Many difficulties were encountered to get access to the proper databases in order to obtain the necessary data for the purposes of this report. Nevertheless, the few data collected allowed the construction of a preliminary analysis, which may be considered as a first step towards a better understanding of the relevance of these fisheries.

These species were and are under-considered, this is mainly due to the fact that most of the species are exploited as subsistence resources for many artisanal fishermen and local communities. A further consideration is that landings and catches are obtained by a great number of small vessels, mostly belonging to the small-scale segment of the fleets, landing everywhere and without actively directing the product towards a particular market. With a few exceptions (Turkey is one), the fisheries related to the small tuna species are not usually considered able to catch significant quantities or to activate productive economic
chains. However small quantities grouped together and a better knowledge of these fisheries reveal that this perception might be not entirely accurate.

This preliminary analysis was carried out on prices and total revenues (turnover) for the more abundant small tuna species caught in the Mediterranean Sea. More analyses should be undertaken concerning the socio-economic aspects of these fisheries through case studies and the identification of this gap is an output of this report.

The data related to employment, markets and socio-economic indicators are not currently available in most of the countries because data have never been collected specifically for the fleet segment carrying out these fisheries. However, some data were available, particularly in the case of Morocco.

The EUROSTAT database is the main source for the analysis carried out in this chapter. The Eurostat data are related to time-series and the evolution of price (euro or US$ per kilo), production (metric tonnes - MT), and total revenue (turn-over) of the main small tuna species.

The main species examined are:

- Atlantic bonito (*Sarda sarda*);
- Bullet tuna (*Auxis rochei* and *Auxis thazard*, due to the confusion existing in identifying and reporting the species);
- Little thunny (=Atl. black skipjack) (*Euthynnus alletteratus*);
- Plain bonito (*Orcynopsis unicolor*);
- Skipjack tuna (*Katsuwonus pelamis*).

It is to be taken into due account that catch (=landing) data in Eurostat are sometimes different from the data in the FAO or ICCAT databases and therefore discrepancies might appear. This problem is discussed in the final part of this report.

The information existing in the Eurostat database and some additional data obtained for this study for some countries have permitted this specific analysis to be carried out.

4.1 Overview of small tuna species landings in the Mediterranean Sea

The data existing for small tuna species in Eurostat are related to five main species, considering that the bullet tuna (*Auxis rochei*) and the frigate tuna (*Auxis thazard*) were considered as one species, although landings were sometimes reported for two separate species.

The catches of Atlantic bonito (*Sarda sarda*) show fluctuations over the last 30 years, with an average production of 18 000 tonnes per year for the last 10-year period. Catches of other species, namely Auxids tuna (*Auxis rochei* and *Auxis thazard*) (from here on conventionally named bullet tuna), little tunny (or Atlantic black skipjack) (*Euthynnus alletteratus*), plain bonito (*Orcynopsis unicolor*) and skipjack tuna (*Katsuwonus pelamis*), remained almost stable, with an average catch of 3 700 tonnes, 2 300 tonnes, 120 tonnes and 80 tonnes, respectively (Figure 63).

During the 1970s the total catch for these species was less than 15 000 tonnes; it increased up to a peak of 44 000 tonnes in 1983; since then the total quantity landed decreased until it stabilized around 25 000 tonnes\(^3\) (Figure 63).

---

\(^3\) The time series do not include the most recent year, when, according to FAO and ICCAT landings data, high catches were obtained, particularly for the Atlantic bonito.
4.2 The economic relevance of small tuna fisheries.

As stated in the previous paragraph 4.0, it is difficult to find specific data or information about the economy linked to the fisheries of small tuna species. However, for the purpose of this report, it was possible to recover some useful data either from Eurostat or from the scientific community in the region, thus consenting the exploration of the situation in some countries.

4.2.1 EC France

The only species of small tunas reported to Eurostat by France in the Mediterranean is the skipjack; the maximum quantity recorded was 25 tonnes in 2003.

The price of skipjack showed an exponential increase; after a slight decrease in 2005, the trend continues moving upwards. The average price recorded in the last five years is EUR3.7/kg (Figure 64).

4.2.2 EC Greece

According to the Eurostat database skipjack is the main species of small tunas caught in Greece. Its catch reached a maximum of about 2 100 tonnes in 1995. Since then the skipjack quantities decreased, reaching an average of about 1 300 tonnes per year over the last 5 years (Figure 65).
The total revenue (turn-over) made by the Greek fleet targeting skipjack reached an total of about 7.5 million euros between 1995 and 1997. Since then it has decreased, stabilizing at around 5 million euros during the last 5 years (Figure 66).

The average price per year of the skipjack landed in Greece did not show any remarkable fluctuation; it oscillated between EUR3 and 5/kg, with an average of EUR3.8/kg, with a higher average value in the last five years (Figure 67).
Figure 67 – Price of skipjack landed in Greece (EUR/kg) from 1992 to 2006

Figure 68 shows the trend of the mean price for the other three species of small tunas caught by the Greek fleet over the time period 1983–1997; these species are less important than skipjack in terms of quantities landed in Greece.

The price of bullet tuna is relatively low and remained stable between 1.1 to US$1.7/kg. The price of Atlantic bonito has recorded an upward trend with the highest level of US$6.7/kg reached in 1985. The price of little tunny showed an upward trend too, but for a lower average price of US$2.9/kg per year (Figure 67).

Figure 68 – Price of Atlantic bonito, bullet tuna and little tunny in Greece from 1983 to 1997

4.2.3 EC Italy

According to the Eurostat database, in comparison with other Mediterranean countries and without considering some recent catches reported in other data banks or the catches in the Black Sea, Italy has had on average the highest catches of small tunas. Italian production did not change over the time period 2004 to 2006, with an average of 7 500 tonnes per year (Figure 69).

Also according to Eurostat, the two main species of small tunas caught during the same period in Italy are skipjack and Atlantic bonito. They represent an average of 56 percent and 20 percent of the total catches respectively (Figure 69).
In terms of total revenue (turn-over) there was a downward trend, from 11.3 million euros in 2004 to 10.1 million euros in 2006. The largest part of these revenues is due to the Atlantic bonito, with a share of 46 percent of the total; the remaining 54 percent was obtained by the landings of the three other species (bullet tuna, little tunny and skipjack) (Figure 70).

Examining the dynamic of prices in the last four years, the averages for the four species together remained almost stable, without noteworthy variations (source IREPA). For the Atlantic bonito the price is around EUR3.4/kg, for the little tunny the average is EUR2.3/kg, for bullet tuna it is EUR1.6/kg and, finally, the lowest price is reported for the skipjack, EUR0.7/kg (Figure 71).
Figure 71 – Average price (EUR/kg) of the main small tunas species in Italy, from 2004 to 2007 (source IREPA). Frigate mackerel is the bullet tuna.

4.2.4 EC Malta

The landings of small tunas in Malta from 2003 to 2006 are relatively low and they ranged from 5 to 10 tonnes per year. These quantities are related mainly to two species: the little tunny, accounting for between 4 and 6 tonnes per year and the bullet tuna, with quantities varying between 1 and 4 tonnes per year.

The total revenue (turn-over) has substantially increased during the last four years, varying from about 8 000 euros in the year 2003 to 12 000 euros in 2006 (Figure 72).

Figure 72 – Total revenue (turn-over, value in 1 000 euro) of the two main species of small tuna in Malta, from 2003 to 2006.

The prices show two different trends between the two species in the same period (2003–2006). The price of bullet tuna price was almost steady around 1 euro/kg, with a slight increase in the last year, while the price of little tunny jumped from EUR1.5/kg to EUR2.5/kg from 2003 to 2006, with a peak of more than 3 euros in 2005 (Figure 73).
Figure 73 – Average price (EUR/kg) of the two main species of small tuna in Malta, from 2003 to 2006

4.2.5 EC Slovenia

According to Eurostat database, only 1 tonne of small tuna species was landed in Slovenia in 2006. No data are available on the total value of these fish or on their price.

4.2.6 EC Spain

A large proportion of the Spanish catches of small tunas is from the Atlantic Ocean fisheries; the quantities obtained in the Mediterranean are relatively low. The latter, according to Eurostat, shows a downward trend from 1996, followed by a stable catch from 1998 to 2003, with an increase in 2004. The average quantity landed by the Spanish Mediterranean fleet is around 1 400 tonnes per year over the whole time period (Figure 74).

The bullet tuna and Atlantic bonito are the most important species caught by Spanish Mediterranean fleet from 1996 to 2006 with respectively 870 tonnes and 480 tonnes. A very low quantity has been recorded for the little tunny with an average of about 40 tonnes per year for the same period (Figure 74).

Figure 74 – Catches of the main species of small tunas in Spanish Mediterranean waters from 1996 to 2006 (source Eurostat)

The total revenue (turn-over) drawn from the catches of small tunas in Spain is about 2.8 million euros for the year 2006. This amount has decreased by 45 percent with respect to the quantity landed in 2004. Eighty percent (80 percent) of the 2006 total revenue is related to bullet tuna and Atlantic bonito, where they represent respectively 51 percent and 44 percent of this amount (the remaining is related to little tunny) (Figure 75).
Figure 75 – Total revenue (values in 1,000 euros) attributed to the three main species of small tunas caught in the Spanish Mediterranean, from 2004 to 2006

In terms of price of the three main species of small tuna landed in the Spanish Mediterranean, this parameter does not show any clear annual trend for the time period considered. Therefore, it is important to note the direct correlation existing between the price of bullet tuna and that of little tunny, showing the same trend. On the contrary, the price of Atlantic bonito shows a different pattern; the average prices recorded for the last three years are: Atlantic bonito EUR2.7/kg, bullet tuna EUR2.5/kg and little tunny EUR1.8/kg (Figure 76).

Figure 76 – Average price (EUR/kg) for the three main species of small tunas in Spain (Mediterranean coast) from 2004 to 2006

4.2.7 Lebanon

The catches of small tuna in Lebanon are mostly limited to two species; Atlantic bonito and little tunny. The total catches of these two species ranges from about 200 to 300 tons per year. From 2006 to 2007 the turnover (total revenue) has increased five times in only one year, from 565,000 US$ in 2006 to 2.5 million US$ in 2007. The annual average price of Atlantic bonito for the time period 2005–2007 ranged from 6 to US$10/kg and that of little tunny was between US$1.3 to US$3/kg (Figure 77).
Figure 77 – Mean price per year (US$/kg) for Atlantic bonito and little tunny from 2005 to 2008 (first quarter) in Lebanon

The prices of both species are influenced by the fishing gear used. The Atlantic bonito caught by nets is sold 40 percent higher than that captured by hooks and lines, reaching an average price of US$9.1/kg for the first, against US$6.6/kg for the latter.

The opposite occurs with the little tunny, the individuals of this species when caught by lines are valued much more highly (100 percent) than the ones caught by nets. In terms of price, it reaches US$2.9/kg when catches are obtained by lines, against only US$1.4/kg when they are obtained by nets (Tables 28 and 29).

Table 28 – Catch (tonnes), price (US$/kg) and value (US$) of Atlantic bonito, caught in Lebanon from 2005 to 2008 (first quarter only)

<table>
<thead>
<tr>
<th>Year</th>
<th>Catch (tonnes)</th>
<th>Price (US$/kg)</th>
<th>Value (US$)</th>
<th>Gear used</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>60.0</td>
<td>5.9</td>
<td>352,645</td>
<td>Nets</td>
</tr>
<tr>
<td>2006</td>
<td>50.0</td>
<td>7.2</td>
<td>359,691</td>
<td>Nets</td>
</tr>
<tr>
<td>2006</td>
<td>1.0</td>
<td>6.0</td>
<td>7,689</td>
<td>Lines</td>
</tr>
<tr>
<td>2007</td>
<td>230.0</td>
<td>10.0</td>
<td>2,338,924</td>
<td>Nets</td>
</tr>
<tr>
<td>2007</td>
<td>0.3</td>
<td>7.2</td>
<td>1,877</td>
<td>Lines</td>
</tr>
<tr>
<td>2008</td>
<td>0.1</td>
<td>13.2</td>
<td>1,760</td>
<td>Nets</td>
</tr>
</tbody>
</table>

Table 29 – Catch (tonnes), price (US$/kg) and value (US$) of little tunny, caught in Lebanon from 2005 to 2008 (first quarter only)

<table>
<thead>
<tr>
<th>Year</th>
<th>Catch (tonnes)</th>
<th>Price (US$/kg)</th>
<th>Value (US$)</th>
<th>Gear used</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>122.0</td>
<td>1.3</td>
<td>164,214</td>
<td>Nets</td>
</tr>
<tr>
<td>2006</td>
<td>15.0</td>
<td>2.2</td>
<td>33,373</td>
<td>Lines</td>
</tr>
<tr>
<td>2007</td>
<td>58.0</td>
<td>1.7</td>
<td>100,630</td>
<td>Nets</td>
</tr>
<tr>
<td>2007</td>
<td>3.0</td>
<td>3.0</td>
<td>8,700</td>
<td>Lines</td>
</tr>
<tr>
<td>2008</td>
<td>2.0</td>
<td>1.3</td>
<td>2,507</td>
<td>Nets</td>
</tr>
<tr>
<td>2008</td>
<td>0.6</td>
<td>3.4</td>
<td>1,963</td>
<td>Lines</td>
</tr>
</tbody>
</table>

4.2.8 Morocco

In Morocco small tuna fishery is much more important along the Atlantic coast. In the Mediterranean Moroccan coast, however, there is fishing activity targeting mainly two species of small tunas: the bullet tuna and the Atlantic bonito. The average quantities landed over the time period 1996 – 2006 are respectively 590 tonnes and 70 tonnes. The little tunny is caught by small scale fishery.

In terms of price, the frigate mackerel showed an upward trend during the last ten years and a remarkable increase in 2006, with an average of about US$0.8/kg, whereas that of Atlantic bonito is almost stable in the period considered, with yearly variations, getting average price of US$1.2/kg (Figure 78).
Along the Mediterranean coast of Morocco, small tunas are mainly targeted by a small-scale fishery of more than 1,000 small boats plus hundreds of longliners which operate seasonally. The majority of the fishing season lasts between 3 and 6 months per year. These fishing activities offer part-time employment to about 4,000 fishers.

The greatest part of the small tunas landed in Morocco is used by the canning industry at local level, providing raw products for factories based in the main coastal towns.

It is important, however, to emphasize that small tunas are not yet sufficiently valued by retailers and consumers, and this explains their low market values in comparison with other similar species. The small specimens are sometimes used as bait for longline or other line fisheries.

### 4.2.9 Turkey

The Atlantic bonito is the main species among all the various species of small tunas landed by Turkish fleet. The quantities of this species reached a remarkable amount of 70,000 tonnes in 2005 (Figure 79). However, the landings of little tunny and bullet tuna in the years 2004–2006, show respectively an average quantity of 770 tonnes and 780 tonnes.

No data are available for this very important fishery in terms of global value or on the prices in the various years.
4.3 An overall economic indicator for small tuna fisheries.

It is quite difficult to define the economic relevance of the fishery catching small tuna species in the Mediterranean and the Black Seas, due to the number of uncertainties that are pointed out in several paragraphs of this report. Using the available data on catches it is, however, possible to identify at least one indicator.

To achieve this, the total revenue is used; it is obtained from the four main species of small tunas landed by most of the Mediterranean and Black Sea countries. The calculation was done by using the average price of each species per year and the corresponding total catch reported by Eurostat for the whole Mediterranean and Black Sea region.

According to these inputs, the total revenue estimated for all the four species combined is about 42 million euros in 2004, 168 million euros in 2005 and 88 million euros in 2006.

Considering the most important species in the study area, the Atlantic bonito (Sarda sarda), the annual revenue is estimated at about 80 million euro in 2006; it was twice this amount in 2005 (160 million euros), and about 40 million euro in 2004 (Figure 80).

The same estimation provides values for the annual revenue concerning the other three species, bullet tuna (Auxis rochei, including Auxis thazard, as it is sometimes reported), skipjack (Katsuwonus pelamis) and little tunny (Euthynnus alletteratus). The dynamics of annual income from these catches show different trends among the single species, which are also quite different from the values obtained for the Atlantic bonito, with higher values on average in 2004 and then more or less stable lower values in 2005 and 2006 (Figure 81).

Figure 80 – Total revenue (values in 1 000 euros) estimated for Atlantic bonito in the Mediterranean and Black Sea area (all countries together), from 2004 to 2006
The economic relevance of the small tuna species fisheries appears quite important from this first estimation exercise, taking into account that to the assessment should be considered a very prudential one, due to the many uncertainty factors which create an effective underestimation of the possible status of these fishing activities in the Mediterranean and Black Seas.

It is important to underline that, besides of the lack of several data and information, it appears quite clear that when combined these fisheries have high economic relevance for Mediterranean and Black Sea countries, certainly comparable with other much more well-known fisheries for other species.

### 4.4 Socio-economic indicators for small tuna fisheries

One of the preliminary goals of this report was to find some socio-economic indicators, able to define the relevance of these fisheries better. Despite the various efforts to obtain data useful for this exercise from both official sources and from the region’s scientific community working in various research institutes in many Mediterranean countries, it has proved impossible to disentangle the existing information from the rest of the fisheries. Indeed the basic information, when and where it exists, is mixed up together with other components of the small scale fishery or with other segments of the fleets.

Only the future implementation of an approach to data collection by “métier” and related segments might allow for the improved identification of the data required to distinguish the various aspects of these fisheries.

The fact that these fisheries were considered for a long time as just a sort of traditional subsistence activity, able to partially support the needs of several coastal communities along the shores of the Mediterranean and Black Seas, alone substantiates the fact that these fisheries have a certain socio-economic relevance throughout the area.

More specific effort is needed to define these fisheries, including the economic and socio-economic aspects. Métier-based data collection approach, field surveys and dedicated pilot studies are useful tools to be used to improve the understanding of these fisheries immediately.

### 5. DISCUSSION

It is very clear, from what has been reported in the previous chapters, that much knowledge does not yet exist about the fishery of small tuna species in the Mediterranean and the Black Seas. While some situations are getting better and data are generally improving, others appear still undefined.

The landing data represent one of the points where an improvement is necessary. As has been pointed out several times in the report, there are a number of factors affecting the reliability of the landing data. It is certain that not all the countries are declaring their catches of small tuna species and it is strongly suspected that several others are under-estimating or under-reporting their catches. This is mostly due to the low consideration given to this fishing activity, which is not believed to be relevant in terms of production and