>Gymnothorax unicolor</i>    | 16.648  | 1.611                 |
| Scorfanotto                  | Small red scorpionfish  | <i>Scorpaena notata</i>        | 15.866  | 1.536                 |
| Granchi                      | Marine crabs nei        | <i>Brachyura</i>               | 5.293   | 0.512                 |
| Anguille                     | European eel            | <i>Anguilla anguilla</i>       | 4.966   | 0.481                 |
| Moscardino muschiato         | Musky octopus           | <i>Eledone moschata</i>        | 3.193   | 0.309                 |
| Scorfano rosso               | Red scorpionfish        | <i>Scorpaena scrofa</i>        | 2.772   | 0.268                 |
| Aragosta                     | Common spiny lobster    | <i>Palinurus elephas</i>       | 0.905   | 0.088                 |
| Tracine                      | Weeverfishes nei        | <i>Trachinidae</i>             | 0.168   | 0.016                 |
| Razza maculata               | Spotted ray             | <i>Raja montagui</i>           | 0.096   | 0.009                 |
| Dentici                      | Common dentex           | <i>Dentex dentex</i>           | 0.090   | 0.009                 |
| Musdea                       | Forkbeard               | <i>Phycis phycis</i>           | 0.058   | 0.006                 |
| Argentine                    | Argentines              | <i>Argentina spp</i>           | 0.055   | 0.005                 |
| Moscardino bianco            | Horned octopus          | <i>Eledone cirrhosa</i>        | 0.041   | 0.004                 |
| Pagello fragolino            | Common pandora          | <i>Pagellus erythrinus</i>     | 0.038   | 0.004                 |
| Pesce prete                  | Stargazer               | <i>Uranoscopus scaber</i>      | 0.032   | 0.003                 |
| Rana pescatrice              | Angler(=Monk)           | <i>Lophius piscatorius</i>     | 0.032   | 0.003                 |

Source: estimates from MIPAAFT/National Fisheries Data Collection Programme

**Table 4.2.3.4 – List of species detected for UoA using drift longlines (LLD) in GSA 11. The species underlined are the species detected for the selected UoA.**

| Italian name      | English name                     | Scientific name               | Mean landing in weight 2015-2016 (Ton) | Percentage (%) |
|-------------------|----------------------------------|-------------------------------|--|----------------|
| Pesce spada       | Swordfish                        | <i>Xiphias gladius</i>        | 429.797                                | 79.301         |
| Ricciole          | Greater amberjack                | <i>Seriola dumerili</i>       | 74.663                                 | 13.776         |
| Alalunga          | Albacore                         | <i>Thunnus alalunga</i>       | 18.114                                 | 3.342          |
| Cernia di scoglio | Dusky grouper                    | <i>Epinephelus marginatus</i> | 3.275                                  | 0.604          |
| Tonno rosso       | Atlantic bluefin tuna            | <i>Thunnus thynnus</i>        | 3.262                                  | 0.602          |
| Luccio            | European barracuda               | <i>Sphyrna sphyraena</i>      | 1.947                                  | 0.359          |
| Altri pesci       | Marine fishes nei                | <i>Osteichthyes</i>           | 1.501                                  | 0.277          |
| Lampughe          | Common dolphinfish               | <i>Coryphaena hippurus</i>    | 1.336                                  | 0.247          |
| Nasello           | European hake                    | <i>Merluccius merluccius</i>  | 1.271                                  | 0.235          |
| Pesce sciabola    | Silver scabbardfish              | <i>Lepidopus caudatus</i>     | 0.820                                  | 0.151          |
| Razza chiodata    | Thornback ray                    | <i>Raja clavata</i>           | 0.757                                  | 0.140          |
| Sgombro           | Atlantic mackerel                | <i>Scomber scombrus</i>       | 0.742                                  | 0.137          |
| Verdesca          | Blue shark                       | <i>Prionace glauca</i>        | 0.740                                  | 0.136          |
| Palamita          | Atlantic bonito                  | <i>Sarda sarda</i>            | 0.688                                  | 0.127          |
| Palombo           | Blackspotted smooth-hound        | <i>Mustelus punctulatus</i>   | 0.649                                  | 0.120          |
| Istiophoridae     | Marlins, sailfishes, etc. nei    | <i>Istiophoridae</i>          | 0.513                                  | 0.095          |
| Tonnetto striato  | Skipjack tuna                    | <i>Katsuwonus pelamis</i>     | 0.476                                  | 0.088          |
| Pesce castagna    | Atlantic pomfret                 | <i>Brama brama</i>            | 0.399                                  | 0.074          |
| Gronghi           | European conger                  | <i>Conger conger</i>          | 0.364                                  | 0.067          |
| Rana pescatrice   | Angler (=Monk)                   | <i>Lophius piscatorius</i>    | 0.184                                  | 0.034          |
| Tonnetto          | Little tunny (=Atl. black skipj) | <i>Euthynnus alletteratus</i> | 0.164                                  | 0.030          |
| Lanzardo          | Chub mackerel                    | <i>Scomber japonicus</i>      | 0.139                                  | 0.026          |
| Palombo liscio    | Smooth-hound                     | <i>Mustelus mustelus</i>      | 0.109                                  | 0.020          |
| Aguglie           | Garfish                          | <i>Belone belone</i>          | 0.051                                  | 0.009          |
| Pagro comune      | Red porgy                        | <i>Pagrus pagrus</i>          | 0.010                                  | 0.002          |
| Scorfano rosso    | Red scorpionfish                 | <i>Scorpaena scrofa</i>       | 0.009                                  | 0.002          |

Source: estimates from MIPAAFT/National Fisheries Data Collection Programme

#### 4.2.4 Environmental context

The geographic sub-area 11 includes the totality of the seas surrounding Sardinia. The depths surrounding the island and potentially exploitable are estimated at around 23.700 Km<sup>2</sup>; their displacement along the coasts (1,846 km) is not homogeneous both in extension and in oceanographic, geomorphological and bionomic characteristics.

From an oceanographic point of view, this area belongs to two different basins, the Algero-Provençal basin and the Tyrrhenian basin, connected to each other by the Sardinian Channel.

From a bathymorphological point of view the funds in front of Sardinia can be divided into four main areas:

1. the west coast (Sardinia Sea) characterized by a vast extension of both the platform and escarpment bottoms. The stalls in fact end between 150 and 200 meters, with a slightly marked slope followed by the slightly sloping continental slope. The particular interest of the funds of the continental plateau, in addition to their considerable extension, is given by the scarcity of funds made up of slime and the abundance of coarse sand funds. This condition, combined with the great transparency of the water, allows a very marked development of the vegetation; between 0 and 40 meters there are in fact extensive prairies of marine Phanerogams (*Posidonia oceanica*). Unlike the other areas, on the west coast alternate coastal detritus Algal and coralligenous. The coastal hard waters present the typical biocenosis of the vertical walls. There are some of the most interesting gorgonaceous facies (*Paramuricea clavata*) and red coral (*Corallium rubrum*). The margin of the continental shelf is characterized by the presence of detrital bottoms on which the crinoid *Leptometra phalangium* reaches high concentrations. This area is exposed to winds from the third and fourth quadrant.
2. the northern coast is characterized by the presence of the Gulf of Asinara and the Bocche di Bonifacio, which divide Sardinia from Corsica. The continental shelf is moderately extended while the escarpment is reduced and steep;
3. the east coast is characterized by reduced and steep fishing grounds, with the 1000 m bathymetric that runs very close to the coast. Moreover, from Capo Carbonara to the Bocche di Bonifacio, the continental shelf is very narrow and irregular, with the presence of underwater valleys, lifts and canyons as in the Gulf of Orosei;
4. the southern coast is characterized by the presence of the Gulf of Cagliari. The platform is much wider (11 km) in the western portion (40 km of coast) rather than in the eastern part where its extension is very limited and steep (the 500 m isobath runs less than 3 km from the coast).

The subdivision by bathymetric layers of the entire GSA 11 shows that most of them (about 67%) are over 100 meters deep.

The masses of water involved in fishing activities are above all superficial and intermediate ones. The circulation of the surface water masses of the seas around Sardinia is mainly due to the Atlantic water vein (AW) that feeds the Algerian stream. This current flows east along the African continental slope, normally affecting an area of about 10 km and 100 m of depth. To the Algerian current vortices of various dimensions and duration are often associated. Some of them, consisting exclusively of AW and characterized by anticyclonic circulation, can have diameters of 100-200 km and affect the entire water column (up to 3,000 m depth). These vortices can last for long times and can be removed from the Algerian coast accumulating between the Balearics and Sardinia. The eastward advancement of these open sea vortices is in fact topographically limited by the Sardinian Channel, and the vortices are forced to move northwards (contributing to the instability of the flow of current west of Sardinia and Corsica) before turning west finally to return to the Algerian basin.

A part of the AW flows through the Sardinian Channel in the Strait of Sicily. Another part enters the southern Tyrrhenian Sea and circulates in a cyclonic direction along the escarpment of northern Sicily and the Italian continental coasts. A vein of AW passes through the Capraia Channel in the Ligurian Sea, another continues to travel south along the coasts of Corsica and Sardinia.

The southern Tyrrhenian Sea, in particular the Sardinia-Sicily section, is a key part of the hydrological dynamics between the western and eastern Mediterranean basin.

As regards intermediate and deep waters, intermediate levantine water (LIW) and a small fraction of Levantine deep water (EMDW) enters the Tyrrhenian Sea from the Strait of Sicily and then circulates, above all the LIW, in a cyclonic sense, between 200-600 m depth. A vein of LIW enters the Ligurian Sea through the Capraia Channel (saddle to ~ 400 m), another and more consistent vein of LIW flows south along Corsica and Sardinia, mixing in part with the deep Tyrrhenian water (TDW), which with the LIW forms the outflow from the Tyrrhenian basin towards the Sardinian Channel.

Along the south-western coasts of Sardinia, the LIW and the TDW, which flow north along the Sardinian escarpment and run, showing a variation of pattern from south to north attributed to the interaction with the Algerian sea vortexes.

Furthermore, in accordance with the Convention on Biological Diversity (CHM, 2017), the northern coasts of Sardinia fall into one of the significant areas EBSA (EBSA: Ecologically or Biologically Significant Areas). The area is representative of the peculiarities of the western Mediterranean basin in terms of oceanographic conditions, geomorphology and contains ecosystems that host unique trophic networks. With its wide variety of characteristics of the seabed, the area is home to a unique diversity of habitats from the mediolittoral zone to the bathyal zone, and also contains a large amount of biodiversity, characterized by bio-constructive species. Most species and habitats in this area are vulnerable and characterized by low resilience.

The northern coasts of Sardinia also fall within the significant EBSA area of the pelagic ecosystem of the north-west Mediterranean. The area is characterized by a series of geomorphological and oceanographic features that allow it to host species of marine mammals with exceptional levels of diversity and abundance of species. The oceanography of the water masses in the area is at the base of its productivity and its extraordinary biological and ecological significance. For some large pelagic groups, including tuna, this region represents an important breeding and feeding area also for sea turtles (*Caretta caretta* and *Dermochelys coriacea*).

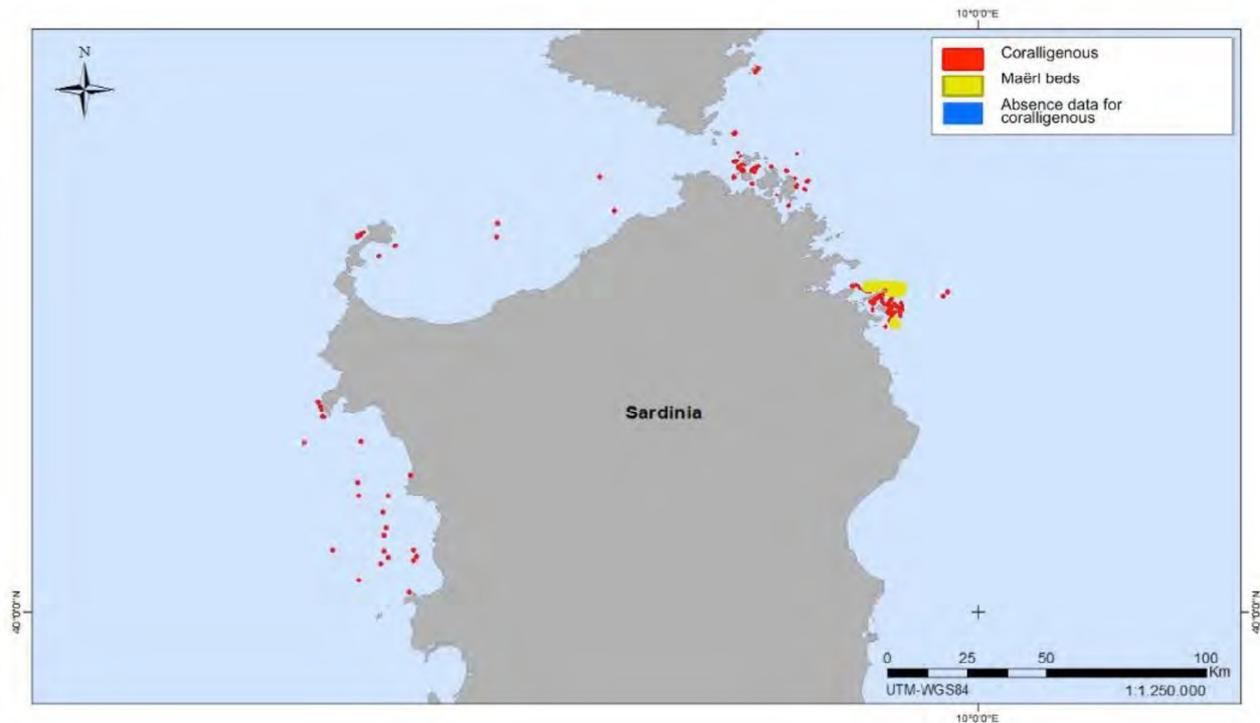
#### **Distribution of marine seagrasses**

All the coasts of Sardinia are characterized by the important presence of prairies of *P. oceanica*, while *Halophila stipulacea* and *Cymodocea nodosa* are less abundant (Figure 4.1.4.2, Annex I, GSA 10). The prairies of *P. oceanica* along the coasts of Sardinia are very well studied and mapped. Distribution maps are currently available for the entire coastal area.

#### **Distribution of coralligenous**

In Sardinia, the presence of coralligenous and maërl bottoms is most recently reported for the northern portion of the island's coasts (Figure 4.2.4.1). In particular, R.O.V. performed in different areas of the northern coasts of Sardinia have confirmed in a timely manner the presence of circulatory biocenosis of hard substrate indicated in multibeam prospecting. There was also a substantial difference between the superficial and deep coralligenous formations. To this result is added the confirmation of a well-structured upper and middle coralligenous with facies at *Eunicella cavolinii* and *P. clavata* (Cossu and De Luca, 2016). The coralligenous of northern Sardinia is considered a key ecosystem, as are the maërl funds located near the island of

Tavolara, which are the result of coral algae construction activities as well as biological erosion processes. This habitat develops in low light conditions and in relatively calm waters. Mäerl beds are biodiversity "hot spots" because they improve the biological and functional diversity of coastal sediments.

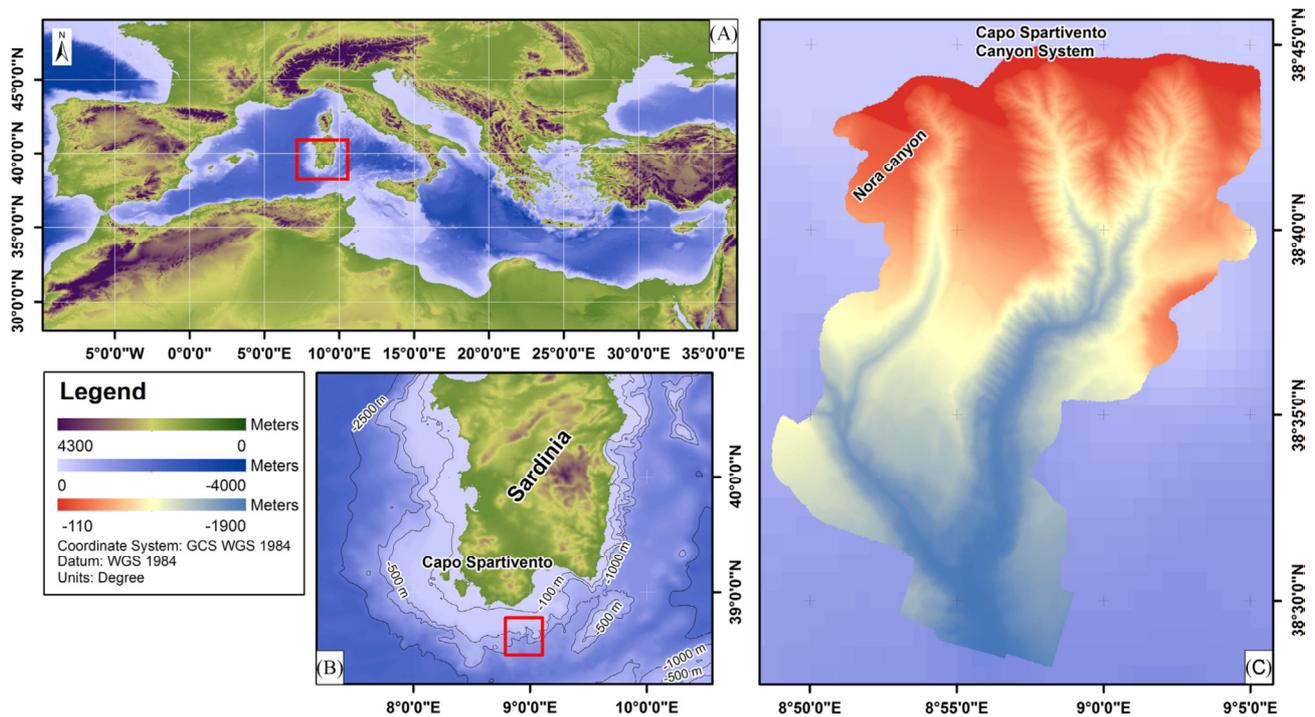


**Figure 4.2.4.1 - Map of the distribution of coralligenous bottoms in Sardinia (Giannoulaki et al., 2013).**

### Deep coral biocoenosis

In the north of Sardinia there are underwater caves characterized by the presence of endemic species of corals and other deep habitats important for the diversity of the sea floor, such as the funds characterized by the presence of *C. rubrum*. This species has been fishing for many decades and since 1979, the red coral harvest in Sardinia has been regulated by regional laws.

To the south of the island has recently been identified a new area with the presence of deep corals of cold water (Figure 4.2.4.2) near the canyon system Spartivento off the southern coast of Sardinia. These colonies are characterized by a spectacular growth of corals, and are characterized by the dominance of *Madrepora oculata* at a depth of 380 - 460 m. In addition, *Desmophyllum dianthus* and occasionally *Lophelia pertusa* are also present. As documented by the prospecting with ROV, this area is a hotspot of megafaunal diversity that also hosts specimens *Neopycnodonte zibrowii* (Taviani et al., 2016).



**Figure 4.2.4.2 - Map of the distribution of deep coral bottoms in southern Sardinia (Taviani et al., 2016).**

#### The ecosystem of the seas surrounding Sardinia

The GSA 11 is in the same eco-region as the GSA 10, previously covered in Annex I, Section 4.1.4.

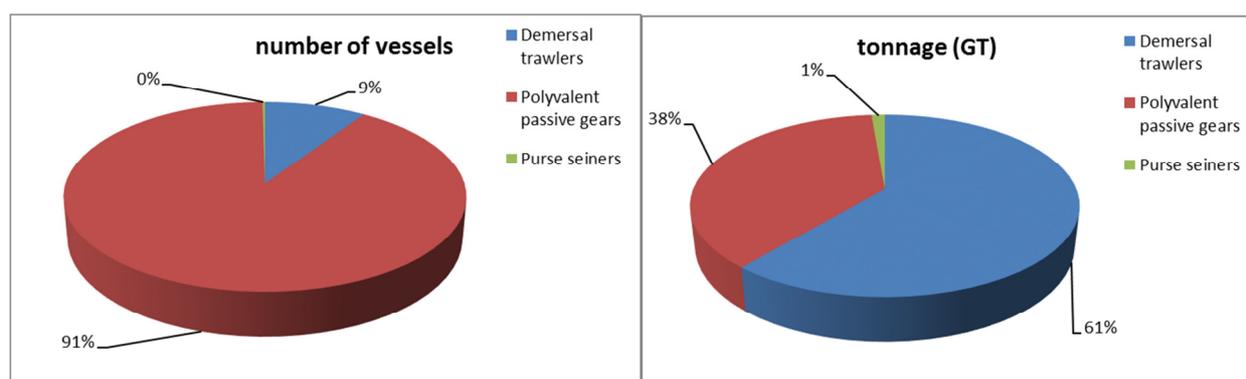
#### 4.2.5 Socio-economic context. Analysis of the main socio-economic indicators and of market trends in the 10 UoAs selected for the Deeper Mapping

The Sardinian fisheries sector is markedly artisanal and polyvalent. Polyvalent passive vessels are the vast majority (91%) and exert a commensurate social, occupational, and economic influence. This fleet segment consists almost completely of small boats with a LOA less than 12 m that use exclusively passive gears (1,090 out of 1,127 vessels using passive gear). The gears employed by most artisanal fishermen are highly selective, *i.e.* gillnets and pots and traps.

However, trawlers also play a far from negligible role. In fact, besides accounting for most of the tonnage (61%), they also represent a large proportion of catches, since in 2017 they landed more than 3,000 tons of product, worth €24 million, accounting for more than one third of landing volume and value.

Sardinian trawlers tend to be larger than the Italian average (48 vs. 43 GT), due to the fact that the fish-rich areas with suitable geo-morphological features for trawling are found at a great distance from the coast. Moreover, the presence of several protected areas such as marine parks and military zones reduces the available trawlable areas, requiring trawlers to reach sites very far from their port. The larger vessels usually sail southwards, to catch red shrimp (MIPAAFT, 2017).

Small-scale fisheries involve 1,066 boats (82% of all vessels and 22% of the region's tonnage), which account for a total of 2,158 GT and a power of 33,000 kW. These vessels employ 1,687 operators (about 70% of fisheries jobs in the area), who are characterised by marked technical flexibility since they need to be able to perform different tasks in relation to time of the year, stock availability, and climate conditions. However, such flexibility reflects a high degree of uncertainty, since activities are heavily dependent on climate conditions and stock status.



**Figure 4.2.5.1 - Composition of the fleet registered in the ports of GSA 10 in relation to predominant fishing technique, vessel number, and tonnage (2017 data). Source: MIPAAFT / National Fisheries Data Collection Programme. Data processed by NISEA.**

In the past few years the average number of vessels employing pots and traps, particularly to catch octopus, has increased. This highly selective fishery involves limited costs and is a good source of income, especially in winter.

With regards to product sale, markets are very few and poorly organised. Sales are mostly managed by wholesalers. In the main market, in Cagliari, sales are managed by market operators who set the average sale price and then deal with potential buyers. Whereas until recently buyers had free access to the market at any time, they are now admitted later and all together, to increase competition. Nonetheless, competition is still limited compared with the markets where fish is traded in electronic auctions. The market in Porto Torres, the second most important on the island, is private and sales are managed by a single wholesaler (MIPAAFT, 2017).

The analysis of product flows highlighted that the amount of local product sold in the Sardinian markets is much lower than the volume actually caught and landed by the local fleets. The products found in these markets are those caught by trawlers. The average sale price of local fish, recorded in the Cagliari market, increased by about 6% from 2015 to 2017. The limited role of this market in the sale of local fish is also due to its distance from the landing sites and to poor infrastructure, which penalise transport and add to the sale price.

Nonetheless, the FLAGs (Fishery Local Action Groups) have invested heavily to enhance the value of some local species, such as red mullet<sup>1</sup>, through a sustainability certificate. Their objective is to boost the sale of locally caught fish by actions aimed at the whole production chain, also involving the local restaurants (MIPAAFT, 2017).

<sup>1</sup> [http://www.retedeiproduttori.it/wp/wp-content/uploads/2015/11/154\\_2015\\_W\\_GAC\\_Red-mullet\\_triglia-di-fango.pdf](http://www.retedeiproduttori.it/wp/wp-content/uploads/2015/11/154_2015_W_GAC_Red-mullet_triglia-di-fango.pdf)

Other local initiatives of FLAGS involve the creation of a virtual shop<sup>2</sup> for producers. An upward trend has been detected in the consumption of local lagoon products, which are viewed as highly valuable in terms of quality and nutritional properties. Also in relation to local product, the Eastern Sardinia FLAG has adopted EMFF measures aimed both at the sustainable management of lagoon resources – through the involvement of local fishermen – and at spreading the stock protection culture to a wide range of stakeholders like young people, restaurateurs and educators.

The fishing activities carried out in the 10 UoAs of GSA 11 that have been selected for the Deeper Mapping (listed in Table 4.2.1.1) employ gears such as trawls, passive gears (chiefly trammel nets and traps), and drifting longlines to catch swordfish. The next table reports the estimated number of vessels which in 2017 practiced a *métier* based on a combination of gear and group of target species according to DCF programme codifications. Notably, the adoption of a gear does not exclude the use of another gear in the course of the same year and, in some cases, even of the same day. For this reason, it is impossible to sum vessel and crew numbers.

**Table 4.2.5.1 - Structural and production indicators for the 10 UoAs selected in GSA 11 (2017 data)<sup>3</sup>**

| Gear (species defining the selected UoA)   | Group of target species | Number of vessels | Estimated crew number | Total value of landings (€ 000) | Value of landings of species of the selected UoA (%) |
|--|-------------------------|-------------------|-----------------------|---------------------------------|--|
| Pots ( <i>Common octopus</i> )   | DEF                     | 440               | 881                   | 7,374,360                       | 77%  |
| Drifting longlines ( <i>Swordfish</i> )  | LPF                     | 35                | 106                   | 4,063,064                       | 88%  |
| Bottom otter trawl ( <i>Giant red shrimp, Musky octopus, Surmullet</i> )   | DEF                     | 84                | 335                   | 9,697,436                       | 35%  |
|  | DWS                     | 6                 | 28                    | 1,800,587                       | 64%  |
|  | MDD                     | 35                | 141                   | 12,222,764                      | 39%  |
| Trammel nets ( <i>Common octopus, Common cuttlefish, Surmullet, Red scorpionfish, Common spiny lobster</i> )   | DEF                     | 635               | 1,270                 | 14,085,606                      | 61%  |
| <ul style="list-style-type: none"> <li>– DEF: Demersal fish</li> <li>– DWS: Deep-water species</li> <li>– MDD: Mixed demersal and deep-water species</li> <li>– LPF: Large pelagic fish</li> </ul> |                         |                   |                       |                                 |  |

**Source:** MIPAAFT / National Fisheries Data Collection Programme. Data processed by NISEA.

<sup>2</sup> <http://www.flagsardegnaorientale.it/azione-2-la-vevtrina-del-pescatore/>

<sup>3</sup> Crew numbers are based on the mean job figures reported in the period in question for the fleet segment to which the 10 UoAs belong (where a segment includes vessels using predominantly a given gear).

The 10 UoAs selected for the Deeper Mapping belong to the three main fleet segments defined by Commission Regulation (EC) No. 1639/2001, as follows:

- polyvalent passive vessels (PGP) both longer and shorter than 12 m LOA: for the UoAs where vessels use predominantly pots and traps, trammel nets, and longlines;
- trawlers (DTS): for the UoAs that use trawls, which are commonly the predominant gear.

The next figure shows the 2008-2016 trends of the main structural indicators (vessel and crew number) and production variables (value of landings and value added) relating to the fleet segments to which the 10 UoAs of GSA 11 belong.

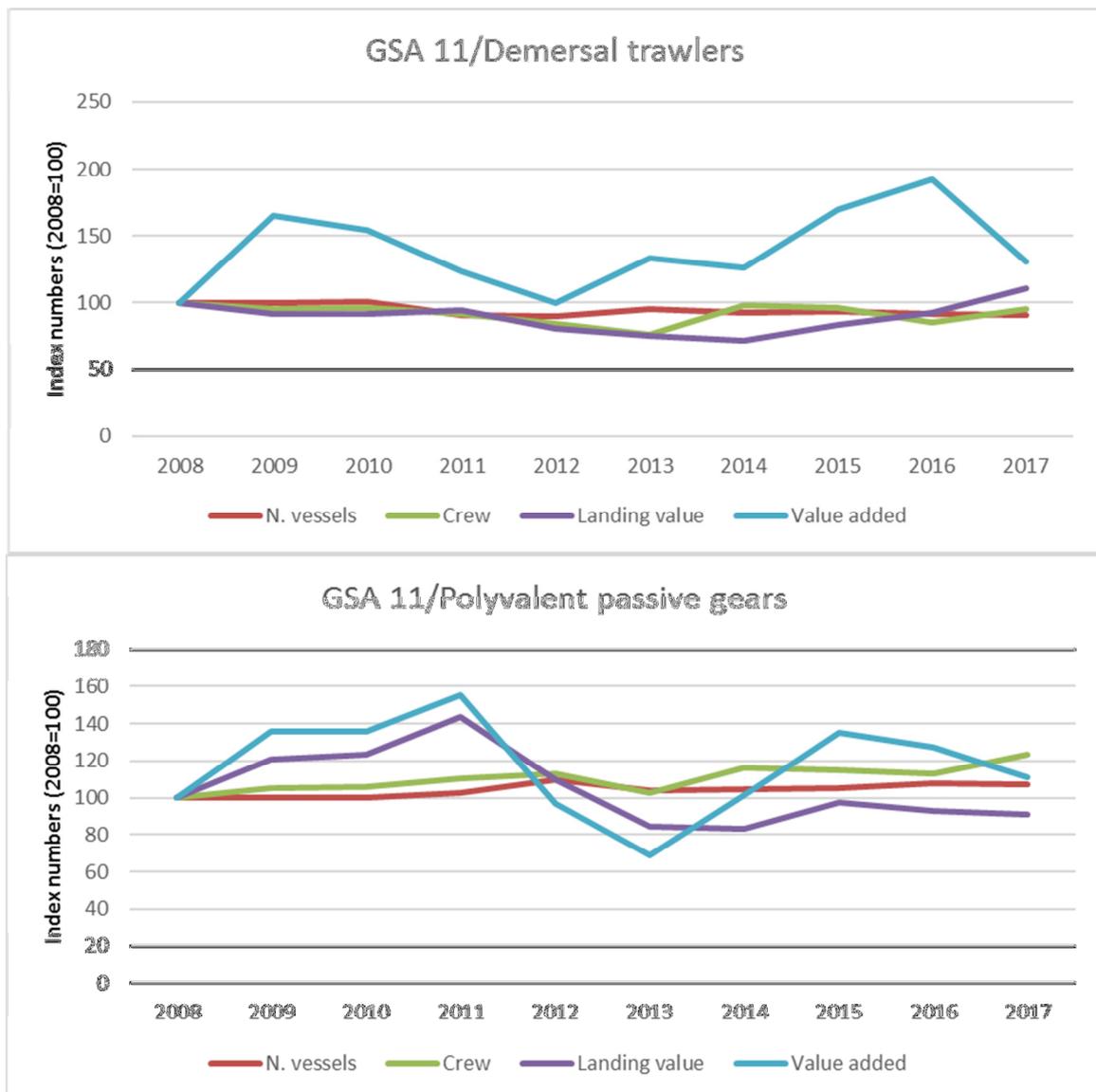
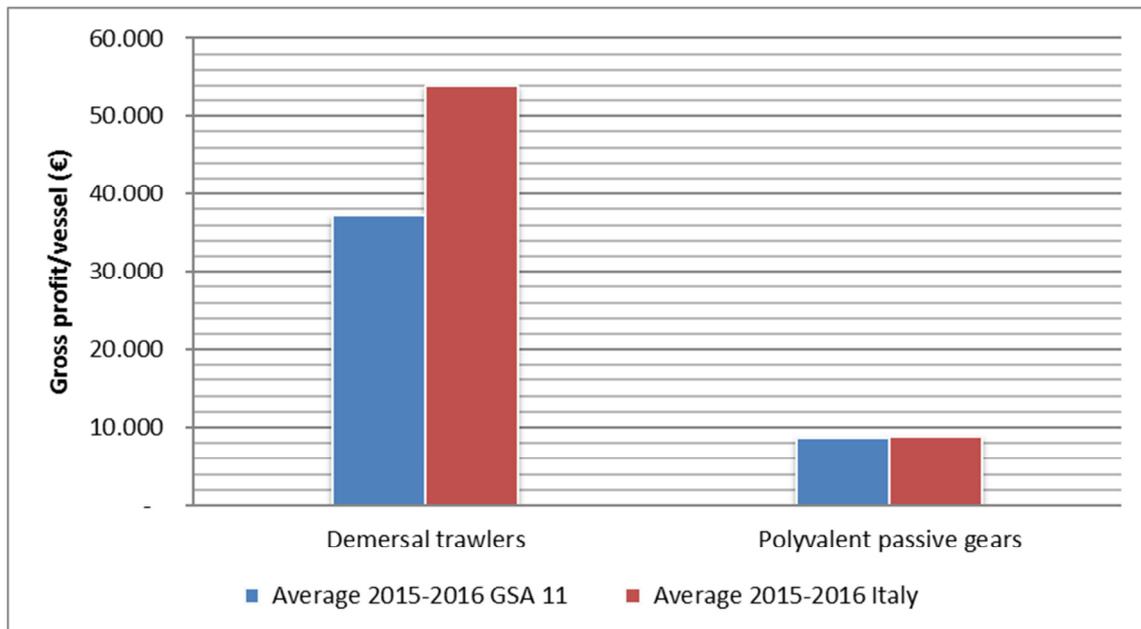


Figure 4.2.5.2 - Trends of the structural and production indicators for the fleet segments to which the 10 UoAs selected in GSA 11 belong; index numbers 2008-2016 (2008=100). **Source:** MIPAAFT / National Fisheries Data Collection Programme. Data processed by NISEA.

As shown in the diagram, capacity, crew number, and the value of landings were fairly stable throughout the period, whereas the second indicator of economic performance, value added, improved starting in 2012.

The trend of gross profit *per vessel* regarding the boats using predominantly passive gears was less stable. The value of landings increased until 2011, accompanied by a more than proportional increase of value added, it then declined until 2013, and finally recovered again, while the value added rose strongly at least until 2015.



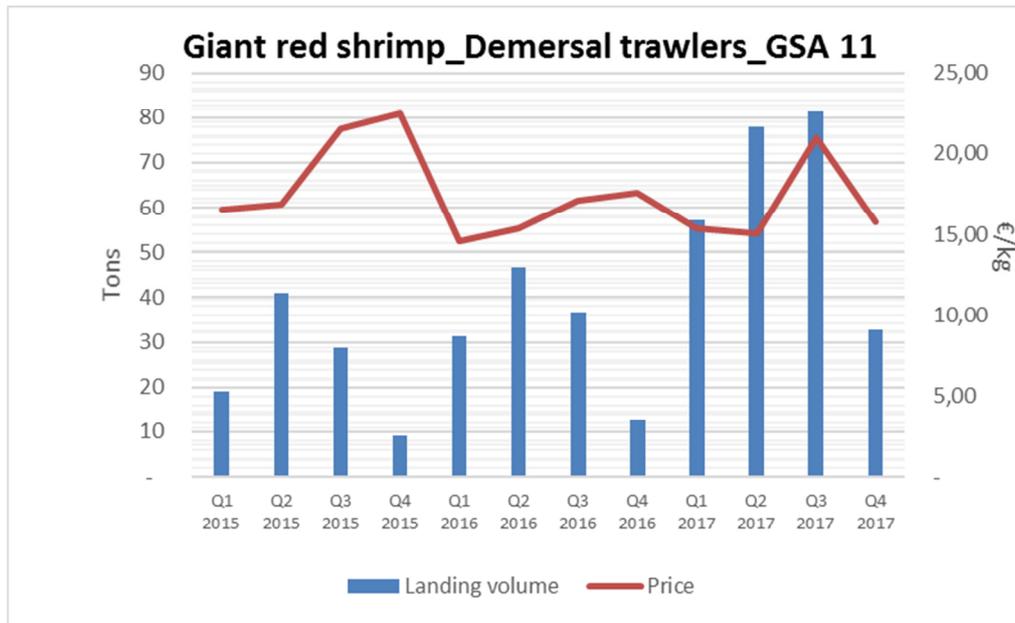
**Figure 4.2.5.3 – Gross revenue *per vessel* for each fleet segment in the 10 UoAs selected in GSA 11. Comparison with the Italian 2015-2016 national average. Source: MIPAAFT / National Fisheries Data Collection Programme. Data processed by NISEA.**

The revenue and cost data for 2015 and 2016 indicate that gross profit per boat in the case of polyvalent passive vessels was in line with the Italian average (about €9,000 a year). Gross profit *per trawler* was €38,000 (compared with the national average of €54,000).

The 10 UoAs selected for the Deeper Mapping of GSA 11 are listed below. For each UoA, this report provides quarterly production figures (landed volume and sale price) for 2015-2017, wholesale market volumes and prices (minimum and maximum), and data regarding consumption of domestic and imported product (as available).

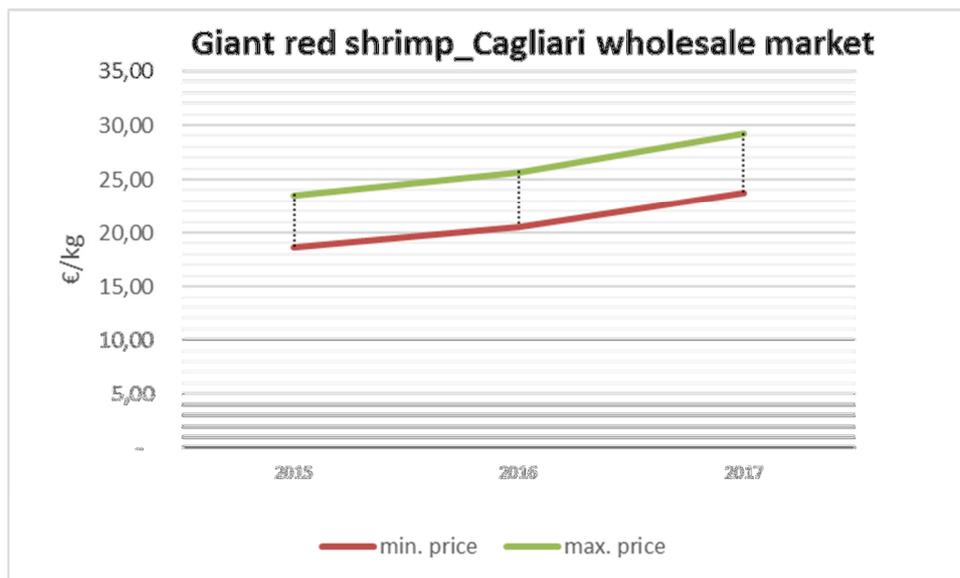
- Giant red shrimp: bottom otter trawls
- Musky octopus: bottom otter trawls
- Swordfish: drifting longlines
- Common octopus: pots and traps and trammel nets
- Common cuttlefish: trammel nets
- Surmullet: bottom otter trawls and trammel nets
- Red scorpionfish: trammel nets
- Common spiny lobster: trammel nets.

**Giant red shrimp:**



**Figure 4.2.5.4 – Average volumes and production prices of giant red shrimp (ARS) landed by vessels using bottom otter trawls (OTB) in GSA 11 (2015-2017 quarterly [Q] data). Source: MIPAAFT / National Fisheries Data Collection Programme. Data processed by NISEA.**

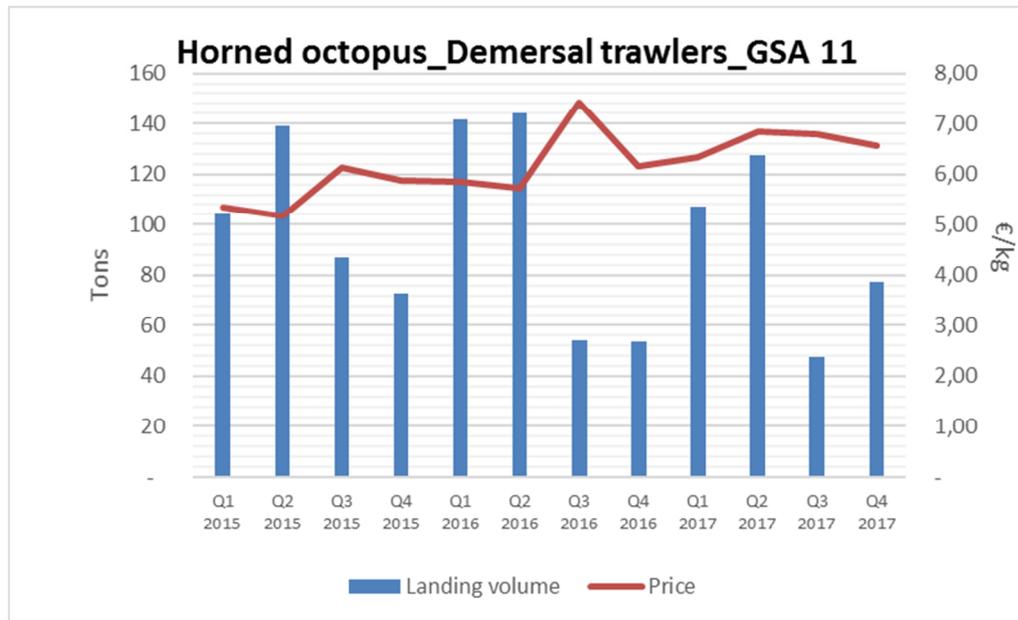
The average annual landings of giant red shrimp by trawlers operating in GSA 11 more than doubled from little under 100 tons in 2015 to 250 tons in 2017. The increased supply involved a slight decline (-13%) in the first sale price, which in 2017 was nearly €17 / kg.



**Figure 4.2.5.5 – Minimum and maximum price of giant red shrimp recorded at the mixed market in Cagliari (Sardinia). Average annual data (2015-2017). Data processed by NISEA.**

The available data for the Cagliari mixed market provide exclusively prices, not sale volumes. The prices suggest that giant red shrimp was supplied exclusively by the Sardinian fleet. The analysis of average sale prices shows a constant increase from about €21 / kg to more than €26.5 / kg (and sometimes even to almost €29 / kg), with an increment of more than 25% over these three years.

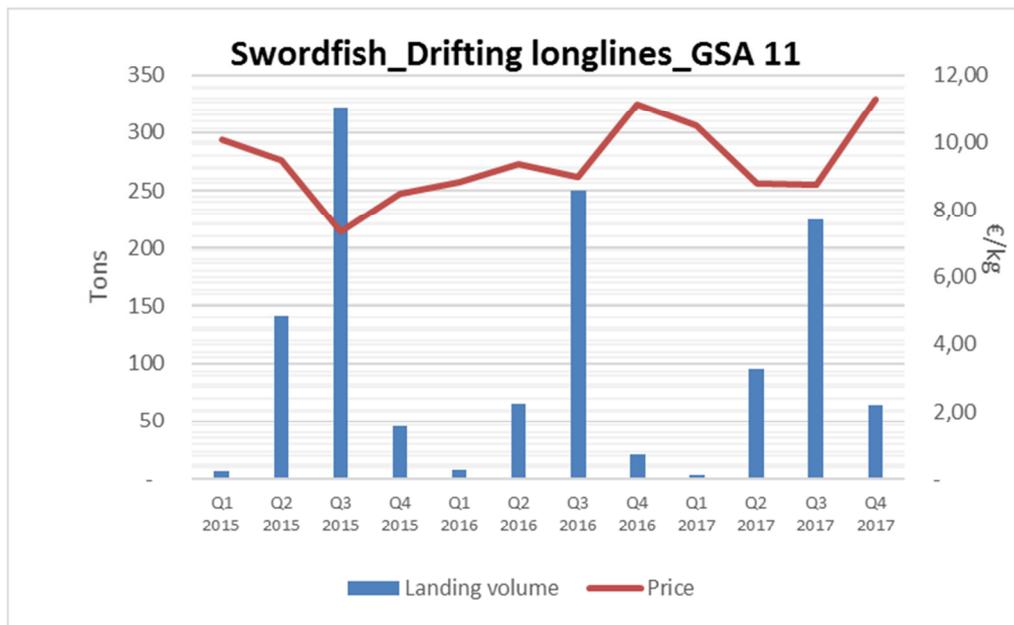
### Musky octopus:



**Figure 4.2.5.6 – Average volumes and production prices of musky octopus (EDT) landed by vessels using bottom otter trawls (OTB) in GSA 11 (2015-2017 quarterly [Q] data). Source: MIPAAFT / National Fisheries Data Collection Programme. Data processed by NISEA.**

The landed volumes of musky octopus in 2017 showed an 11% reduction to 360 tons. Prices grew in proportion, from €5.60 / kg to €6.60 / kg.

Volume figures in the Cagliari market are available only for white octopus.

**Swordfish:**

**Figure 4.2.5.7 – Average volumes and production prices of swordfish (SWO) landed by vessels using drifting longlines (LLD) in GSA 11 (2015-2017 quarterly [Q] data). Source: MIPAAFT / National Fisheries Data Collection Programme. Data processed by NISEA.**

Average annual swordfish landings decreased from 2015 to 2017 (-25%) to slightly less than 400 tons in 2017. This fishery is highly seasonal and is concentrated in the second and third quarter. The average price has been slightly increasing, peaking in 2017 (at a little under €10 / kg). Prices were logically highest in the months when supply was lowest (as in the fourth quarter of 2017, €11.30 /kg).

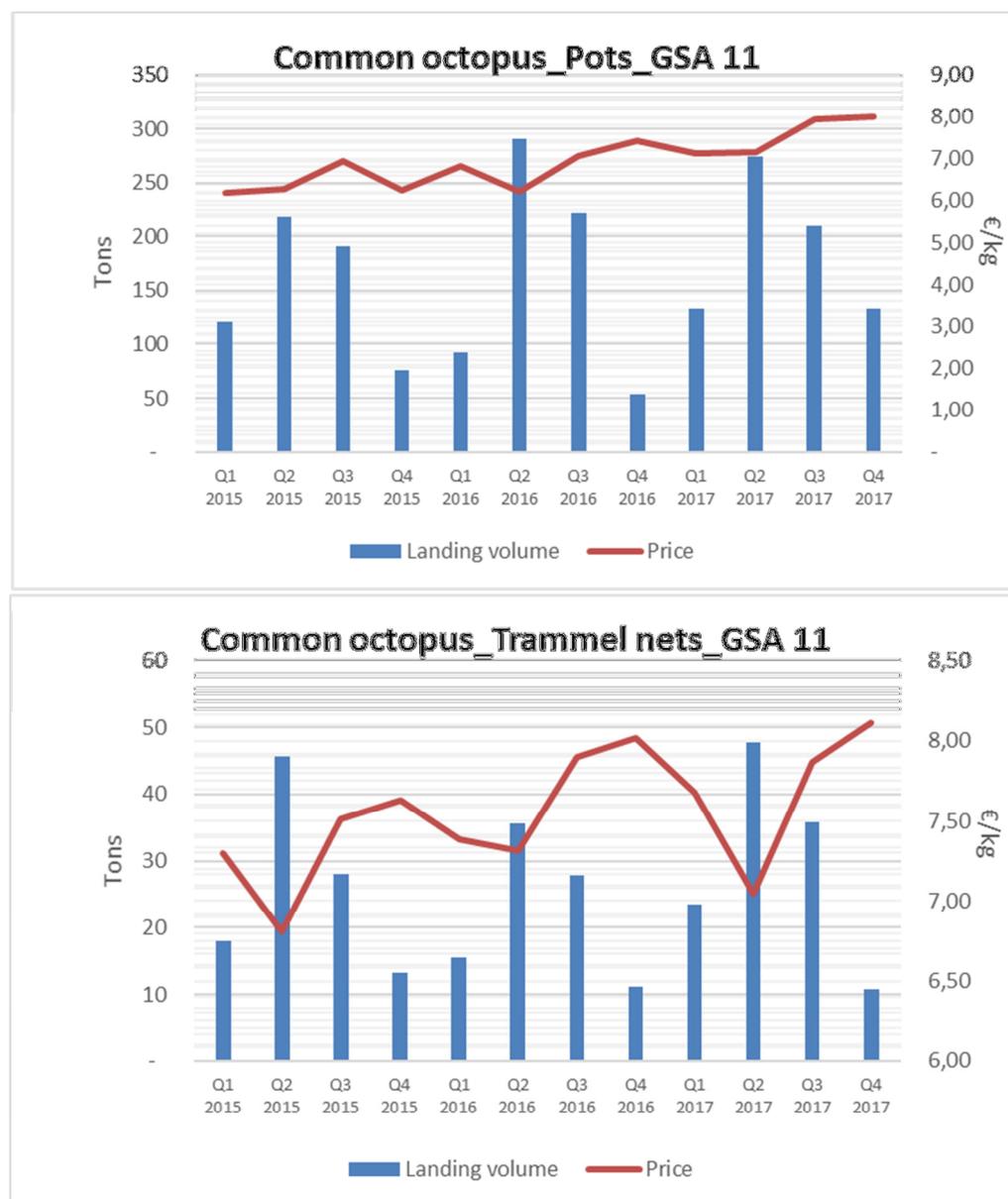


**Figure 4.2.5.8 – Minimum and maximum price of swordfish recorded at the Cagliari mixed market (Sardinia). Average annual data (2015-2017). Data processed by NISEA**

The data from the Cagliari market show a constant supply of locally caught swordfish in 2015-2017. When available, this species is provided to the wholesale market in a single size, the large size. The average price rose slightly by 5% from 2015 to 2017, the highest price being recorded in 2017 with peaks that exceeded €12.50 / kg.

As regards consumption and import-export figures, the reader is referred to the considerations made for swordfish in GSA 10.

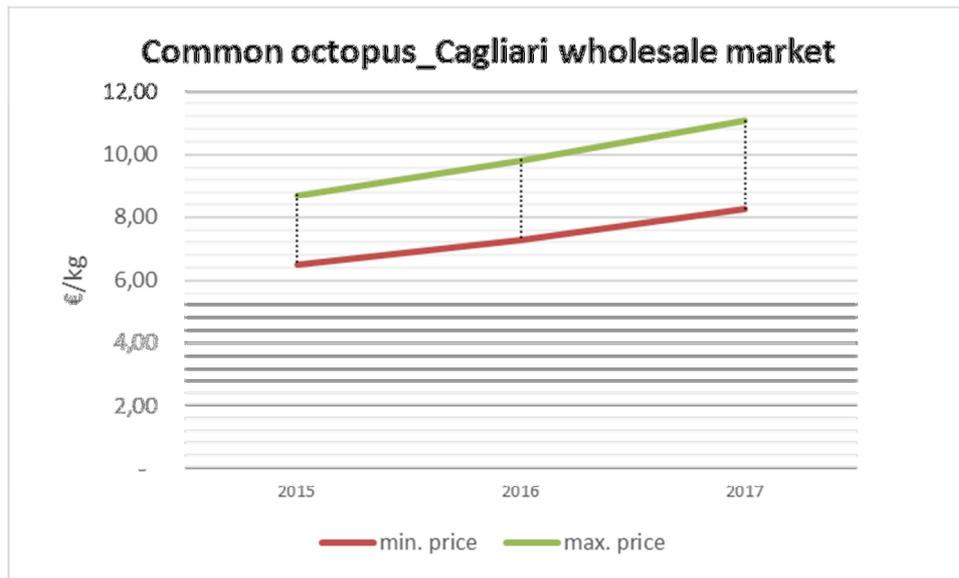
### Common octopus:



**Figure 4.2.5.9 – Average volumes and production prices of common octopus (OCC) landed by vessels using pots and traps (FPO) and trammel nets (GTR) in GSA 11 (2015-2017 quarterly [Q] data). Source: MIPAAFT / National Fisheries Data Collection Programme. Data processed by NISEA.**

The volumes of common octopus landed by boats using pots and traps and by vessels using trammel nets rose to 750 tons in 2017, up by 24% compared with 2015. The volumes landed by vessels using trammel nets were lower and fairly stable, reaching 118 tons in 2017.

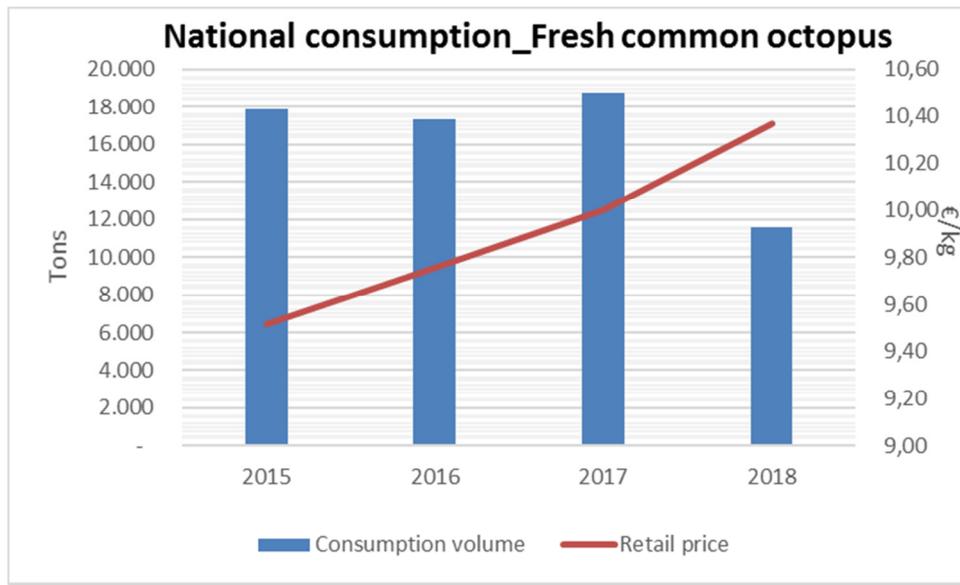
In contrast, the respective average landing price was not significantly different and was €7 / kg (pots and traps, +24% in 2015-2017) and €7.50 / kg (trammel nets, fairly stable).



**Figure 4.2.5.10 – Minimum and maximum price of octopus recorded at the Cagliari mixed market (Sardinia). Average annual data (2015-2017). Data processed by NISEA.**

All octopus sold in the Cagliari fish market is caught locally. Its usual size, which rarely exceeds 1.5 kg *per* individual, indicated that it respected the minimum landing size of 450 g. The auctions commonly offer a whole basket containing 4 or 5 kg of product.

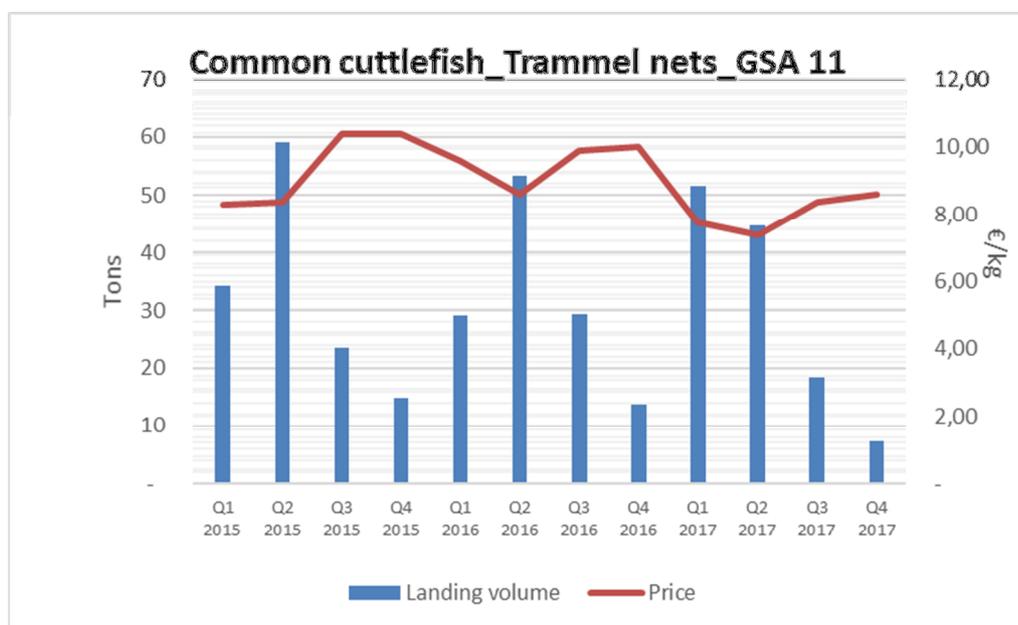
Average prices increased by 27% in 2015-2017, ranging from little more than €6 / kg to more than €11 / kg in 2017. The supply is stable and shows no seasonal trend.



**Figure 4.2.5.11 – National consumption volume and price of octopus in 2015-2018 (2018 data available until 31 August). Source: EUMOFA. Data processed by NISEA.**

The diagram reporting the national octopus consumption figures indicates that consumption in 2015 was 18,000 tons. Since domestic landings in 2017 were 2,600 tons, a strong dependence on imports can be assumed, although such data are not available for this species.

#### Common cuttlefish:



**Figure 4.2.5.12 – Average volumes and production prices of common cuttlefish (CTC) landed by vessels using trammel nets (GTR) in GSA 11 (2015-2017 quarterly [Q] data). Source: MIPAAFT / National Fisheries Data Collection Programme. Data processed by NISEA.**

Vessels using trammel nets provided a stable supply of common cuttlefish in GSA 11. In 2017, the landing volume was about 120 tons and the first sale price was €8 / kg.

All the cuttlefish sold in the Cagliari market come from the Atlantic. The price of medium-sized and large individuals was fairly constant in 2015-2017. Although imports manage to meet most of the local demand, it can be assumed that the consumer generating the demand for the local catch is not the one shopping in the Cagliari mixed market.

As regards consumption and import-export figures, the reader is referred to the considerations made in Annex 1 (GSA 10).

### Surmullet:

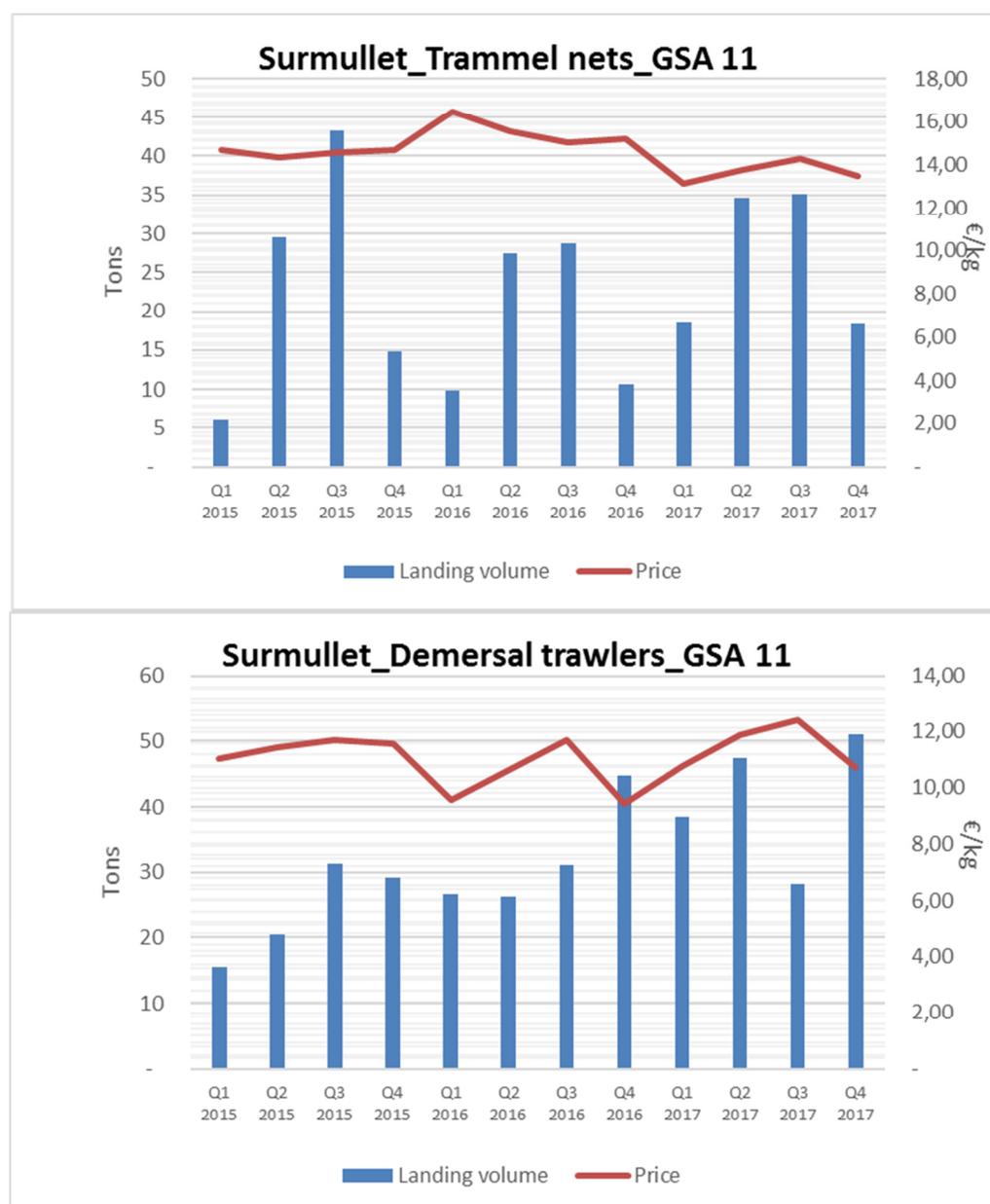
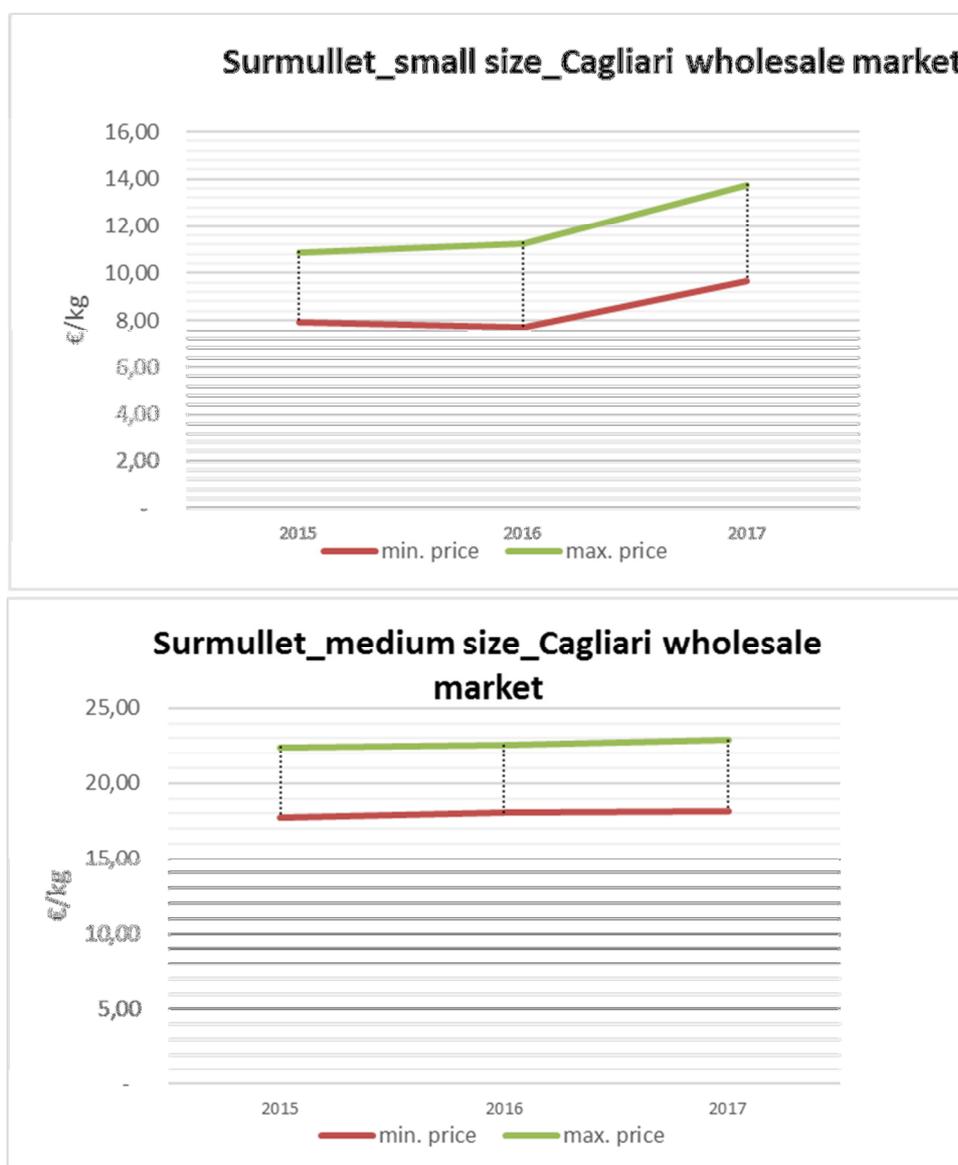


Figure 4.2.5.13 – Average volumes and production prices of surmullet (MUR) landed by vessels using trammel nets (GTR) and bottom otter trawls (OTB) in GSA 11 (2015-2017 quarterly [Q] data). **Source:** MIPAAFT / National Fisheries Data Collection Programme. Data processed by NISEA.

Landings have been increasing, especially the product landed by bottom otter trawls, which in 2017 reached 165 tons (+71% compared with 2015). The price of surmullet caught with trammel nets was higher and more stable (€15 / kg) than the one (€11 / kg) of surmullet caught with trawls, due to the higher quality of the fish caught with the more selective trammel net.

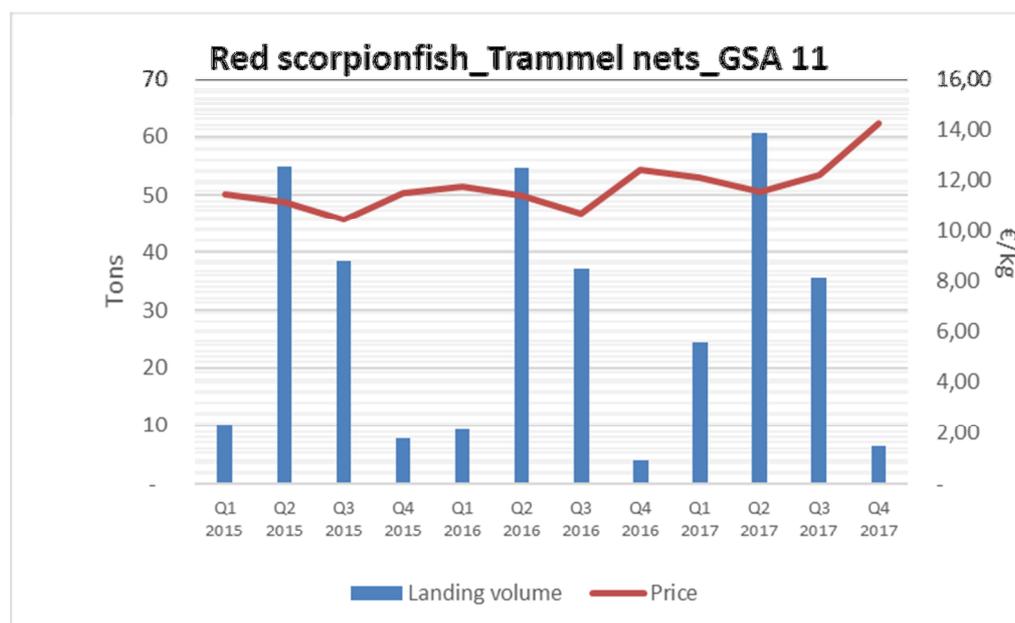


**Figure 4.2.5.14 –Minimum and maximum price of surmullet recorded at the Cagliari mixed market (Sardinia). Average annual data (2015-2017). Data processed by NISEA.**

Surmullet is traded in the Cagliari market. Data analysis highlighted a clear difference between the local supply, which is characterised by small and medium-sized fish that never exceed 200 g, and imported fish, which always exceed this size and whose average price is generally lower. Medium-sized individuals (up to 200 g) consistently command a higher price, which in 2017 exceeded €20.5 / kg. In 2015-2017, the average wholesale price of imported surmullet never exceeded €13.5 / kg. In 2017, the smaller fish, which were offered at €11.70 / kg, were less expensive than both the

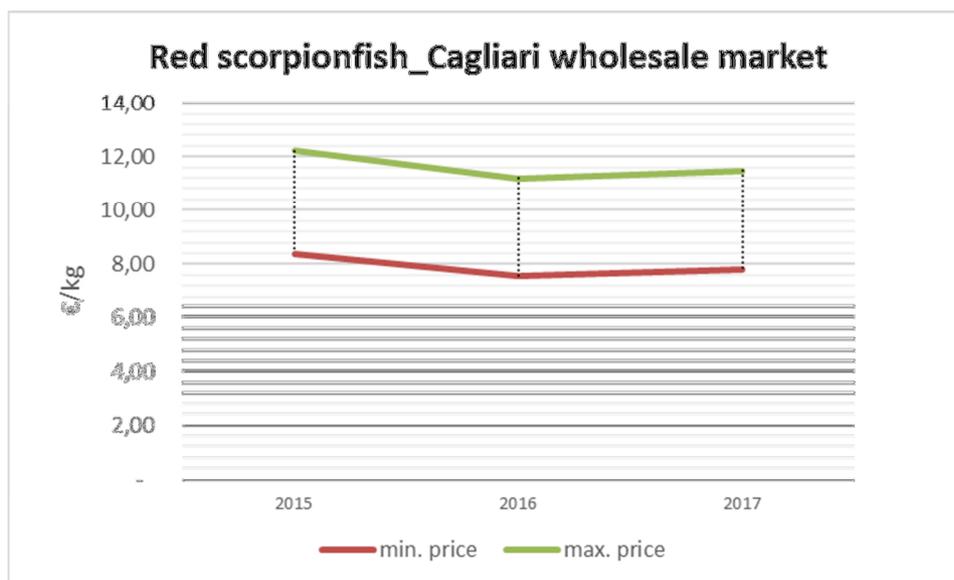
larger sizes and the imported product. The 2015-2017 data for small individuals confirmed the habits of consumers, who prefer either small fish or large imported fish. Analysis of wholesale prices indicates that the two types are fully interchangeable, since in 2015-2017 they showed nearly identical increments in average price: small local fish by about 24.4% and larger imported fish exceeding 200 g by about 23%. Medium-sized surmullet (150-200 g) did not exhibit significant price changes, showing an average increase of slightly more than 2% in 2015-2017 (ISMEA, 2018).

### Red scorpionfish:



**Figure 4.2.5.15 – Average volumes and production prices of red scorpionfish (RSE) landed by vessels using trammel nets (GTR) in GSA 11 (2015-2017 quarterly [Q] data). Source: MIPAAFT / National Fisheries Data Collection Programme. Data processed by NISEA.**

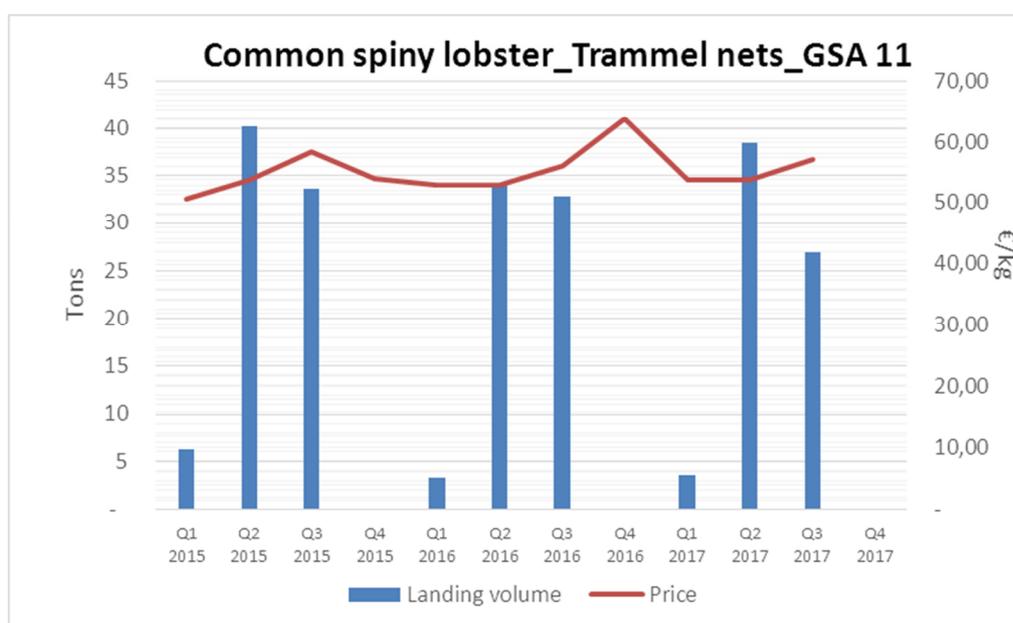
Red scorpionfish landed with trammel nets showed stable quantities of 100-120 tons a year in 2015-2017. Their average price exhibited a small increase and reached €12.50 / kg in 2017 with a peak in winter, due to the limited supply, that exceeded €14 / kg.



**Figure 4.2.5.16 – Minimum and maximum price of red scorpionfish recorded at the Cagliari mixed market (Sardinia). Average annual data (2015-2017). Data processed by NISEA.**

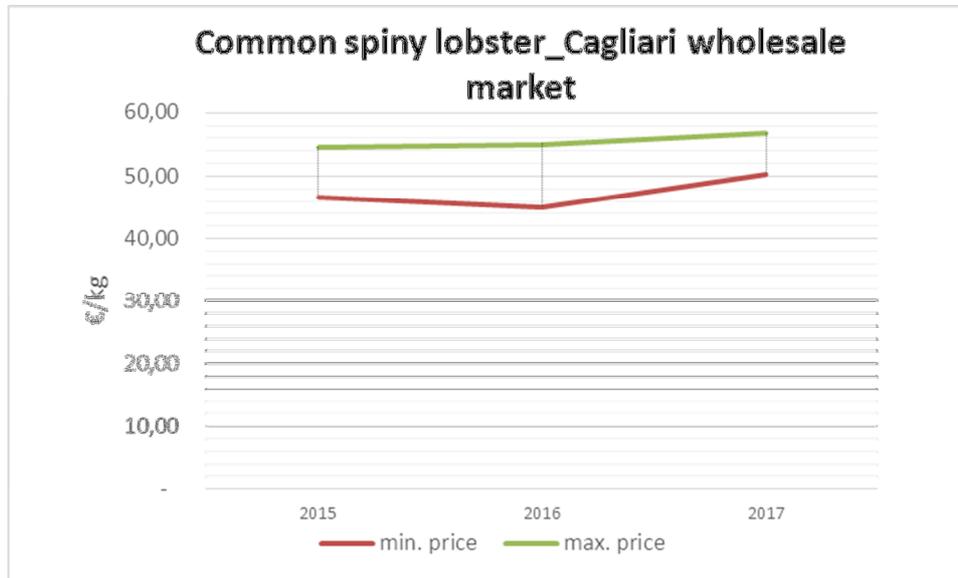
The red scorpionfish sold in the Cagliari fish market was exclusively local. Size never exceeded 300-500 g. Minimum and maximum prices were largely stable throughout 2015-2017, although minima were highest in 2015 (about €8.40 / kg; maximum price more than €12.20 / kg).

### Common spiny lobster:



**Figure 4.2.5.17 – Average volumes and production prices of common spiny lobster (SLO) landed by vessels using trammel nets (GTR) in GSA 11 (2015-2017 quarterly [Q] data). Source: MIPAAFT / National Fisheries Data Collection Programme. Data processed by NISEA.**

In 2015-2017, the landed volume of common spiny lobster caught with trammel nets, a typical Sardinian fishery, exhibited a slight reduction (-14%). At less than 70 tons in 2017, it is a niche product whose high and stable average price (€55 / kg) reflects the high demand for a highly appreciated species whose supply is limited.



**Figure 4.2.5.18 – Minimum and maximum price of spiny lobster recorded at the Cagliari mixed market (Sardinia). Average annual data (2015-2017). Data processed by NISEA.**

Local common spiny lobster is the only species for which sale figures are recorded in the Cagliari mixed market, reflecting a strong consumer appreciation and a high market value. In 2017 prices, which for medium-sized individuals (500-700 g) have never been lower than €45 / kg, actually exceeded €57 / kg. A very small fraction of common spiny lobster is traded in the wholesale market, where it is used to attract the demand for other local or imported species. According to locally collected information, most of the local supply meets local demand, especially the Ho.Re.Ca. segment.