Table 5-1-7-1 Species Composition and CPUA (individual/km^2) of Shrimps

Family name (Common name)	Scientific name	Day						Night					
		20m	50m	75m	150m	350m	Total	20m	50m	75m	150m	350m	Total
Penaeidae (Speckled shrimp)	*Metapenaeus monoceros*							9	20				8
Penaeidae (Deep-water pink shrimp)	*Parapenaeus longirostris*		17	948	460	4,601	777	8	14	1,944	61	208	467
Penaeidae (Green tiger prawn)	*Penaeus semisulcatus*							17	14				9
Penaeidae (Southern rough shrimp)	*Trachypenaeus curvirostris*							31					10
Pandalidae (Green shrimp)	*Chlorotocus crassicornis*										30	182	24
Pandalidae (Striped soldier shrimp)	*Plesionika edwardsii*											130	14
Pandalidae (Arrow shrimp)	*P. heterocarpus*					9,343	1,038					26	3
Pandalidae (Golden shrimp)	*P. martia*											26	3
Pasiphaeidae (White glass shrimp)	*Pasiphaea sivado*											26	3
Processidae (Processa shrimp)	*Processa canaliculata*											130	14
Total		0	17	948	460	13,944	1,815	65	48	1,944	91	728	555

The catch per unit area of deep-water pink shrimp *Parapenaeus longirostris*, considered to be the major species of shrimp in the surveyed areas, is roughly 5 kg/km^2 or less.

(2) CPUA by Fishing Gear with Respect to Shrimps

Demersal fish trawling was carried out at 14 stations during the day in areas at east of 35° east longitude (see Fig. 4-1-4), while shrimp trawling was carried out similarly at 9 stations (see Fig. 4-6). The operating depth for shrimp trawling was correlated to the depth zones of demersal fish trawling operations in the manner shown below.

Shrimp trawling	20 m·50 m·75 m (7)	150 m (1)	350 m (1)
Demersal fish trawling	20 - 100 m (11)	101 - 200 m (2)	201 - 500 m (1)

Note: Figures in parentheses indicate the number of trawling stations.

In addition, the areas swept that were recalculated using each of the trawling data of the 14 demersal fish trawling stations and 9 shrimp trawling stations in the above-mentioned areas are shown in Table 5-1-7-2.

Table 5-1-7-2 Areas Swept by Fishing Gear

Fishing methods	Demersal fish trawl net	Shrimp trawl net
Mean (km^2)	0.02384	0.03403
Standard deviation(km^2)	0.0033105	0.0043288
Ranange (km^2)	0.01778~0.03070	0.02917~0.04329

The individual by species of shrimps caught at each trawling station for both types of fishing gear are shown in Table 5-1-7-3 after correcting to CPUA using each of the mean areas swept.

The overall CPUA of shrimps was high for the shrimp trawl net. There was one common species of shrimps, namely deep-water pink shrimp *Parapenaeus longirostris*, that was caught using both types of fishing gear, and the CPUA of that species was higher with the shrimp trawl net. Although two species of large kuruma shrimp, consisting of kuruma shrimp *Penaeus japonicus* and green tiger prawn *Penaeus semisulcatus* were caught by the demersal fish trawl net, the number of those species caught was low at roughly only 10 per 1 km^2.

Table 5-1-7-3 CPUA (individual/km^2) by Fishing Gear of Shrimps

Fishing gears	Demersal fish trawl net				Shrimp trawl net			
Scientific name \ Stratum (m)	20~100	101~200	201~500	20~500	20~100	101~200	201~500	20~500
Metapenaeus monoceros	10			8				
Parapenaeus longirostris	146	9	82	122	275	460	4,601	777
Penaeus japonicus	9			7				
P. semisulcatus	7			6				
Plesionika heterocarpus							9,343	1,038
Total	172	9	82	143	275	460	13,944	1,815

As stated in sections (1) and (2), although there are large kuruma shrimp, having high economic value, thriving in Iskenderun Bay, their stock size is considered to be close to zero. In addition, the stock size of deep-water pink shrimp *Parapenaeus longirostris*, which demonstrated a relatively high CPUA among shrimps species, was 64 tons in the entire East Mediterranean Sea (see Table 5-1-3-57 for seasonal mean values), and the stock size of this species is considered to be even smaller when limited to Iskenderun Bay. Thus, in Iskenderun Bay, trawl fishery targeted at shrimps alone are considered to be unfeasible in view of the small stock sizes of those species in the depth of 20 m and deeper zone due to the small resource size.

5-2 Fish Landing Site Survey

5-2-1 Fisheries Statistics

5-2 Fish Landing Site Survey

5-2-1 Fisheries Statistics

(1) Objective of Use of Fisheries Statistical Data

It is necessary to gain an understanding of the actual status of the fisheries in the surrounding waters of Turkey in order to evaluate resources based on biological parameters values of each species obtained from the results of the sea-borne survey. Therefore, fisheries statistical data published by the Turkish government (to be referred to as "government fisheries statistical data") were collected for the roughly 20 year period from 1970-1990 (data is missing for 1981 and 1982) for the purpose of obtaining an understanding of the overview of the fisheries in the around waters of Turkey. These data were then used to clarify annual changes in catches and amount of fishing effort and so forth by area and species. These results serve as fundamental reference materials that are required to evaluate exploited marine resources, evaluate unexploited marine resources and make recommendation relating to future fisheries management and so forth described in Chapters 6 through 8.

Furthermore, in this section 5-2-1, data for the Black Sea was also cited in order to obtain an understanding of the overall catch of marine resources of the country of Turkey as a whole. Thus, the areas referred to in this section refer to all areas including the Black Sea. In addition, since figures for the Aegean Sea and Mediterranean Sea are given without dividing into the North and South Aegean Sea and East and West Mediterranean Sea in government fisheries statistical data, those figures were used as is in this section.

Finally, the scientific names corresponding to the names of fish species (in Turkish) shown in government fisheries statistical data are as shown below. Since the English names corresponding to those Turkish names vary depending on the year in which data was collected, the English names shown in this section were used that correspond to the Turkish names mainly used during the sea-borne survey.

Table 5-2-1-1 Correlation Chart of Turkish, English and Scientific Names of Fish Species

Turkish name	English name	Scientific name
Sardalya	European pilchard	*Sardina pilchardus*
Hamsi	European anchovy	*Engraulis encrasicolus*
Zurna	Brushtooth lizardfish	* *Saurida undosquamis*
Bakalorya	Hake	* *Merluccius merluccius*
Mezgit	Whiting	*Merlangius merlangus euxinus*
Hani	Painted comber	* *Serranus scriba*
Lufer	Bluefish	*Pomatomus saltator*
Istavrit(Kraca)	Atlantic horse-mackerel	* *Trachurus trachurus*
Istavrit(Karagoz)	Mediterranean horse-mackerel	*Trachurus mediterraneus*
Barbunya	Red mullet (Striped mullet)	* *Mullus barbatus*
Tekir	Striped red mullet	* *Mullus surmuletus*
Cipura	Gilt-head sea bream	* *Sparus aurata*
Isparoz	Annular sea bream	* *Diplodus annularis*
Karagoz	Common two-banded sea bream	* *Diplodus vulgaris*
Mercan	Common pandora	* *Pagellus erythrinus*
Kolyoz	Chub mackerel	*Scomber japonicus*
Palamut	Atlantic bonito	*Sarda sarda*
Kaya baligi(Lahoz)	Gobies	*Gobius* spp.
Turna	Barracuda (Picke)	* *Sphyraena sphyraena*
Iskarmoz	Obtuse barracuda	* *Sphyraena chrysotaenia*
Kefal	Mullet	*Mugil* spp., *Liza* spp.

Note:
The names of fish species shown here (Turkish names) were limited to those species that were covered in the section on major fish species by area described in part (3).

(2) Annual Changes in Catch by Area

1) Catch by Area of Sea Fishes

The catches of sea fishes (to be referred to as "fishes") in Turkey for the past 20 years were within a range of 100,000 - 580,000 tons. With respect to catch by area, the East Black Sea accounted for the largest percentage of the total catch followed by the West Black Sea. Catches in both these areas accounted for roughly 80% of the total catch, in all areas, with the proportions of catches in the Mediterranean Sea, Aegean Sea and The Sea of Marmara being low.

In looking at annual changes in catches, although catches gradually decreased at roughly 100,000 tons from 1970 to 1975, starting in the following year of 1976 to 1983, catches increased rapidly, reaching the 500,000 ton level in 1983. Catches then increased slightly around the 500,000 ton level until 1988. There was a sudden drop in catches starting in the following year of 1989, falling to a level of 297,000 tons in 1990. The major cause of the decrease in catches from 1989 to 1990 was the effect of reduced catches in the East Black Sea and West Black Sea. Catches in the Mediterranian Sea, the Aegean Sea and The Sea of Marmara are generally to be stable past 13 years (Fig. 5-2-1-1).

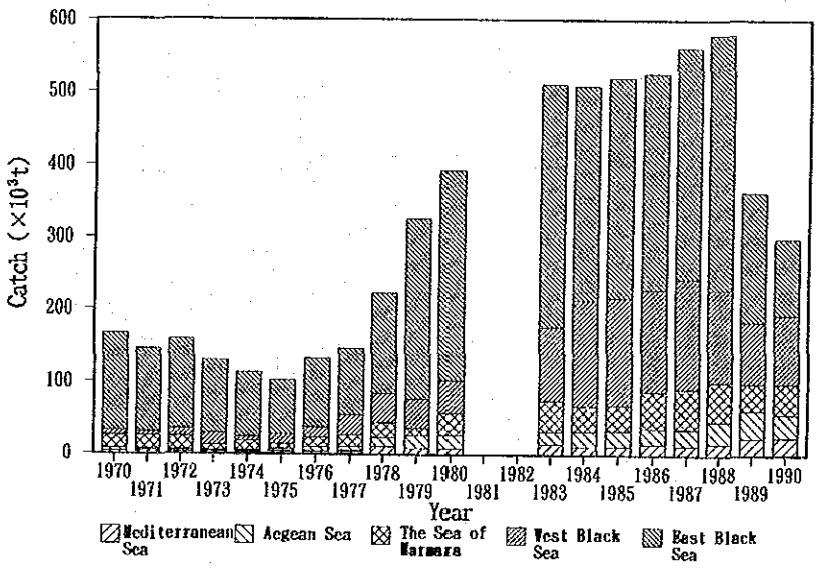

Fig. 5-2-1-1 Annual Catches by Area of Sea Fishes

2) Catch by Sea Area of Other Marine Products

The catches of marine products other than fish (to be referred to as "marine life") in Turkey over the past 10 years demonstrated a roughly ten-fold increase from roughly 5,000 tons to 50,000 tons. The catches of marine products reached a level of 45,000 tons in 1990. With respect to catch by area, although the East Black Sea accounted for a high percentage of the catches before 1980, starting in 1983, the catches in The Sea of Marmara, Aegean Sea and Mediterranean Sea began to increase, with the catches of those three areas accounting for roughly 80% of the total catch. This was opposite to the trend demonstrated by catches of fishes (Fig. 5-2-1-2).

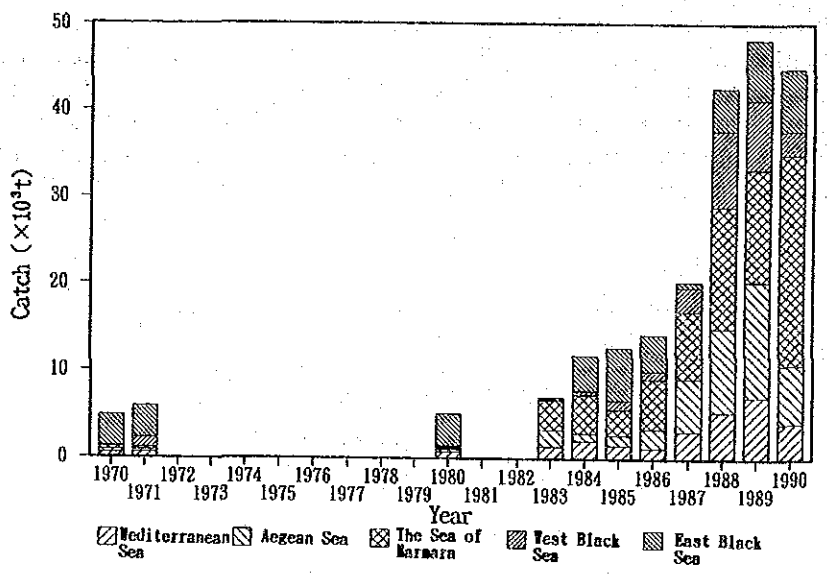

Fig. 5-2-1-2 Annual Catches by Area of Marine Products

(3) Major Fishes Species by Sea Area

The top five ranked species of sea fishes in terms of the mean annual catch over roughly the past 20 years by species and area as well as that for commercially important species and their order are shown in Tables 5-2-1-2 through 5-2-1-6.

Furthermore, since past data was insufficient for marine products other than fishes, their description has been omitted in this section.

1) East Black Sea

The mean annual catch in the East Black Sea was 194,195.2 tons. The mean annual catch of European anchovy *Engraulis encrasicolus* was the largest at 131,119.3 tons, accounting for roughly nearly 70% of the total catch.

Among commercially important species, Atlantic horse-mackerel *Trachurus trachurus* was ranked in the top five species at 28,635.9 tons. In addition, those important species that demonstrated a mean annual catch of 100 tons or more consisted of red mullet *Mullus barbatus* (1,467.3 tons), striped red mullet *Mullus surmuletus* (469.4 tons) and painted comber *Serranus scriba* (115.9 tons) (Table 5-2-1-2).

Table 5-2-1-2 Mean Annual Catches in the East Black Sea (1970-1990)

	Scientific Name	Mean Annual Catch (ton/year)	Order
	Engraulis encrasicolus	131,119.3	< 1 >
*	*Trachurus trachurus*	28,635.9	< 2 >
	Merlangius merlangus euxinus	10,387.5	< 3 >
	Sarda sarda	5,452.9	< 4 >
	Trachurus mediterraneus	4,082.6	< 5 >
*	*Mullus barbatus*	1,467.3	< 9 >
*	*Mullus surmuletus*	469.4	< 15 >
*	*Serranus scriba*	115.9	< 20 >
*	*Diplodus annularis*	46.2	< 30 >
*	*Merluccius merluccius*	7.3	< 36 >
*	*Sparus aurata*	4.8	< 39 >
*	*Pagellus erythrinus*	4.2	< 40 >
*	*Sphyraena sphyraena*	0.6	< 50 >
	TOTAL (54 species)	194,195.2	

Note: Figures in parentheses indicate order.

2) West Black Sea

The mean annual catch in the West Black Sea was 64,314.9 tons. The mean annual catch of European anchovy *Engraulis encrasicolus* was the largest at 24,671.1 tons, accounting for roughly 40% of the total catch.

Among commercially important species, Atlantic horse-mackerel *Trachurus trachurus* was ranked in the top five species at 18,270.6 tons. In addition, those important species that demonstrated a mean annual catch of 100 tons or more consisted of red mullet *Mullus barbatus* (510.2 tons), striped red mullet *Mullus surmuletus* (400.0 tons) and annular sea bream *Diplodus annularis* (109.3 tons) (Table 5-2-1-3).

Table 5-2-1-3 Mean Annual Catches in the West Black Sea (1970-1990)

	Scientific Name	Mean Annual Catch (ton/year)	Order
	Engraulis encrasicolus	24,671.1	< 1 >
*	*Trachurus trachurus*	18,270.6	< 2 >
	Pomatomus saltator	4,220.7	< 3 >
	Sarda sarda	3,422.6	< 4 >
	Scomber japonicus	3,341.2	< 5 >
*	*Mullus barbatus*	510.2	< 11 >
*	*Mullus surmuletus*	400.0	< 13 >
*	*Diplodus annularis*	109.3	< 17 >
*	*Serranus scriba*	13.4	< 37 >
*	*Merluccius merluccius*	3.5	< 43 >
*	*Sparus aurata*	2.1	< 44 >
*	*Pagellus erythrinus*	1.7	< 45 >
*	*Sphyraena sphyraena*	0.1	< 52 >
	TOTAL (54 species)	64,314.9	

Note: Figures in parentheses indicate order.

3) The Sea of Marmara

The mean annual catch in The Sea of Marmara was 27,781.8 tons. The mean annual catch of European anchovy *Engraulis encrasicolus* was the largest at 7,494.0 tons, accounting for just under 30% of the total catch.

Among commercially important species, Atlantic horse-mackerel *Trachurus trachurus* was ranked in the top five species at 4,020.7 tons. In addition, those important species that demonstrated a mean annual catch of 100 tons or more consisted of striped red mullet *Mullus surmuletus* (573.4 tons), hake *Merluccius merluccius* (148.5 tons) and red mullet *Mullus barbatus* (102.3 tons) (Table 5-2-1-4).

Table 5-2-1-4 Mean Annual Catches in The Sea of Marmara (1970-1990)

	Scientific Name	Mean Annual Catch (ton/year)	Order
	Engraulis encrasicolus	7,494.0	< 1 >
	Scomber japonicus	4,301.6	< 2 >
*	*Trachurus trachurus*	4,020.7	< 3 >
	Pomatomus saltator	2,110.0	< 4 >
	Sardina pilchardus	1,817.6	< 5 >
*	*Mullus surmuletus*	573.4	< 9 >
*	*Merluccius merluccius*	148.5	< 17 >
*	*Mullus barbatus*	102.3	< 26 >
*	*Diplodus annularis*	78.4	< 28 >
*	*Pagellus erythrinus*	23.0	< 36 >
*	*Sphyraena sphyraena*	16.8	< 38 >
*	*Sparus aurata*	11.8	< 42 >
*	*Serranus scriba*	0.5	< 55 >
	TOTAL (57 species)	27,781.8	

Note: Figures in parentheses indicate order.

4) Aegean Sea

The mean annual catch in the Aegean Sea was 14,939.3 tons. The mean annual catch of European pilchard *Sardina pilchardus* was the largest at 5,647.7 tons, accounting for just under 40% of the total catch.

Among commercially important species, Atlantic horse-mackerel *Trachurus trachurus* was ranked in the top five species at 734.0 tons. These important species that demonstrated the mean annual catch of 100 tons or more consisted of red mullet *Mullus barbatus* (455.6 tons), gilt-head sea bream *Sparus aurata* (274.4 tons), common pandora *Pagellus erythrinus* (259.3 tons), annular sea bream *Diplodus annularis* (165.8 tons), hake *Merluccius merluccius* (140.9 tons), common two-banded sea bream *Diplodus vulgaris* (132.4 tons) and striped red mullet *Mullus surmuletus* (117.5 tons) (Table 5-2-1-5).

Table 5-2-1-5 Mean Annual Catches in the Aegean Sea (1970-1990)

	Scientific Name	Mean Annual Catch (ton/year)	Order
	Sardina pilchardus	5,647.7	< 1 >
	Mugil spp., *Liza* spp.	1,118.6	< 2 >
	Scomber japonicus	915.0	< 3 >
	Engraulis encrasicolus	816.5	< 4 >
*	*Trachurus trachurus*	734.0	< 5 >
*	*Mullus barbatus*	455.6	< 7 >
*	*Sparus aurata*	274.4	< 9 >
*	*Pagellus erythrinus*	259.3	< 10 >
*	*Diplodus annularis*	165.8	< 17 >
*	*Merluccius merluccius*	140.9	< 19 >
*	*Diplodus vulgaris*	132.4	< 21 >
*	*Mullus surmuletus*	117.5	< 23 >
*	*Saurida undosquamis*	45.7	< 38 >
*	*Sphyraena sphyraena*	16.8	< 47 >
*	*Serranus scriba*	15.6	< 49 >
*	*Sphyraena chrysotaenia*	3.3	< 55 >
	TOTAL (57 species)	14,939.3	

Note: Figures in parentheses indicate order.

5) Mediterranean Sea

The mean annual catch in the Mediterranean Sea was 9,201.9 tons. The mean annual catch of brushtooth lizardfish *Saurida undosquamis* was the largest at 1,092.1 tons, accounting for roughly 10% of the total catch.

Among other commercially important species, red mullet *Mullus barbatus* was ranked in the top five species at 659.6 tons. Those important species that demonstrated a mean annual catch of 100 tons or more consisted of common pandora *Pagellus erythrinus* (310.0 tons), gilt-head sea bream *Sparus aurata* (280.9 tons), striped red mullet *Mullus surmuletus* (150.4 tons), common two-banded sea bream *Diplodus vulgaris* (132.4 tons), hake *Merluccius merluccius* (104.3 tons) and Atlantic horse-mackerel *Trachurus trachurus* (103.0 tons) (Table 5-2-1-6).

Table 5-2-1-6 Mean Annual Catches in the Mediterranean Sea (1970-1990)

	Scientific Name	Mean Annual Catch (ton/year)	Order
*	*Saurida undosquamis*	1,092.1	< 1 >
	Sardina pilchardus	759.5	< 2 >
	Gobius spp.	683.1	< 3 >
*	*Mullus barbatus*	659.6	< 4 >
	Mugil spp., *Liza* spp.	609.9	< 5 >
*	*Pagellus erythrinus*	310.0	< 9 >
*	*Sparus aurata*	280.9	< 11 >
*	*Mullus surmuletus*	150.4	< 17 >
*	*Diplodus vulgaris*	132.4	< 19 >
*	*Merluccius merluccius*	104.3	< 22 >
*	*Trachurus trachurus*	103.0	< 24 >
*	*Diplodus annularis*	41.9	< 37 >
*	*Sphyraena chrysotaenia*	37.2	< 40 >
*	*Sphyraena sphyraena*	36.4	< 41 >
*	*Serranus scriba*	20.7	< 46 >
	TOTAL (57 species)	9,201.9	

Note: Figures in parentheses indicate order.

(4) Catches of Commercially Important Species

The catches of commercially important species were indicated in terms of the annual catches for each area, and those annual changes are shown in Figs. 5-2-1-3 through 5-2-1-14. The annual changes in catch by species were expressed for all areas in Turkey (consisting of the East Black Sea, West Black Sea, The Sea of Marmara, the Aegean Sea and Mediterranean Sea) to obtain an understanding of the proportions of those catches by area. In addition, annual fluctuations by each area are described below in The Sea of Marmara, the Aegean Sea and Mediterranean Sea in which sea-borne surveys were conducted in the present survey (to be referred to as the "Sea-Borne Survey Areas").

1) Brushtooth Lizardfish *Saurida undosquamis*

The catch of brushtooth lizardfish is shown in Fig. 5-2-1-3.

The catch of this species from 1970 to 1990 was in the range of roughly 500 tons to 3,500 tons, and the largest catch was in 1986. In looking at the catch by area, this species was found to be caught primarily in the Mediterranean Sea.

In looking at the annual changes of the catch in the sea-borne survey areas, other than catch of roughly 500 tons in 1985, there was hardly any catch in each of the other years in the Aegean Sea. In the Mediterranean Sea, the catch remained virtually unchanged at roughly 500 tons from 1970 to 1979. Although the catch increased starting in the following year of 1980 and reached a level of roughly 3,000 tons in 1986, it decreased to roughly 1,000 tons in the following year of 1987, and have remained at roughly 1,000 tons in the following years to 1990.

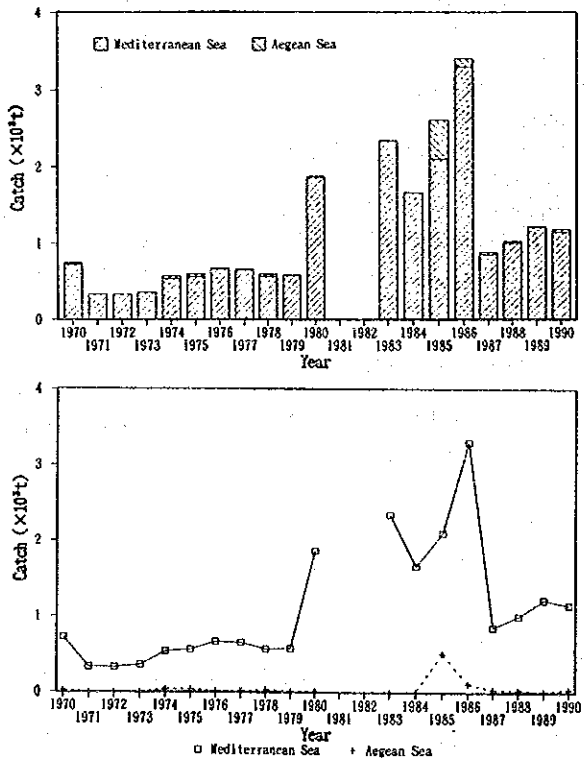

Fig. 5-2-1-3 Total Annual Catch (Upper Figure) and Catch by Area (Lower Figure) of Brushtooth Lizardfish

2) Hake *Merluccius merluccius*

The catch of hake is shown in Fig. 5-2-1-4.

The catch of this species from 1970 to 1990 increased from roughly 50 tons to 1,300 tons in all areas. In looking at the catch by area, this species was found to be caught in large numbers in The Sea of Marmara, the Mediterranean Sea and the Aegean Sea.

In looking at the annual fluctuations of the catch in the sea-borne survey areas, although the catch remained at a level of roughly 100 tons in The Sea of Marmara, this figure suddenly increased to 700 tons or more in 1989 and 1990. In the Aegean Sea, although the catch remained at less than 100 tons from 1970 to 1980, it began to increase starting in 1980, eventually reaching a level of roughly 500 tons in 1989. In the Mediterranean Sea, the catch remained at the level of roughly 100 tons from 1975 to 1985. Although the catch increased to roughly 550 tons from 1985 to 1988, there was hardly any catch in 1989 and 1990.

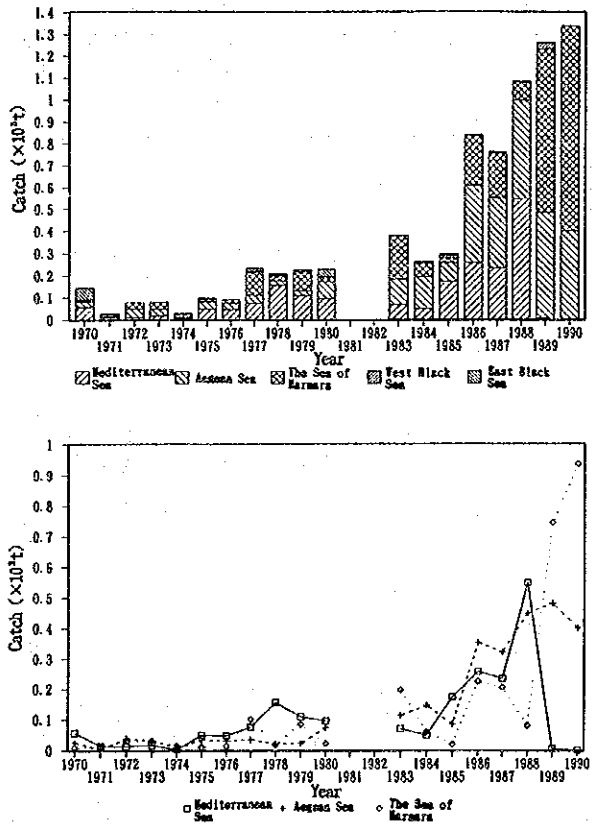

Fig. 5-2-1-4 Total Annual Catch (Upper Figure) and Catch by Area (Lower Figure) of Hake

3) Painted Comber *Serranus scriba*

The catch of painted comber is shown in Fig. 5-2-1-5.

The catch of this species exceeded 2,000 tons in all areas in 1970. The catch was at the level of roughly 100 tons during the ten year period starting in 1980. In looking at the catch by area, the catch in the West Black Sea or East Black Sea accounted for the majority of the total catch until 1979, while starting in 1980 and beyond, the catch in the Mediterranean Sea or Aegean Sea accounted for the majority of the total catch.

In looking at the catch in the sea-borne survey areas, there was hardly any catch of this species in The Sea of Marmara. Although the catch increased from around 30 tons to 90 tons in the Mediterranean Sea starting in 1984, it demonstrated large fluctuations, dropping to 0 tons in 1984 and then increasing to 70 tons in the following year of 1990. In the Aegean Sea, although the catch was in the around of 10 tons from 1983 to 1988, it increased to roughly 100 tons in 1989 after which it dropped off to 0 tons in the following year of 1990. The catch of this species in the Mediterranean Sea and Aegean Sea in 1989 and 1990 tended to offset each other, with the catch being large in one area and 0 tons in the other. Consequently, the total catch generally was the same in both years.

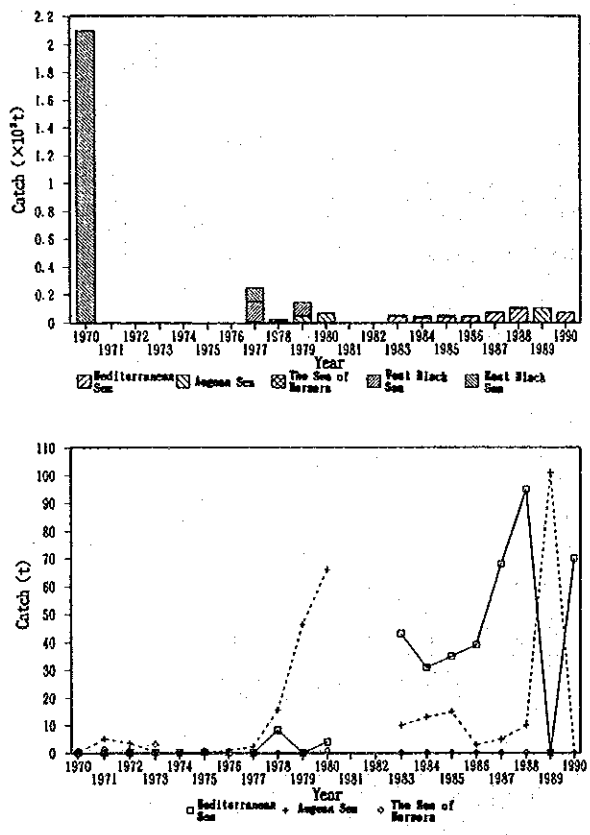

Fig. 5-2-1-5 Total Annual Catch (Upper Figure) and Catch by Area (Lower Figure) of Painted Comber

4) Atlantic Horse-Mackerel *Trachurus trachurus*

The catches of Atlantic horse-mackerel is shown in Fig. 5-2-1-6.

The catch of this species was within a range of 10,000-30,000 tons in all areas from 1970 to 1978. However, in 1979 to 1984, the catch increased to 50,000-80,000 tons, and further increased to roughly 100,000 tons during the period from 1985 to 1989. In looking at the catch by area, the majority of this species was caught in the East Black Sea and West Black Sea.

In looking at the catch in the sea-borne survey areas, the catch fluctuated between roughly 500 tons and 3,000 tons from 1970 to 1977 in The Sea of Marmara, and fluctuated between roughly 3,000 tons and 8,000 tons in the following year of 1978 to 1990. In the Aegean Sea, although the catch was less than 50 tons from 1970 to 1977, it fluctuated between roughly 300 tons and 2,000 tons from 1978 to 1990. In the Mediterranean Sea, the catch was roughly 200 tons from 1970 to 1990, and the maximum catch was no larger than 500 tons.

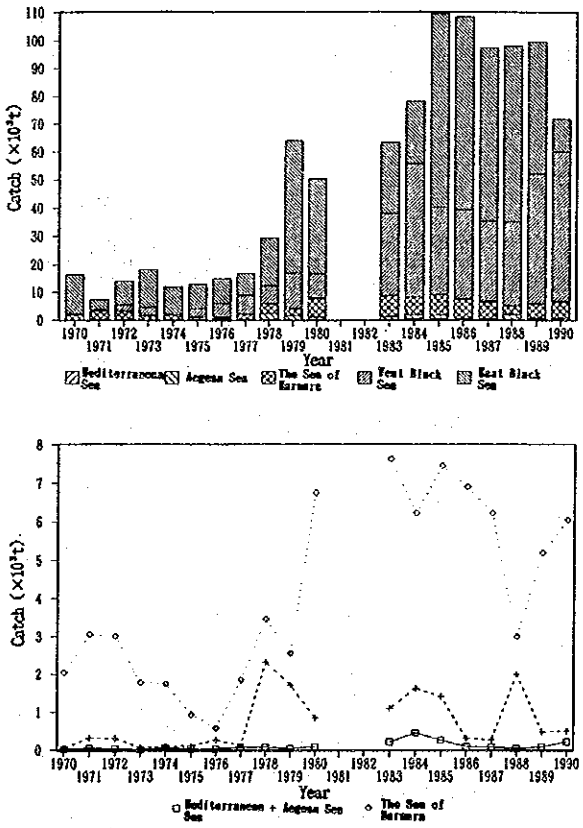

Fig. 5-2-1-6 Total Annual Catch (Upper Figure) and Catch by Area (Lower Figure) of Atlantic Horse-Mackerel

5) Red Mullet *Mullus barbatus*

The catch of red mullet is shown in Fig. 5-2-1-7.

Although the catch of this species in all areas was roughly 2,000 tons from 1970 to 1977, it increased to roughly 2,000 tons to roughly 6,000 tons from 1978 to 1988. Although the catch suddenly increased to 9,000 tons in 1989, it dropped to roughly half that amount at 4,000 tons in 1990. In looking at the catch by area, a large proportion of this species was caught in the East Black Sea and West Black Sea.

In looking at the catch in the sea-borne survey areas, the catch ranged from 0-200 tons in The Sea of Marmara from 1970 to 1990. In the Aegean Sea, although the catch was in the range of roughly 100 tons to 300 tons from 1970 to 1979, it increased to roughly 500 tons to 1,000 tons starting in 1980 (with the exception of 1985). In the Mediterranean Sea, the catch fluctuated between roughly 400 tons and 1,000 tons from 1974 to 1987 (with the exception of 1985), and fluctuated between roughly 1,200 tons and 2,100 tons from 1988 to 1990. Furthermore, the catch in both the Aegean Sea and Mediterranean Sea decreased considerably in 1985, falling below the level of 200 tons.

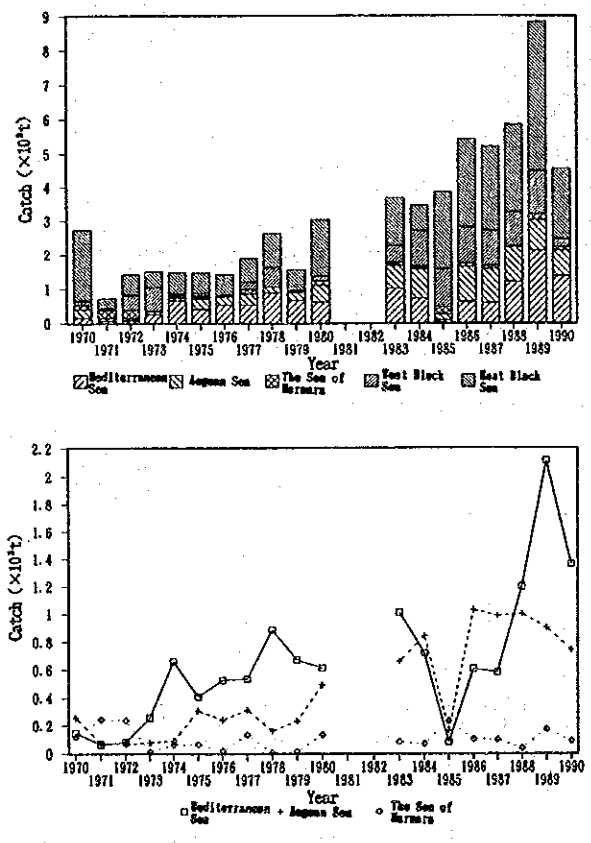

Fig. 5-2-1-7 Total Annual Catch (Upper Figure) and Catch by Area (Lower Figure) of Red Mullet

6) Striped Red Mullet *Mullus surmuletus*

The catch of striped red mullet is shown in Fig. 5-2-1-8.

The catch of this species in all areas decreased from roughly 4,000 tons to roughly 2,500 tons from 1970 to 1972, and fell below the level of 1,000 tons from 1973 to 1978. Although the catch increased to roughly 2,000 tons from 1979 to 1983, it decreased to roughly 1,000 tons in 1984, after which it increased to roughly 1,000 tons to 3,000 tons from the following year of 1985 to 1990. In looking at the catch by area, the catch in the East Black Sea or West Black Sea accounted for a large proportion of the total catch in the years following the recording of a catch of roughly 2,000 tons, while the catch in The Sea of Marmara accounted for a large proportion of the total catches in other years. Thus, the changes in catch in the East and West Black Sea had a major effect on fluctuations in total catches.

In looking at the catch in the sea-borne survey areas, although the catch fluctuated between 100 tons and 500 tons in The Sea of Marmara from 1970 to 1979, it fluctuated between 500 tons and 1,100 tons from 1980 to 1990. In the Aegean Sea, the catch remained at a level of 0-100 tons from 1970 to 1985, and was in the range of roughly 200 tons to 400 tons from the following year of 1986 to 1990. In the Mediterranean Sea, the catch fluctuated in the vicinity of 100 tons from 1970 to 1979. The catch then decreased to a range of roughly 300 tons to 10 tons from 1980 to 1985, and then demonstrated an increasing trend from roughly 100 tons to 700 tons starting in the following year of 1986 to 1990.

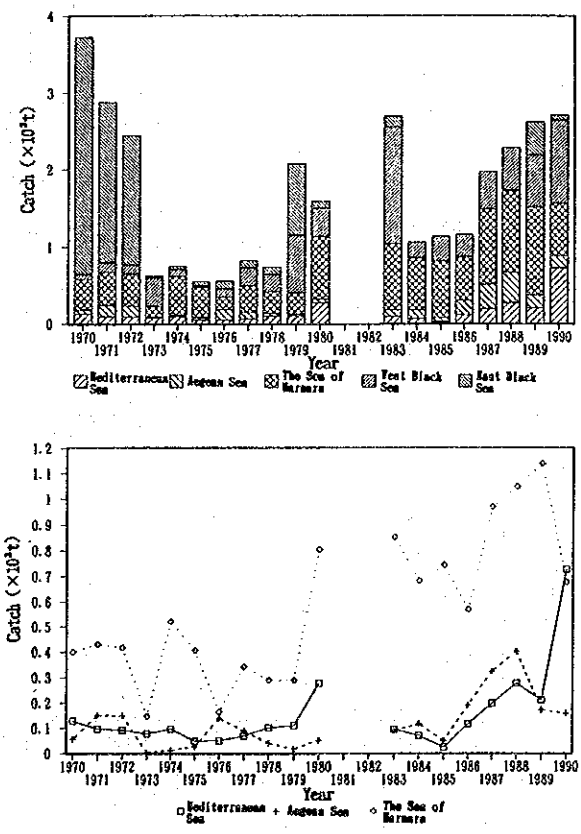

Fig. 5-2-1-8 Total Annual Catch (Upper Figure) and Catch by Area (Lower Figure) of Striped Red Mullet

7) Gilt-Head Sea Bream *Sparus aurata*

The catch of gilt-head sea bream is shown in Fig. 5-2-1-9.

The catch of this species decreased from roughly 400 tons to roughly 100 tons in all areas from 1970 to 1974, and then demonstrated a generally increasing trend starting in the following year of 1975 to 1990 from roughly 300 tons to roughly 1,200 tons. In looking at the catch by area, the proportion of the catch in the Mediterranean Sea and Aegean Sea was large.

In looking at the catch in the sea-borne survey areas, the catch in The Sea of Marmara was low at roughly 20 tons from 1970 to 1990. In the Aegean Sea, the catch gradually decreased from roughly 150 tons to 30 tons from 1970 to 1974, and then demonstrated an increasing trend accompanied by large annual fluctuations (best year: 400-600 tons, worst year: 100-200 tons). In the Mediterranean Sea, the catch remained roughly at 200 tons from 1970 to 1972, and then dropped to less than 100 tons from 1973 to 1977. An increasing trend was then observed from 1978 to 1990 during which the catch increased from 100 tons to 800 tons.

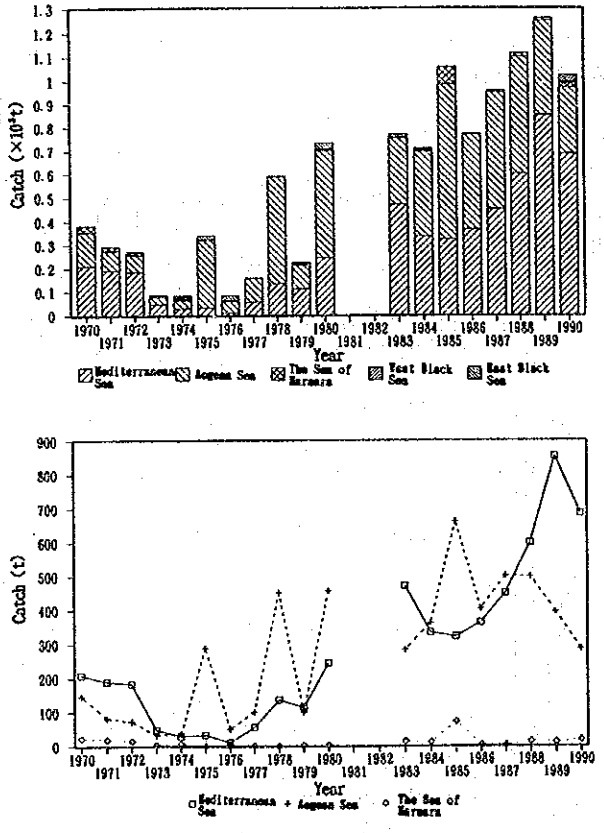

Fig. 5-2-1-9 Total Annual Catch (Upper Figure) and Catch by Area (Lower Figure) of Gilt-Head Sea Bream

8) Annular Sea Bream *Diplodus annularis*

The catch of annular sea bream is shown in Fig. 5-2-1-10.

The catch of this species from 1970 to 1990 remained primarily at the level of roughly 500 tons accompanied by large annual fluctuations between roughly 100 tons and 1,100 tons. In looking at the catch by area, the proportion of the catch in the West Black Sea was large in years in which the total catch exceeded 1,000 tons, while the proportion of the total catch primarily in the Aegean Sea was the largest in other years.

In looking at the catch in the surveyed areas, the catch remained at less than 100 tons from 1970 to 1980 in The Sea of Marmara, and then demonstrated annual fluctuations between less than 100 tons and roughly 300 tons from 1983 to 1990. In the Aegean Sea, the catch was at the level of 200 tons from 1970 to 1972, and then fell below 100 tons from 1973 to 1979. From 1980 to 1990, the catch demonstrated large annual fluctuations within a range of less than 100 tons to 400 tons. In the Mediterranean Sea, with the exception of the catch exceeding 100 tons from 1978 to 1980, the catch was generally 50 tons or less in all other years.

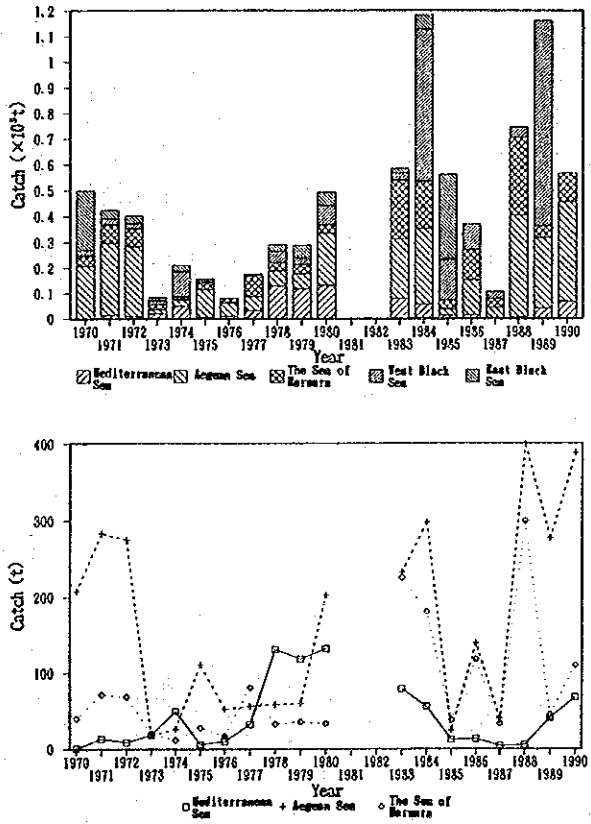

Fig. 5-2-1-10 Total Annual Catch (Upper Figure) and Catch by Area (Lower Figure) of Annular Sea Bream

9) Common Two-Banded Sea Bream *Diplodus vulgaris*

The catch of common two-banded sea bream is shown in Fig. 5-1-2-11.

Although the catch of this species varied from roughly 100 tons to 800 tons, the catch was less than 500 tons up to 1984 and greater than 500 tons in 1985 and beyond, demonstrating an increasing trend. In looking at the catch by area, the proportion of the catch in the Mediterranean Sea and Aegean Sea was the largest.

In looking at the catch in the sea-borne survey areas, the catch in the Aegean Sea was 100 tons or less from 1970 to 1980, and generally within a range of 150 tons to 500 tons from 1983 to 1990, indicating an increasing trend. In the Mediterranean Sea, the catch was less than 100 tons from 1970 to 1977, and within a range of 100 tons to 350 tons from 1978 to 1990, also demonstrating an increasing trend.

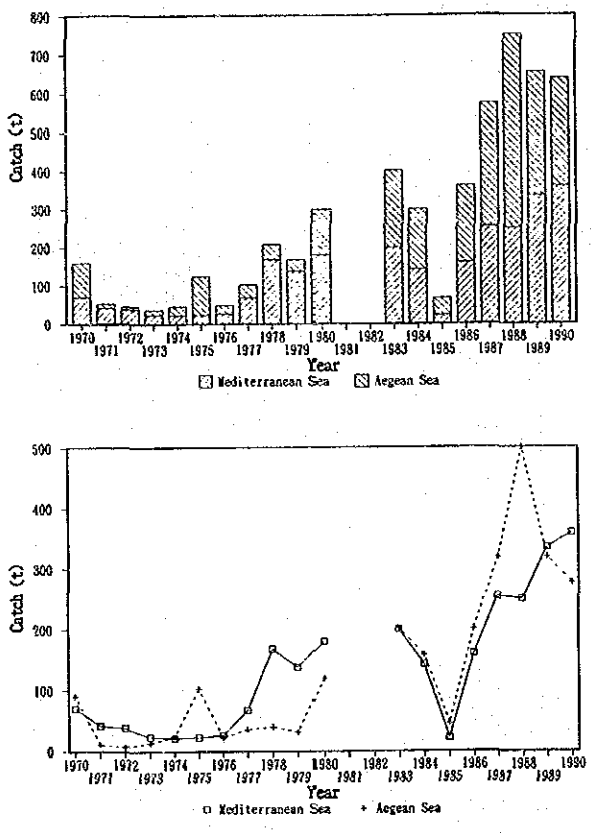

Fig. 5-2-1-11 Total Annual Catch (Upper Figure) and Catch by Area (Lower Figure) of Common Two-Banded Sea Bream

10) Common Pandora *Pagellus erythrinus*

The catch of common pandora is shown in Fig. 5-2-1-12.

Although the catch of this species was from less than 200 tons to 1,700 tons, it was typically roughly 200 tons throughout the 1970's, and demonstrated an increasing trend from 600 tons to roughly 1,000 tons starting in 1980. In looking at the catch by area, the proportion of the catch in the Mediterranean Sea and Aegean Sea was the largest.

In looking at the catch in the sea-borne survey areas, the catch was generally 50 tons or less in The Sea of Marmara from 1970 to 1977. In the Aegean Sea, the catch was less than 200 tons from 1970 to 1978, and fluctuated within a range of 100 tons to 700 tons starting in 1978. In the Mediterranean Sea, other than demonstrating a catch of roughly 1,300 tons in 1978, the catch generally demonstrated an increasing trend from roughly 100 tons to 600 tons from 1970 to 1990.

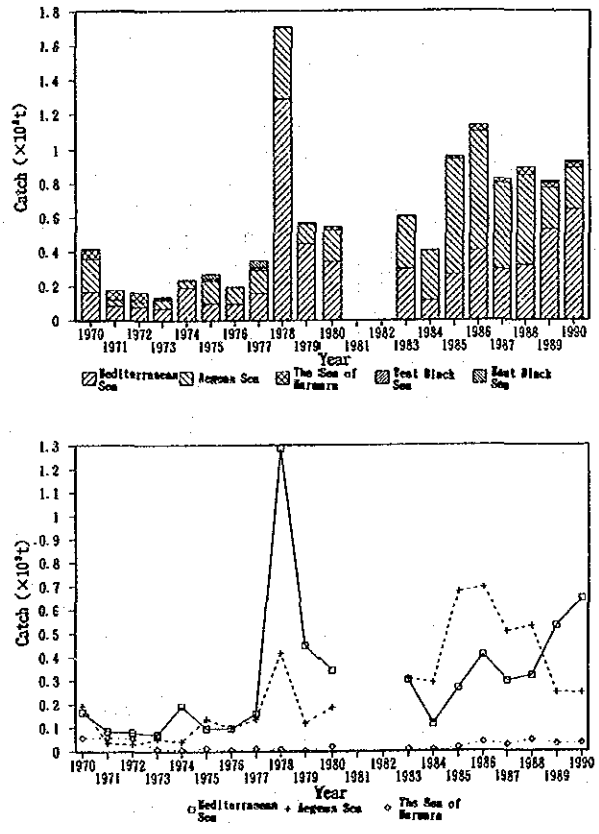

Fig. 5-2-1-12 Total Annual Catch (Upper Figure) and Catch by Area (Lower Figure) of Common Pandora

11) Barracuda *Sphyraena sphyraena*

The catch of barracuda is shown in Fig. 5-2-1-13.

The catch of this species was within a range of 10-110 tons from 1970 to 1980, and within a range of roughly 90 tons to 200 tons from 1983 to 1987. Furthermore, this species was omitted from government fisheries statistical data starting in 1987. In looking at the catch by area, the proportion of the catch in the Mediterranean Sea, Aegean Sea and The Sea of Marmara was large.

In looking at the catch in the sea-borne survey areas, the catch in The Sea of Marmara was roughly 80 tons in 1986, and fluctuated within a range of several to 50 tons in other years. In the Aegean Sea, the catch was roughly 60 tons in 1986, and ranged from less than 10 tons to 30 tons in other years. In the Mediterranean Sea, the catch fluctuated between less than 10 tons and roughly 50 tons from 1970 to 1980, and then demonstrated a decreasing trend from roughly 150 tons down to 20 tons from 1983 to 1987.

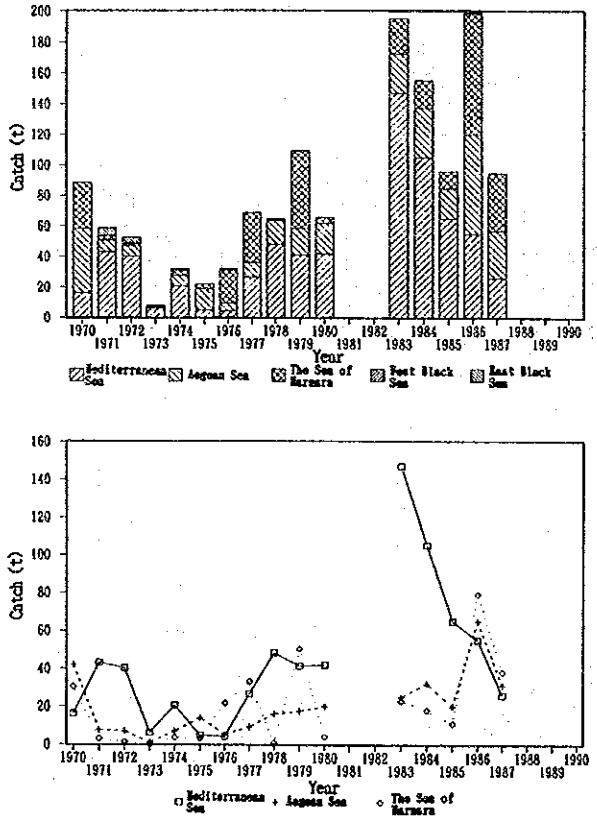

Fig. 5-2-1-13 Total Annual Catch (Upper Figure) and Catch by Area (Lower Figure) of Barracuda

12) Obtuse Barracuda *Sphyraena chrysotaenia*

The catch of obtuse barracuda is shown in Fig. 5-1-2-14.

The catch of this species in all areas from 1970 to 1990 was roughly 10-230 tons, and the largest catch was recorded in 1989. In looking at the catch by area, this species was found to mainly be caught in the Mediterranean Sea.

In looking at the annual fluctuations of the catch in the sea-borne survey areas, other than catch being roughly 200 tons in 1989 and 1990 in the Mediterranean Sea, the catch demonstrated an increasing trend from roughly 10 tons in the first half of the 1970's to roughly 50 tons in the latter half of the 1980's. The catch of this species in the Aegean Sea was generally less than 10 tons (with the maximum catch of roughly 20 tons recorded in 1988).

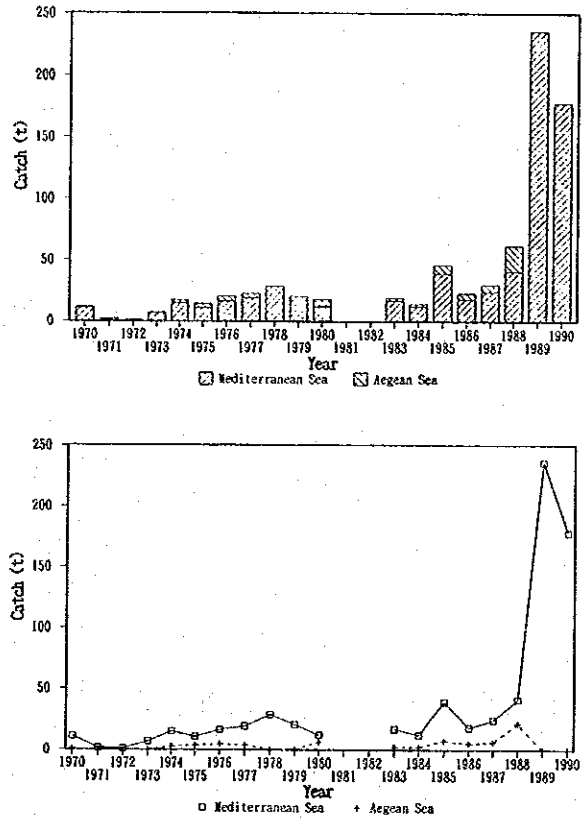

Fig. 5-2-1-14 Total Annual Catch (Upper Figure) and Catch by Area (Lower Figure) of Obtuse Barracuda

(5) Annual Changes in Fishing Effort

1) Annual Changes in Number of Fishing Boats

The annual changes in the number of fishing boats in Turkey over roughly the past 20 years are shown in Fig. 5-2-1-15.

In looking at the changes in the number of fishing boats for each year, although there were roughly 6,000 boats from 1970 to 1972, this number decreased to roughly 4,000 boats in 1973. Later, the number of fishing boats demonstrated an increasing trend until 1984, reaching a total of roughly 7,000 boats. After further reaching a level of roughly 8,000 boats in the following year of 1985, the number of fishing boats remained at the same level until 1990. In looking at the number of fishing boats by area, the proportions of fishing boats in The Sea of Marmara and the East Black Sea were large from 1970 to 1972, when the number of fishing boats was in excess of 6,000, as well as in 1980 and beyond. In addition, the number of fishing boats in the Aegean Sea and Mediterranean Sea demonstrated an increasing trend from 1973 to 1980 when the total number of fishing boats increased from a level of 4,000 to a level of 6,000 boats.

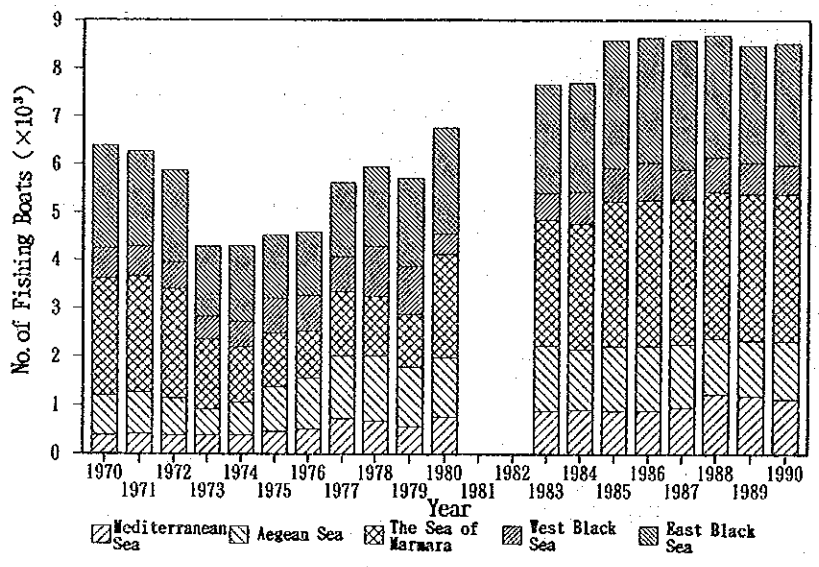

Fig. 5-2-1-15 Number of Fishing Boats by Area

2) Number of Fishing Boats by Area and Horsepower Class

The changes in the number of fishing boats in Turkey by area and horsepower class are shown in Figs. 5-1-2-16 through 5-1-2-20.

The following provides a description of the annual changes in the number of fishing boats by horsepower class for each area.

a. East Black Sea

In looking at the annual changes in the number of fishing boats in the East Black Sea, the number of fishing boats was found to decrease from roughly 2,300 to roughly 1,300 from 1970 to 1975, increase from roughly 1,300 to roughly 2,300 boats from 1976 to 1984, and then remain essentially unchanged at a level of roughly 2,500 boats starting in the following year of 1985 (Fig. 5-2-1-16).

In looking at these figures by horsepower class, boats having engines of 1-9 Hp were the most common in each year, followed by those of 10-19 Hp. Furthermore, starting in 1976, the number of boats having engines of 10-19 Hp increased remarkably, followed by an increase in the number of boats having engines of 100 Hp or more and those of 20-49 Hp, thus demonstrating a trend towards the use of higher horsepower engines overall.

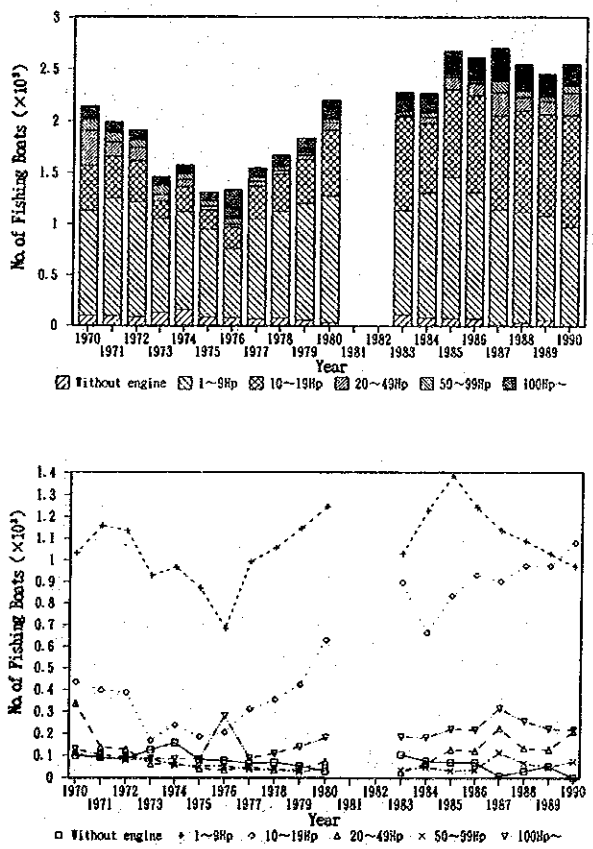

Fig. 5-2-1-16 Total Number of Fishing Boats (Upper Figure) and Number of Fishing Boats by Horsepower Class (Lower Figure) in the East Black Sea

b. West Black Sea

In looking at the annual changes in the number of fishing boats in the West Black Sea, the number of fishing boats decreased from roughly 600 to 400 boats from 1970 to 1973, increased from roughly 500 to 1,000 boats from 1974 to 1979, and then decreased by half to roughly 400 boats in the following year of 1980. The number of boats then remained within a range of 500 to 700 boats until 1990 (Fig. 5-2-1-17).

In looking at these figures by horsepower class, in contrast to those boats having engines of 1-9 Hp being the most common up to 1984, those having engines of 10-19 Hp were the most common starting in 1985. There was also an increase in the number of fishing boats having 20-49 Hp engines. Based on these findings, a trend was observed in which fishing boats began to use higher horsepower engines starting in 1985.

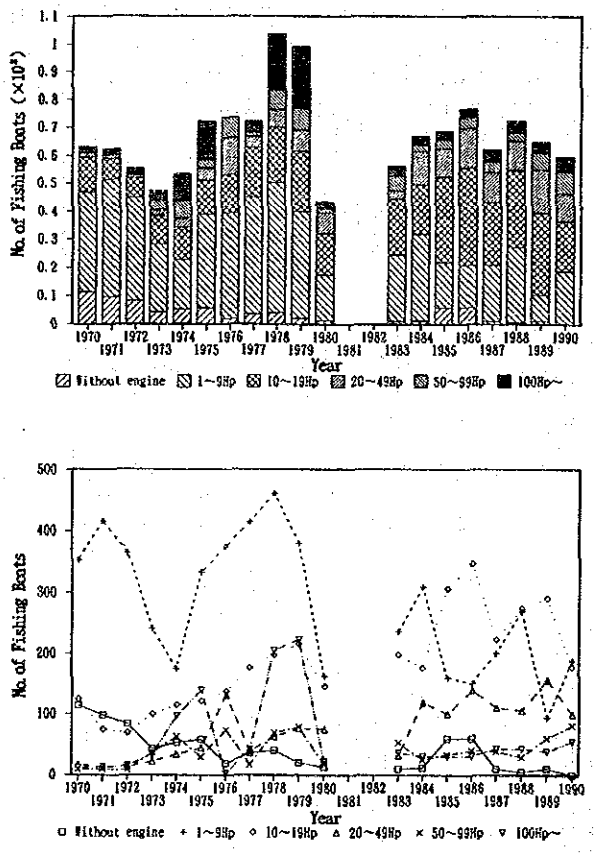

Fig. 5-2-1-17 Total Number of Fishing Boats (Upper Figure) and Number of Fishing Boats by Horsepower Class (Lower Figure) in the West Black Sea

c. The Sea of Marmara

In looking at the annual changes in the number of fishing boats in The Sea of Marmara, after decreasing from roughly 2,400 to 1,000 boats from 1970 to 1976, the number of fishing boats demonstrated an increasing trend starting in the following year of 1977, reaching a level of roughly 3,000 boats in 1985. This number remained essentially unchanged at roughly 3,000 boats from 1985 to 1990 (Fig. 5-2-1-18).

In looking at these figures by horsepower class, although the number of fishing boats equipped with 1-9 Hp engines was the most common up to 1989, the number of these boats began to decrease starting in 1983, and instead, the number of fishing boats equipped with 10-19 Hp, 20-49 Hp and 100 Hp or more engines increased. Based on these findings, it was found that there was a remarkable trend towards the use of higher horsepower engines particularly starting in 1983.

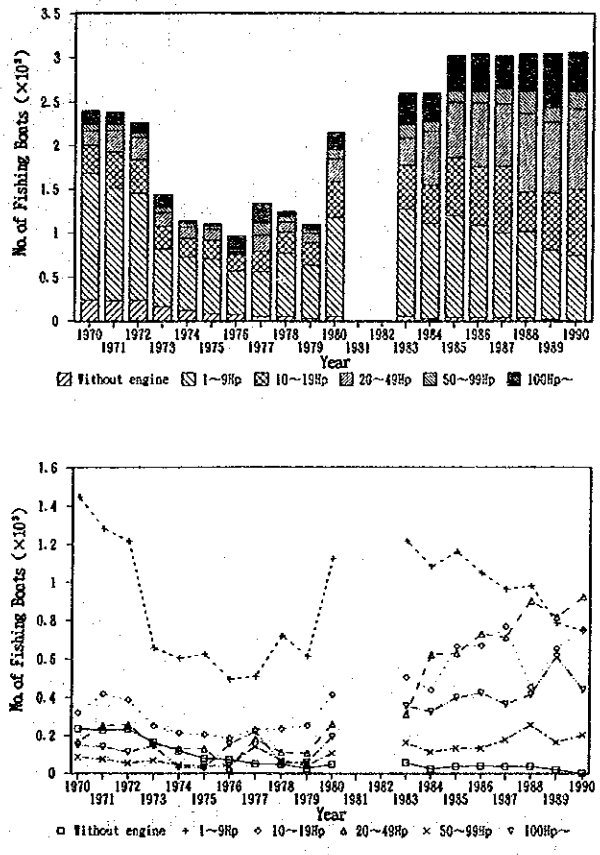

Fig. 5-2-1-18 Total Number of Fishing Boats (Upper Figure) and Number of Fishing Boats by Horsepower Class (Lower Figure) in The Sea of Marmara

d. Aegean Sea

In looking at the annual changes in the number of fishing boats in the Aegean Sea, the number of fishing boats demonstrated a decreasing trend from roughly 800 to 500 boats from 1970 to 1973, and then increased from 600 to 1,300 boats from the following year of 1974 to 1978. The number of fishing boats remained essentially unchanged at roughly 1,100 to 1,300 boats from 1979 to 1990 (Fig. 5-2-1-19).

In looking at these figures by horsepower class, although the number of boats equipped with 1-9 Hp engines was the largest over the past 20 years, the number of boats in this class began to decrease starting in 1983 so that, overall, the proportion of fishing boats having higher horsepower engines has demonstrated an increasing trend.

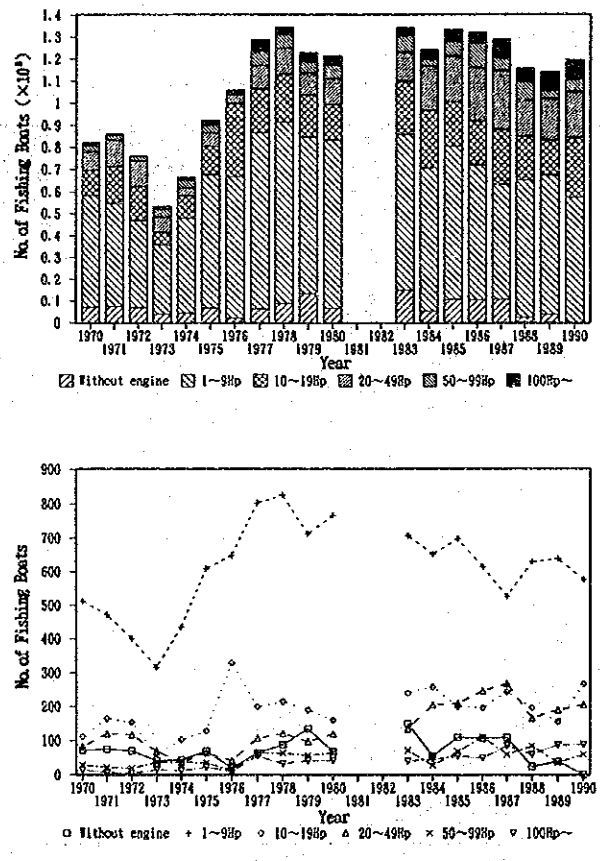

Fig. 5-2-1-19 Total Number of Fishing Boats (Upper Figure) and Number of Fishing Boats by Horsepower Class (Lower Figure) in the Aegean Sea

e. Mediterranean Sea

In looking at the annual changes in the number of fishing boats in the Mediterranean Sea, after remaining essentially unchanged at roughly 400 boats from 1970 to 1974, the number of fishing boats increased from roughly 400 to 900 boats from the following year of 1975 to 1983, and then leveled off at roughly 900 boats from 1983 to 1987. After increasing to roughly 1,200 boats in 1988, the number of fishing boats decreased slightly to roughly 1,100 boats in 1990 (Fig. 5-2-1-20).

In looking at these figures by horsepower class, the number of fishing boats with 1-9 Hp engines was the largest in each year. These were followed by those equipped with 10-19 Hp and 20-49 Hp engines. In addition, a trend was also observed in which there was an increase in the number of fishing boats equipped with 50-99 Hp engines as well as engines of 100 Hp or more.

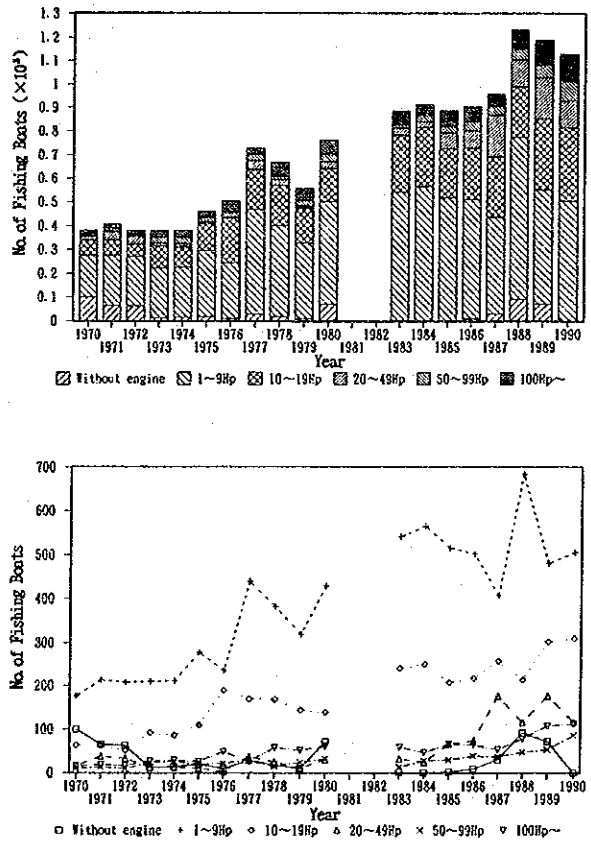

Fig. 5-2-1-20 Total Number of Fishing Boats (Upper Figure) and Number of Fishing Boats by Horsepower Class (Lower Figure) in the Mediterranean Sea

(6) Annual Changes in Catch Per Unit Effort

The annual catch per fishing boat along with the annual catches per horsepower in Turkey over roughly the past 20 years were determined in order to obtain an understanding of the catch per unit effort (CPUE). The catch per fishing boat (tons/boat) was determined by dividing the total annual catch by the total number of fishing boats, while the annual catch per horsepower (kg/Hp) was determined by dividing the total annual catch by total horsepower. Total horsepower is the total sum of the products of multiplying the number of fishing boats of each horsepower class times the horsepower value representing each horsepower class. The horsepower values representing each horsepower class used here are as shown below.

Non-powered	0.1 Hp
1 ~ 9 Hp	5 Hp
10 ~ 19 Hp	15 Hp
20 ~ 49 Hp	35 Hp
50 ~ 99 Hp	75 Hp
100 Hp or more	150 Hp

1) Annual Catch per Fishing Boat

The annual changes in the annual catch per fishing boat ($CPUE_{fb}$) are shown for each area in Fig. 5-2-1-21.

In looking at the values of $CPUE_{fb}$ for each year, the East Black Sea demonstrated the highest $CPUE_{fb}$ values from 1970 to 1980 at roughly 50-140 tons/boat. This was followed by the West Black Sea at roughly 10-100 tons/boat. The $CPUE_{fb}$ values in both these areas increased rapidly in 1980. On the other hand, in the surveyed areas, all three areas tended to remain virtually unchanged at 20 tons/boat or less.

The West Black Sea demonstrated the highest $CPUE_{fb}$ values at roughly 130-250 tons/boat from 1983 to 1990. This was followed by the East Black Sea at roughly 40-150 tons/boat. The $CPUE_{fb}$ values tended to decrease in both areas. On the other hand, in the surveyed areas, the $CPUE_{fb}$ values were roughly 10-30 tons/boat in all three areas, with a slight increasing tendency observed.

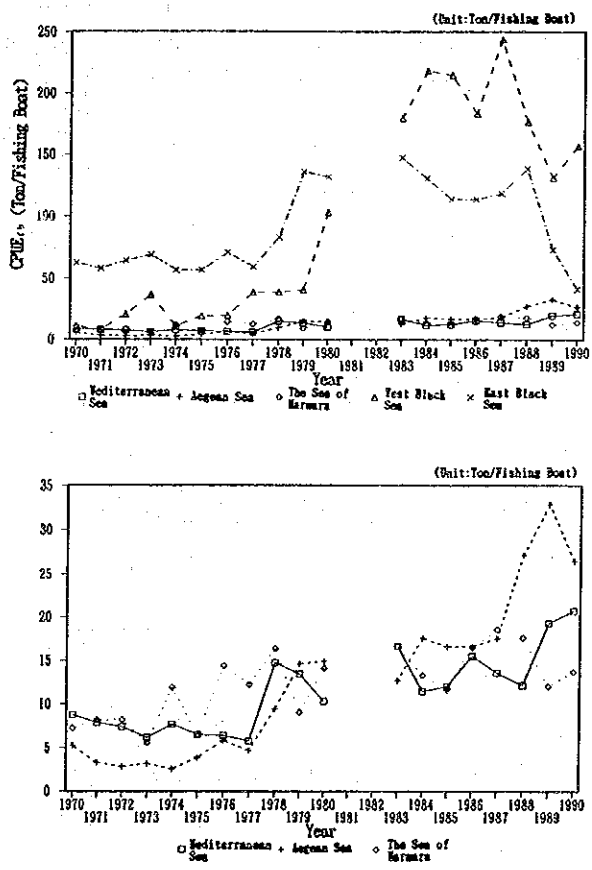

Fig. 5-2-1-21 Annual Catch per Fishing Boat

2) Annual Catch per Horsepower

The annual changes in the annual catch per horsepower ($CPUE_{Hp}$) are shown for each area in Fig. 5-2-1-22.

In looking at the $CPUE_{Hp}$ values for each year, the East Black Sea demonstrated the highest $CPUE_{Hp}$ values from 1970 to 1980 at roughly 2-7 kg/Hp. This was followed by the West Black Sea at roughly 1-4 kg/Hp. The $CPUE_{Hp}$ values tended to increase over time in both these areas. On the other hand, in the surveyed areas, the $CPUE_{Hp}$ values were 1 kg/Hp or less in all three areas.

The West Black Sea demonstrated the highest $CPUE_{Hp}$ values from 1983 to 1990 at roughly 4-10 kg/Hp. This was followed by the East Black Sea at roughly 2-7 kg/Hp. These values tended to decrease over time in both areas. On the other hand, in the surveyed areas, the Aegean Sea demonstrated the highest $CPUE_{Hp}$ values at roughly 0.7-1.3 kg/Hp, followed by the Mediterranean Sea at 0.5-0.8 kg/Hp. The lowest $CPUE_{Hp}$ values were observed in The Sea of Marmara at 0.2-0.5 kg/Hp. With respect to the annual changes in the $CPUE_{Hp}$ values in these three areas, the $CPUE_{Hp}$ values tended to increase somewhat in the Aegean Sea, and decrease somewhat in the Mediterranean Sea and The Sea of Marmara.

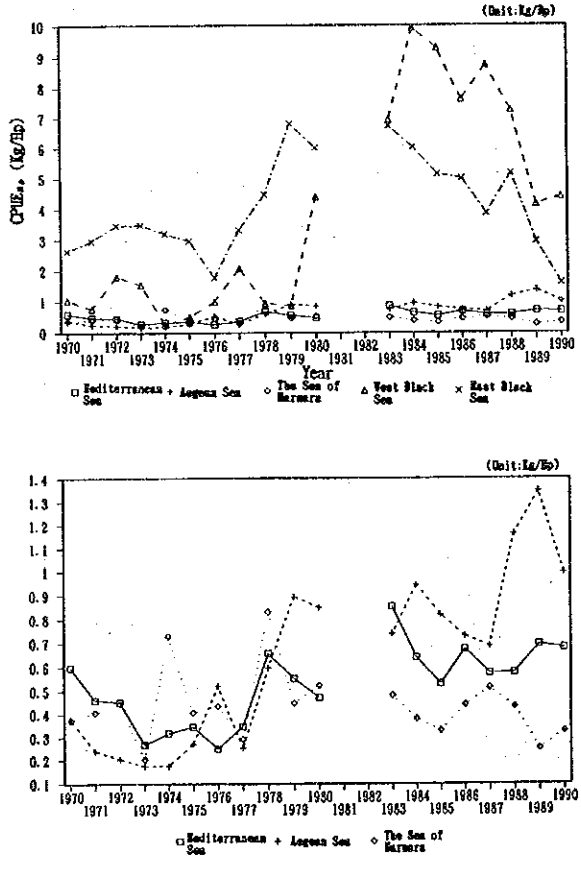

Fig. 5-2-1-22 Annual Catches per Horsepower

5-2-2 Actual Status of Fisheries

5-2-2 Actual Status of Fisheries

(1) Objectives and Methods of Fisheries Survey

Although the previous discussion of "Fisheries Statistics" in section 5-2-1 provided a macroscopic portrayal of changes in the catches and fishing effort by area and species over roughly the past 20 years, in terms of actual implementation of resource management, it is necessary to have an in-depth understanding of the actual status of the fisheries, including such aspects as fishing methods, fishing seasons and the monetary value of catches. Therefore, the resource materials indicated below were collected and used corresponding to that particular resource material.

1) Government Fisheries Statistical Data

Recent data pertaining to the catches by area and species for 1990 were used to compare with the stock sizes by area and species obtained from the results of the sea-borne survey.

2) Individual Prefecture Sea Fishery Catch Statistical Data

We collected the 1990 editions of sea fishery catch statistical data tabulated for each prefecture (to be referred to as "prefecture tabulation data") in order to obtain an understanding of the catches, unit prices and catch value in representative prefectures of each area. This data was then compared between each area.

3) Port Survey (Interview Sheet A)

The survey personnel of regional offices of the Ministry of Agriculture and Rural Affairs located in each representative prefecture selected several representative fishing ports in each prefecture and recorded the annual catches at those ports. Those results were compared with prefecture tabulation data.

4) Sample Boat Survey (Interview Sheet B)

Since the amounts of fishing effort vary according to the season, the survey personnel of regional offices of the Ministry of Agriculture and Rural Affairs selected sample boats at representative fishing ports. These sample boats were then used to survey the catches per day by season in coordination with the timing of the sea-borne survey in order to obtain an understanding of seasonal changes of fishing effort.

(2) Catch by Area

1) Total Catch in Each Area

The catches of sea fishes (to be referred to as "fishes") and the catches of marine products other than fishes (to be referred to as "marine products") for 1990 based on fisheries statistical data issued by the government of Turkey (to be referred to as "government fisheries statistical data") are shown in Table 5-2-2-1 (1), (2).

The following provides a description of the catch in each area.

a. The Sea of Marmara

The total catch of fishes in The Sea of Marmara was 42,064 tons consisting of 44 species, while the total catch of marine products was 24,306 tons consisting of 13 species. There were 10 fishes and 4 species of marine products that demonstrated a catch of 1,000 tons or more.

The species and catches that accounted for 10% or more of the total catch of fishes consisted of Atlantic horse-mackerel *Trachurus trachurus* at 6,042 tons (14.4%), chub mackerel *Scomber japonicus* at 5,956 tons (14.2%), European anchovy *Engraulis encrasicolus* at 5,627 tons (13.4%) and European pilchard *Sardina pilchardus* at 4,965 tons (11.8%). The total catch of these four species accounted for 54% of the total catch of fishes in The Sea of Marmara.

The species and catches that accounted for 10% or more of the total catch of marine products consisted of striped venus *Chamelea gallina* at 13,207 tons (54.3%), shrimps-prawns *MACRURA* at 4,429 tons (18.2%) and Mediterranean mussel *Mytilus galloprovincialis* at 3,778 tons (15.5%). The total catch of these three species accounted for 88% of the total catch of marine products in The Sea of Marmara.

b. Aegean Sea

The total catch of fishes in the Aegean Sea was 31,731 tons consisting of 51 species, while the total catch of marine products was 6,715 tons consisting of 13 species.

There were 6 fishes and 2 species of marine products that demonstrated a catch of 1,000 tons or more.

The species and catches that accounted for 10% or more of the total catch of fishes consisted of European pilchard *Sardina pilchardus* at 9,216 tons (29.0%), mullets *Mugil spp., Liza spp.* at 4,361 tons, (13.7%) and chub mackerel *Scomber japonicus* at 4,002 tons (12.6%). The total catch of these three species accounted for 55% of the total catch of fishes in the Aegean Sea.

The species and catches that accounted for 10% or more of the total catch of marine products consisted of squids at 2,702 tons (40.2%) and cuttlefish *Sepia spp.* at 2,059 tons (30.7%). The total catch of these two species accounted for 71% of the total catch of marine products in the Aegean Sea.

c. Mediterranean Sea

The total catch of fishes in the Mediterranean Sea was 23,498 tons consisting of 48 species, while the total catch of marine products was 4,032 tons consisting of 10 species. There were 7 fishes and 2 species of marine products that demonstrated the catch of 1,000 tons or more.

The species and catches that accounted for 10% or more of the total catch of fishes consisted of mullets *Mugil spp., Liza spp.* at 2,922 tons (12.4%) and chub mackerel *Scomber japonicus* at 2,413 tons (10.3%). The total catch of these two species accounted for 23% of the total catch of fishes in the Mediterranean Sea.

The species and catches that accounted for 10% or more of the total catch of marine products consisted of cuttlefish *Sepia spp.* at 2,073 tons (51.4%), shrimps-prawns MACRURA at 1,149 tons (28.5%) and squids at 452 tons (11.2%). The total catch of these three species accounted for 91% of the total catch of marine products in the Mediterranean Sea.

2) Habitats of Top Ranked Species in Terms of Catch in Each Area

In looking at the classification of the top 10 ranked fishes in terms of the catch in each area into pelagic fish and bottom fish, there were 2 species of bottom fish, 6 species of pelagic fish and 2 species classified as both in The Sea of Marmara. In the Aegean Sea, there were 4 species of bottom fish and 5 species of pelagic fish, and in the Mediterranean Sea, there were 5 species of bottom fish, 3 species of pelagic fish and 1 species classified as both.

These findings suggested that pelagic fish have a high degree of importance in The Sea of Marmara, while bottom fish having a high degree of importance in the Mediterranean Sea (Table 5-2-2-1(1)).

Similarly, in looking at the habitats of the top 10 ranked species of marine products in each area, there were many species of demersal marine products in each area (Table 5-2-2-1(2)).

3) Catch of Commercially Important Species in Each Area

Those species of the 21 commercially important species covered in this survey (18 fishes and 3 species of crustaceans, mollusks) that were able to be correlated with government fisheries statistics data consisted of 12 fishes and no species of crustaceans and mollusks. This is because government fisheries statistics data do not contain a detailed classification of species with respect to crustaceans and mollusks in particular.

The catch by species of commercially important species in each area, the proportion of each species with respect to the total catch, and their order are shown in Table 5-2-2-2.

The following provides a description of the catch of fishes having a catch of 500 tons or more (the proportion of the total catch and order) in order to examine their importance as

commercially important fishes in each area.

a. The Sea of Marmara

There were 9 commercially important fishes caught in The Sea of Marmara. There were 3 species that demonstrated large catches, consisting of Atlantic horse-mackerel *Trachurus trachurus* (6,042 tons, 14.4%, 1st), hake *Merluccius merluccius* (937 tons, 2.3%, 11th) and striped red mullet *Mullus surmuletus* (676 tons, 1.6%, 13th). The other 6 species all demonstrated a catch of less than 500 tons, and the proportions of the total catch were less than 1% for each species.

b. Aegean Sea

There were 9 commercially important fishes caught in the Aegean Sea. There were 2 species that demonstrated large catches, consisting of red mullet *Mullus barbatus* (745 tons, 2.3%, 10th) and Atlantic horse-mackerel *Trachurus trachurus* (503 tons, 1.6%, 12th). The other 7 species all demonstrated a catch of less than 500 tons, and the proportions of the total catch were less than 1.5% for each species.

c. Mediterranean Sea

There were 10 commercially important fishes caught in the Mediterranean Sea. There were 5 species that demonstrated large catches, consisting of red mullet *Mullus barbatus* (1,363 tons, 5.8%, 5th), brushtooth lizardfish *Saurida undosquamis* (1,145 tons, 4.9%, 6th), striped red mullet *Mullus surmuletus* (727 tons, 3.1%, 11th), gilt-head sea bream *Sparus aurata* (686 tons, 2.9%, 12th) and common pandora *Pagellus erythrinus* (647 tons, 2.8%, 13th). The other 5 species all demonstrated a catch of less than 500 tons, and the proportions of the total catch were less than 1.6% for each species.

4) Catch by Area of Commercially Important Species

The ratio of the catches in each area to the total catches and their orders were observed in the commercially important species covered in this survey. A degree of importance of fish species in each area was examined (Table 5-2-2-2).

a. Brushtooth Lizardfish *Saurida undosquamis*

Brushtooth lizardfish was caught in the Mediterranean Sea, and its catch was 1,145 tons (4.9%, 6th).

b. Hake *Merluccius merluccius*

Although the catch of hake was 937 tons (2.3%, 11th) in The Sea of Marmara and 402 tons (1.3%, 16th) in the Aegean Sea, this

species was not caught in the Mediterranean Sea.

c. Painted Comber *Serranus scriba*

Painted comber was caught in the Mediterranean Sea, and its catch was 70 tons (0.3%, 40th).

d. Atlantic Horse-Mackerel *Trachurus trachurus*

The catch of Atlantic horse-mackerel was 6,042 tons (14.4%, 1st) in The Sea of Marmara, 503 tons (1.6%, 12th) in the Aegean Sea, and 216 tons (0.9%, 24th) in the Mediterranean Sea. This species demonstrated a high degree of importance in The Sea of Marmara based on its catch and ranking.

e. Red Mullet *Mullus barbatus*

The catch of red mullet was 91 tons (0.2%, 29th) in The Sea of Marmara, 745 tons (2.3%, 10th) in the Aegean Sea, and 1,363 tons (5.8%, 5th) in the Mediterranean Sea. This species demonstrated a high degree of importance in the Mediterranean Sea based on its catch and ranking.

f. Striped Red Mullet *Mullus surmuletus*

The catch of striped red mullet was 676 tons (1.6%, 13th) in The Sea of Marmara, 158 tons (0.5%, 24th) in the Aegean Sea, and 727 tons (3.1%, 11th) in the Mediterranean Sea. This species demonstrated a higher degree of importance in The Sea of Marmara and Mediterranean Sea than in the Aegean Sea based on its catch and ranking.

g. Gilt-Head Sea Bream *Sparus aurata*

The catch of gilt-head sea bream was 18 tons (less than 0.5%, 38th) in The Sea of Marmara, 286 tons (0.9%, 20th) in the Aegean Sea, and 686 tons (2.9%, 12th) in the Mediterranean Sea. This species demonstrated a high degree of importance in the Mediterranean Sea based on its catch and ranking.

h. Annular Sea Bream *Diplodus annularis*

The catch of annular sea bream was 110 tons (0.3%, 28th) in The Sea of Marmara, 388 tons (1.2%, 18th) in the Aegean Sea, and 68 tons (0.3%, 41st) in the Mediterranean Sea. This species demonstrated a higher degree of importance in the Aegean Sea than in the other two areas based on its catch and ranking.

i. Common Two-Banded Sea Bream *Diplodus vulgaris*

The catch of common two-banded sea bream was 221 tons (0.5%, 22nd) in The Sea of Marmara, 277 tons (0.9%, 21st) in the Aegean

Sea, and 359 tons (1.5%, 18th) in the Mediterranean Sea. There were no large differences observed in both catch and ranking of this species between areas.

j. Common Pandora *Pagellus erythrinus*

The catch of common pandora was 33 tons (0.1%, 34th) in The Sea of Marmara, 246 tons (0.8%, 22nd) in the Aegean Sea, and 647 tons (2.8%, 13th) in the Mediterranean Sea. This species demonstrated a high degree of importance in the Mediterranean Sea based on its catch and ranking.

k. Obtuse Barracuda *Sphyraena chrysotaenia*

The catch of obtuse barracuda was 9 tons (less than 0.05%, 40th) in The Sea of Marmara, 36 tons (0.1%, 42nd) in the Aegean Sea, and 178 tons (0.8%, 30th) in the Mediterranean Sea. This species demonstrated a high degree of importance in the Mediterranean Sea based on its catch and ranking.

Table 5-2-2-1(1) Top 10 Fishes in Terms of Catch in Each Area (1990)

Area		Species	Catch (t)	Catch rate (%)	Remarks
The Sea of Marmara	1	* *Trachurus trachurus*	6,042	14.4	B, P
	2	*Scomber japonicus*	5,956	14.2	P
	3	*Engraulis encrasicolus*	5,627	13.4	P
	4	*Sardina pilchardus*	4,965	11.8	P
	5	*Pomatomus saltator*	2,933	7.0	P
	6	*Trachurus mediterraneus*	2,872	6.8	B, P
	7	*Merlangius merlangus euxinus*	2,047	4.9	B
	8	*Sarda sarda*	1,942	4.6	P
	9	*Mugil* spp., *Liza* spp.	1,631	3.9	P
	10	*Spicara smaris*	1,074	2.6	B
		Total in the area (44 species)	42,064	100.0	
Agean Sea	1	*Sardina pilchardus*	9,216	29.0	P
	2	*Mugil* spp., *Liza* spp.	4,361	13.7	P
	3	*Scomber japonicus*	4,002	12.6	P
	4	*Engraulis encrasicolus*	1,999	6.3	P
	5	*Boops boops*	1,104	3.5	B
	6	Others	1,062	3.3	—
	7	*Sarda sarda*	863	2.7	P
	8	*Sarpa salpa*	795	2.5	B
	9	*Spicara smaris*	784	2.5	B
	10	* *Mullus barbatus*	745	2.3	B
		Total in the area (51 species)	31,731	100.0	
Mediterranean Sea	1	*Mugil* spp., *Liza* spp.	2,922	12.4	P
	2	*Scomber japonicus*	2,413	10.3	P
	3	*Sardina pilchardus*	1,937	8.2	P
	4	Others	1,822	7.8	—
	5	* *Mullus barbatus*	1,363	5.8	B
	6	* *Saurida undosquamis*	1,145	4.9	B, P
	7	*Trigla lucerna*	1,080	4.6	B
	8	*Spicara smaris*	836	3.6	B
	9	*Atherina boyeri*	803	3.4	B
	10	*Gobius* spp.	760	3.2	B
		Total in the area (48 species)	23,498	100.0	

Remarks) B : Bottom fish P : Pelagic fish — : Unknown
* : Important fishes

Table 5-2-2-1(2) Top 10 Marine Products in Terms of Catch in Each Area (1990)

Area		Species	Catch (t)	Catch rate (%)	Remarks
The Sea of Marmara	1	*Chamelea gallina*	13,207	54.3	B
	2	MACRURA	4,429	18.2	B
	3	*Mytilus galloprovincialis*	3,778	15.5	O
	4	*Ostrea edulis*	2,098	8.6	O
	5	*Sepia* spp.	231	1.0	B
	6	Jelly fishes	216	0.9	P
	7	PORTUNIDAE	111	0.5	B
	8	*Carcinus aestuarii*	92	0.4	B
	9	Squids	78	0.3	B, P
	10	OCTOPODIIDAE	33	0.1	B
		Total in the area (13 species)	24,306	100.0	
Aegean Sea	1	Squids	2,702	40.2	B, P
	2	*Sepia* spp.	2,059	30.7	B, P
	3	MACRURA	581	8.7	B
	4	Others	447	6.7	—
	5	OCTOPODIIDAE	362	5.4	B
	6	*Ostrea edulis*	259	3.9	O
	7	Jelly fishes	147	2.2	P
	8	*Homarus gammarus*	121	1.8	B
	9	PALINURIDAE	20	0.3	B
	10	*Mytilus galloprovincialis*	6	0.1	O
	11	GASTROPODA	6	0.1	B
		Total in the area (13 species)	6,715	100.0	
Mediterranean Sea	1	*Sepia* spp.	2,073	51.4	B, P
	2	MACRURA	1,149	28.5	B
	3	Squids	452	11.2	B, P
	4	*Ostrea edulis*	114	2.8	B
	5	OCTOPODIIDAE	87	2.2	B
	6	*Homarus gammarus*	69	1.7	B
	7	*Carcinus aestuarii*	34	0.8	B
	8	BRACHYURA	20	0.5	B
	9	Jelly fishes	19	0.5	P
	10	PALINURIDAE	15	0.4	B
		Total in the area (10 species)	4,032	100.0	

Remarks) B : Bottom fish P : Pelagic fish O : Others — : Unknown

Table 5-2-2-2 Catch of Commercially Important Species by Area (1990)

Unit : ton

Species \ Area	The Sea of Marmara	Aegean Sea	Mediterranean Sea
Saurida undosquamis	—	—	1,145 (4.9) < 6 >
Merluccius merluccius	937 (2.3) < 11 >	402 (1.3) < 16 >	—
Serranus scriba	—	—	70 (0.3) < 40 >
Trachurus trachurus	6,042 (14.4) < 1 >	503 (1.6) < 12 >	216 (0.9) < 24 >
Mullus barbatus	91 (0.2) < 29 >	745 (2.3) < 10 >	1,363 (5.8) < 5 >
Mullus surmuletus	676 (1.6) < 13 >	158 (0.5) < 24 >	727 (3.1) < 11 >
Sparus aurata	18 (+) < 38 >	286 (0.9) < 20 >	686 (2.9) < 12 >
Diplodus annularis	110 (0.3) < 28 >	388 (1.2) < 18 >	68 (0.3) < 41 >
Diplodus vulgaris	221 (0.5) < 22 >	277 (0.9) < 21 >	359 (1.5) < 18 >
Pagellus erythrinus	33 (0.1) < 34 >	246 (0.8) < 22 >	647 (2.8) < 13 >
Sphyraena chrysotaenia	9 (+) < 40 >	36 (0.1) < 42 >	178 (0.8) < 30 >
Total in the area	42,064 44 species	31,731 51 species	23,498 48 species

Note:
( ) Figures in these parentheses indicate the proportions of the total catch in each area. A "+" mark indicates catch of less than 0.05%.
< > Figures in these parentheses indicate the order of catch by area and species.

(3) Catch by Prefecture

In order to implement proper resource management in the future, it is necessary to determine the catches and amounts of fishing effort for each prefecture and place regulations on the number of fishing boats and fishing seasons. In this section, the catches in prefectures representing each area were investigated and compared with the catches based on government fisheries statistical data. Furthermore, those prefectures included in government fisheries statistical data are indicated below by area.

East Black Sea: ARTVIN, RIZE, TRABZON, GIRESUN, ORDU, SAMSUN, SINOP
West Black Sea: KASTAMONU, ZONGULDAK, BOLU, SAKARYA KOCAELI, ISTANBUL (Partial), KIRKLARELI, BARTIN
The Sea of Marmara: ISTANBUL (Partial), TEKIRDAG, CANAKKALE (Partial), BURSA, BALIKESIR, KOCAELI
Aegean Sea: EDIRNE, CANAKKALE (Partial), IZMIR, BALIKESIR, AYDIN, MUGLA
Mediterranean Sea: ANTALYA, MERSIN, ADANA, HATAY

In this survey, the representative prefectures for each sub area were selected as shown below.

The Sea of Marmara: ISTANBUL
North Aegean Sea: CANAKKALE
South Aegean Sea: MUGLA
West Mediterranean Sea: ANTALYA
East Mediterranean Sea: MERSIN

1) Total Catch in Representative Prefectures of Each Area

The catches of sea fishes (to be referred to as "fishes") and marine products other than fishes (to be referred to as "marine products") for 1990 are shown in Table 5-2-2-3 (1),(2)) based on fisheries-related tabulation statistics of those prefectures representing each area (to be referred to as "prefecture tabulation data").

The following provides a description of the catch of each prefecture representing each area.

a. ISTANBUL Prefecture (Representing The Sea of Marmara)

The total catch of fishes in ISTANBUL prefecture was 3,048.7 tons consisting of 33 species, while the total catch of marine products was 384.7 tons consisting of 3 species. These amounts accounted for 7.2% and 1,6%, respectively, of the total catch in The Sea of Marmara overall (fishes: 42,064 tons, marine products: 24,306 tons).

Those species and catches that accounted for 10% or more of the total catch of fishes in this prefecture consisted of European anchovy *Engraulis encrasicolus* at 868.0 tons (28.5%), Atlantic horse-mackerel *Trachurus trachurus* at 607.4 tons (19.9%) and Mediterranean horse-mackerel *Trachurus mediterraneus* at 413.9 tons (13.6%).

The total catch of these three species accounted for 62.0% of the total catch of fishes in the ISTANBUL prefecture.

Those species and catches that accounted for 10% or more of the total catch of marine products in this prefecture consisted only of Mediterranean mussel *Mytilus galloprovincialis* at 353.3 tons (91.9%).

b. CANAKKALE Prefecture (Representing the North Aegean Sea)

The total catch of fishes in CANAKKALE prefecture was 4,004.6 tons consisting of 36 species, while the total catch of marine products was 13,016.6 tons consisting of 12 species. Although fishes account for 12.6% when compared with the total catch in the entire North Aegean Sea (fish species: 31,731 tons, marine products: 6,715 tons), with respect to marine products, the catches in the CANAKKALE prefecture greatly surpassed the total catch in the entire North Aegean Sea. This is believed to be due to differences in tabulation methods and so on between government fisheries statistical data and prefecture tabulation data with respect to marine products.

Those species and catches that accounted for 10% or more of the total catch of fish species in this prefecture consisted of European pilchard (Sardina pilchardus) at 1,055.6 tons (26.4%) and Atlantic horse-mackerel *Trachurus trachurus* at 577.7 tons (14.4%). The total catch of these two species accounted for 40.8% of the total catch of fishes species in the CANAKKALE prefecture.

Those species and catches that accounted for 10% or more of the total catch of marine products in this prefecture consisted of striped venus *Chamelea gallina* at 7,853.0 tons (60.3%) and Mediterranean mussel *Mytilus galloprovincialis* at 3,995.0 tons (30.7%). Despite the total catch of these two species accounting for 91.0% of the total catch of marine products in the CANAKKALE prefecture, the catches of these species were shown as being only 0 tons and 6 tons, respectively, in government fisheries statistical data. This is believed to indicate that differences between prefecture tabulation data and government fisheries data are greatly affected by major species of marine products in this prefecture not being included in government fisheries statistical data.

c. ANTALYA Prefecture (Representing the West Mediterranean Sea)

The total catch of fish species in ANTALYA prefecture was 2,105.4 tons consisting of 61 species, while the total catch of marine products was 108.0 tons consisting of 8 species. These

amounts accounted for 9.0% and 2.7%, respectively, of the total catch in the entire Mediterranean Sea (fish species: 23,498 tons, marine products: 4,032 tons).

Those species and catches that accounted for 10% or more of the total catch of fish species in this prefecture consisted of chub mackerel *Scomber japonicus* at 270.4 tons (12.8%), European pilchard *Sardina pilchardus* at 260.3 tons (12.4%) and bogue *Boops boops* at 214.2 tons (10.2%).

The total catch of these three species accounted for 35.4% of the total catch of fish species in the ANTALYA prefecture.

Those species and catches that accounted for 10% or more of the total catch of marine products in this prefecture consisted of cuttlefish *Sepia spp.* at 38.0 tons (35.2%), octopus OCTOPODIIDAE at 22.4 tons (20.7%), shrimps-prawns at 18.1 tons (16.7%) and swimming crabs at 15.3 tons (14.1%). The total catch of these four species accounted for 86.8% of the marine products in the ANTALYA prefecture.

d. MERSIN Prefecture (Representing the East Mediterranean Sea)

The total catch of fish species in MERSIN prefecture was 2,863.9 tons consisting of 28 species, while the total catch of marine products was 199.8 tons consisting of 4 species. These amounts accounted for 12.2% and 5.0%, respectively, of the total catch in the entire Mediterranean Sea (fish species: 23,498 tons, marine products: 4,032 tons).

Those species and catches that accounted for 10% or more of the total catches of fish species and marine products in this prefecture consisted of European pilchard *Sardina pilchardus* at 520.0 tons (18.2%) and penaeid shrimps-prawns *Penaeidae* at 165.0 tons (82.5%).

2) Habitats of Top Ranked Species in Terms of Catch by Prefecture

When the top 10 ranked species in terms of catch by prefecture were classified into pelagic fish and bottom fish, there were 3 species of bottom fish, 4 species of pelagic fish and 2 species classified as both in the ISTANBUL prefecture (The Sea of Marmara). In CANAKKALE prefecture (North Aegean Sea), there were 3 species of bottom fish, 5 species of pelagic fish and 1 species classified as both. In ANTALYA prefecture (West Mediterranean Sea), there were 6 species of bottom fish and 4 species of pelagic fish, and in MERSIN prefecture (East Mediterranean Sea), there were 6 species of bottom fish and 4 species of pelagic fish. Based on these findings, the importance of pelagic fish was suggested in representative prefectures of The Sea of Marmara, while the importance of bottom fish was suggested in representative prefectures of the Mediterranean Sea (Table 5-2-2-3 (1)). These results demonstrated a similar trend as the results of studies of catch by area based on government fisheries statistical data.

Similarly, in looking at the top ranking species of marine products of each area, there was found to be a large number of bottom species in each prefecture (Table 5-2-2-3 (2)).

Table 5-2-2-3(1) Top 10 Ranked Fishes in Terms of Catch in Each Prefecture (1990)

Prefecture (Sub area)		Species	Catch (kg)	Catch rate (%)	Remarks
ISTANBUL (The Sea of Marmara)	1	*Engraulis encrasicolus*	868,000	28.5	P
	2	* *Trachurus trachurus*	607,400	19.9	B, P
	3	*Trachurus mediterraneus*	413,850	13.6	B, P
	4	*Sarda sarda*	265,589	8.7	P
	5	Others	190,000	6.2	—
	6	*Merlangius merlangus euxinus*	183,170	6.0	B
	7	*Pomatomus saltator*	106,598	3.5	P
	8	*Thunnus thynnus*	75,000	2.5	P
	9	* *Mullus surmuletus*	55,920	1.8	B
	10	*Spicara smaris*	49,680	1.6	B
		Total in the prefecture (33 species)	3,048,702	100.0	
CANAKKALE (North Aegean Sea)	1	*Sardina pilchardus*	1,055,600	26.4	P
	2	* *Trachurus trachurus*	577,650	14.4	B, P
	3	Others	381,500	9.5	—
	4	*Scomber japonicus*	349,750	8.7	P
	5	*Mugil* spp., *Liza* spp.	269,600	6.7	P
	6	*Boops boops*	228,750	5.7	B
	7	*Thunnus thynnus*	190,700	4.8	P
	8	*Spicara smaris*	147,950	3.7	B
	9	*Pomatomus saltator*	111,450	2.8	P
	10	*Sarpa salpa*	76,600	1.9	B
		Total in the prefecture (36 species)	4,004,550	100.0	
ANTALYA (West Mediterranean Sea)	1	*Scomber japonicus*	270,358	12.8	P
	2	*Sardina pilchardus*	260,259	12.4	P
	3	*Boops boops*	214,214	10.2	B
	4	*Mugil* spp., *Liza* spp.	117,664	5.6	P
	5	*Spicara smaris*	111,010	5.3	B
	6	* *Mullus barbatus*	94,367	4.5	B
	7	* *Upeneus moluccensis*	83,095	3.9	B
	8	* *Pagellus erythrinus*	77,956	3.7	B
	9	*Lichia amia*	73,183	3.5	P
	10	* *Mullus surmuletus*	58,130	2.8	B
		Total in the prefecture (61 species)	2,105,448	100.0	
MERSIN (East Mediterranean Sea)	1	*Sardina pilchardus*	520,000	18.2	P
	2	*Mugil* spp., *Liza* spp.	280,000	9.8	P
	3	* *Mullus surmuletus*	255,000	8.9	B
	4	* *Saurida undosquamis*	250,000	8.7	B
	5	*Spicara smaris*	233,000	8.1	B
	6	*Epinephelus aeneus*	225,000	7.9	P
	7	*Boops boops*	185,000	6.5	B
	8	* *Sphyraena sphyraena*	112,000	3.9	P
	9	* *Merluccius merluccius*	110,000	3.8	B
	10	*Dicentrarchus labrax*	94,000	3.3	B
		Total in the prefecture (28 species)	2,863,900	100.0	

Remarks) B : Bottom fish P : Pelagic fish — : Unknown
* : Important fishes

Table 5-2-2-3(2) Top 10 Marine Products in Terms of Catch in Each Prefecture (1990)

Prefecture (Sub area)		Species	Catch (kg)	Catch rate (%)	Remarks
ISTANBUL (The Sea of Marmara)	1	*Mytilus galloprovincialis*	353,530	91.9	O
	2	MACRURA	22,544	5.9	B
	3	*Carcinus aestuarii*	8,590	2.2	B
	Total in the prefecture (3 species)		384,664	100.0	
CANAKKALE (North Aegean Sea)	1	*Chamelea gallina*	7,853,000	60.3	B
	2	*Mytilus galloprovincialis*	3,995,000	30.7	O
	3	*Ostrea edulis*	885,000	6.8	O
	4	MACRURA	239,000	1.8	B
	5	OCTOPODIIDAE	13,000	0.1	B
	6	Squids	10,350	0.1	B, P
	7	Others	9,200	0.1	—
	8	*Spongia* spp.	5,800	+	B
	9	*Sepia* spp.	4,950	+	B, P
	10	*Carcinus aestuarii*	525	+	B
	Total in the prefecture (12 species)		13,016,630	100.0	
ANTALYA (West Mediterranean Sea)	1	*Sepia* spp.	38,034	35.2	B, P
	2	OCTOPODIDDAE	22,364	20.7	B
	3	MACRURA	18,058	16.7	B
	4	Swimming crabs	15,268	14.1	B
	5	Squids	9,805	9.1	B, P
	6	PALINURIDAE	2,216	2.1	B
	7	*Homarus gammarus*	1,398	1.3	B
	8	BRACHYURA	849	0.8	B
	Total in the prefecture (8 species)		107,992	100.0	
MERSIN (East Mediterranean Sea)	1	PENAEIDAE	165,000	82.5	B
	2	*Loligo vulgaris*	17,000	8.5	B, P
	3	*Sepia officinalis*	9,500	4.8	B, P
	4	*Eledone* sp.	8,300	4.2	B
	Total in the prefecture (4 species)		199,800	100.0	

Remarks) B : Bottom fish P : Pelagic fish O : Others — : Unknown

3) Catch of Commercially Important Species in Representative Prefectures of Each Area

The proportions of the catches of commercially important species covered in this survey with respect to the total catch by prefecture for each species, along with their order, are shown in Table 5-2-2-4.

The following provides a description of a study conducted on the importance of each species by prefecture based on these results, along with comparisons made with the catch by area contained in government fisheries statistical data.

a. Brushtooth Lizardfish *Saurida undosquamis*

The catch of brushtooth lizardfish was 28.5 tons (1.4%, 18th) in ANTALYA prefecture and 250 tons (8.7%, 4th) in MERSIN prefecture, with this species only appearing in the Mediterranean Sea, thus coinciding with government fisheries statistical data. Furthermore, this species demonstrated a high degree of importance in the eastern portion of the Mediterranean Sea.

b. Hake *Merluccius merluccius*

The catch of hake was absent in ISTANBUL prefecture (The Sea of Marmara), 7.1 tons (0.2%, 34th) in CANAKKALE prefecture (North Aegean Sea), 31.4 tons (1.5%, 15th) in ANTALYA prefecture (West Mediterranean Sea) and 110 tons (3.8%, 9th) in MERSIN prefecture (East Mediterranean Sea), thus demonstrating a high degree of importance in the East Mediterranean Sea. Furthermore, although this species is indicated as being caught in The Sea of Marmara in government fisheries statistical data, it is not indicated as being caught in the Mediterranean Sea, thus indicating a discrepancy with prefecture tabulation data.

c. Painted Comber *Serranus scriba*

The catch of painted comber was 3.2 tons (0.2%, 53rd) in ANTALYA prefecture (West Mediterranean Sea), and there are no records of catch in other prefectures, thus coinciding with government fisheries statistical data.

d. Atlantic Horse-Mackerel *Trachurus trachurus*

The catch of Atlantic horse-mackerel was 607.4 tons (19.9%, 2nd) in ISTANBUL prefecture (The Sea of Marmara), 577.7 tons (13.1%, 2nd) in CANAKKALE prefecture (North Aegean Sea), 30.9 tons (1.5%, 16th) in ANTALYA prefecture (West Mediterranean Sea), and 35.0 tons (1.2%, 18th) in MERSIN prefecture (East Mediterranean Sea), thus demonstrating a high degree of importance in The Sea of Marmara and The North Aegean Sea. Although this trend coincided with government fisheries statistical data, since the catch in CANAKKALE prefecture was

larger than that of the Aegean Sea (503 tons), there is a possibility that Mediterranean horse-mackerel may be mistakenly contained in prefecture tabulation data.

e. Red Mullet *Mullus barbatus*

The catch of red mullet was not recorded in ISTANBUL prefecture (The Sea of Marmara), 16.6 tons (0.4%, 25th) in CANAKKALE prefecture (North Aegean Sea), 94.4 tons (4.5%, 6th) in ANTALYA prefecture (West Mediterranean Sea), and 255.0 tons (8.9%, 3rd) in MERSIN prefecture (East Mediterranean Sea), indicating a higher degree of importance in the Mediterranean Sea than in the Aegean Sea. In the Mediterranean Sea, the eastern portion demonstrated a higher degree of importance than the western portion. Furthermore, since the importance of this species was indicated as being low (0.2%, 29th) in The Sea of Marmara and higher in the Mediterranean Sea than in the Aegean Sea in government fisheries statistical data, the trends between prefecture tabulation data and government fisheries statistical data were considered to coincide.

f. Striped Red Mullet *Mullus surmuletus*

Although the catch of striped red mullet was 55.9 tons (1.8%, 9th) in ISTANBUL prefecture (The Sea of Marmara), 10.2 tons (0.2%, 27th) in CANAKKALE prefecture (North Aegean Sea) and 58.1 tons (2.8%, 10th) in ANTALYA prefecture (West Mediterranean Sea), there was no catch recorded in MERSIN prefecture (East Mediterranean Sea). This species demonstrated a higher degree of importance in The Sea of Marmara and Mediterranean Sea than in the Aegean Sea. This trend coincided with government fisheries statistical data.

g. Golden-Banded Goatfish *Upeneus moluccensis*

Although the catch of golden-banded goatfish was 83.1 tons (3.9%, 7th) in ANTALYA prefecture (West Mediterranean Sea), the catch of this species was not recorded in the other prefectures tabulation data. Since this species was not contained in government fisheries statistical data, but included in the two species of Mullidae mentioned above, similar findings are most likely contained in prefecture tabulation data.

h. Gilt-Head Sea Bream *Sparus aurata*

Although the catch of gilt-head sea bream was not recorded in ISTANBUL prefecture (The Sea of Marmara), the catch of this species was 9.3 tons (0.2%, 30th) in CANAKKALE prefecture (North Aegean Sea), 17.2 tons (0.8%, 30th) in ANTALYA prefecture (West Mediterranean Sea), and 68.0 tons (2.4%, 13th) in MERSIN prefecture (East Mediterranean Sea). Based on these findings, gilt-head sea bream was found to demonstrate a higher degree of

importance in the Mediterranean Sea than in the Aegean Sea, while in the Mediterranean Sea, the eastern portion tended to demonstrate a higher degree of importance than the western portion. Furthermore, since the importance of this species in The Sea of Marmara was low (less than 0.05%, 38th) according to government fisheries statistical data, and the degree of importance was indicated to be higher in the Mediterranean Sea than in the Aegean Sea, the trends between prefecture tabulation data and government fisheries statistical data were considered to coincide.

i. Annular Sea Bream *Diplodus annularis*

Although there was no catch of annular sea bream in ISTANBUL prefecture (The Sea of Marmara) and CANAKKALE prefecture (North Aegean Sea), the catch of this species was 25.9 tons (1.2%, 21st) in ANTALYA prefecture (West Mediterranean Sea) and 30.0 tons (1.0%, 19th) in MERSIN prefecture (East Mediterranean Sea).

Based on these findings, this species demonstrated a higher degree of importance in the Mediterranean Sea than in other sub areas. Furthermore, since the importance of this species in the Mediterranean Sea according to government fisheries statistical data was lower than that in the Aegean Sea and The Sea of Marmara, a completely opposite trend was indicated between government fisheries statistical data and prefecture tabulation data. This is believed to be due either to the surveyed tabulation data of each prefecture not being representative of each sub area for this species, or some form of confusion with respect to species name.

j. Common Two-Banded Sea Bream *Diplodus vulgaris*

Although the catch of common two-banded sea bream was 18.4 tons (0.6%, 17th) in ISTANBUL prefecture (The Sea of Marmara), 53.1 tons (1.2%, 14th) in CANAKKALE prefecture (North Aegean Sea), and 45.0 tons (1.6%, 16th) in MERSIN prefecture (East Mediterranean Sea), there was no catch of this species in ANTALYA prefecture (West Mediterranean Sea). Based on these findings, this species is considered to not demonstrate importance with respect to the catch throughout all areas, and this trend is nearly consistent with government fisheries statistical data.

k. Common Pandora *Pagellus erythrinus*

Although the catch of common pandora was 0.8 tons (less than 0.05%, 27th) in ISTANBUL prefecture (The Sea of Marmara), 12.6 tons (0.3%, 26th) in CANAKKALE prefecture (North Aegean Sea), and 78.0 tons (3.7%, 8th) in ANTALYA prefecture (West Mediterranean Sea), there was no catch of this species in MERSIN prefecture (East Mediterranean Sea). Based on these findings, this species tended to demonstrate a higher degree of importance in the West Mediterranean Sea than in other sub areas. Furthermore, the

trend towards a high degree of importance of this species in the Mediterranean Sea coincided with government fisheries statistical data.

l. Barracuda *Sphyraena sphyraena*

The catch of barracuda was 112.0 tons (3.9%, 8th) in MERSIN prefecture (East Mediterranean Sea), while there was no catch of this species recorded in other prefectures (areas). Since this species was not included in the 1990 edition of government fisheries statistical data, it is believed that this species was included in the catch of obtuse barracuda *Sphyraena chrysotaenia* of the same genus for that year.

m. Obtuse Barracuda *Sphyraena chrysotaenia*

The catch of obtuse barracuda was 18.1 tons (0.9%, 29th) in ANTALYA prefecture (West Mediterranean Sea), while there was no catch of this species recorded in other prefectures (areas).

Furthermore, the trend towards this species as well as the above-mentioned species of the same genus demonstrating a high degree of importance in the Mediterranean Sea as described in prefecture tabulation data generally coincided with the trend described in government fisheries statistical data.

Table 5-2-2-4 Catch of Commercially Important Species by Prefecture (1990)

Unit : kg

Species \ Prefecture (Sub area)	Istanbul (The Sea of Marmara)	Canakkale (North Aegean Sea)	Mugla (South Aegean Sea)	Antalya (West Mediterranean Sea)	Mersin (East Mediterranean Sea)
Saurida undosquamis	—	—		(1.4) 28,460 < 18 >	(8.7) 250,000 < 4 >
Merluccius merluccius	—	(0.2) 7,100 < 34 >		(1.5) 31,392 < 15 >	(3.8) 110,000 < 9 >
Serranus scriba	—	—		(0.2) 3,195 < 53 >	—
Trachurus trachurus	(19.9) 607,400 < 2 >	(13.1) 577,650 < 2 >		(1.5) 30,890 < 16 >	(1.2) 35,000 < 18 >
Mullus barbatus	—	(0.4) 16,600 < 25 >		(4.5) 94,367 < 6 >	(8.9) 255,000 < 3 >
Mullus surmuletus	(1.8) 55,920 < 9 >	(0.2) 10,200 < 27 >		(2.8) 58,130 < 10 >	—
Upeneus moluccensis	—	—		(3.9) 83,095 < 7 >	—
Sparus aurata	—	(0.2) 9,300 < 30 >		(0.8) 17,227 < 30 >	(2.4) 68,000 < 13 >
Diplodus annularis	—	—		(1.2) 25,880 < 21 >	(1.0) 30,000 < 19 >
Diplodus vulgaris	(0.6) 18,430 < 17 >	(1.2) 53,050 < 14 >		—	(1.6) 45,000 < 16 >
Pagellus erythrinus	(+) 770 < 27 >	(0.3) 12,550 < 26 >		(3.7) 77,956 < 8 >	—
Sphyraena sphyraena	—	—		—	(3.9) 112,000 < 8 >
Sphyraena chrysotaenia	—	—		(0.9) 18,052 < 29 >	—
Total in the area	3,048,702 33 species	4,004,550 36 species		2,105,448 61 species	2,863,900 28 species

Note:
( ) Figures in these parentheses indicate the proportions of the total catch in each area. A "+" mark indicates catch of less than 0.05%.
< > Figures in these parentheses indicate the order of catch by area and species.

(4) Prices by Species

1) Prices by Species in Representative Prefectures of Each Area

The prices by species of sea fishes (to be referred to as "fishes") and marine products other than fish species (to be referred to as "marine products") for 1990 based on fisheries-related tabulation data of prefectures representing each area (to be referred to as "prefecture tabulation data") are shown in Table 5-2-2-5.

The following provides a description of the prices by species for each prefecture representing each area. In addition, TL means Turkish Lila.

a. ISTANBUL (Representing The Sea of Marmara)

The mean price of fishes in ISTANBUL prefecture (33 species total) was 8.217 TL/kg (1,125-41,734 TL/kg), while the mean price of marine products (3 species total) was 10,422 TL/kg (8,897-12,602 TL/kg).

The top 5 ranked fish species in terms of price consisted of European sea bass *Dicentrarchus labrax* (1,734 TL/kg), Atlantic bluefin tuna *Thunnus thynnus* (35,167 TL/kg), tub gurnard *Trigla lucerna* (32,477 TL/kg), turbot *Pasetta maxima* (26,634 TL/kg) and brown meagre *Sciaena umbra* (21,429 TL/kg). The prices of these species were 2.6-5.1 times higher than the mean price.

With respect to marine products, the price of shrimps-prawns MACRURA was the highest at 12,602 TL/kg.

b. CANAKKALE Prefecture (Representing the North Aegean Sea)

The mean price of fishes in CANAKKALE prefecture (36 species total) was 8,147 TL/kg (1,000-45,000 TL/kg), while the price of marine products (12 species total) was 514 TL/kg (500-280,000 TL/kg).

The top 5 ranked fishes in terms of price consisted of Atlantic bluefin tuna *Thunnus thynnus* (45,000 TL/kg), European sea bass *Dicentrarchus labrax* (40,000 TL/kg), common pandora *Pagellus erythrinus* (40,000 TL/kg), gilt-head sea bream *Sparus aurata* (35,000 TL/kg) and common dentex *Dentex dentex* (25,000 TL/kg). The prices of these species were 3.1-5.3 times higher than the mean price.

The top 3 ranked species of marine products in terms of price consisted of sponges *Spongia spp.* (280,000 TL/kg), European lobster *Homarus gammarus* (75,000 TL/kg) and spiny lobsters *Palinuridae* (70,000 TL/kg).

c. ANTALYA Prefecture (Representing the West Mediterranean Sea)

The mean price of fishes in ANTALYA prefecture (61 species

total) was 8,343 TL/kg (1,143-27,998 TL/kg), while the mean price of marine products (8 species total) was 10,422 TL/kg (506-31,906 TL/kg).

The top 5 ranked fish species in terms of price consisted of swordfish *Xiphias gladius* (27,998 TL/kg), white grouper *Epinephelus aeneus* (26,552 TL/kg), common sea bream *Pagrus pagrus* (21,283 TL/kg), albacore *Thunnus alalunga* (20,168 TL/kg) and common dentex *Dentex dentex* (19,951 TL/kg). The prices of these species were 2.4-3.4 times higher than the mean price.

The top 3 ranked species of marine products in terms of price consisted of shrimps-prawns MACRURA (31,906 TL/kg), European lobster *Homarus gammarus* (20,043 TL/kg) and spiny lobsters *Palinuridae* (17,017 TL/kg).

d. MERSIN Prefecture (Representing the East Mediterranean Sea)

The mean price of fish species in MERSIN prefecture (28 species total) was 7,153 TL/kg (3,500-18,000 TL/kg), while the mean price of marine products (4 species total) was 2,255 TL/kg (2,000-40,000 TL/kg).

The top 5 ranked fish species in terms of price consisted of white grouper *Epinephelus aeneus* (18,000 TL/kg), dusky grouper *Epinephelus guaza* (15,000 TL/kg), bluefish *Pomatomus saltator* (15,000 TL/kg), European sea bass *Dicentrarchus labrax* (14,700 TL/kg) and swordfish *Xiphias gladius* (14,000 TL/kg). The prices of these species were 2.0-2.5 times higher than the mean price.

With respect to marine products, the price of penaeid prawns *Penaeus spp.* was the highest at 40,000 TL/kg, followed by the price of European squid *Loligo vulgaris* at 15,000 TL/kg.

2) Habitats of Top Ranking Species in Terms of Price by Prefecture

When the top 10 ranked fish species in terms of price for each prefecture were divided into pelagic fish and bottom fish, there were found to be 6 species of bottom fish and 3 species of pelagic fish in ISTANBUL prefecture (The Sea of Marmara), 8 species of bottom fish and 2 species of pelagic fish in CANAKKALE prefecture (North Aegean Sea), 7 species of bottom fish and 2 species of pelagic fish in ANTALYA prefecture (West Mediterranean Sea), and 7 species of bottom fish and 3 species of pelagic fish in MERSIN prefecture (East Mediterranean Sea). These findings suggested the importance of bottom fish among top ranked fishes in terms of price in all representative prefectures of each area (Table 5-2-2-5 (1)).

Similarly, in looking at the top ranked species of marine products in terms of price for each area, there were numerous species of bottom marine products (Table 5-2-2-5 (2)).

Table 5-2-2-5(1) Top 10 Ranked Sea Fishes in Terms of Price in Each Prefecture (1990)

Prefecture (Sub area)		Species	Price (TL/kg)	Price/ Mean Price	Remarks
ISTANBUL (The Sea of Marmara)	1	*Dicentrarchus labrax*	41,734	5.1	B
	2	*Thunnus thynnus*	35,167	4.3	P
	3	*Trigla lucerna*	32,477	4.0	B
	4	*Pselta maxima*	26,634	3.2	B
	5	*Sciaena umbra*	21,429	2.6	B
	6	*Xiphias gladius*	20,000	2.4	P
	7	* *Pagellus erythrinus*	19,481	2.4	B
	8	* *Mullus surmuletus*	18,099	2.2	B
	9	*Katswonus (Euthynnus) pelamis*	17,879	2.2	P
	10	Others	17,421	2.1	—
	Mean Price in the prefecture (33 species)		8,217	1.0	
CANAKKALE (North Aegean Sea)	1	*Thunnus thynnus*	45,000	5.5	P
	2	*Dicentrarchus labrax*	40,000	4.9	B
	3	* *Pagellus erythrinus*	40,000	4.9	B
	4	* *Sparus aurata*	35,000	4.3	B
	5	*Dentex dentex*	25,000	3.1	B
	6	* *Diplodus vulgaris*	20,000	2.5	B
	7	* *Mullus barbatus*	20,000	2.5	B
	8	*Psetta maxima*	20,000	2.5	B
	9	*Xiphias gladius*	20,000	2.5	P
	10	*Epinephelus guaza*	17,000	2.1	B
	Mean Price in the prefecture (36 species)		8,147	1.0	
ANTALYA (West Mediterranean Sea)	1	*Xiphias gladius*	27,998	3.4	P
	2	*Epinephelus aeneus*	26,552	3.2	P
	3	*Pagrus pagrus*	21,283	2.6	B
	4	*Thunnus alalunga*	20,168	2.4	B
	5	*Dentex dentex*	19,951	2.4	B
	6	GADIDAE	19,671	2.4	B
	7	Pleuronectoidei	19,255	2.3	B
	8	*Epinephelus guaza*	19,079	2.3	B
	9	*Pagrus coeruleostictus*	18,416	2.2	B
	10	Unidentified fish	17,537	2.1	—
	Mean Price in the prefecture (61 species)		8,343	1.0	
MERSIN (East Mediterranean Sea)	1	*Epinephelus aeneus*	18,000	2.5	P
	2	*Epinephelus guaza*	15,000	2.1	B
	3	*Pomatomus saltator*	15,000	2.1	P
	4	*Dicentrarchus labrax*	14,700	2.1	B
	5	*Xiphias gladius*	14,000	2.0	P
	6	* *Pagellus erythrinus*	12,500	1.7	B
	7	* *Sparus aurata*	10,760	1.5	B
	8	Pleuronectoidei	10,440	1.5	B
	9	* *Diplodus vulgaris*	10,000	1.4	B
	10	*Argyrosomus regius*	10,000	1.4	B
	Mean Price in the prefecture (28 species)		7,153	1.0	

Remarks) B : Bottom fish P : Pelagic fish — : Unknown
* : Important fishes

Table 5-2-2-5(2) Top 10 Ranked Marine Products in Terms of Price in Each Prefecture (1990)

Prefecture (Sub area)		Species	Price (TL/kg)	Remarks
ISTANBUL (The Sea of Marmara)	1	MACRURA	12,602	B
	2	*Carcinus aestuarii*	1,152	B
	3	*Mytilus galloprovincialis*	897	O
		Average in the prefecture (3 species)	10,422	
CANAKKALE (North Aegean Sea)	1	*Spongia* spp.	280,000	B
	2	*Homarus gammarus*	75,000	B
	3	PALINURIDAE	70,000	B
	4	Squids	15,000	B, P
	5	OCTOPODIDAE	10,000	B
	6	Others	10,000	—
	7	*Sepia* spp.	7,000	B, P
	8	*Carcinus aestuarii*	4,000	B
	9	MACRURA	510	B
	10	*Chamelea gallina*	500	B
		Average in the prefecture (12 species)	514	
ANTALYA (West Mediterranean Sea)	1	MACRURA	31,906	B
	2	*Homarus gammarus*	20,043	B
	3	PALINURIDAE	17,017	B
	4	Squids	11,434	B, P
	5	*Sepia* spp.	6,114	B, P
	6	OCTOPODIDAE	5,731	B
	7	BRACHYURA	3,581	P
	8	Swiming crabs	506	B
		Average in the prefecture (8 species)	10,422	
MERSIN (East Mediterranean Sea)	1	*Penaeus* spp.	40,000	B
	2	*Loligo vulgaris*	15,000	B, P
	3	*Sepia officinalis*	4,000	B, P
	4	*Eledone* sp.	2,000	B
		Average in the prefecture (4 species)	2,255	

Remarks) B : Bottom fish P : Pelagic fish O : Others — : Unknown

3) Prices of Commercially Important Species in Representative Prefectures of Each Area

The results of comparing the prices of commercially important species covered in this survey by prefecture are shown in Table 5-2-2-6, and the following provides a description of those prices for each species.

a. Brushtooth lizardfish *Saurida undosquamis*

The price of brushtooth lizardfish was 6,916 TL/kg in ANTALYA prefecture and 5,000 TL/kg in MERSIN prefecture, indicating a trend in which this species was priced higher in the West Mediterranean Sea than in the East Mediterranean Sea.

b. Hake *Merluccius merluccius*

The price of hake was 7,000 TL/kg in CANAKKALE prefecture and 6,957 TL/kg in ANTALYA prefecture. There was hardly any difference in price according to prefecture (area).

c. Painted Comber *Serranus scriba*

The price of painted comber was 5,382 TL/kg in ANTALYA prefecture.

d. Atlantic Horse-Mackerel *Trachurus trachurus*

The price of Atlantic horse-mackerel was 3,556 TL/kg in ISTANBUL prefecture, 2,200 TL/kg in CANAKKALE prefecture, 4,581 TL/kg in ANTALYA prefecture and 3,860 TL/kg in MERSIN prefecture. The price tended to be the lowest in the Aegean Sea, and highest in the Mediterranean Sea, with the price in the West Mediterranean Sea being more than double than in the North Aegean Sea.

e. Red Mullet *Mullus barbatus*

The price of red mullet was 20,000 TL/kg in CANAKKALE prefecture, 10,779 TL/kg in ANTALYA prefecture and 7,830 TL/kg in MERSIN prefecture. The price in the North Aegean Sea was roughly double that in the West and East Mediterranean Sea.

f. Striped Red Mullet *Mullus surmuletus*

The price of striped red mullet was 18,099 TL/kg in ISTANBUL prefecture, 14,000 TL/kg in CANAKKALE prefecture, and 9,761 TL/kg in ANTALYA prefecture. Thus, the price was the highest in The Sea of Marmara, followed by the price in the North Aegean Sea.

g. Golden-Banded Goatfish *Upeneus moluccensis*

The price of golden-banded goatfish was 8,297 TL/kg in ANTALYA prefecture, and was the lowest among the three Mullidae species.

h. Gilt-Head Sea Bream *Sparus aurata*

The price of gilt-head sea bream was 35,000 TL/kg in CANAKKALE prefecture, 16,615 TL/kg in ANTALYA prefecture, and 10,760 TL/kg in MERSIN prefecture. Thus, the price in the North Aegean Sea was the highest, being more than double that in the West Mediterranean Sea, and more than three times that in the East Mediterranean Sea.

i. Annular Sea Bream *Diplodus annularis*

The price of annular sea bream was 5,792 TL/kg in ANTALYA prefecture, and 6,000 TL/kg in MERSIN prefecture. Thus, there was hardly any difference in prices in the Mediterranean Sea with respect to the East and West sub areas.

j. Common Two-Banded Sea Bream *Diplodus vulgaris*

The price of common two-banded sea bream was 15,321 TL/kg in ISTANBUL prefecture, 20,000 TL/kg in CANAKKALE prefecture, and 10,000 TL/kg in MERSIN prefecture. Thus, the prices in The Sea of Marmara and North Aegean Sea were 1.5 and 2.0 times higher than the price in the East Mediterranean Sea, respectively.

k. Common Pandora *Pagellus erythrinus*

The price of common pandora was 19,481 TL/kg in ISTANBUL prefecture, 40,000 TL/kg in CANAKKALE prefecture, and 14,447 TL/kg in ANTALYA prefecture. Thus, the price in the North Aegean Sea was more than double the prices in the West Mediterranean Sea and The Sea of Marmara.

l. Barracuda *Sphyraena sphyraena*

The price of barracuda was 6,500 TL/kg in MERSIN prefecture.

m. Obtuse Barracuda *Sphyraena chrysotaenia*

The price of obtuse barracuda was 10,870 TL/kg in ANTALYA prefecture.

Table 5-2-2-6 Prices of Commercially Important Species by Prefecture (1990)

Unit : TL/kg

Species \ Prefecture (Sub area)	Istanbul (The Sea of Marmara)	Canakkale (North Aegean Sea)	Mugla (South Aegean Sea)	Antalya (West Mediterranean Sea)	Mersin (East Mediterranean Sea)
Saurida undosquamis	—	—		6,916 < 38 >	5,000 < 22 >
Merluccius merluccius	—	7,000 < 25 >		6,957 < 37 >	6,600 < 16 >
Serranus scriba	—	—		5,382 < 47 >	—
Trachurus trachurus	3,556 < 30 >	2,200 < 32 >		4,581 < 50 >	3,860 < 26 >
Mullus barbatus	—	20,000 < 7 >		10,779 < 24 >	7,830 < 15 >
Mullus surmuletus	18,099 < 8 >	14,000 < 16 >		9,761 < 18 >	—
Upeneus moluccensis	—	—		8,297 < 32 >	—
Sparus aurata	—	35,000 < 4 >		16,615 < 12 >	10,760 < 7 >
Diplodus annularis	—	—		5,792 < 42 >	6,000 < 18 >
Diplodus vulgaris	15,321 < 13 >	20,000 < 6 >		—	10,000 < 9 >
Pagellus erythrinus	19,481 < 7 >	40,000 < 3 >		14,447 < 17 >	—
Sphyraena sphyraena	—	—		—	6,500 < 17 >
Sphyraena chrysotaenia	—	—		10,870 < 23 >	—
Total in the Prefecture	8,271 33 species	8,147 36 species		8,343 61 species	7,153 28 species

Note: Figures in parentheses indicate the order of price by prefectue and species.

4) Trends in Fish Prices in Representative Prefectures of Each Area

In contrast to the mean price of fishes in representative prefectures of each area, the mean price was roughly 8,100-8,300 TL/kg in ISTANBUL prefecture (The Sea of Marmara), CANAKKALE prefecture (North Aegean Sea) and ANTALYA prefecture (West Mediterranean Sea), that in MERSIN prefecture (East Mediterranean Sea) was low at 7,100 TL/kg (Table 5-2-2-5(1), 5-2-2-6). Based on these findings, the prices in representative prefectures in the East Mediterranean Sea tended to be lower in comparison with the prices in representative prefectures for The Sea of Marmara, the Aegean Sea and West Mediterranean Sea.

In looking at the mean prices of marine products in representative prefectures of each area, the mean price was 10,422 TL/kg in ISTANBUL prefecture, 514 TL/kg in CANAKKALE prefecture, 10,422 TL/kg in ANTALYA prefecture, and 2,255 TL/kg in MERSIN prefecture, with only the price in CANAKKALE prefecture being extremely low (Table 5-2-2-5(2)). This is because a large number of species priced at 500 TL/kg or less, such as striped venus *Chamelea gallina* and Mediterranean mussel *Mytilus galloprovincialis*, were observed in this area in comparison with other areas.

(5) Economic Value by Area

1) Economic Value in Representative Prefectures of Each Area

The economic values of sea fishes and marine products other than fishes for 1990 based on tabulation data of prefectures representing each area are shown in Table 5-2-2-7 (1), (2).

The following provides a description of economic value by prefectures representing each area.

a. ISTANBUL Prefecture (Representing The Sea of Marmara)

The total economic value in ISTANBUL prefecture was 25,052.3 million TL for fishes (33 species total), and 611.0 million TL for marine products (3 species total).

Those species and economic values that accounted for 10% or more of the total economic value of fishes in this prefecture consisted of European anchovy *Engraulis encrasicolus* at 3,877.5 million TL (15.5%), Atlantic bonito *Sarda sarda* at 3,432.2 million TL (13.7%), other species at 3,310.0 million TL (13.2%) and Atlantic bluefin tuna *Thunnus thynnus* at 2,637.5 million TL (10.5%) (other species were treated as a single species). The total economic value of these four species accounted for 52.9% of the total economic value of fishes in ISTANBUL prefecture.

Those species and economic values that accounted for 10% or more of the total economic value of marine products in this

prefecture consisted of Mediterranean mussel *Mytilus galloprovincialis* at 317.0 million TL (51.9%) and shrimps-prawns MACRURA at 284.1 million TL (46.5%). The total economic value of these two species accounted for 98.4% of the total economic value of marine products in ISTANBUL prefecture.

b. CANAKKALE Prefecture (Representing the North Aegean Sea)

The total economic value in CANAKKALE prefecture was 32,624.7 million TL for fishes (36 species total) and 6,689.4 million TL for marine products (12 species total).

Those species and economic values that accounted for 10% or more of the total economic value of fishes in this prefecture consisted of Atlantic bluefin tuna *Thunnus thynnus* at 8,581.5 million TL (26.3%) and other species at 5,722.5 million TL (17.5%) (other species were treated as a single species). The total economic value of these two species accounted for 43.8% of the total economic value of fishes in CANAKKALE prefecture.

Those species and economic values that accounted for 10% or more of the total economic value of marine products in this prefecture consisted of striped venus *Chamelea gallina* at 3,926.5 million TL (58.7%) and sponges *Spongia spp.* at 1,624.0 million TL (24.3%). The total economic value of these two species accounted for 83.0% of the total economic value of marine products in CANAKKALE prefecture.

c. ANTALYA Prefecture (Representing the West Mediterranean Sea)

The total economic value in ANTALYA prefecture was 17,564.9 million TL for fishes (61 species total) and 1,125.5 million TL for marine products (8 species total).

There were no fishes that accounted for 10% or more of the total economic value of fishes in this prefecture. Chub mackerel *Scomber japonicus* demonstrated the highest economic value at 1,301.0 million TL (7.4%).

Those species and economic values that accounted for 10% or more of the total economic value of marine products in this prefecture consisted of shrimps-prawns MACRURA at 576.2 million TL (51.2%), cuttlefishes *Sepia spp.* at 232.5 million TL (20.7%), octopuses *Octopodidae* at 128.2 million TL (11.4%) and squids at 112.1 million TL (10.7%). The total economic value of these four species accounted for 94.0% of the total economic value of marine products in ANTALYA prefecture.

d. MERSIN Prefecture (Representing the East Mediterranean Sea)

The total economic value in MERSIN prefecture was 20,484.2 million TL for fishes (28 species total) and 6,909.0 million TL for marine products (4 species total).

Those species and economic values that accounted for 10% or more of the total economic value of fishes in this prefecture consisted of only one species, namely white grouper *Epinephelus*

aeneus at 4.050.0 million TL (19.8%).

Those species and economic values that accounted for 10% or more of the total economic value of marine products in this prefecture also consisted of only one species, namely penaeid prawns *Penaeus spp.* at 6,600.0 million TL, which accounted for 95.5% of the total economic value of marine products in MERSIN prefecture.

2) Habitats of Top Ranked Species in Terms of Economic Value by Prefecture

When the top 10 ranked fishes in terms of economic value by prefecture were divided into bottom fish and pelagic fish, there were found to be 3 species of bottom fish and 4 species of pelagic fish and 2 species classified as both in ISTANBUL prefecture (The Sea of Marmara).

Similarly, there were 2 species of bottom fish, 6 species of pelagic fish and 1 species classified as both in CANAKKALE prefecture (North Aegean Sea). In ANTALYA prefecture (West Mediterranean Sea), there were 4 species of bottom fish and 6 species of pelagic fish, while in MERSIN prefecture (East Mediterranean Sea), there were 7 species of bottom fish and 3 species of pelagic fish. Based on these findings, it was suggested that, pelagic fish are important in terms of economic value in all areas except the East Mediterranean Sea (Table 5-2-2-7 (1)).

Table 5-2-2-7 (1) Top 10 Ranked Fishes in Terms of Economic Value in Each Prefecture (1990)

Prefecture (Sub area)		Species	Economic Value ($\times 10^3$ TL)	E. V. Rate (%)	Remarks
ISTANBUL (The Sea of Marmara)	1	*Engraulis encrasicolus*	3,877,500	15.5	P
	2	*Sarda sarda*	3,432,163	13.7	P
	3	Others	3,310,000	13.2	—
	4	*Thunnus thynnus*	2,637,500	10.5	P
	5 *	*Trachurus trachurus*	2,159,795	8.6	B, P
	6	*Trachurus mediterraneus*	2,110,250	8.4	B, P
	7	*Merlangius merlangus euxinus*	1,697,025	6.8	B
	8	*Pomatomus saltator*	1,402,590	5.6	P
	9 *	*Mullus surmuletus*	1,012,100	4.0	B
	10	*Trigla lucerna*	908,990	3.6	B
	Total in the prefecture (33 species)		25,052,348	100.0	
CANAKKALE (North Aegean Sea)	1	*Thunnus thynnus*	8,581,500	26.3	P
	2	Others	5,722,500	17.5	—
	3	*Sardina pilchardus*	2,639,000	8.1	P
	4	*Pomatomus saltator*	1,894,650	5.8	P
	5	*Mugil* spp., *Liza* spp.	1,752,400	5.4	P
	6 *	*Trachurus trachurus*	1,270,830	3.9	B, P
	7	*Scomber japonicus*	1,224,125	3.8	P
	8 *	*Diplodus vulgaris*	1,061,000	3.3	B
	9	*Sarda sarda*	982,600	3.0	P
	10	*Boops boops*	857,812	2.6	B
	Total in the prefecture (36 species)		32,624,742	100.0	
ANTALYA (West Mediterranean Sea)	1	*Scomber japonicus*	1,031,001	7.4	P
	2 *	*Pagellus erythrinus*	1,126,214	6.4	B
	3	*Mugil* spp., *Liza* spp.	1,108,797	6.3	P
	4	*Epinephelus aeneus*	1,018,942	5.8	P
	5 *	*Mullus barbatus*	1,017,136	5.8	B
	6	*Lichia amia*	875,555	5.0	P
	7	*Sardina pilchardus*	794,598	4.5	P
	8	*Xiphias gladius*	785,023	4.5	P
	9	*Boops boops*	717,265	4.1	B
	10 *	*Upeneus moluccensis*	689,441	3.9	B
	Total in the prefecture (61 species)		17,564,909	100.0	
MERSIN (East Mediterranean Sea)	1	*Epinephelus aeneus*	4,050,000	19.8	P
	2 *	*Mullus barbatus*	1,996,650	9.7	B
	3	*Sardina pilchardus*	1,820,000	8.9	P
	4	*Dicentrarchus labrax*	1,381,800	6.7	B
	5	*Mugil* spp., *Liza* spp.	1,302,000	6.4	P
	6 *	*Saurida undosquamis*	1,250,000	6.1	B
	7 *	*Pagellus erythrinus*	937,500	4.6	B
	8	Pleuronectoidei	908,280	4.4	B
	9	*Spicara smaris*	815,500	4.0	B
	10	*Boops boops*	740,000	3.6	B
	Total in the prefecture (28 species)		20,484,235	100.0	

Remarks) B : Bottom fish P : Pelagic fish — : Unknown
* : Important fishes

Table 5-2-2-7 (2) Top 10 Ranked Marine Products in Terms of Economic Value in Each Prefecture (1990)

Prefecture (Sub area)		Species	Economic Value ($\times 10^3$ TL)	E.V. Rate (%)	Remarks
ISTANBUL (The Sea of Marmara)	1	*Mytilus galloprovincialis*	317,022	51.9	O
	2	MACRURA	284,097	46.5	B
	3	*Carcinus aestuarii*	9,895	1.6	B
		Total in the prefecture (3 species)	611,014	100.0	
CANAKKALE (North Aegean Sea)	1	*Chamelea gallina*	3,926,500	58.7	B
	2	*Spongia* spp.	1,624,000	24.3	B
	3	*Mytilus galloprovincialis*	279,650	4.2	O
	4	*Ostrea edulis*	265,500	4.0	O
	5	Squids	155,250	2.3	B, P
	6	OCTOPODIDAE	130,000	1.9	B
	7	MACRURA	121,890	1.8	B
	8	Others	92,000	1.4	—
	9	PALINURIDAE	34,650	0.5	B
	10	*Homarus gammarus*	23,250	0.3	B
		Total in the prefecture (12 species)	6,689,440	100.0	
ANTALYA (West Mediterranean Sea)	1	MACRURA	576,150	51.2	B
	2	*Sepia* SPP.	232,530	20.7	B, P
	3	OCTOPODIDAE	128,173	11.4	B
	4	Squids	112,108	10.7	B, P
	5	PALINURIDAE	37,710	3.4	B
	6	*Homarus gammarus*	28,020	2.5	B
	7	Swiming crabs	7,733	0.7	B
	8	BRACHYURA	3,040	0.3	B
		Total in the prefecture (8 species)	1,125,464	100.0	
MERSIN (East Mediterranean Sea)	1	*Penaeus* spp.	6,600,000	95.5	B
	2	*Loligo vulgaris*	255,000	3.7	B, P
	3	*Sepia officinalis*	38,000	0.6	B, P
	4	*Eledone* sp.	16,000	0.2	B
		Total in the prefecture (4 species)	6,909,000	100.0	

Remarks) B : Bottom fish P : Pelagic fish O : Others — : Unknown

3) Economic Values of Commercially Important Species in Representative Prefectures of Each Area

In addition, the economic value by prefecture of each species, the proportion of economic value of each fishes with respect to the total economic value of each prefecture, and the order of economic value of each fishes, based on prefecture tabulation data for 13 sea fishes of the 21 species of commercially important species, for which economic values were known, are shown in Table 5-2-2-8.

The degrees of importance of commercially important species in each area were compared based on the proportions of the economic value of each fishes with respect to the total economic value of each prefecture, along with the order of those proportions.

a. Brushtooth Lizardfish *Saurida undosquamis*

The economic value of brushtooth lizardfish in ANTALYA prefecture (West Mediterranean Sea) was 197 million TL (1.1%, 28th), and 1,250 million TL (6.1%, 6th) in MERSIN prefecture (East Mediterranean Sea). Thus, within the Mediterranean Sea, this species demonstrated a higher degree of importance in the eastern portion than in the western portion.

b. Hake *Merluccius merluccius*

The economic value of hake was 50 million TL (0.2%, 25th) in CANAKKALE prefecture (North Aegean Sea), 218 million TL (1.2%, 27th) in ANTALYA prefecture (West Mediterranean Sea) and 726 million TL (3.5%, 13th) in MERSIN prefecture (East Mediterranean Sea).

Thus, this species demonstrated the highest degree of importance in the East Mediterranean Sea, followed by the West Mediterranean Sea and North Aegean Sea in that order.

c. Painted Comber *Serranus scriba*

The economic value of painted comber was 17 million TL (0.1%, 55th) in ANTALYA prefecture (West Mediterranean Sea). Thus, this species demonstrated a low degree of importance with respect to the economic value.

d. Atlantic Horse-Mackerel *Trachurus trachurus*

The economic value of Atlantic horse-mackerel was 2,160 million TL (8.6%, 5th) in ISTANBUL prefecture (The Sea of Marmara), 1,271 million TL (3.9%, 6th) in CANAKKALE prefecture (North Aegean Sea), 142 million TL (0.8%, 33rd) in ANTALYA prefecture (West Mediterranean Sea) and 135 million TL (0.7%, 22th) in MERSIN prefecture (East Mediterranean Sea).

Thus, this species demonstrated the highest degree of

importance in The Sea of Marmara, followed by the North Aegean Sea.

e. Red Mullet *Mullus barbatus*

The economic value of red mullet was 332 million TL (1.0%, 17th) in CANAKKALE prefecture (North Aegean Sea), 1,107 million TL (5.8%, 5th) in ANTALYA prefecture (West Mediterranean Sea) and 1,997 million TL (9.7%, 2nd) in MERSIN prefecture (East Mediterranean Sea). Thus, this species demonstrated the highest degree of importance in the East Mediterranean Sea, followed by the West Mediterranean Sea.

f. Striped Red Mullet *Mullus surmuletus*

The economic value of striped red mullet was 1,012 million TL (4.0%, 9th) in ISTANBUL prefecture (The Sea of Marmara), 143 million TL (0.4%, 28th) in CANAKKALE prefecture (North Aegean Sea), and 567 million TL (3.2%, 11th) in ANTALYA prefecture (West Mediterranean Sea). Thus, this species demonstrated the highest degree of importance in The Sea of Marmara, followed by the West Mediterranean Sea.

g. Golden-Banded Goatfish *Upeneus moluccensis*

The economic value of golden-banded goatfish was 689 million TL (3.9%, 10th) in ANTALYA prefecture (West Mediterranean Sea).

h. Gilt-Head Sea Bream *Sparus aurata*

The economic value of gilt-head sea bream was 326 million TL (1.0%, 19th) in CANAKKALE prefecture (North Aegean Sea), 286 million TL (1.6%, 23rd) in ANTALYA prefecture (West Mediterranean Sea) and 732 million TL (3.6%, 11th) in MERSIN prefecture (East Mediterranean Sea). Thus, the importance of this species was high in the East Mediterranean Sea.

i. Annular Sea Bream *Diplodus annularis*

The economic value of annular sea bream was 150 million TL (0.9%, 32nd) in ANTALYA prefecture (West Mediterranean Sea) and 180 million TL (0.9%, 20th) in MERSIN prefecture (East Mediterranean Sea), this indicating a low degree of importance for this species with respect to the economic value.

j. Common Two-Banded Sea Bream *Diplodus vulgaris*

The economic value of common two-banded sea bream was 282 million TL (1.1%, 12th) in ISTANBUL prefecture (The Sea of Marmara), 1,061 million TL (3.3%, 8th) in CANAKKALE prefecture (North Aegean Sea) and 450 million TL (2.2%, 15th) in MERSIN prefecture (East Mediterranean Sea). Thus, the importance of

this species in terms of economic value was highest in the North Aegean Sea.

k. Common Pandora *Pagellus erythrinus*

The economic value of common pandora was 15 million TL (0.1%, 25th) in ISTANBUL prefecture (The Sea of Marmara), 502 million tons (1.5%, 14th) in CANAKKALE prefecture (North Aegean Sea) and 1,126 million TL (6.4%, 2nd) in ANTALYA prefecture (West Mediterranean Sea). Thus, this species demonstrated the highest degree of importance in terms of economic value in the West Mediterranean Sea.

l. Barracuda *Sphyraena sphyraena*

The economic value of barracuda was 728 million TL (3.6%, 12th) in MERSIN prefecture (East Mediterranean Sea).

m. Obtuse Barracuda *Sphyraena chrysotaenia*

The economic value of obtuse barracuda was 196 million TL (1.1%, 29th) in ANTALYA prefecture (West Mediterranean Sea).

Table 5-2-2-8 Economic Values of Commercially Important Species by Prefecture (1990)

Unit : 1,000 TL

Species \ Prefecture (Sub area)	Istanbul (The Sea of Marmara)	Canakkale (North Aegean Sea)	Mugla (South Aegean Sea)	Antalya (West Mediterranean Sea)	Mersin (East Mediterranean Sea)
Saurida undosquamis	—	—		(1.1) 196,820 < 28 >	(6.1) 1,250,000 < 6 >
Merluccius merluccius	—	(0.2) 49,700 < 25 >		(1.2) 218,397 < 27 >	(3.5) 726,000 < 13 >
Serranus scriba	—	—		(0.1) 17,195 < 55 >	—
Trachurus trachurus	(8.6) 2,159,795 < 5 >	(3.9) 1,270,830 < 6 >		(0.8) 141,508 < 33 >	(0.7) 135,100 < 22 >
Mullus barbatus	—	(1.0) 332,000 < 17 >		(5.8) 1,017,136 < 5 >	(9.7) 1,996,650 < 2 >
Mullus surmuletus	(4.0) 1,012,100 < 9 >	(0.4) 142,800 < 28 >		(3.2) 567,390 < 11 >	—
Upeneus moluccensis	—	—		(3.9) 689,441 < 10 >	—
Sparus aurata	—	(1.0) 325,500 < 19 >		(1.6) 286,235 < 23 >	(3.6) 731,680 < 11 >
Diplodus annularis	—	—		(0.9) 149,890 < 32 >	(0.9) 180,000 < 20 >
Diplodus vulgaris	(1.1) 282,375 < 12 >	(3.3) 1,061,000 < 8 >		—	(2.2) 450,000 < 15 >
Pagellus erythrinus	(0.1) 15,000 < 25 >	(1.5) 502,000 < 14 >		(6.4) 1,126,214 < 2 >	—
Sphyraena sphyraena	—	—		—	(3.6) 728,000 < 12 >
Sphyraena chrysotaenia	—	—		(1.1) 196,225 < 29 >	—
Total in the Prefecture	25,052,348 33 species	32,624,742 36 species		17,564,909 61 species	20,484,235 28 species

Notes:
( ) Figures in these parentheses indicate the proportion of the total catch in each area (%).
< > Figures in these parentheses indicate the order of catch by prefecture and species.

(6) **Catch Per Unit Effort**

The four reference materials, a, b, c and d used for calculating the catch per unit effort, one expressed as the annual catch per boat and the other expressed as the daily catch per boat (both are called CPUE), are shown below;

a. Government fisheries statistical data (1990),
b. Prefecture tabulation data (1990),
c. Results of the fishing port survey (Interview Sheet A, 1990) and
d. Results of the sample boat survey (Interview Sheet B, 1991-1992).

Among these reference materials, only "d. Results of the sample boat survey" contains data on the catch by the fishing methods. Therefore, it should be noted that the two CPUE* calculated from each reference materials include the catch by all the fishing methods (Table 5-2-2-9 (1)).

When the two CPUEs from these 4 reference materials are compared, the catch calculated from "d. Results of the sample boat survey" are highest in 4 prefectures with the exception of ISTANBUL prefecture. This is probably due to the fact that the sample boats at ISTANBUL were mainly small gill net fisheries, while those of other 4 prefectures were trawlers. It would appear that the catch data from the sample boats of CANAKKALE prefecture (the daily catch per boat: 10-20 tons except in winter time) are unreliable.

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* Calculation method for the two CPUEs.

(1) Annual catch per boat

Reference materials a, b, c: annual catch/number of boats
Reference material d: average daily catch of a sample boat x 70 days[1)]/season x 4 seasons

(2) Daily[1)]catch per boat

Reference materials a, b, c: annual catch/number of boats/280 days/year[2)]
Reference material d: average daily catch of a sample boat

Where, 1) and 2) are estimated fishing days.

Table 5-2-2-9(1) Comparison of Catch Per Unit Effort by Reference Material (all fishing methods)

(Unit:t/fishing boat/y)

Prefecture (Sub area)	State Institute of Statistics	Prefectural Data of Fisheries	Port Authorities (Interview Sheet A)	Samples of Fishing Boats (Interview Sheet B)
ISTANBUL (The Sea of Marmara)	13.6	1.97	0.09	5.0
CANAKKALE (North Aegean Sea)	25.5	11.31	1.45	3,649.4
MUGLA (South Aegean Sea)				79.4
ANTALYA (West Mediterranean Sea)	19.4	5.45	0.70	68.0
MERSIN (East Mediterranean Sea)		31.82	2.27	34.6

Note: Underlined figures indicate converted values.

Table 5-2-2-9 (2) Comparison of Catch Per Unit Effort by Reference Material (all fishing methods)

(Unit: kg/fishing boat/d)

Prefecture (Sub area)	State Institute of Statistics	Prefectural Data of Fisheries	Port Authorities (Interview Sheet A)	Samples of Fishing Boats (Interview Sheet B)
ISTANBUL (The Sea of Marmara)	48.6	7.0	0.32	36 (Autumn) 36 (Winter)
CANAKKALE (North Aegean Sea)	91.1	40.4	5.18	16,822 (Spring) 10,987 (Summer) 20,650 (Autumn) 3,675 (Winter)
MUGLA (South Aegean Sea)				259 (Spring) 231 (Summer) 644 (Autumn)
ANTALYA (West Mediterranean Sea)	69.3	19.5	2.50	276 (Spring) 357 (Summer) 180 (Autumn) 158 (Winter)
MERSIN (East Mediterranean Sea)		113.6	8.10	494 (Summer)

Note: Underlined figures indicate converted values.

(7) Catch Per Unit Effort for Bottom Trawling

1) CPUE in Prefectures Representing Each Area

Interview surveys were conducted by season regarding the number of operations per navigation, number of horsepower of fishing boats, and catch by species by extracting sample boats engaged in bottom trawling in each prefecture in order to obtain an understanding of the CPUE values of bottom trawling in prefectures representing each area. Based on these results, the catch per unit effort by season are shown in Table 5-2-2-10 with respect to the catch per fishing boat (kg/fishing boat), catch per operation (kg/operation) and catch per horsepower (kg/horsepower). In addition, the values of CPUE by species in each prefecture are shown in Tables 5-2-2-11 through 5-2-2-14 with respect to the catch per operation. Furthermore, since all trawl fishing is prohibited in The Sea of Marmara, sample boat surveys for trawl fishing were not conducted for this area.

The following provides a description of the CPUE values of bottom trawling for prefectures representing each area.

a. CANAKKALE Prefecture (Representing the North Aegean Sea)

As a result of surveying 2-6 sample boats in CANAKKALE prefecture, the average number of operations per fishing boat was 4-6 operations, and the average horsepower per fishing boat was 213.5-256.2 Hp. The CPUE values with respect to the total catch were 3,675-20,976 kg/fishing boat, 608-4,489 kg/operation and 1.53-14.44 kg/Hp (Table 5-2-2-10).

b. MUGLA Prefecture (Representing the South Aegean Sea)

As a result of surveying 38-59 samples boats in MUGLA prefecture, the average number of operations per fishing boat was 4-6 operations, and the average horsepower per fishing boat was 213.5-256.2 Hp. The CPUE values with respect to the total catch were 214-644 kg/fishing boat, 28-148 kg/operation and 0.09-0.53 kg/Hp (Table 5-2-2-10).

c. ANTALYA Prefecture (Representing the West Mediterranean Sea)

As a result of surveying 6-39 sample boats in ANTALYA prefecture, the average number of operations per fishing boat was 5 operations, and the average horsepower per fishing boat was 180.8-257.6 Hp. The CPUE values with respect to the total catch were 158-366 kg/fishing boat, 25-75 kg/operation and 0.08-6.33 kg/Hp (Table 5-2-2-10).

d. MERSIN Prefecture (Representing the East Mediterranean Sea)

As a result of surveying 9 sample boats in MERSIN prefecture, the average number of operations per fishing boat was 4

operations, and the average horsepower per fishing boat was 167.9 Hp. The CPUE values with respect to the total catch were 494 kg/fishing boat, 113 kg/operation and 0.65 kg/Hp (Table 5-2-2-10).

Based on the above results, a comparison of the CPUE values of each prefecture indicated only CANAKKALE prefecture demonstrated values roughly 10 times higher than the CPUE values of other prefectures.

2) Seasonal Changes in CPUE Values in Representative Prefectures

a. CANAKKALE Prefecture (Representing the North Aegean Sea)

When looking at the CPUE values in CANAKKALE prefecture in terms of catch per operation, that in autumn was the highest at 4,489 kg/operation, followed by that in spring at 4,016 kg/operation (Table 5-2-2-10).

Those species demonstrating high CPUE values by season consisted of blue whiting *Micromesistius poutassou* (1,513 kg/operation) and hake *Merluccius merluccius* (1,285 kg/operation) in spring, hake *Merluccius merluccius* (562 kg/operation) and striped red mullet *Mullus surmuletus* (341 kg/operation) in summer, codfishes *Gadidae* (1,116 kg/operation) and whiting *Merlangius merlangus euxinus* (744 kg/operation) in autumn, and hake *Merluccius merluccius* (316 kg/operation) and red mullet *Mullus barbatus* (116 kg/operation) in winter. Thus, the CPUE values of hake, *Gadidae* and *Mullidae* were high throughout all seasons (Table 5-2-2-11).

b. MUGLA Prefecture (Representing the South Aegean Sea)

The CPUE values in MUGLA prefecture were obtained only in spring, summer and autumn. When looking at the CPUE values in terms of catch per operation, that in autumn was the highest at 148 kg/operation, followed by that in spring at 51 kg/operation (Table 5-2-2-10).

Those species demonstrating high CPUE values by season consisted of picarel *Spicara smaris* (14 kg/operation) and red mullet *Mullus barbatus* (13 kg/operation) in spring, striped red mullet *Mullus surmuletus* (10 kg/operation) and painted comber *Serranus scriba* (8 kg/operation) in summer, and bogue *Boops boops* (44 kg/operation) and squid *Loligo sp.* (30 kg/operation) in autumn. Based on these findings, *Mullidae* demonstrated high CPUE values in spring and summer, while bogue *Boops boops* and squid *Loligo sp.* demonstrated high CPUE values in autumn (Table 5-2-2-12).

c. ANTALYA Prefecture (Representing the West Mediterranean Sea)

The CPUE values in ANTALYA prefecture were obtained in spring, summer and winter. When looking at the CPUE values in terms of catch per operation, that in summer was the highest at

75 kg/operation, followed by that in spring at 45 kg/operation (Table 5-2-2-10).

Those species demonstrating high CPUE values by season consisted of picarel *Spicara smaris* (17 kg/operation), red mullet *Mullus barbatus* (13 kg/operation) and golden-banded goatfish *Upeneus moluccensis* (12 kg/operation) in spring, red mullet *Mullus barbatus* (31 kg/operation) and blotched picarel *Spicara maena* (13 kg/operation) in summer, and red mullet *Mullus barbatus* (8 kg/operation) and golden-banded goatfish *Upeneus moluccensis* (5 kg/operation) in winter.

Based on these findings, the CPUE values of *Mullidae* were high in this prefecture throughout all seasons (Table 5-2-2-13).

d. MERSIN Prefecture (Representing the East Mediterranean Sea)

The CPUE values in MERSIN prefecture were obtained only in summer. The CPUE value in terms of catch per operation was 113 kg/operation (Table 5-2-2-10).

Those species demonstrating high CPUE values consisted of picarel *Spicara smaris* (21 kg/operation) and brushtooth lizardfish *Saurida undosquamis* (12 kg/operation) (Table 5-2-2-14).

3) Seasonal Changes in CPUE Values of Commercially Important Species

All 18 fishes of the 21 commercially important species were caught by the sample boats. The following provides a description of the CPUE values of each species as summarized from Tables 5-2-2-11 through 5-2-2-14 for each species and area in terms of the catch per operation (kg/operation).

a. Brushtooth Lizardfish *Saurida undosquamis*

Brushtooth lizardfish was caught in ANTALYA prefecture (West Mediterranean Sea) and MERSIN prefecture (East Mediterranean Sea). The CPUE value in ANTALYA prefecture was 7 kg/operation (units are hereinafter omitted) in summer and 1 in winter, while that in MERSIN prefecture was 12 in summer. Thus, this species demonstrated high values for CPUE in both prefectures in summer.

b. Hake *Merluccius merluccius*

Hake was caught in all four representative prefectures. The CPUE value was 316-1,285 in CANAKKALE prefecture (North Aegean Sea), less than 1 to 2 in MUGLA prefecture (South Aegean Sea), less than 1 to 1 in ANTALYA prefecture (West Mediterranean Sea) and 9 in MERSIN prefecture (East Mediterranean Sea). In looking at the CPUE value in CANAKKALE prefecture for which there was seasonal data, the CPUE value was 1,285 in spring, which was higher than the values of the other three seasons that were within a range of 316-562.

c. Comber *Serranus cabrilla*

Comber was caught in MUGLA prefecture (South Aegean Sea). The CPUE value was 3 in spring, 1 in summer and 7 in autumn, with the highest CPUE value being demonstrated in autumn.

d. Painted Comber *Serranus scriba*

Painted comber was caught in MUGLA prefecture (South Aegean Sea). The CPUE value was 1 in spring, 8 in summer and 4 in autumn.

e. Atlantic Horse-Mackerel *Trachurus trachurus*

Atlantic horse-mackerel was caught in MUGLA prefecture (South Aegean Sea) and MERSIN prefecture (East Mediterranean Sea). The CPUE value was 1 in MUGLA prefecture in spring, and 11 in MERSIN prefecture in summer.

f. Red Mullet *Mullus barbatus*

Red mullet was caught in all four representative prefectures. The CPUE value was 116-312 in CANAKKALE prefecture (North Aegean Sea), less than 1 to 17 in MUGLA prefecture (South Aegean Sea), 8-31 in ANTALYA prefecture (West Mediterranean Sea) and 2 in MERSIN prefecture (East Mediterranean Sea). In looking at the CPUE value in CANAKKALE prefecture for which there was seasonal data, it was high in summer at 312 and low in winter at 116.

g. Striped Red Mullet *Mullus surmuletus*

Striped red mullet was caught in all prefectures with the exception of MERSIN prefecture (East Mediterranean Sea). The CPUE value was 87-341 in CANAKKALE prefecture (North Aegean Sea), 2-10 in MUGLA prefecture (South Aegean Sea) and 1-4 in ANTALYA prefecture (West Mediterranean Sea). In looking at the CPUE value in CANAKKALE prefecture for which there was seasonal data, it was high in summer at 341 and low in winter at 87, indicating a trend similar to that of red mullet *Mullus barbatus* mentioned above.

h. Golden-Banded Goatfish *Upeneus moluccensis*

Golden-banded goatfish was caught in all prefectures with the exception of CANAKKALE prefecture (North Aegean Sea). The CPUE value was less than 1 to 3 in MUGLA prefecture (South Aegean Sea), 5-12 in ANTALYA prefecture (West Mediterranean Sea) and 4 in MERSIN prefecture (East Mediterranean Sea).

i. Gilt-Head Sea Bream *Sparus aurata*

Gilt-head sea bream was caught in all prefectures with the

exception of MERSIN prefecture (East Mediterranean Sea). The CPUE value was 20 in CANAKKALE prefecture (North Aegean Sea), less than 1 to 1 in MUGLA prefecture (South Aegean Sea) and less than 1 in ANTALYA prefecture (West Mediterranean Sea).

j. Large-Eye Dentex *Dentex macrophthalmus*

Large-eye dentex was caught in all prefectures with the exception of MERSIN prefecture (East Mediterranean Sea). The CPUE value was 20-208 in CANAKKALE prefecture (North Aegean Sea), less than 1 to 2 in MUGLA prefecture (South Aegean Sea) and 1-8 in ANTALYA prefecture (West Mediterranean Sea). In looking at the CPUE value in CANAKKALE prefecture for which there was seasonal data, it was high in spring at 208 and low in winter at 20. On the other hand, the CPUE value was high at 8 in summer and low at 0 in spring in ANTALYA prefecture.

k. Annular Sea Bream *Diplodus annularis*

Annular sea bream was caught in all prefectures with the exception of CANAKKALE prefecture (North Aegean Sea). The CPUE value was 1 in MUGLA prefecture (South Aegean Sea), less than 1 to 1 in ANTALYA prefecture (West Mediterranean Sea) and 4 in MERSIN prefecture (East Mediterranean Sea).

l. Common Two-Banded Sea Bream *Diplodus vulgaris*

Common two-banded sea bream was caught in CANAKKALE prefecture (North Aegean Sea) and MUGLA prefecture (South Aegean Sea). The CPUE value was 33 in CANAKKALE prefecture and less than 1 to 2 in MUGLA prefecture.

m. Common Pandora *Pagellus erythrinus*

Common pandora was caught in all four representative prefectures. The CPUE value was 16-280 in CANAKKALE prefecture (North Aegean Sea), 3-12 in MUGLA prefecture (South Aegean Sea), less than 1 in ANTALYA prefecture (West Mediterranean Sea) and 4 in MERSIN prefecture (East Mediterranean Sea).

n. Axillary Sea Bream *Pagellus acarne*

Axillary sea bream was caught in MUGLA prefecture (South Aegean Sea) and MERSIN prefecture (East Mediterranean Sea). The CPUE value was 1-3 in MUGLA prefecture and 2 in MERSIN prefecture.

o. Red Sea Bream *Pagellus bogaraveo*

Red sea bream was caught in CANAKKALE prefecture (North Aegean Sea) and MUGLA prefecture (South Aegean Sea). The CPUE value was 66 in CANAKKALE prefecture and 1 in MUGLA prefecture.

p. Barracuda *Sphyraena sphyraena*

Barracuda was caught in all prefectures with the exception of CANAKKALE prefecture (North Aegean Sea). The CPUE value was less than 1 in MUGLA (South Aegean Sea) and ANTALYA (West Mediterranean Sea) prefectures, and 3 in MERSIN prefecture (East Mediterranean Sea).

q. Obtuse Barracuda *Sphyraena chrysotaenia*

Obtuse barracuda was caught only in ANTALYA prefecture (West Mediterranean Sea), and the CPUE value was less than 1.

r. Common Sole *Solea vulgaris*

Common sole was caught in all four representative prefectures. The CPUE value was 66 in CANAKKALE prefecture (North Aegean Sea), less than 1 in MUGLA (South Aegean Sea) and ANTALYA (West Mediterranean Sea) prefectures, and 4 in MERSIN prefecture (East Mediterranean Sea).

Table 5-2-2-10 Seasonal Changes in Catch Per Unit Effort of Bottom Trawling in Representative Prefectures

Prefecture \ Season		Spring	Summer	Autumn	Winter
Canakkale (North Aegean Sea)	Number of fishing boat	6	4	6	2
	Mean Number of operation	4 (3~ 6)	6 (6~ 6)	5 (4~ 6)	6 (6~ 6)
	Mean Horsepower	360.8 (285~570)	390 (285~570)	290.8 (285~570)	427.5 (285~570)
	Catch per fishing boat (kg/fishing boat)	16,822 (15,000~28,700)	10,987 (7,950~13,500)	20,976 (17,000~25,150)	3,675 (3,450~3,900)
	Catch per operation (kg/operation)	4,016 (2,573~9,564)	1,828 (1,324~2,248)	4,489 (2,831~6,287)	608 (574~648)
	Catch per horsepower (kg/Hp)	12.44 (7.03~29.87)	4.86 (3.93~6.41)	14.44 (5.08~22.02)	1.53 (1.12~2.00)
Mugla (South Aegean Sea)	Number of fishing boat	38	59	40	
	Mean Number of operation	4 (3~ 5)	6 (3~16)	4 (4~ 5)	
	Mean Horsepower	235.3 (152~400)	213.5 (152~330)	256.2 (180~400)	
	Catch per fishing boat (kg/fishing boat)	259 (91~585)	214 (49~742)	644 (245~1,145)	
	Catch per operation (kg/operation)	51 (21~117)	28 (4~73)	148 (60~284)	
	Catch per horsepower (kg/Hp)	0.18 (0.06~0.49)	0.09 (0.01~0.33)	0.53 (0.16~1.08)	
Antalya (West Mediterranean Sea)	Number of fishing boat	6	36		39
	Mean Number of operation	5 (4~ 6)	5 (3~11)		5 (3~ 8)
	Mean Horsepower	180.8 (125~360)	257.6 (125~360)		242.1 (125~365)
	Catch per fishing boat (kg/fishing boat)	250 (111~473)	366 (64~788)		158 (31~388)
	Catch per operation (kg/operation)	45 (18~113)	75 (7~225)		25 (9~ 95)
	Catch per horsepower (kg/Hp)	6.33 (0.06~37.20)	0.24 (0.03~0.76)		0.08 (0.01~0.31)
Mersin (East Mediterranean Sea)	Number of fishing boat		9		
	Mean Number of operation		4 (4~ 4)		
	Mean Horsepower		167.9 (90~240)		
	Catch per fishing boat (kg/fishing boat)		494 (435~540)		
	Catch per operation (kg/operation)		113 (104~130)		
	Catch per horsepower (kg/Hp)		0.65 (0.48~1.13)		

Table 5-2-2-11 Catch Per Operation of Commercially Important Species and Large Catch Species in CANAKKALE Prefecture

(Unit : kg/operation)

Species \ Season	Spring	Summer	Autumn	Winter
Merluccius merluccius	1,285 (566 ~3,666)	562 (416~1,000)	350 (600~ 800)	316 (300~ 333)
Mullus barbatus	187 (133 ~ 458)	312 (83~ 583)	239 (150~ 466)	116 (100~ 133)
Mullus surmuletus	202 (166 ~ 433)	341 (166~ 833)	279 (150~ 450)	87 (75~ 100)
Sparus aurata	–	–	–	20 (41~ 41)
Dentex macrophthalmus	208 (233 ~ 416)	83 (333~ 333)	70 (425~ 425)	20 (41~ 41)
Diplodus vulgaris	–	–	–	33 (66~ 66)
Pagellus erythrinus	–	280 (125~ 666)	–	16 (33~ 33)
Pagellus bogaraveo	–	–	66 (400~ 400)	–
Solea vulgaris	–	–	66 (150~ 250)	–
Major fishes	*Micromesistius poutassou* (1,513) *Lophius piscatorius* (206)	*Zeus faber* (250)	Gadidae (1,116) *Merlangius merlangus euxinus* (744) *Micromesistius poutassou* (506)	

Note: - indicates fishing but no catch.

Table 5-2-2-12 Catch Per Operation of Commercially Important Species and Large Catch Species in MUGLA Prefecture

(Unit : kg/operation)

Species \ Season	Spring	Summer	Autumn	Winter
Merluccius merluccius	2 (1 ~ 9)	+ (1 ~ 5)	1 (1 ~ 7)	
Serranus cabrilla	3 (3 ~ 15)	+ (6 ~ 6)	7 (7 ~ 37)	
Serranus scriba	1 (7 ~ 11)	8 (2 ~ 25)	4 (7 ~ 37)	
Trachurus trachurus	+ (1 ~ 11)	–	–	
Mullus barbatus	13 (1 ~ 30)	+ (1 ~ 12)	17 (7 ~ 37)	
Mullus surmuletus	2 (1 ~ 22)	10 (1 ~ 33)	2 (7 ~ 18)	
Upeneus moluccensis	+ (1 ~ 5)	–	3 (1 ~ 30)	
Sparus aurata	+ (1 ~ 2)	+ (1 ~ 2)	1 (1 ~ 7)	
Dentex macrophthalmus	+ (2 ~ 7)	+ (2 ~ 2)	2 (5 ~ 18)	
Diplodus annularis	+ (3 ~ 3)	–	–	
Diplodus vulgaris	+ (1 ~ 6)	–	2 (2 ~ 18)	
Pagellus erythrinus	9 (2 ~ 25)	3 (1 ~ 16)	12 (3 ~ 30)	
Pagellus acarne	2 (1 ~ 40)	1 (1 ~ 21)	3 (3 ~ 15)	
Pagellus bogaraveo	–	1 (1 ~ 15)	–	
Sphyraena sphyraena	+ (2 ~ 7)	–	–	
Solea vulgaris	–	–	+ (3 ~ 3)	
Major fishes	*Spicara smaris* (14) *Boops boops* (2)	*Boops boops* (2) *Loligo vulgaris* (2)	*Boops boops* (44) *Loligo* sp. (30) *Spicara smaris* (10)	

Note: - indicates fishing but not catch, + indicates catch less than 1 kg.

Table 5-2-2-13 Catch Per Operation of Commercially Important Species and Large catch Species in ANTALYA Prefecture

(Unit : kg/operation)

Species \ Season	Spring	Summer	Autumn	Winter
Saurida undosquamis	–	7 (1 ~ 33)		1 (1 ~ 4)
Merluccius merluccius	+ (1 ~ 1)	1 (2 ~ 16)		+ (1 ~ 2)
Mullus barbatus	13 (10 ~ 32)	31 (3 ~ 100)		8 (2 ~ 46)
Mullus surmuletus	1 (6 ~ 6)	4 (1 ~ 53)		1 (1 ~ 11)
Upeneus moluccensis	12 (3 ~ 37)	6 (1 ~ 33)		5 (1 ~ 28)
Sparus aurata	–	–		+ (1 ~ 1)
Dentex macrophthalmus	–	8 (1 ~ 33)		1 (1 ~ 5)
Diplodus annularis	1 (1 ~ 2)	+ (2 ~ 2)		–
Pagellus erythrinus	+ (+ ~ +)	–		–
Sphyraena sphyraena	+ (1 ~ 1)	+ (10 ~ 10)		–
Sphyraena chrysotaenia	+ (1 ~ 2)	+ (1 ~ 16)		+ (1 ~ 1)
Solea vulgaris	+ (1 ~ 1)	+ (1 ~ 2)		+ (1 ~ 3)
Major fishes	*Spicara smaris* (17) *Boops boops* (1)	*Spicara maena* (13)		*Spicara maena* (5) *Sepia officinalis* (3) *Lithognathus mormyrus* (1)

Note: - indicates fishing but not catch, + indicates catch less than 1 kg.

Table 5-2-2-14 Catch Per Operation of Commercially Important Species and Large Catch Species in MERSIN Prefecture

(Unit : kg／operation)

Season / Species	Spring	Summer	Autumn	Winter
Saurida undosquamis		12 (10 ～ 15)		
Merluccius merluccius		9 (6 ～ 17)		
Trachurus trachurus		11 (6 ～ 20)		
Mullus barbatus		2 (1 ～ 5)		
Upeneus moluccensis		4 (1 ～ 12)		
Diplodus annularis		4 (2 ～ 6)		
Pagellus erythrinus		4 (1 ～ 7)		
Pagellus acarne		2 (2 ～ 5)		
Sphyraena sphyraena		3 (2 ～ 5)		
Solea vulgaris		4 (3 ～ 7)		
Major fishes		*Spicara smaris* (21) *Lithognathus mormyrus* (10)		