Annex 6.3: Impact Assessment on Fishing Activities at Ceyhan Marine Terminal Area Adana

September 2002

Prepared by
Turkish Marine Research Foundation

This report is prepared by:

Bayram ÖZTÜRK, Ph.D.
Turkish Marine Research Foundation (Director)

Ayaka Amaha ÖZTÜRK, Ph.D.
Turkish Marine Research Foundation (Advisor on Biodiversity)

Saadet KARAKULAK, Ph.D.
Turkish Marine Research Foundation (Board Member)

Cumhur Haldun YARDIMCI, M.Sc.
Turkish Marine Research Foundation
Fisheries Engineer

Turkish Marine Research Foundation (TÜDAV)
Address:P.O. Box 10 Beykoz –Istanbul, Turkey
Tel: +90 (216) 424 0772
Fax: +90 (216) 424 0771
e-mail: tudav@superonline.com
Website: www.tudav.org

1. EXECUTIVE SUMMARY

The objective of this study is to collect and comprise information on the fishing activities in Iskenderun Bay and the region surrounding Ceyhan Marine Terminal (CMT) to be able to make an accurate assessment of the impacts of the CMT on fishing activities during the construction and operation phases of the BTC Pipeline Project and Jetty, and also to assess and develop effective mitigation measures.

The field study was made during 15-19 August 2002 in Iskenderun Bay, and particularly in fishing villages within the 10 km radius of the CMT. The additional information was gathered from the local authorities.

General overview of the fishing activities in Iskenderun Bay was presented in terms of fishing ports, boats, catch species, catch statistics, revenue, people engaged in fisheries, fishing gears and so on. Iskenderun Bay is originally a rich fishing ground compared the other part of the Mediterranean in terms of catch amount and variety of species. The stocks, however, have been decreasing due to overfishing, illegal fishing, pollution, and other reasons. The total catch in 2000 was 4,749 t and revenue was 6,562 billion TL. Total number of people engaged in fisheries was estimated as 2,743.

The fishing activities within the 10 km radius of CMT are all small-scale artisanal type, mainly using set nets (gill nets and trammel nets) and longlines. There are three fishing villages in the survey area, namely Golovasi-Sahil Sitesi (referred to as Golovasi hereafter), Yumurtalik, and Incirli. There is no fisherman in Sugozu at the moment. There are 120 fishing boats in total: 40 in Golovasi, 70 in Yumurtalik, and 10 in Incirli. The fishery is carried out on a daily basis and they usually fish at night. The boats are 5.65-9 m long with 9-130 HP, made of wood, and most of them have no compass, radios and echo-sounders. There are usually two or three persons working on a boat. They fish on the continental shelf up to 2-3 miles away from the shore in waters of 40-50 m depth.

The fishing ground in the CMT area is divided into 4 zones, depending on species caught, fishing gear and fishermen who use the zone primarily. ZONE 1 is 0.5-mile-zone from the shore of Golovasi settlement and the length is 2.5 miles along the coast. ZONE 2 is further offshore than ZONE 1, up to 2 miles. ZONE 3 is a 2-mile-zone from the coast off Incirli between Toros Fertilizer Facility and the BOTAS exclusion zone. ZONE 4 is more offshore than ZONE 2 and 3, that is more than 2 miles from the coast. The most frequent users of ZONES 1 and 2 are Golovasi fishermen, while ZONE 3 is used most frequently by Incirli fishermen, and ZONE 4 by non-local industrial fishermen, such as trawlers and purse seiners.
Fishermen are also reported to fish in the CMT exclusion zone.

The most important species in terms of amount and income is shrimp for all three villages. The second important is grouper for Golovasi and Yumurtalik, and bluefish for Incirli. Other species, such as sea bream, sea bass, sole, squids, and grey mullets are commercially not as important as the above three species. Shrimps are caught mostly in ZONES 2 and 3 during March-October, sea bream during March-November and sea bass March-October in ZONES 1, 2 and 3, other species, including groupers are found in all zones. Groupers are caught throughout the year except the prohibited period in summer. Sole and grey mullets are common during November-March, bluefish is caught in September-November.
Cost and income concerning fishing activities are calculated for fishermen in three villages. For a typical fisherman of Golovasi earns 10.05 billion TL per year (income: 35.6 billion TL, cost: 25.5 billion TL) for Yumurtalik, 2.86 billion TL (income: 20.7 billion TL, cost: 17.84 billion TL), and for Incirli, 1.62 billion TL (income: 11.38 billion TL, cost: 9.76 billion TL). The differences in the earnings among these

fishermen are due to the degree of dependence on fishing as a source of livelihood, the fishing grounds, and capacity of boats.

The number of fishermen and the tradesmen in the area are 240 and 18, respectively. There are also family members who help cleaning the nets.

Main problems of the fishermen in the area are illegal trawlers, decline of stocks, decrease of the fishing ground, expensive fuel, blue crab damaging the nets, and continuous debt to tradesmen and banks.

The legal constraints on fishing in the area are Regulation on BOTAS Harbour and Fisheries Act No.1380. The Coast Guards and Fisheries Control Boats of Ministry of Agriculture and Rural Affairs enforce these regulations.

Since the new jetty of CMT will decrease the fishing ground in ZONE 2 and the most frequent users of that zone are Golovasi fishermen, they will be directly impacted. Moreover, shrimps, which are the most important commercial species for them, are fished in ZONE 2. Therefore the compensation should be made for Golovasi fishermen. The most concerned impact is the decrease of the fishing ground, which results in the decrease in catch. The compensation is suggested, as well as alternative livelihoods. Ability to adapt to changes, however, is not high for old fishermen. Therefore, they may continue fishing. On the other hand, young people have more capacity to try a new livelihood.

A wide range of stakeholders, such as local authorities on fisheries and environment, port authorities, universities, were consulted.

The new jetty can be benefit to local fish species as a part of the fishing ground is closed, thus some fish are relieved from fishing pressure. However, further studies are needed to examine this possibility.

2. OBJECTIVES AND SCOPE

2.1. OBJECTIVES

The objectives of this study are to make an accurate assessment of the impacts of the Ceyhan Marine Terminal (CMT) on fishing activities during the construction and operation phases of the BTC Pipeline Project and Jetty, and also to finalize gaps in information from previous studies and to assess and develop effective mitigation measures.

2.2. SCOPE

- Description of fisheries in Iskenderun Bay, in terms of capacity and economical importance.
- Further investigation and evaluation on fishing activities in the areas surrounding CMT to explore and clarify the issues raised in previous studies, such as;
    - Detailed study on fishing grounds and catch,
    - Cost-Benefit analysis, and
    - Fisheries regulations.
- Assessment of potential impacts of the CMT to the local fishing activities.

Suggestions for mitigation measures for the local fishermen who will be affected by the construction of the CMT

3. GENERAL OVERVIEW OF FISHING ACTIVITIES IN ISKENDERUN BAY

The northeastern Mediterranean Sea, where Iskenderun Bay is located, has been known to be rich in fishery resources relative to the Mediterranean standard. Iskenderun Bay (Fig.3-1) was ranked to be within the most productive fishing ground in the early 1950s by Kosswig (1953).

The local continental shelf in Iskenderun Bay, in which nearly all fishing activity occurs, is relatively wide and its margins are bordered by relatively shallow water (40-100m on average) as compared to other parts of the easetern Mediterranean Sea. Therefore, topographically, it is suitable for trawling. There are several rivers, namely the Ceyhan River, the Seyhan River and the Asi River, flowing into the vicinity of the bay, carrying organic materials necessary for primary production. The semi-closed area, that is Yumurtalik Lagoon, is most suitable for nursery gounds of many species of coastal fish.

However, with the increase of fishing vessels both in terms of number and size, the fish stocks are getting overexploited (Bingel, 1987; Gucu, 2000). Pollution in the bay due to the industrialization of the area, has also been a major reason for the decline of the fish stocks. There had been an intensive catch of sea bream and sea bass fry from Yumurtalik region during 1990-2000. Although it has been banned to catch fry in the last 2 years, the stocks of sea bream and sea bass were assumed to be heavily affected by this activity.

Generally, fishing activity in Iskenderun Bay can be divided into two categories, namely artisanal fishing and industrial fishing. While the areas within 2-3 miles from the coast are mostly used by small-scale artisanal fishermen, the offshore fishing grounds, more than 3 miles from the coast are used by industrial fishermen, both local and non-local.

3.1. NUMBER OF PORTS

There are 8 fishing ports located in Iskenderun Bay. Fig. 3.1-1 shows their locations.

Karatas
Haylazli
Yumurtalik
Golovasi-Sahil Sitesi
Dortyol
Iskenderun
Erzin
Samandag.

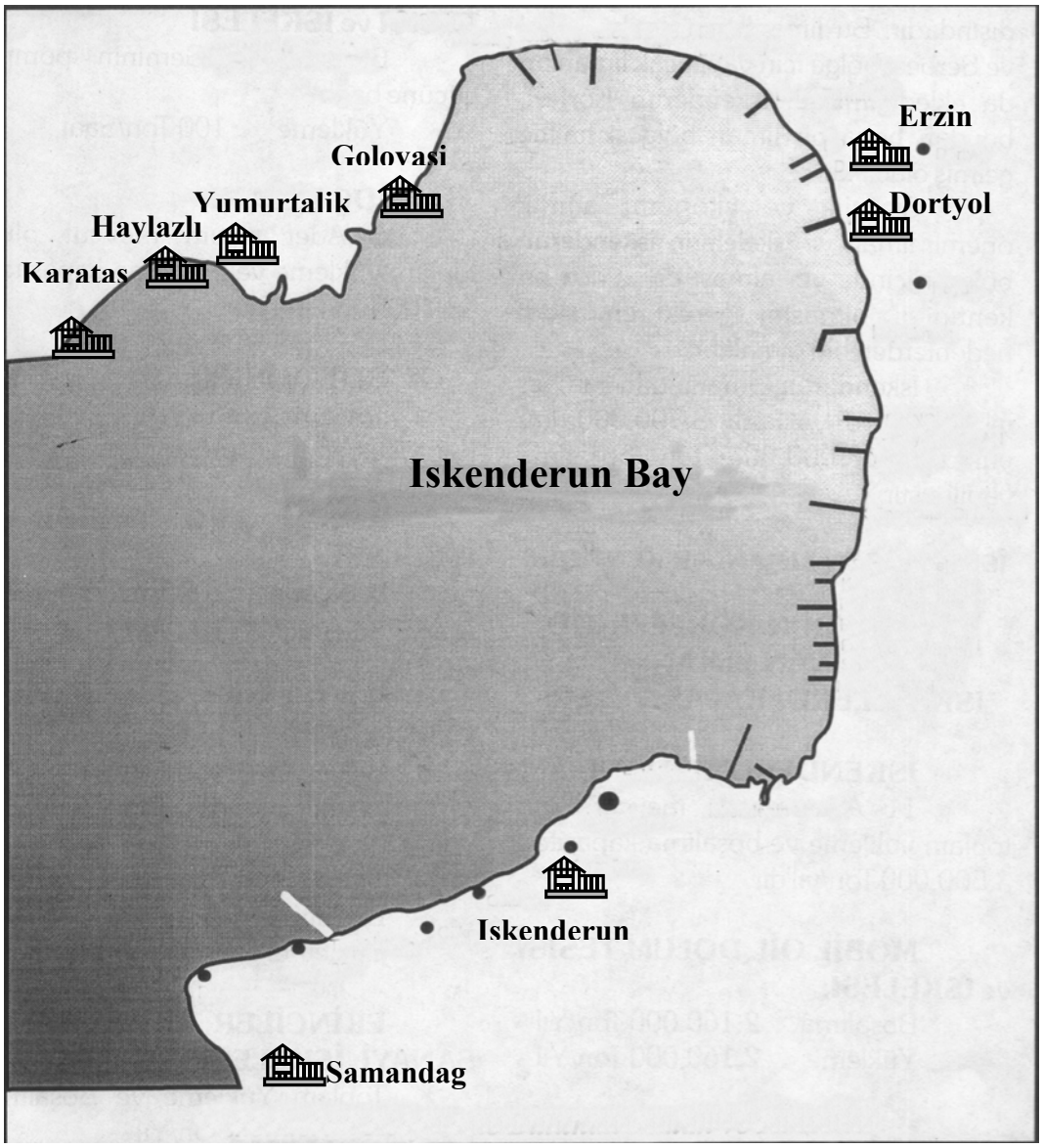


Fig. 3.1-1. Fishing ports in Iskenderun Bay.

3.2. NUMBER AND SIZE OF BOATS

Number and size of boats registered in Iskenderun Bay are summarized in Tables 3.2-1, -2, and -3, depending on the type of boats.

Table 3.2-1. Summary of purse-seiners fishing in Iskenderun Bay during the season of 1999-2000. Based on the archive registrations of Regional Directorates of the Ministry of Agriculture and Rural Affairs (Kara and Aktas, 2001).

	Adana	Hatay Small-scale*	Hatay Large-scale*	Total
Number of vessels	-	9	10	19
Total gross ton	-	100	770	870
Total horse power	-	1,160	4,285	5,445
Total number or crew	-	80	150	230
Mean fishing d2ays per vessel	-	172	160	-
Total catch (t/year)	-	242	869.4	1111.4
Mean catch per vessel (t/year)	-	27	87	-
Total number of nets	-	9	10	19
Mean length of nets (m)	-	350	800-1200	-

*Small-scale purse seines are operated with man power, while large-scale purse seines are operated with hydraulic machines.

Table 3.2-2. Summary of trawl fishing in Iskenderun Bay during the season of 1999 – 2000. Based on the archive registrations of Regional Directorates of the Ministry of Agriculture and Rural Affairs (Kara and Aktas, 2001).

	Adana	Hatay	Total
Number of vessels	5	108	113
Total gross ton	55	4150	4205
Total horse power	880	25,278	26,158
Total number of crew	27	600	627
Mean fishing days per vessel	800	17,280	18,080
Total catch (t/year)	64.5	1,393.2	1,457.7
Mean catch per vessel (t/year)	12.9	12.9	-
Total number of nets	10	320	330

Table 3.2-3. Summary of artisanal fishing in Iskenderun Bay during the season of 1999 – 2000. Based on the archive registrations of Regional Directorates of the Ministry of Agriculture and Rural Affairs (Kara and Aktas, 2001).

	Adana	Hatay	Total
Number of vessels	150	496	646
Total gross ton	680	1,010	1,690
Total horse power	8,500	7,942	16,442
Total number of crew	310	1,000	1310
Mean fishing days per boat	27,000	89,280	116,280
Total catch (t/year)	175.8	581.3	757.1
Mean catch per boat (t/year)	1.2	1.2	
Total number of nets	1,300	2,800	4,100
Total hooks for longlines	20,000	100,000	120,000

The number of fishing vessels has been increasing both in Turkey and in the Mediterranean coasts (Fig. 3.2-1). However, in the Mediterranean coasts, including Iskenderun Bay, only the vessels of 10-19.9 m are increasing. These are mostly trawling vessels (Plate 2). There has been an increase in the number of smaller boats in Adana.

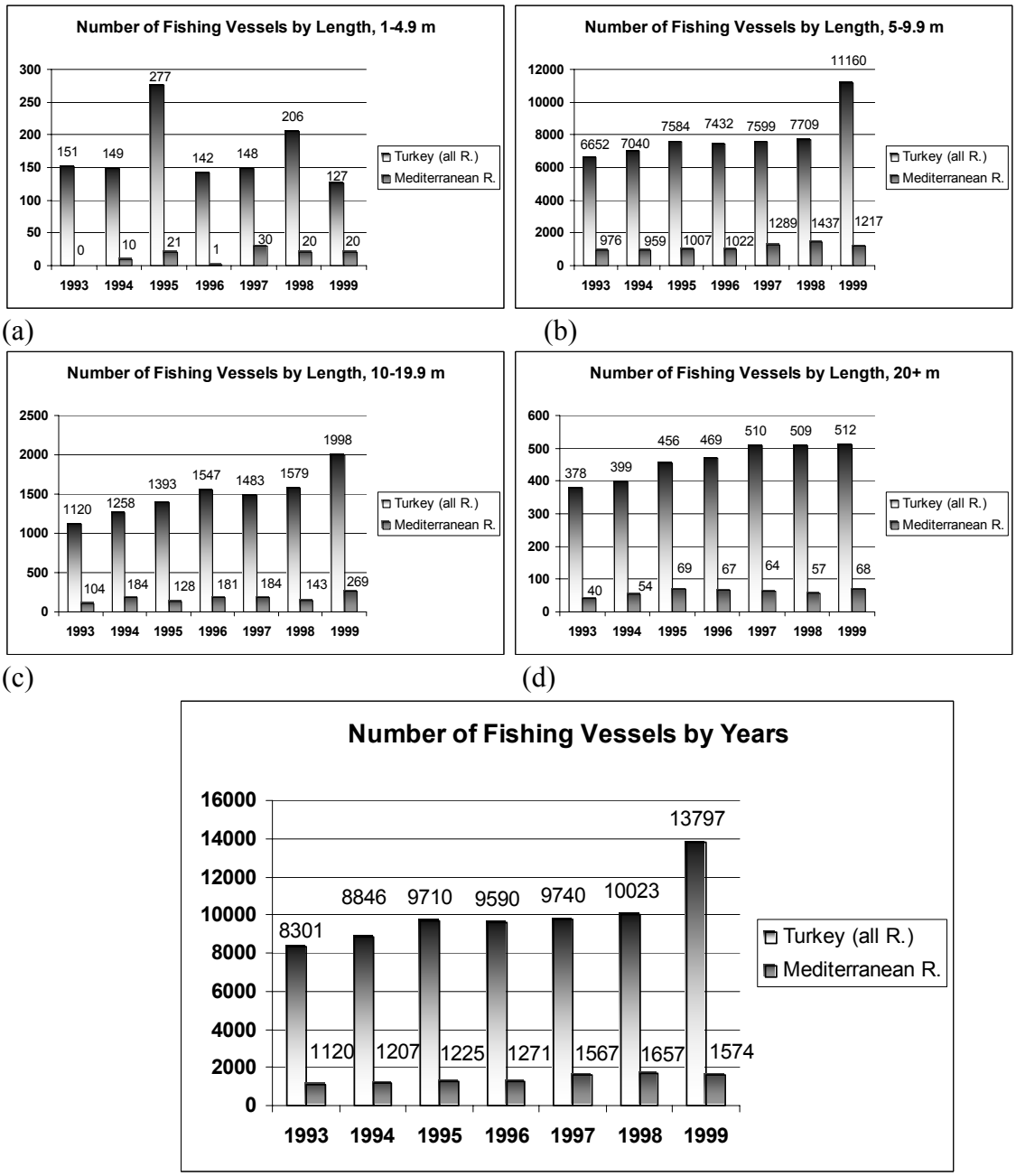


Fig. 3.2-1. (a) – (e). Number of fishing vessels from 1993 to 1999, according to size, in Turkey and in the Mediterranean coasts (SIS, 1993-1999).

3.3. SPECIES OF COMMERCIAL IMPORTANCE

Table 3.3-1 shows the list of commercially important species caught in Iskenderun Bay. There are 44 fish species and 8 invertebrate species considered commercially important in the region (Basusta and Erdem, 1997, 2001; Gucu and Bingel 1994a; Turan and Can, 2000).

Table 3.3-1. The list of commercially important species in Iskenderun Bay.

Latin name	English name	Turkish name
Argyrosomus regius	meagre	sariagiz-muskar
Boops boops	bogue	kupes
Callinectes sapidus	blue crab	mavi yengec
Caranx crysos	blue runner	istavrit
Dasyatis pastinaca	common stingray	rina baligi
Dentex dentex	common dentex	sinagrit
Dicentrarchus labrax	european seabass	levrek
Diplodus annularis	annular sea bream	isparoz
Diplodus sargus	white sea bream	sargoz
Diplodus vulgaris	common two-banded sea bream	karagoz
Epinephelus aeneus	white grouper	lagos, lahos
Epinephelus guaza	dusky grouper	orfoz
Euthynnus alletteratus	little tunny	yazili orkinos
Lichia amia	leerfish	akya
Lithognathus mormyrus	striped sea bream	mirmir
Liza aurata	golden grey mullet	kefal
Loligo vulgaris	squid	kalamar
Merluccius merluccius	hake	berlam
Mugil cephalus	flathead grey mullet	kefal
Mullus barbatus	red mullet	barbun
Mullus surmuletus	striped red mullet	tekir
Metapenaeus monoceros	speckled shrimp	jumbo karides
Oblada melanura	saddled sea bream	melanurya
Octopus vulgaris	common octopus	ahtapot
Pagellus erythrinus	common pandora	mercan

Penaeus japonicus	kuruma shrimps	jumbo karides
Penaeus kerathurus	caramote prawn	jumbo karides
Penaeus semisulcatus	green tiger prawn	jumbo karides
Phycis blennoides	greater forkbeard	gelincik
Pomatomus saltator	bluefish	lufer
Rhinobatos rhinobatos	common guitarfish	kemence
Sarda sarda	bonito	palamut
Sardina pilchardus	european pilchard (sardine)	sardalya
Sardinella aurita	round sardine	sardalya
Sarpa salpa	salema	sarpa
Saurida undosquamis	brushtooth lizardfish	iskarmoz
Sciaena umbra	brown meagre	eskine
Scomber japonicus	chub mackerel	kolyoz
Scorpaena spp.	rockfish	iskorpit
Sepia officinalis	common cuttlefish	murekkep baligi
Seriola dumerili	greater amberjack	sarikuyruk
Solea vulgaris	common sole	dil
Sparus aurata	gilthead sea bream	cipura
Sphyraena sphyraena	european barracuda	zurna
Spicara flexuosa	picarel	izmarit
Thunnus thynnus	bluefin tuna	orkinos
Torpedo marmorata	marbled electric ray	vatoz
Trachurus mediterraneus	horse mackerel	istavrit
Trigla spp.	gurnard	kirlangic
Umbrina cirrosa	shidrum	minekop
Upeneus moluccensis	goldband goatfish	pasa barbunyasi
Upeneus pori	golden striped goatfish	nil barbunyasi

In terms of the catch amount, sardines are the most abundant species, followed by lizardfish, red mullets, shrimps and horse mackerels. Most of these fish are caught by industrial fishermen, using purseines and trawling.

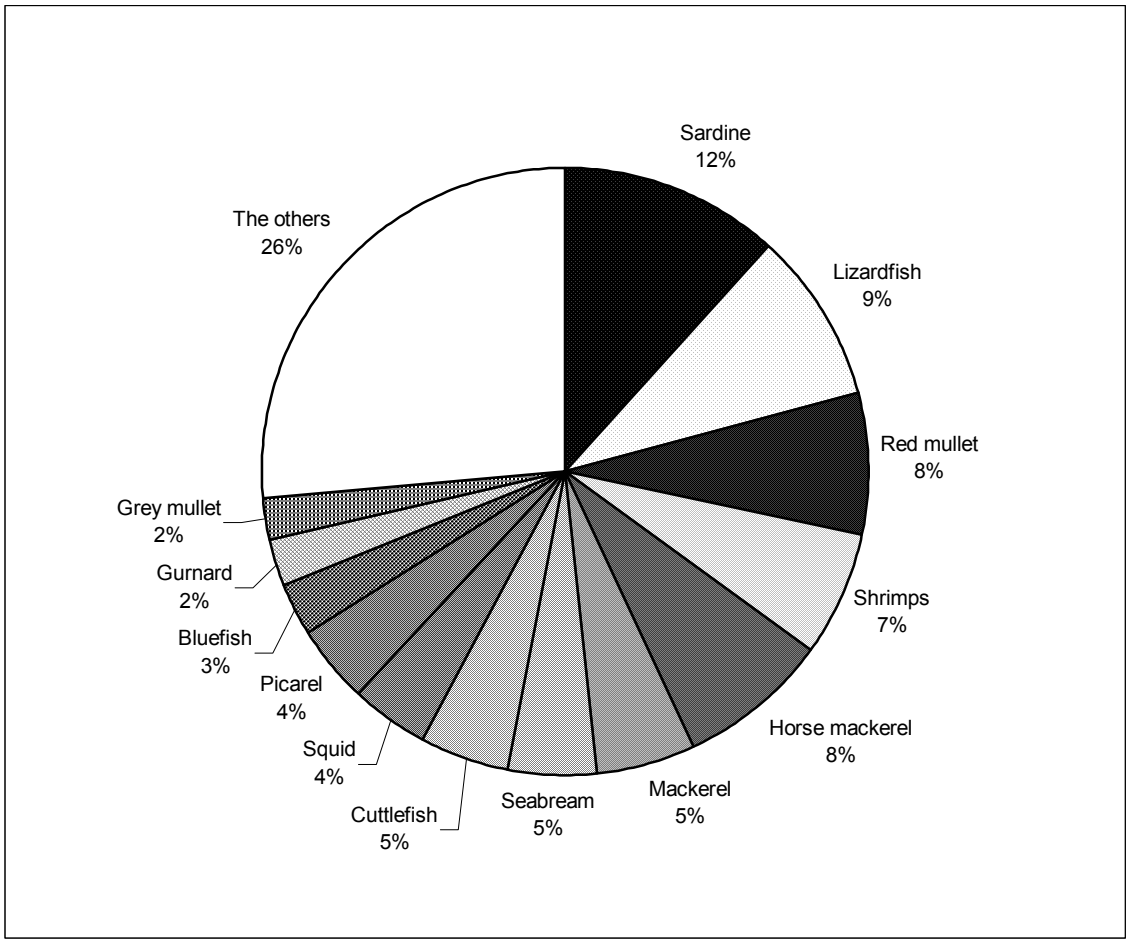


Fig. 3.3-1. The species composition of the catch in Iskenderun Bay, 2000.

3.4. TOTAL NUMBER OF PEOPLE EMPLOYED IN FISHING INDUSTRY

The schematic figure below shows the marketing sturucture of the fishing industry in Iskenderun Bay. The fishermen sell their catch to local tradesmen (or fish markets). These are small-scale markets and there are usually 2-3 people working at each of them. Those local tradesmen sell fish to bigger wholesalers, which can be either local or non-local and to fish exporters. They also sell to restaurants and public in this region. Fish exporters clean and pack fish to export overseas.

Total of 2743 people, are currently working in this industry. This figure does not include those working at restaurants and markets other than local fish markets which buy fish directly from fishermen.

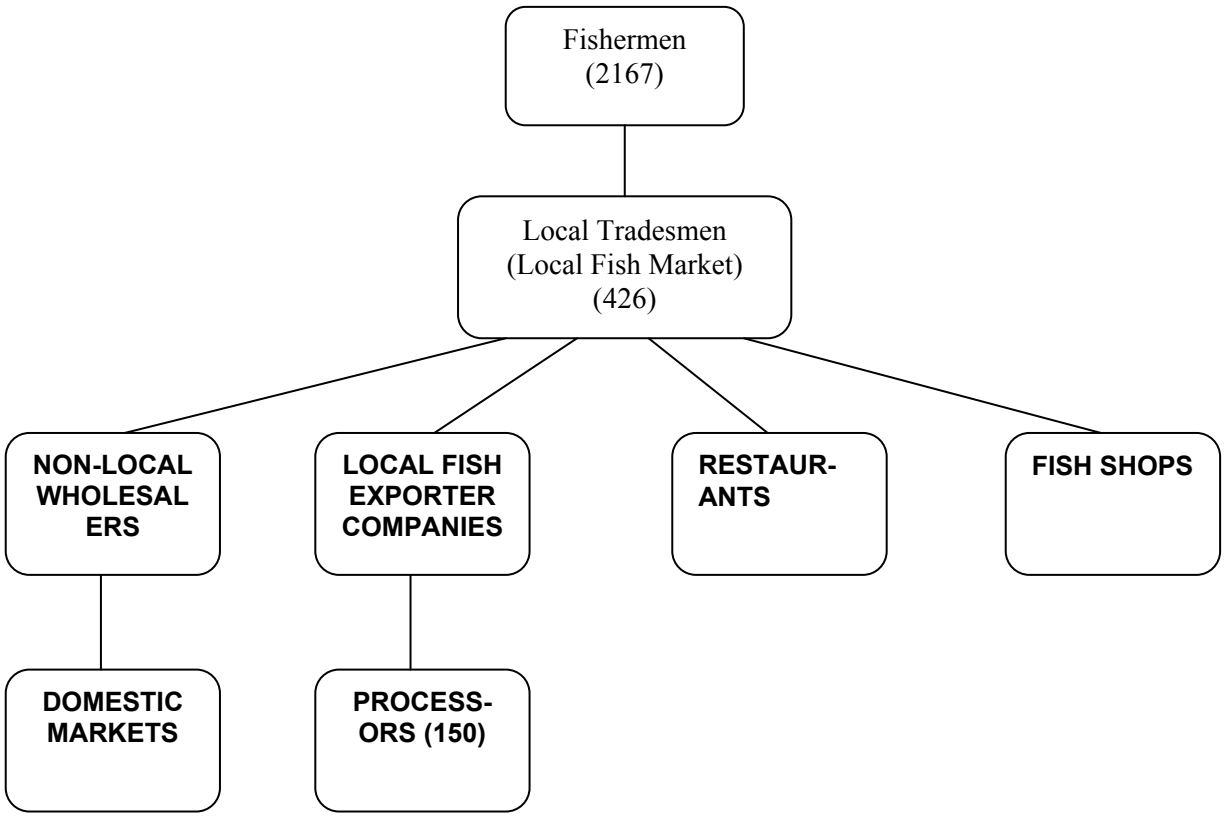


Fig. 3.4-1. Schematic figure of the marketing structure of the fishing industry in Iskenderun Bay. The figure in brackets shows the number of people engaged in each work. It is assumed that 2 people work at each local fish market and that about 50 people work at each export company.

3.5. ANNUAL CATCH AND REVENUE

There are some Lessepsian species, that is, those migrated through the Suez Canal from the Indian Ocean, which have become commercially important. However, the catch statistics have not been collected properly because the fishermen do not separate those fish from some local one which look alike.

Table 3.5-1 shows the annual catch of some of the commercially important species in Iskenderun Bay. Some of the species show increase in catch, such as sea bream, sea bass, and shrimps (Fig. 3.5-1). This is because great fishing effort has been made for these species. The catch has increased, but the number of boats has increased as well, thus the catch per unit effort is actually decreasing, as reported by Gucu and Bingel (1994b). Groupers and grey mullets show slight decrease. The total catch has been decreasing during 1994-2000.

Table 3.5-1 The annual catch of commercially important species in Iskenderun Bay during 1994-2000.

	1994	1995	1996	1997	1998	1999	2000
Leerfish	30	33	33	37.5	34.5	32.5	74.8
Red mullet	93	92	50	199	149	207	341.4
Sea bream	93	89	83	133	116	135	220.5
Common sole	36	42	39	27	30	33	52.3
Common sea bream	15	12	12	10.1	9.1	8.5	-
Lizardfish	133	84	66	87	97	123	85.9
Horse mackerel	154	84	90	94	116	127	114.5
Picarel	98	94	71	50	79	123	180.4
Two-banded bream	17	17	14	5	6	6	17.4
Gobies	105	99	91	71	75	82	82.3
Grey mullet	107	100	96	90.5	85	93	98.8
Red gurnard	59	59	57	53.5	35.5	60	112.8
Chub mackerel	168	85	65	59	51	72	236.3
Bogue	19	18	16	31	28.5	36	96.6
Grouper	91.2	75	73.6	80	72.7	71	70
Sea bass	22	39	40	31.2	35	41	87.7
Bluefish	82	85	66	44	39	54	130.3
Whiting	61	59	57	73.5	43.5	54	59.2
Pandora	69	66	79	67	64.5	47	47.6
Striped seabream	10	12	13	11.5	7	7.5	43.5
Shidrum	24	27	25	24	15	16	13.3
Sardine	625	255	147	169	194	218	522.7
Shrimps	107.8	102.9	85.9	135	126.3	128	132.5
Others	6136	4060.1	3628.5	3494.2	1116.4	2209.5	2016.2
TOTAL	**8355**	**5689**	**4998**	**5077**	**2625**	**3984**	**4749**

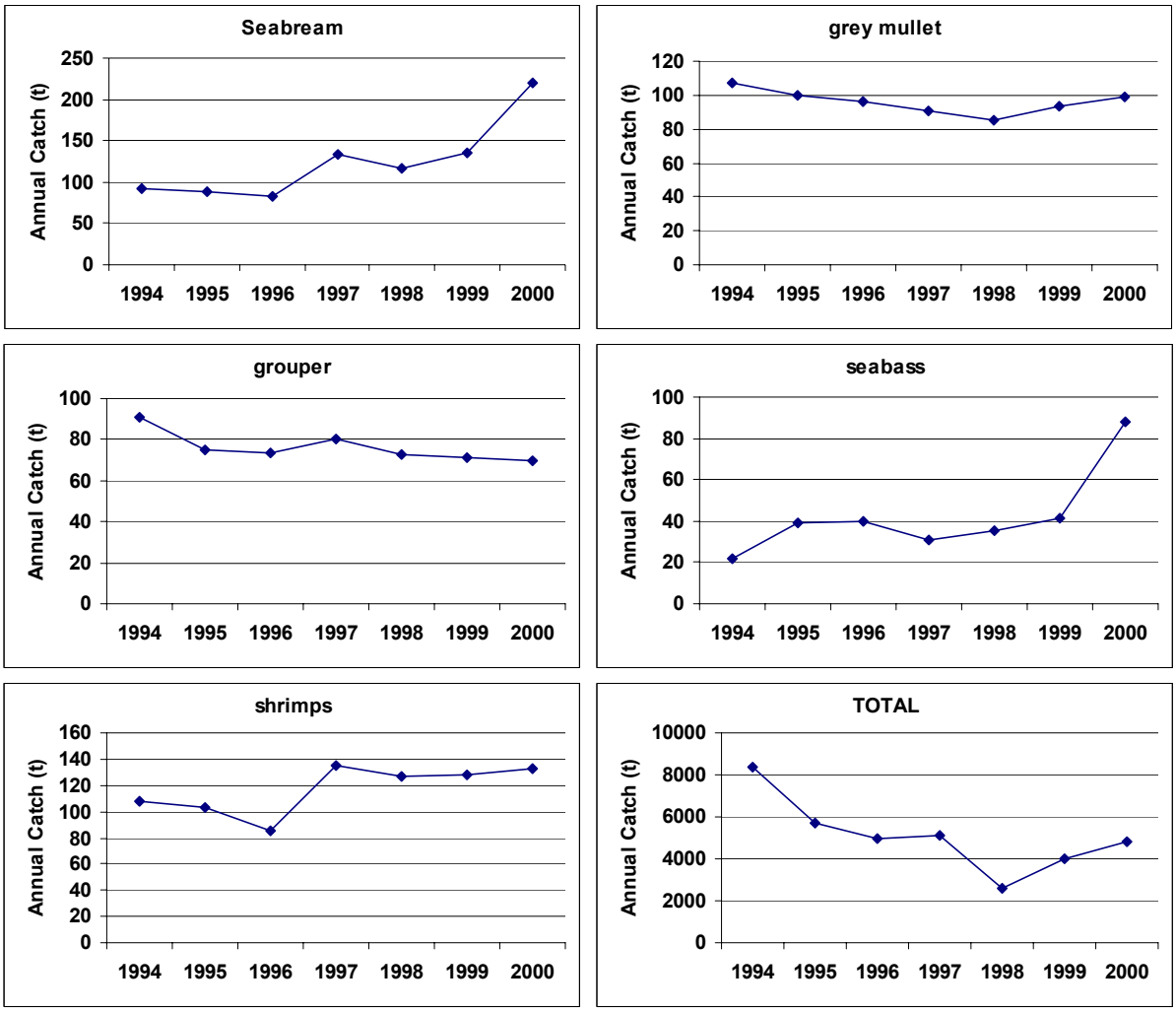


Fig. 3.5-1. Catch fluctuation of catch of commercially important species in Iskenderun Bay (1994-2000).

3.6. NUMBER OF FISHING COMPANIES, FREEZERS, AND COOPERATIVES

Companies

There are three companies buying, processing and exporting fish.

There are about 213 local fish tradesmen or fish markets, as they are called 'balıkhane (fish market)', buying fish directly from fishermen, selling to other cities, companies, restaurants, and public.

Freezers

Large freezers for commercial purposes (over 50 tons) are found in Iskenderun, Adana, Mersin, Yumurtalik, Karatas, and Ceyhan.

Fishing cooperatives

There are 10 fishing cooperatives found in Iskenderun Bay region. Some of them are not very active and rather unsuccessful in protecting the right of the member fishermen.

Iskenderun Fishing Cooperatives
Samandag Fishing Cooperatives
Yumurtalik Fishing Cooperatives
Golovasi Fishing Cooperatives (Newly established)
Deveciusagı Fishing Cooperatives
Haylazli Fishing Cooperatives
Kaldirim Fishing Cooperatives
Sadiye Kirmizidam Fishing Cooperatives
Karatas Fishing Cooperatives
Tabaklar Karatas Fishing Cooperatives

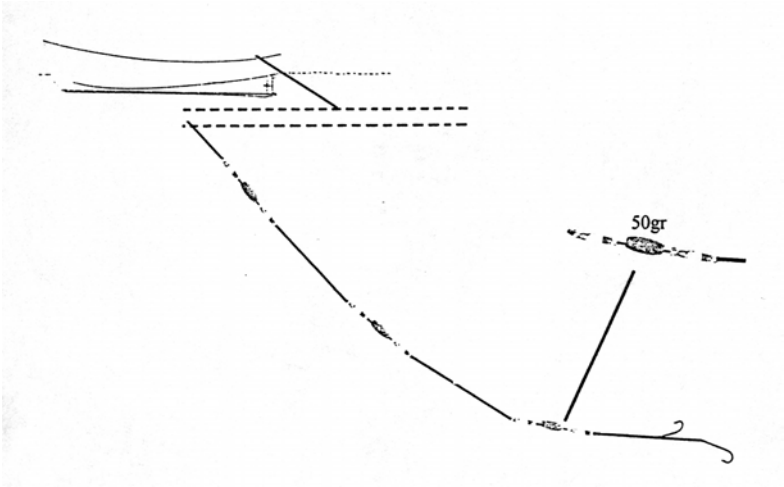
3.7. FISHING GEARS

Fishing gears used in Iskenderun Bay are divided into lines, set nets, trawls and purse seines (Cekic *et al.,* 2000; Tasdemir, 2002). The former two are used mainly in small-scale artisanal fisheries and the latter two are used in large-scale industrial fisheries. Besides, some pots are used to catch some invertebrate species.

A) Fishing lines

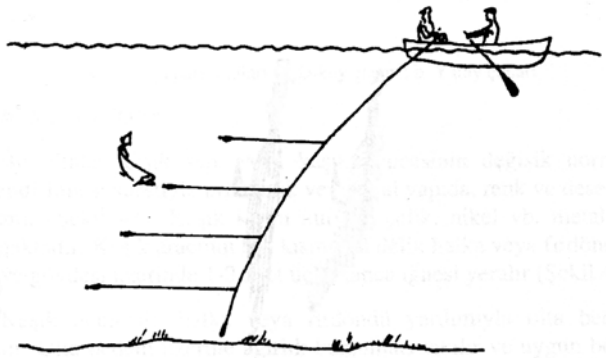
a) Pole and line

With the vessel either stationary or on the move, hand held or mechanically operated rods with baited hooks or lures are used to catch fish which have been attracted to the surface by chumming, the scattering of live or minced bait fish. Light attraction may also be used.



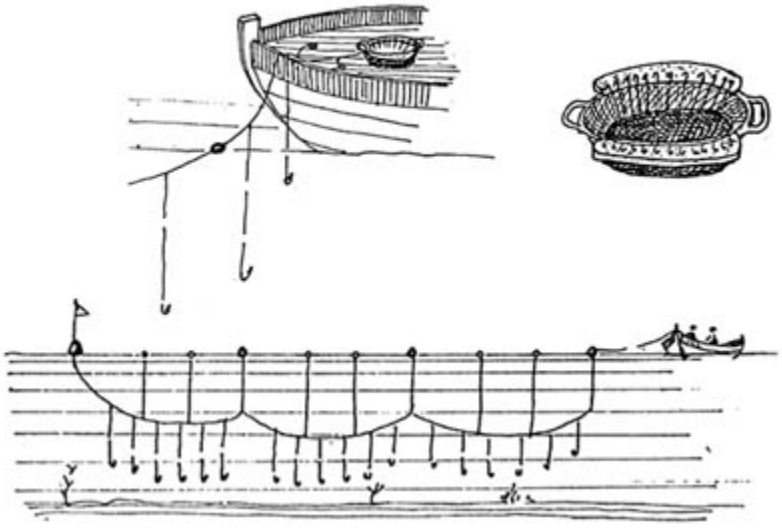
b) Lines

A number of lines carrying multiple baited hooks, lures or multi-hooked jigs are dropped below a stationary or drifting vessel to the sea bed or in mid water. Lines may be operated by hand or machines, with light attraction and jigging technique used.



c) Longline

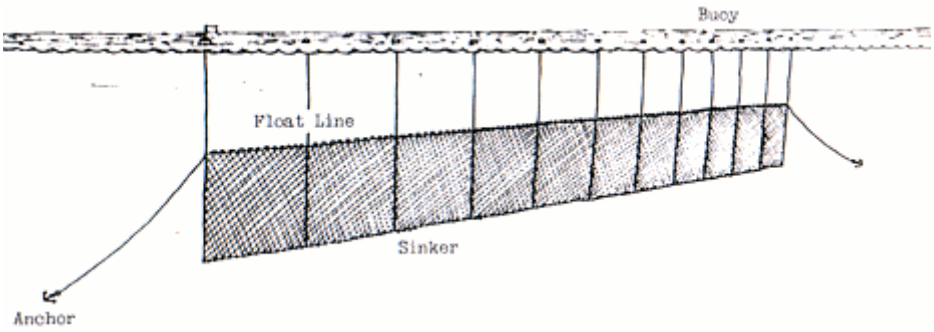
One of the most fuel-efficient, environment friendly and cleanest catching methods, longlining is used for the capture of both demersal and pelagic fishes, the gear being rigged to suit the species being sought and the area being fished. Both horizontal and vertical lines are used. One longline is stored in a special basket when it is not used.



B) Set nets

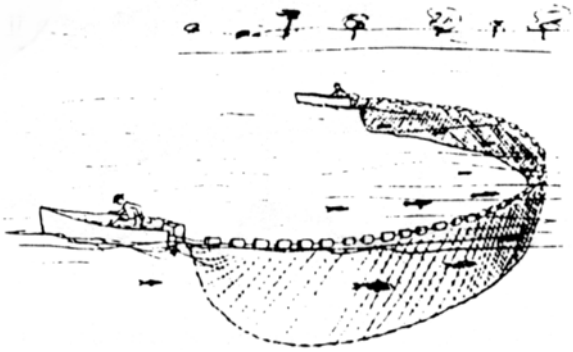
a) Gill nets

The gill net is a large wall of netting which may be set at or below the surface, on the sea bed, or at any depth between. This is probably the oldest form of net fishing, having been in use for thousands years. When working inshore or in relatively shallow waters, the nets are often set and staked or anchored in position.



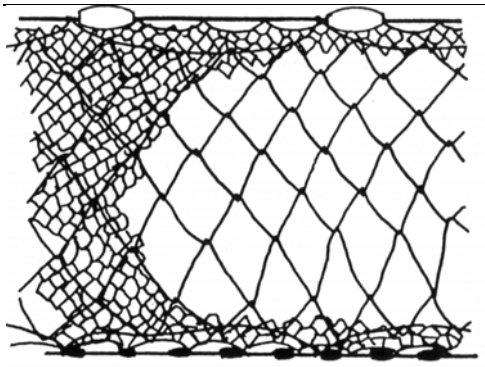
b) Run-around gill net

The type of nets is the same as the gillnets explained above, but the way they place at sea is different, that is place to encircle fish school. Then fishermen make some noise with wooden boards hit on the surface of the water to confuse fish, which try to escape and get entangled to the nets.



c) Trammel nets

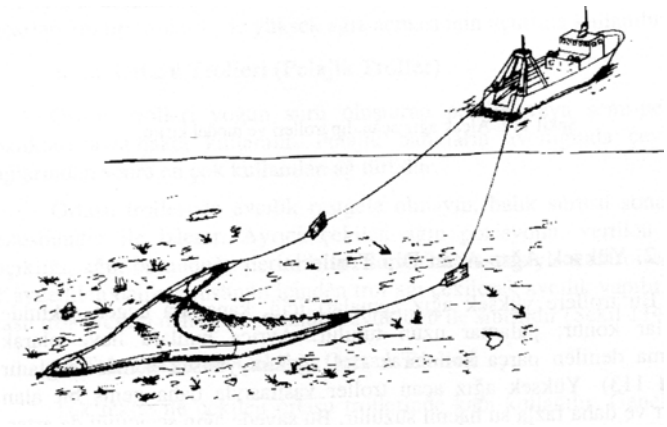
Trammel nets are constructed of three panels of netting attached to the same framing ropes. A middle sheet of webbing of small, loosely hung mesh is rigged between outside walls of large mesh. A fish striking from either side passes through the large outer mesh web and hits the small mesh netting which is carried through the openings of the other large mesh webbing to form a sack or pocket in which the fish is entrapped. The nets are placed at sea in the same way as the gill nets.



C) Trawl

a) Bottom trawling

The modern bottom trawl net is basically a large bag made of netting which is drawn along the sea bed to scoop up fish on or near the bottom. Depending on the manner in which the gear is constructed and rigged, its operating characteristics can be altered to permit use on various types of bottom and many species of fish.

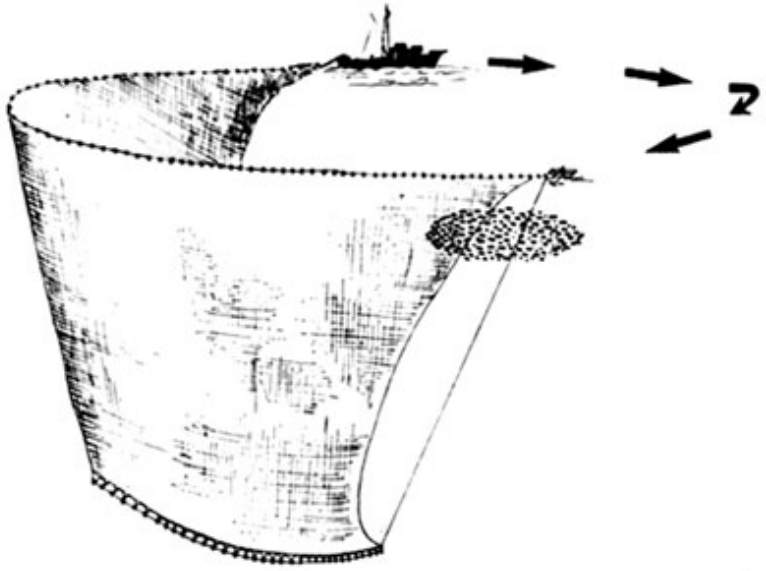


b) Shrimp trawling

The basic characteristic is the same as the above trawl nets, but the nets are much shorter.

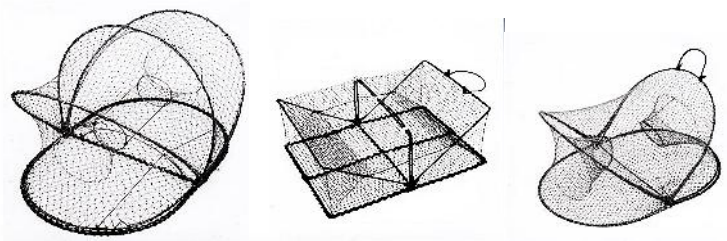
D) Purse seine

This is a general name given to the method of encircling a dense school of fish on, or near, the surface with a large wall of net. The net is then drawn together underneath the fish to make an artificial pond. There are a number of techniques, working from either a single vessel or two crafts, which utilize variations in the rigging and operating procedures. This is often a fuel intensive method due to the searching times and distances which may be involved.



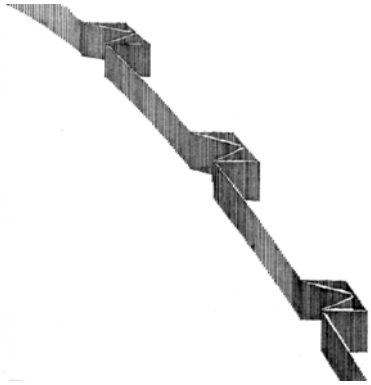
E) Pots

These are constructed from wood, steel and wire mesh, plastic, or plastic coated wire, and they vary in size and design depending upon whether they are used offshore or inshore, and the species being sought. They may be set either on the sea bed for bottom dwelling species or at various depths. These pots are used to catch blue crab in Iskenderun Bay.



F) "ÇİT" DALIAN (River-mouth trap)

"Çit" (meaning fence in Turkish) dalian is a fence made by wooden or metal sticks to trap fish at a river mouth, or a place where sea water and fresh water mix. This traditional type of trap is only used in Yumurtalik Lagoon.



3.8. FISH FARMS AND HATCHERIES

There is no fish farm operating in Iskenderun Bay at present. However, there will be a few in a few years, according to the fishery cooperatives in the region.

There is one hatchery in Yumurtalik producing sea bream and sea bass fry for aquaculture.

3.9. PROBLEMS

As previously mentioned, one of the main problems related to fisheries in Iskenderun Bay is the decline of stocks. There are several factors causing this, which are explained below.

- Overfishing: It is clearly shown above in 3.5 Annual Catch and Revenue that the annual catch has been decreasing although the fishing effort has been increasing. This means that the they have been fishing more that nature can sustain and that the stocks are overfished.

- Illegal fishing: There are legal constraints on size, species, season, fishing ground (e.g. It is prohibited to trawl within 3 miles from the coast). However, some fishermen, particularly non-local ones, do not obey these rules. This will result in inadequate management of the stocks. Illegal fishing can be controlled by the Coast Guards and Fisheries Control Boats (see Chapter 5). However,due to the shortage of trained personells and boats, their control is not enough to cover all areas.

- Season limitation: Many fishermen complain that the fishing season for trawlers and purse seiners should start in October, not in September as cuurently so. If those industrial fishing is prohibited until the end of September, many pelagic fish still have a chance to reporduce, so that the stocks will have a chance to recover.

- Pollution: The area surrounding IskenderunBay has been industrialized extensively. Morever, marine traffic has been increaing substantially due to both the industries and the petrol terminals. These facilities and ships pollute the bay.

- Decrease of fishing ground: The above industrialization and sea traffic also cause decrease of the fishing grounds in the bay.

- The water input of the rivers decreased sustantially in the past 1o years or so. This has resulted in the decrease of organic matter, thus the productivity of the bay.

Problems that fishermen are facing other than the decline of the fish stocks are as follows.

- Fuel: Fuel oil is very expensive. Because of this, they cannot go furthur to explore new resources.

- Blue crab: An exotic crab species, the blue crab, has entered the Mediterranean Sea from the Atlantic Ocean and it has established a colony successfully over the last decade, especially after sea bream fry were intensively caught for aquaculture because sea bream fry feed on blue crab larvae. Although it is now a commercially important species, being exported to overseas, the local people of Iskenderun Bay and its vicinity do not consume this crab species. However, it also

gets entangled to fishing nets while foraging the fish in the nets and damage them extensively. The fishermen must spend much time repairing their damaged nets and must replace the nets quite often (Plate 3). The blue crab also feed on fish eggs and larvae of commercially important species.

- Debt: The fishermen complain that they get debt from the state banks but the interest is very high.

Problems related to the management of the fishing activities in Iskenderun Bay:

- Statistics: The fishery statistics are collected by staff of the Ministry of Agriculture and Rural Affairs by asking some fishermen (not all) thier catch every three months. Therefore these statistics do not always provide the exact catch record and some species are not clearly recognized as reported by Zengin *et al.* (1999). For example, some of Lessepsian species (exotic species from the Indian Ocean) are not recognized and they are combined with the catch of other similar species. Because of the lack of more reliable statistics, it is difficult to establish a proper management basis.

- Lack of capacity of fishing cooperatives: Although there are number of fishing cooperatives in Iskenderun Bay, they do not have a capacity to control and manage fishing activities locally.

4. FISHING ACTIVITIES WITHIN 10 KM RADIUS OF CMT

4.1. GENERAL DESCRIPTION OF FISHING ACTIVITIES IN THE REGION

There are three fishing villages in 10 km radius of the CMT. Those are Golovasi-Sahil Sitesi (referred to as Golovasi hereafter), Yumurtalik, and Incirli (Fig. 3.1-1). There is no fisherman in Sugozu at the moment. There are 120 fishing boats in total involved in the artisanal fishery in the region. These fishermen mainly use trammel and gill nets and longlines. The fishery is carried out on a daily basis. The boats are 5.65-9 m long with 9-130 HP, made of wood, and most of them have no compass, radios and echo-sounders. There are usually two or three persons working on a boat. They fish on the continental shelf up to 2-3 miles away from the shore in waters of 40-50 m in depth. The general description of fishing activity in Golovasi, Yumurtalik and Incirli are shown in Tables 4.1-1, 2, and 3, respectively. Plates 4, 5, and 6 show fishing ports of Golovasi, Yumurtalik and Incirli, respectively.

The number boat has been increasing in the area. In Adana Province (Yumurtalik, Golovasi, Incirli and Karatas), there were only 55 small boats registered before 1990. At present, however, there are 211 boats registered.

There is considerable difference between KORA report and this report due to the difference and the survey methodologies and knowledge on fisheries. Therefore, KORA report is not referred here.

Table 4.1-1. Information on the fishing activity in Golovasi.

Number of boats	40
Boat length (m)	6-9
Engines	13-32 HP
Number of crew	2-3
Average fishing days / year	300
Total catch (t/year)	150
Mean catch per boat (t/year)	3.75
Total number of shrimps nets	600
Total number of sole nets	600
Total number of gill nets	200
Total number of hooks	40,000

Table 4.1-2. Information on the fishing activity in Yumurtalik.

Number of vessels	70
Boat length (m)	5.65-9
Engines	9-130 HP
Number of crew	2-3
Average fishing days/year	240
Total catch (t/year)	175
Mean catch per boat (t/year)	2,5
Total number of shrimps nets	560
Total number of sole nets	350
Total number of run-around gill nets	35
Total number of gill nets	350
Total number of hooks	70,000

Table 4.1-3. Information on the fishing activity in Incirli.

Number of vessels	10
Boat length (m)	6-8
Engines	17-32 HP
Number of crew	2-3
Average fishing days/year	150
Total catch (t/year)	14
Mean catch per boat (t/year)	1.39
Total number of shrimps nets	80
Total number of sole nets	50
Total number of run-around gill nets	10
Total number of gill nets	30
Total number of hooks	-

4.2. FISHING GROUNDS

The fishing grounds are divided into the following 4 zones according to species caught, fishing gear, and fishermen who use the zone primarily. This coincides with the previous sociological studies done by KORA. The map shows the geographical locations of these zones (Fig. 4.2-1). According to the fishermen, they do not enter the BOTAS maneuvering zone usually. They claim that sometimes one end of the net enters the maneuvering zone because the area is small and the net is long. This statement will be examined later by stakeholders other than fishermen, thus the BOTAS maneuvering area is not considered as a fishing ground.

There is no “gentlemen” agreement on the usage of fishing grounds among the fishermen of Golovasi, Yumurtalik and Incirli. They simply do not go to the fishing grounds of other villages because of the following reasons.

- The fuel oil is costly.

- Boats are not well equipped for long distance traveling. Most of them do not have even a compass nor a radio telephone.
- The resource in other areas is not worth exploiting and running the risk, compared to the nearshore resource.

ZONE 1: Between the thermic power plant and the BOTAS jetty exclusion zone (2.5 miles) and up to 0.5 mile offshore from Golovasi. Fishermen form Golovasi use this zone almost exclusively.

ZONE 2: Between the thermic power plant and the BOTAS jetty exclusion zone starting at 0.5 miles offshore from Golovasi up to 2 miles offshore (totally 1.5 miles). Fishermen from Golovasi use this zone most frequently, but those from Incirli and Yumurtalik rarely use this zone. However, non-local trawls sometimes operate in this zone illegally.

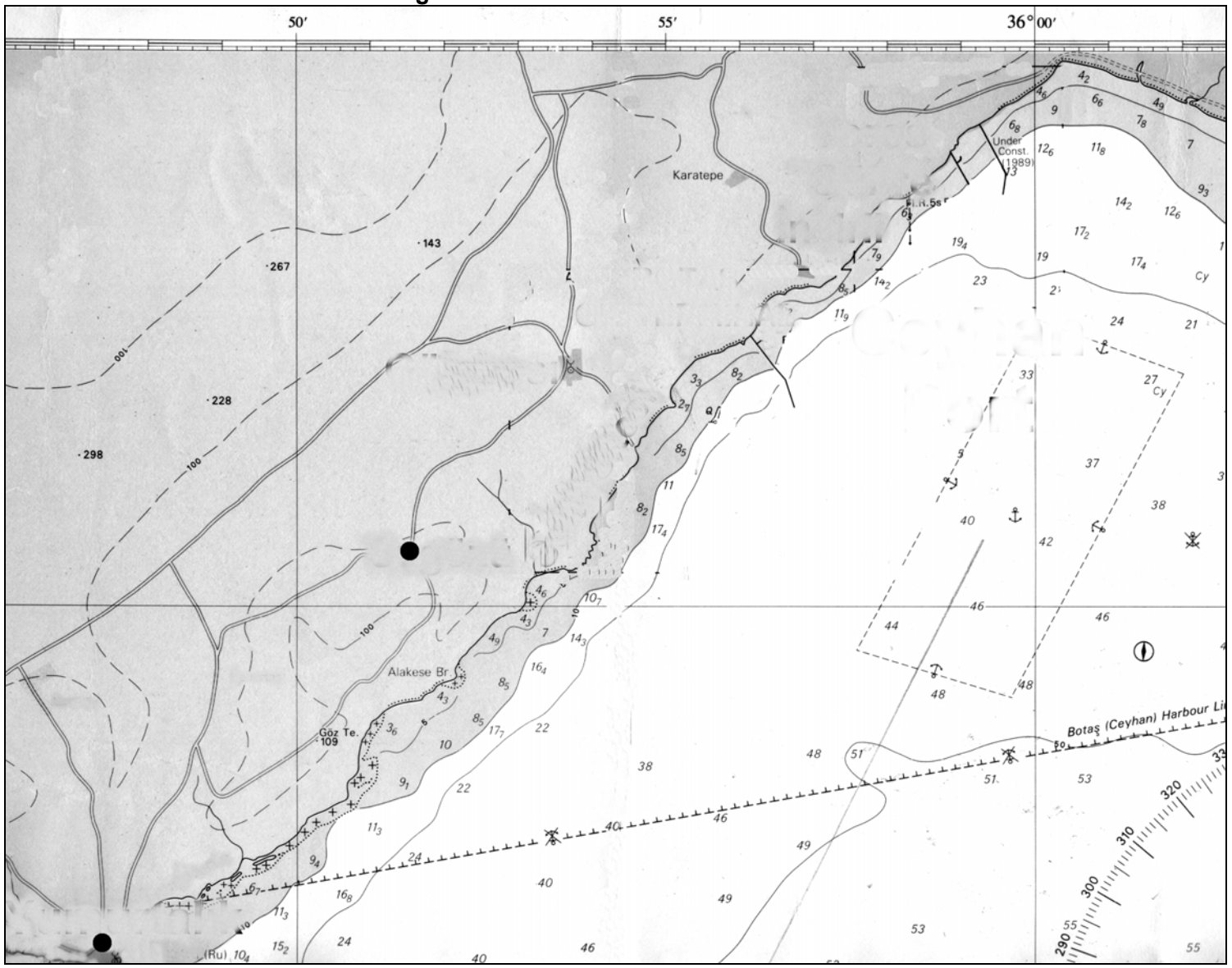
ZONE 3: Between the Toros Fertilizer Facility exclusion zone and the BOTAS exclusion zone (approximately 0.5 mile length) up to 2 miles offshore. Fishermen from Incirli use this zone most frequently. Very rarely Golovasi fishermen fish in this zone. However, non-local trawls sometimes operate in this zone illegally.

ZONE 4: Further distance, after 2 miles offshore from the coastline. Non-local trawlers and purse seiners from Hatay and Mersin primarily use this zone. When trawls and purse seines are forbidden in May - August, the local fishermen from Golovasi, Yumurtalik and Incirli use this zone. The Black Sea purse seine fishermen used to come to this area to catch tuna, but they have not been there for the last 2 years.

Table 4.2-1. Frequency of use of each zone.

Fishermen	ZONE 1	ZONE 2	ZONE 3	ZONE 4
Golovasi	Always	Always	Rarely (a few times a year)	May-Aug (when trawls and purse seines are prohibited)
Incirli	Never	Rarely (a few times a year)	Always	May-Aug (when trawls and purse seines are prohibited)
Yumurtalik	Never	Rarely (a few times a year)	Never	May-Aug (when trawls and purse seines are prohibited)
Non-local	Never	Sometimes (illegal trawling)	Sometimes (illegal trawling)	Always

Figs. 4.4-5 Distribution of Other Fishes



4.3. FISHING GEARS

The fishing gears described below are used by the local artisanal fishermen of Golovasi, Yumurtalik, and Incirli. Refer also to 3.7.

a- Gill net ("zide" net): The bottom gill net is 100 m long. One fishing boat usually has a set of 5 nets. The mesh size of this gill net is 32-36-42 mm and its depth is about 3m. This type of net is used throughout the year for groupers, sea bass, sea bream, greater amberjack, meagre, and grey mullet. It is used within the water of 10m or less (ZONE 1).

b- Shrimp trammel net: Plate 7. This trammel net consists of a middle sheet (mesh size: 24mm) and two outside sheets (mesh size: 110mm). The depth of the net is 1m. Each piece of net is 100 m and there are 8 to15 pieces to make a complete shrimp net. It is used between March and October as the shrimp stocks decrease during winter. This net is primarily for catching shrimp (prawn) species, however, fishes like sea bass, sea bream, and groupers are caught as well. This is used in the waters of 20 m depth (ZONES 2, 3 and 4). When the commercial fishing is prohibited in summer, this method is used outside the 2-mile-zone from the coast.

c- Sole trammel net: The middle sheet has mesh size of 32-36mm, while the outside sheets have 140-160mm. The depth of the net is 1m. Each piece of net is 100 m and there are usually 5 to 15 pieces to make a complete sole net. It is used between November and March for sole, but fishes like sea bass, sea bream, groupers are caught as well. It is used within 2 miles from the coast (ZONES 1, 2, and 3).

d- Run-around gill net: The run-around gill net is 400 m long. The net has mesh size of 28-32 mm and its depth is about 10 m and there is usually 1 piece to make a complete run-around gill net. It is used between September and November, especially for bluefish off Incirli (ZONE 3) and off Yumurtalik.

e- Longlines: The line attached to hooks has a diameter of 0.80-0.90 mm. The distance between the hooks is 4-6 m. One longline is 4000-6000 m. The number of hooks for each logline is 500-1500, depending on the distance between the hooks. There are usually two baskets, in which longlines are kept (Plate 8). Baits are sardine and largehead hairtail, which are usually bought from other fishermen. This is used particularly to catch groupers, but greater amberjack and sea bream are caıught as well. It is forbidden to catch groupers from 15 June to 1 August with longlines. These are used in all zones (ZONES 1, 2, 3 and 4).

Table 4.3-1. Fishing gears used in Zone 1 and Zone 2 according to month.

	J	F	M	A	M	J	J	A	S	O	N	D
Shrimp net	-	-	+	+	+	+	+	+	+	+	-	-
Sole net	+	+	+	-	-	-	-	-	-	-	+	+
Gill net	+	+	+	+	+	+	+	+	+	+	+	+
Run-around gill net	-	-	-	-	-	-	-	-	-	-	-	-
Longlines	+	+	+	+	+	-	-	+	+	+	+	+
Purse seine	-	-	-	-	-	-	-	-	-	-	-	-
Trawl	-	-	-	-	-	-	-	-	-	-	-	-

Table 4.3-2. Fishing gears used in Zone 3 according to month

	J	F	M	A	M	J	J	A	S	O	N	D
Shrimp net	-	-	+	+	+	+	+	+	+	+	-	-
Sole net	+	+	+	-	-	-	-	-	-	-	+	+
Gill-net	+	+	+	+	+	+	+	+	+	+	+	+
Run-around gill net	-	-	-	-	-	-	-	-	+	+	+	-
Longlines	+	+	+	+	+	-	-	+	+	+	+	+
Purse seine	-	-	-	-	-	-	-	-	-	-	-	-
Trawl	-	-	-	-	-	-	-	-	-	-	-	-

Table 4.3-3. Fishing gears used in Zone 4 according to month

	J	F	M	A	M	J	J	A	S	O	N	D
Shrimp net	-	-	-	-	+	+	+	+	-	-	-	-
Sole net	-	-	-	-	-	-	-	-	-	-	-	-
Gill-net	-	-	-	-	-	-	-	-	-	-	-	-
Run-around gill net	-	-	-	-	-	-	-	-	-	-	-	-
Longlines	-	-	-	-	+	-	-	+	-	-	-	-
Purse seine	+	+	+	+	-	-	-	-	+	+	+	+
Trawl	+	+	+	+	-	-	-	-	+	+	+	+

4.4. SPECIES OF COMMERCIAL IMPORTANCE

The species of commercial importance, in terms of the catch amount and price, are shown in Table 4.4-1 according to each fishing zone. The distributions of these species are shown in Figs. 4.4-1, -2, -3, -4 and -5. The fishing ground of Yumurtalik fishermen is not included in ZONES 1-4, however the species are the same. Some of the important species are shown in Plates 9-21. A typical daily catch consists of several species as shown in Plate 22.

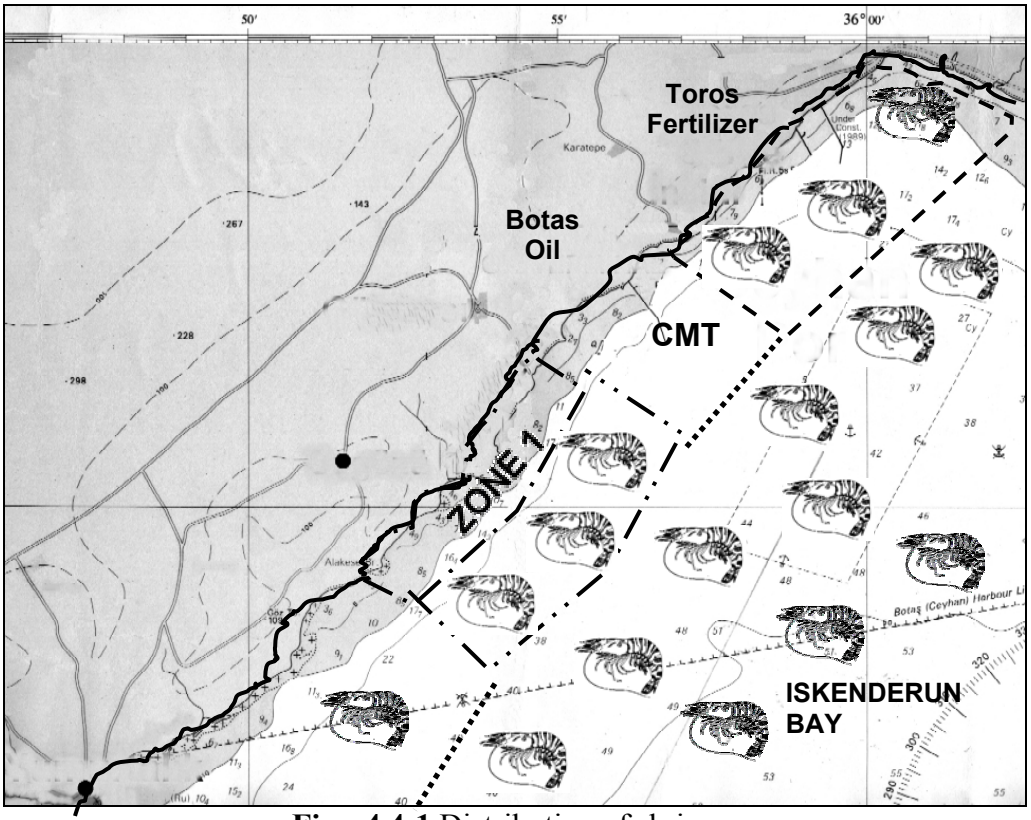
Table 4.4-1. List of commercial importance in ZONES 1-4.

Zone 1	Zone 2	Zone 3	Zone 4
sea bass	**shrimps**	**shrimps**	**shrimps**
sea bream	**sea bass**	**sea bass**	**white grouper**
grey mullet	**sea bream**	**sea bream**	**dusky grouper**
white grouper	**grey mullet**	**grey mullet**	**grey mullet**
sole	**white grouper**	**white grouper**	**red mullets**
red mullets	**sole**	**sole**	**squids**
common dentex	**dusky grouper**	**dusky grouper**	rays
shidrum	**bluefish**	**bluefish**	common pandora
brown meagre	**squids**	**squids**	guitarfish
common pandora	common pandora	common pandora	———
	common dentex	common dentex	Abundant but not
	salema	salema	fished by local
	meagre	meagre	fishermen

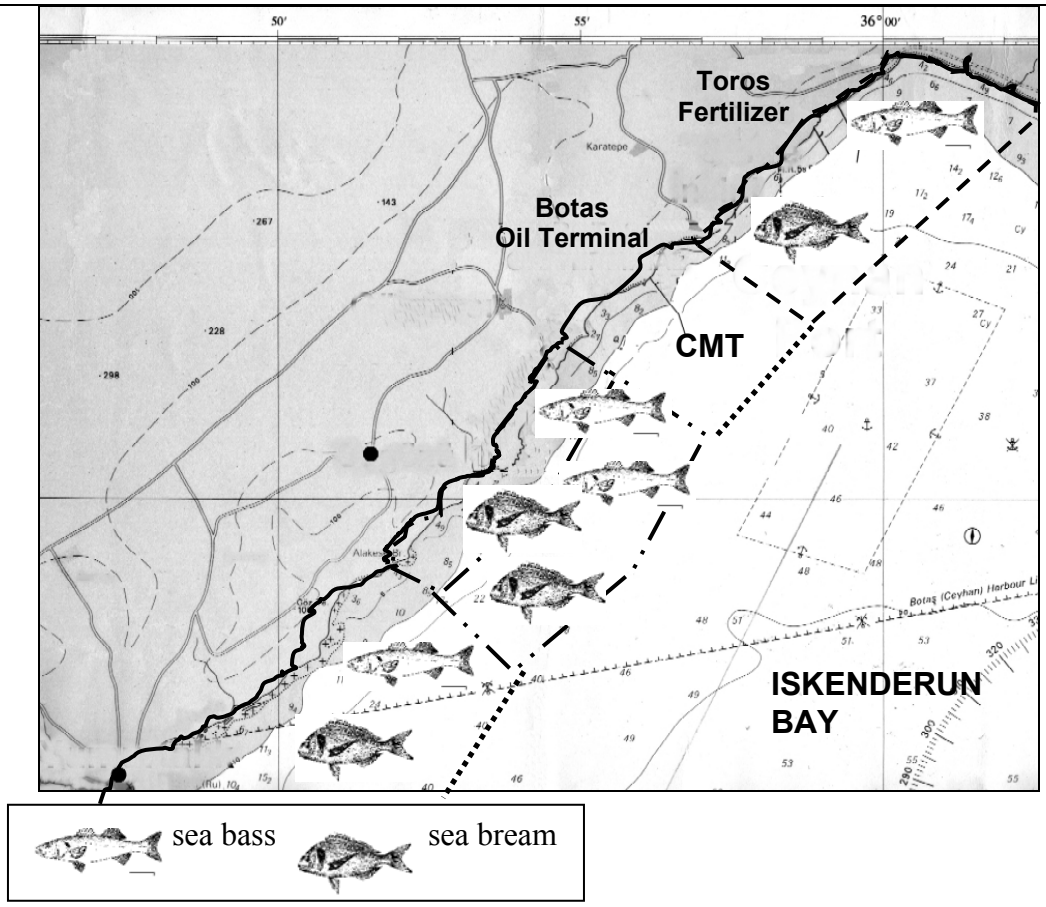
	gilthead sea bream rays guitarfish	gilthead sea bream rays guitarfish	sardines mackerel bonito tunas bluefish hake horse mackerel

NOTE: Species in bold have higher commercial value in terms of quantity and income.

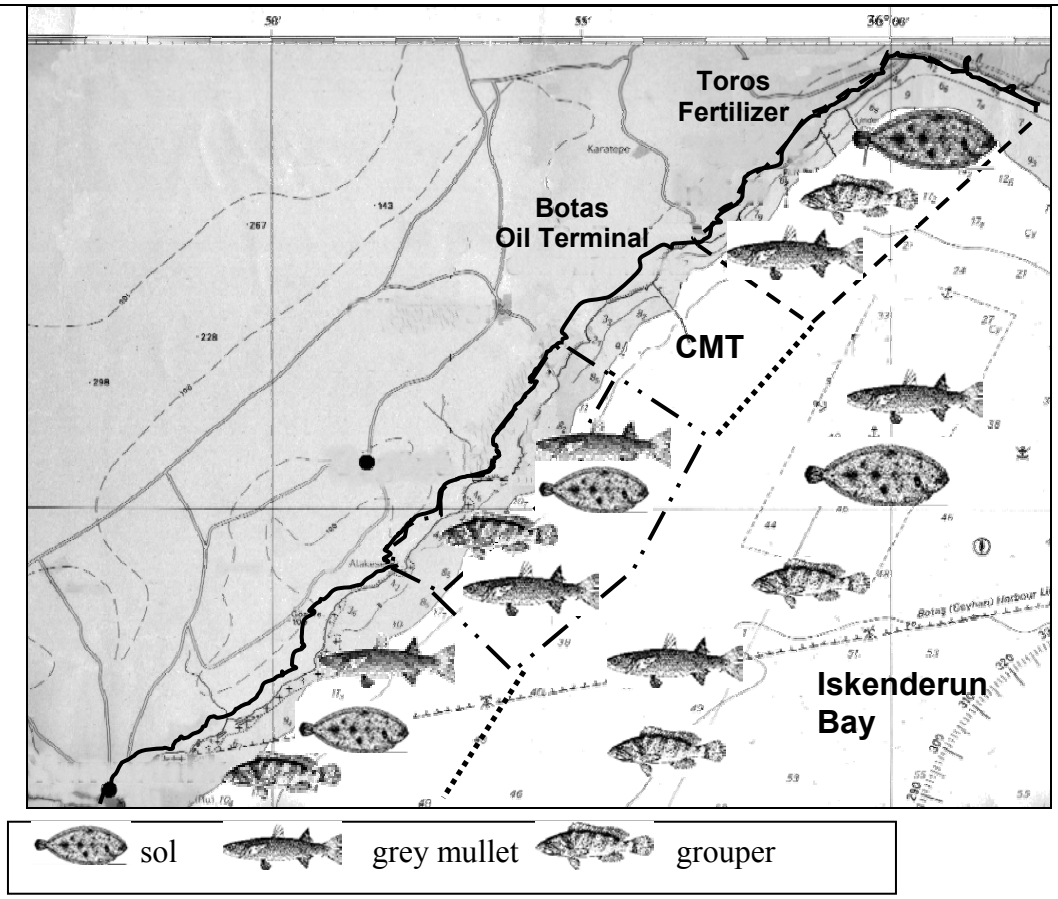
It should be noted that shrimps are common in all areas except the shallow water of ZONE 1. Sea bream and sea bass are more often found in the shallower water of ZONES 1, 2, and 3, than the deeper water of ZONE 4. All the other fish caught by local fishermen are found in all zones.



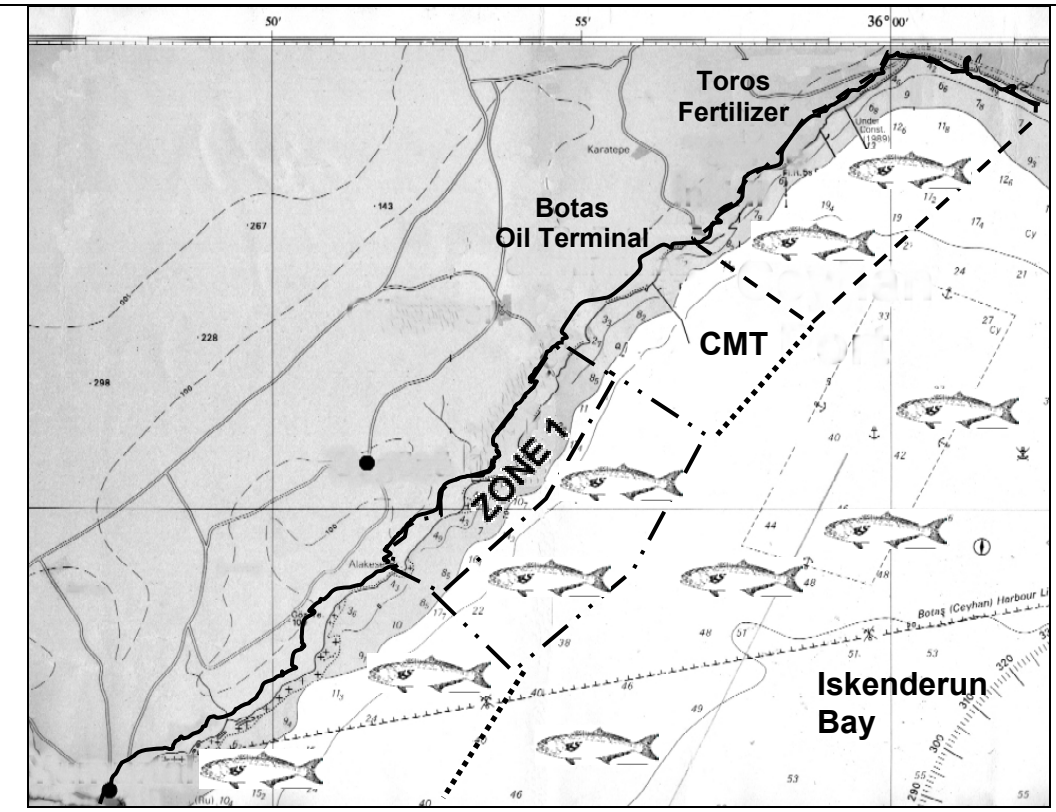
Figs. 4.4-1 Distribution of shrimps



Figs. 4.4-2 Distribution of sea bass and sea bream



Figs. 4.4-3 Distribution of sole, grey mullet and grouper



Figs. 4.4-4 Distribution of bluefish

4.5. SEASONAL VARIATION

The fishermen in the region go to the sea to fish throughout the year. Seasonal variation of some of the most important species is as follows and also shown in Table 4.5-1.

- Shrimps: Fished between March and October, but the catch is low during summer.
- Groupers: Fished throughout the year except the prohibited period, 15 June – 1 August.
- Sole, grey mullets, and sea bass: Fished between November and March.
- Sea bream: Fished between March and November.
- Bluefish: Fished during September – November.
- Squids: Fished throughout the year, but in a small quantity.

Table 4.5-1. Seasonal variation of fishing on commercially important species in Golovasi, Yumurtalik and Incirli.

	J	F	M	A	M	J	J	A	S	O	N	D
Shrimps	-	-	+	+	+	+	+	+	+	+	-	-
Grouper	+	+	+	+	+	+	-	+	+	+	+	+
Sea bass	+	+	+	-	-	-	-	-	-	-	+	+
Sea bream	-	-	+	+	+	+	+	+	+	+	+	-
Grey mullet	+	+	+	-	-	-	-	-	-	-	+	+
Sole	+	+	+	-	-	-	-	-	-	-	+	+
Squid	+	+	+	+	+	+	+	+	+	+	+	+
Bluefish	-	-	-	-	-	-	-	-	+	+	+	-

4.6. DAILY ACTIVITY OF FISHERMEN

The fishermen in Golovasi work 25 days a month, Yumurtalik 20 days and Incirli 15 days on average. Yumurtalik fishermen work less than Golovasi ones since Yumurtalik is located closer to the open sea, the weather condition is harsher there than Golovasi area. On the other hand, Incirli fishermen work less at the sea compared to others because they do not have their own port and they are also engaged in agriculture.

In general, they do not go to the sea when the weather is not favorable and when they need to check-up the boats. The check-up must be done every three months and it takes about 3-4 days each time.

The fishermen in this area fish usually within 2 miles off the coast in front of their settlements, the maximum travel distance is 3 miles, because of the following reasons.

- The fuel oil is costly.
- There are trawlers and purse seiners, which are non-local and at bigger scales, working in the off shore areas (more than 2 miles).
- Boats are not well equipped for long distance traveling. Most of them do not have even a compass.
- Offshore resource is not worth exploiting and running the risk, compared to the nearshore resource.

Regardless of the season, their daily activity does not change. Their activity changes according to the fishing gear they use.

a- Set nets (shrimps and sole trammel nets, gill nets)

A fisherman goes out to the sea in the evening (around sunset) to throw set nets and come back to the port. He usually travels 2miles for one way, which takes 2 hours, thus the total 4 miles and 4 hours. Early in the morning (around sunrise), he goes to the sea to haul the nets. He travels the same distance and time as he did before. After coming back to the port, he cleans and repairs the nets.

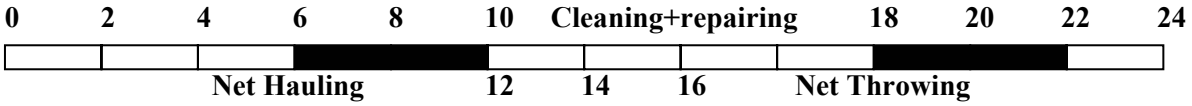


Fig. 4.6-1 Daily activity of a set netting fisherman.

b- Longlines

A fisherman goes to the sea in the evening (around sunset) to throw longlines. He stays at the sea for the whole night. He keeps checking the longline regularly. If fish are caught, he has to haul the line, take the fish, rebait the hooks and throw it back to the water. He usually travels 2miles for one way to the preferred location, which takes 2 hours. When he is longlining, he turns off the engine, usually. Early in the morning (around sunrise), he comes back to the port. He travels the same distance and time as he did before.

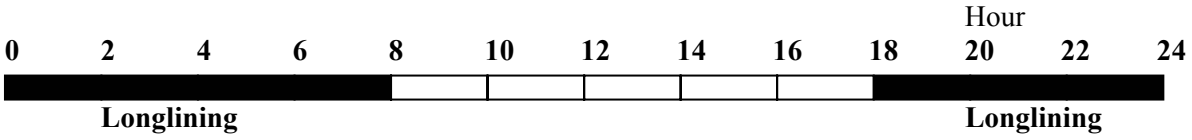


Fig. 4.6-2 Daily activity of a longlining fisherman.

c- Set nets + Longlines

A fisherman goes out to the sea in the evening (around sunset) to throw set. He usually travels 2miles for one way to the preferred location, which takes 2 hours. Then he throws a longline and stays at the sea for the whole night. He keeps checking the longline regularly. If fish are caught, he has to haul the line, take the fish, bait the hooks and throw it back to the water. Early in the morning (around sunrise), he hauls the nets and goes back to the port. He travels the same distance and time as he did before. After coming back to the port, he cleans and repairs the nets. The artisanal fishermen in this area usually operate this kind of fishing activity, that is, throwing set nets and longlining at the same time on the same expense.

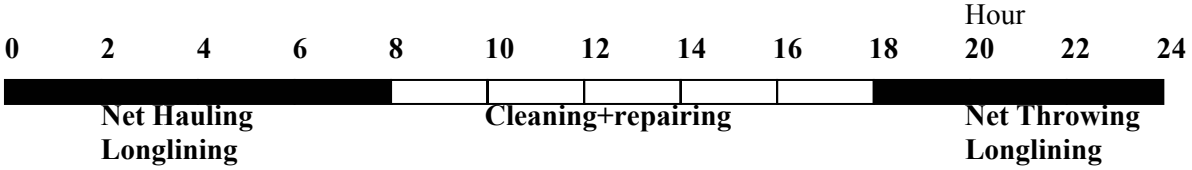


Fig. 4.6-3 Daily activity of a set netting and longlining fisherman.

4.7. CATCH OF COMMERCIALLY IMPORTANT SPECIES

The monthly catch of commercially important species, shrimps, groupers, soles, grey mullets, sea bass, sea bream, and bluefish were learned from both the fishermen and local tradesmen. The data from two sources are almost identical to each other.

Price per kilo for the most comercially important species in the area is shown in Fig. 4.7-1. The highest price is found for shrimps, followed by groupers and bluefish being the same price. Then they are followed by sole, sea bass and sea bream, and grey mullet being the lowest. This is common for all three villages in concern.

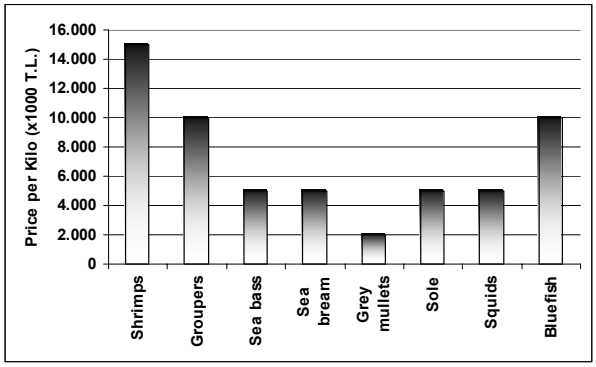


Fig. 4.7-1. Price per kilo of commercially important species in Golovasi, Yumurtalik and Incirli in August 2002

4.7.1. Golovasi

As you see in Tables 4.7.1-1 and -2 and Fig. 4.7.1-1, the most important species in terms of catch amount is shrimps, which comprise 37 % of all the catch. This is followed by groupers (27 %), soles (13 %), and grey mullet (13 %). The total catch of Golovasi is 150 tons annually.

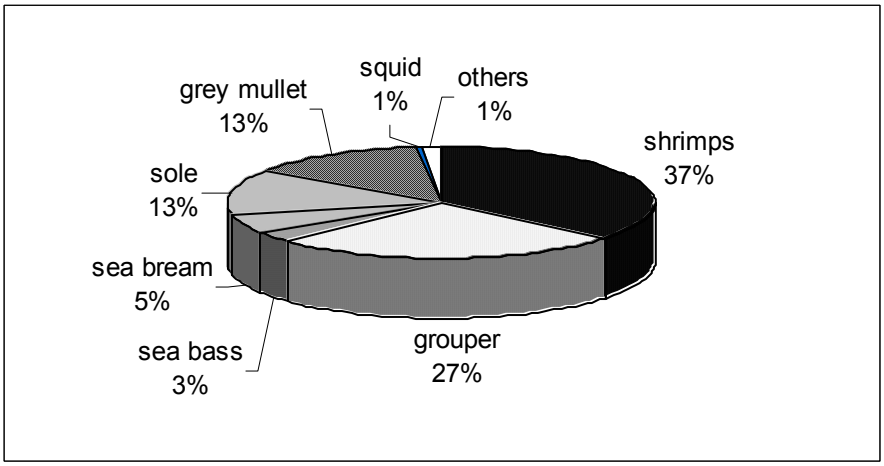


Fig.4.7.1-1. The species composition of the catch in Golovasi.

4.7. CATCH OF COMMERCIALLY IMPORTANT SPECIES

The monthly catch of commercially important species, shrimps, groupers, soles, grey mullets, sea bass, sea bream, and bluefish were learned from both the fishermen and local tradesmen. The data from two sources are almost identical to each other.

Price per kilo for the most comercially important species in the area is shown in Fig. 4.7-1. The highest price is found for shrimps, followed by groupers and bluefish being the same price. Then they are followed by sole, sea bass and sea bream, and grey mullet being the lowest. This is common for all three villages in concern.

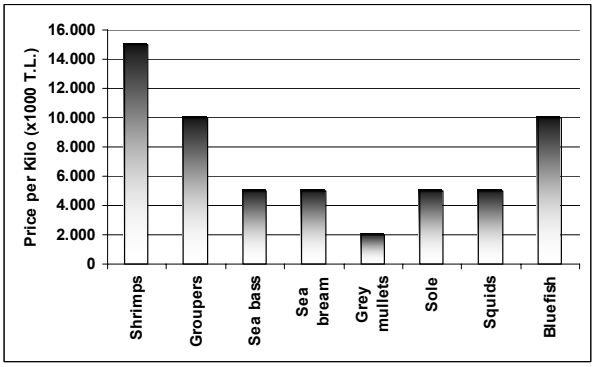


Fig. 4.7-1. Price per kilo of commercially important species in Golovasi, Yumurtalik and Incirli in August 2002

4.7.1. Golovasi

As you see in Tables 4.7.1-1 and -2 and Fig. 4.7.1-1, the most important species in terms of catch amount is shrimps, which comprise 37 % of all the catch. This is followed by groupers (27 %), soles (13 %), and grey mullet (13 %). The total catch of Golovasi is 150 tons annually.

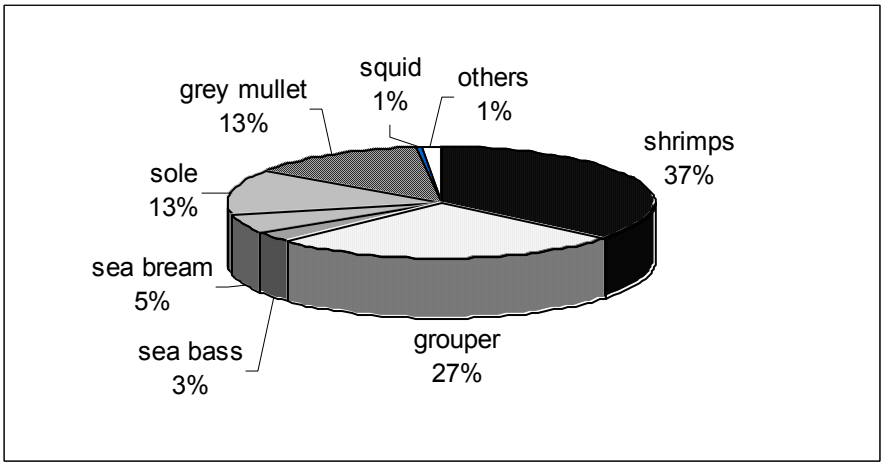


Fig.4.7.1-1. The species composition of the catch in Golovasi.

For Golovasi fishermen, the shrimp fishery is vital. For example, they used to use run-around gill net in September-November for bluefish, but not anymore because they put more effort on groupers and shrimps in the same period. The second important species is groupers.

Table 4.7.1-1. The catch (kg) of the commercially important species by a fisherman in Golovasi..

	Shrimps	Groupers	Sole	Grey mullet	Sea bass	Sea bream
January	-	100	100	100	25	-
February	-	100	100	100	25	-
March	125	100	100	100	25	25
April	250	100	-	-	-	25
May	250	100	-	-	-	25
June	125	100	-	-	-	25
July	50	-	-	-	-	25
August	50	-	-	-	-	-
September	250	100	-	-	-	25
October	250	100	-	-	-	25
November	-	100	100	100	25	25
December	-	100	100	100	25	-
Total	**1350**	**1000**	**500**	**500**	**125**	**200**

The figures are general catch amounts confirmed by both the fishermen and the local tradesmen.

Table 4.7.1-2. Total annual catch of commercially important species by Golovasi fishermen.

	Total catch (t)
Shrimp	54
Grouper	40
Sea bass	5
Sea bream	8
Grey mullets	20
Sole	20
Squids	1
Others	2
TOTAL	150

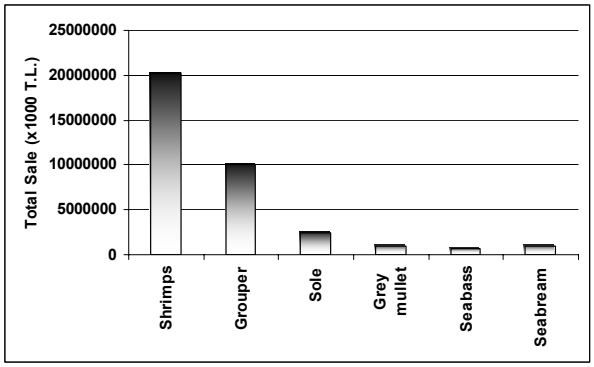


Fig. 4.7.1-2. Total sale of commercially important species in Golovasi

For the total sale (Fig. 4.7.1-2), shrimps show the highest sale, followed by groupers, then sole. The sales of other species, grey mullet, sea bream, sea bass, and squids are little compared to other three species. Therefore, both in terms of catch amount and income, shrimps are the most important species for the fisheries in Golovasi, followed by groupers.

4.7.2. Yumurtalik

As you see in Tables 4.7.2-1 and -2, and Fig. 4.7.2-1, the most important species in terms of catch amount is groupers, which comprise 22 % of all the catch. This is followed by soles (20 %), shrimps (16 %), and grey mullet (12 %). The total catch of Yumurtalik is 175 tons annually.

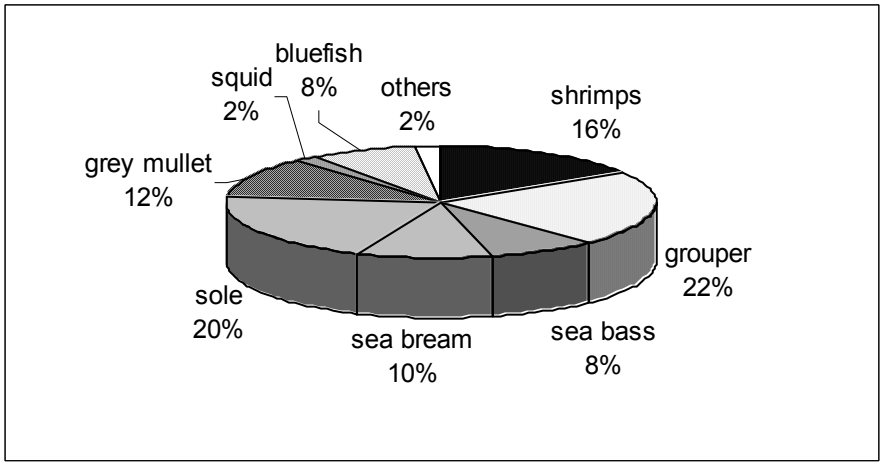


Fig. 4.7.2-1. The species composition of the catch in Yumurtalik.

Table 4.7.2-1. The general catch (kg) of the commercially important species by a fisherman in Yumurtalik.

	Shrimps	Groupers	Sole	Grey mullets	Sea bass	Sea bream	Bluefish
January	-	55	60	100	40	-	-
February	-	55	60	100	40	-	-
March	40	55	60	100	40	33	-
April	60	55	-	-	-	33	-
May	60	55	-	-	-	33	-
June	40	55	-	-	-	33	-
July	40	-	-	-	-	32	-
August	40	-	-	-	-	-	-
September	60	55	-	-	-	32	134
October	60	55	-	-	-	32	133
November	-	55	60	100	40	32	133
December	-	55	60	100	40	-	-
Total	**400**	**550**	**300**	**500**	**200**	**260**	**400**

The figures are general catch amounts confirmed by both the fishermen and the local tradesmen.

Table 4.7.2-2. Total annual catch of commercially important species by Yumurtalik fishermen.

	Total catch (t)
Shrimps	28
Grouper	38.5
Sea bass	14
Sea bream	18.2
Grey mullet	35
Sole	21
Squids	2.8
Bluefish	14
The others	3.5
TOTAL	175

For the total sale (Fig.4.7.2-2), shrimps show the highest sale, followed by groupers, then bluefish. The sales of other species, sole, sea bream, sea bass, grey mullet, and squids are little compared to other three species. Therefore, both in terms of catch amount and income, shrimps and grouper are the most species for the fisheries in Yumurtalık, followed by bluefish.

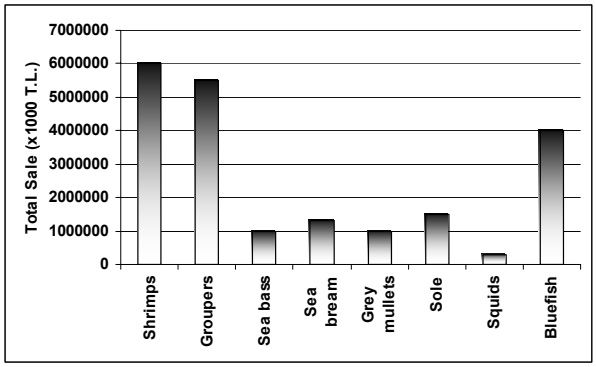


Fig. 4.7.2-2. Total sale of commercially important species in Yumurtalik.

4.7.3. Incirli

As you see in Tables 4.7.3-1 and -2 and Fig. 4.7.3-1, the most important species in terms of catch amount are shrimps and bluefish, of which each comprises 18 % of all the catch. This is followed by soles (16 %), groupers (14 %), sea bass (13 %) and sea bream (13 %). The total catch of Incirli is 13.85 tons annually.

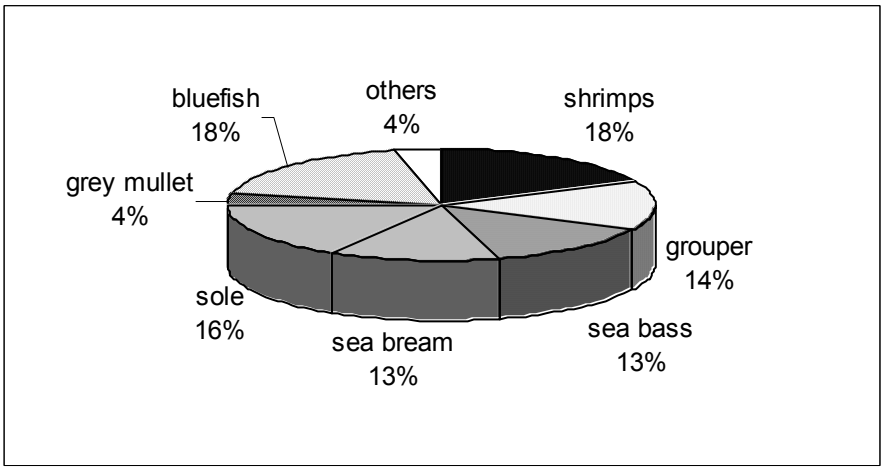


Fig.4.7.3-1. The species composition of the catch in Incirli.

Table 4.7.3-1. The general catch (kg) of the commercially important species by a fisherman in Incirli.

	Shrimps	Groupers	Sole	Grey mullets	Sea bass	Sea bream	Bluefish
January	-	20	45	10	36	-	-
February	-	20	45	10	36	-	-
March	20	20	45	10	36	22	-
April	35	20	-	-	-	22	-
May	35	20	-	-	-	22	-
June	20	20	-	-	-	22	-
July	20	-	-	-	-	23	-
August	20	-	-	-	-	-	-
September	50	20	-	-	-	23	83
October	50	20	-	-	-	23	84
November	-	20	45	10	36	23	83
December	-	20	45	10	36	-	-
Total	**250**	**200**	**225**	**50**	**180**	**180**	**250**

The figures are general catch amounts confirmed by both the fishermen and the local tradesmen.

Table 4.7.3-2. Total annual catch of commercially important species by Incirli fishermen.

	Total catch (t)
Shrimps	2.5
Grouper	2
Sea bass	1.8
Sea bream	1.8
Grey mullet	0.5
Sole	2.25
Squids	-
Bluefish	2.5
Others	0.5
TOTAL	13.85

For the total sale (Fig.4.7.3-2), shrimps show the highest sale, followed by bluefish, then groupers.The sales of other species, sole, sea bream, and sea bass followed the former three species, and the sale of grey mullets was the lowest. Therefore, both in terms of catch amount and income, shrimps and bluefish are the most species for the fisheries in Incirli, followed by groupers.

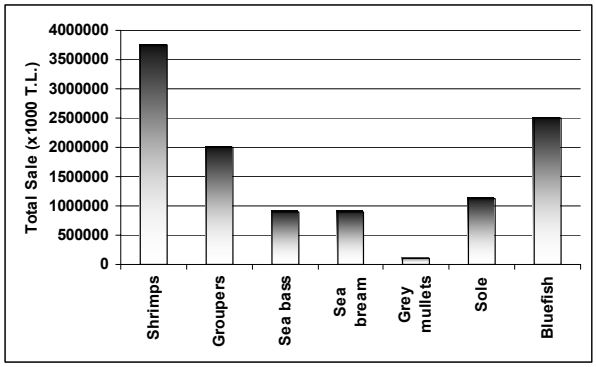


Fig. 4.7.3-2. Total sale of commercially important species in Incirli.

4.8. INCOME AND COST

The income and cost concerning the fishing activities were calculated for each fishing village.
Tables 4.8-1 and -2 show the selling price of commercially important species in Yumurtalik District in 2001 and in the first 5 months of 2002, respectively. Table 4.8-3 shows the selling price learned from the local tradesmen during our field survey in mid-August 2002. As you can see, the prices learned from Yumurtalik Directorate and local tradesmen coincide well.

Table 4.8-1. The selling price (million TL per kilo) of the fish caught by the artisanal fishermen in Yumurtalik District in 2001.

(From the archive of the Ministry of Agriculture and Rural Affairs, Yumurtalik Directorate).

Species	J	F	M	A	M	J	J	A	S	O	N	D
Shrimps	7.5	7.5	7.5	9	-	-	14	14	15	7.5	7.5	7.5
Groupers	7	7	7	7	7	-	-	8	8	9	9	9
Sea bass	3.5	3.5	3.5	4.5	4.5	4.5	-	4	4	4.5	4.5	4.5
Sea bream	3	3	3	3	-	-	-	-	3.5	3.5	3.5	3.5
Grey mullets	1	1	1	1.5	2	2	1.2	1.2	1.2	1.3	1.3	1.3
Sole	2.5	2.5	2.5	-	-	-	-	-	4	2.5	2.5	2.5
Squids	2.5	2.5	2.5	5	-	-	-	-	-	4.5	4.5	4.5
Red mullets	1.5	1.8	2	3.5	-	-	-	-	3	2	2	2
Horse mackerel	0.8	0.8	0.8	1.5	-	-	-	-	1.5	1.3	1.3	1.3
Cuttlefish	0.7	0.7	0.7	0.7	-	-	-	-	-	1	1	1

Table 4.8-2. The selling price (million TL per kilo) of the fish caught by the artisanal fishermen in Yumurtalik District in the first five months of 2002. (From the archive of the Ministry of Agriculture and Rural Affairs. Yumurtalik Directorate.)

Species	J	F	M	A	M
Shrimps	15	15	15	8.2	-
Groupers	9	9	9	-	-
Sea bass	4.5	4.5	4.5	4.5	4.5
Sea bream	-	-	-	4.5	-
Grey mullets	1.5	1.5	1.5	1.5	1.5
Sole	-	-	-	-	-
Squids	3	3	3	3.5	-
Red mullets	2.5	2.5	-	2.5	-
Horse mackerel	1.5	1.5	-	1.3	-
Cuttlefish	0.8	0.8	0.8	1	-

Table 4.8-3. The selling price (million TL per kg) of the fish caught by the artisanal fishermen in Golovasi, Yumurtalik and Incirli, learned from the local tradesmen on 16 August 2002.

	Price
Shrimps	15
Groupers	10
Sea bass	5
Sea bream	5
Grey mullets	2
Sole	5
Squids	5
Bluefish	10

4.8.1. Golovasi

Income

The annual income of a typical fisherman of Golovasi was calculated according to the total catch and the selling price of the fish. Table 4.8.1-1 shows the details and the annual income is computed as about **35.6 billion TL (35,600,000000 TL).**

Table 4.8.1-1. Annual income of a Golovasi fisherman.

	Total catch (kg)	Price (mTL/kg)*	Total sale (m TL)
Shrimps	1,350	15	20,250
Groupers	1,000	10	10,000
Sea bass	125	5	625
Sea bream	200	5	1.000
Grey mullets	500	2	1.000
Sole	500	5	2.500
Squids	25	5	125
Others (H.mackerel.etc)	50	2	100
Total	3,750		35,600

*The prices are obtained from the local tradesmen on 16 August 2002.

Cost

A fishing boat carries various kinds of fishing gears (nets and lines) at one time. It should be noted that they catch fish "A" at one place. while setting another kind of nets to catch fish "B". longlining for another type of fish "C" while waiting for the hauling of the above nets. It means that with the same oil they can catch various kinds of fish without any extra expence.

Besides the below items. a boat and an engine need to be taken into account. The price of a boat of the most typical type used in Golovasi is 6.000 -10.000 mTL. The price of an engine is about 2.000 mTL. Although the fishermen in Golovasi reported that they had rarely replaced their boats and engines so far. they need to be repaired whenever broken. Family members of a fisherman. such ashis wife and children. also work with the fishermen without any cost. The fishermen pay small amount of money to the children who help cleaning the nets. but it is not included in the below computation. Therefore the following calculation shows the minimum cost for a fisherman. who owns a boat.

- Shrimp nets: 100 mTL/piece x 15 pieces x 2* = **3,000 mTL/year**
  *Needs to be replaced twice a year.
- Sole nets: **1.500 mTL/year**
- Zide nets: **500 mTL/year**
- Longlines: 800 mTL x 2* = **1,600 mTL/year**
  *Needs to be replaced twice a year.
  Bait for longlines. sardine: 1.5 mTL/kg x 10 kg = 15 mTL/day
  15 mTL/day x 25 days x 10 months =**3,750 mTL/year**
- Fuel (oil): 1.2 mTL/L x 5 L/h x 6 hours (average. daily) = 36 mTL/day
  36 mTL/day x 25 days/month x 12 months = **10,800 mTL/year**
- Engine oil: 100 mTL x 2* = **200 mTL/year**
  *Needs to be replaced twice a year.
- Paints: 300 mTL x 4* = **1,200 mTL/year**
  *Needs to be repainted 4 times a year.
- Personnel: 10 mTL/person/day x 25 days/month x 12 months = **3,000 mTL/year**

Average yearly cost for a Golovasi fisherman (an owner of a fishing boat) is then calculated as **25,550,000 mTL.**

Profit
The summary of the above calculation is:

Income:	35,600,000,000 TL
Cost:	25,550,000,000 TL
Profit:	10,050,000,000 TL

A typical fisherman of Golovasi earns 10.05 billion TL per year, this means 837.5 million TL per month on average.

4.8.2. Yumurtalik

Income
The annual income of a typical fisherman of Yumurtalik was calculated according to the total catch and the selling price of the fish. Table 4.8.2-1 shows the details and the annual income is computed as about **20.7 billion TL (20,700,000,000TL).**

Table 4.8.2-1 Annual income of a Yumurtalik fisherman.

	Total catch (kg)	Price (m TL /kg)*	Total sale (m TL)
Shrimps	400	15	6,000
Groupers	550	10	5,500
Sea bass	200	5	1,000
Sea bream	260	5	1,300
Grey mullets	500	2	1,000
Sole	300	5	1,500
Squids	60	5	300
Bluefish	400	10	4,000
Others (horse mackerel. etc)	50	2	100
Total	2,720		20,700

Cost

- Shrimp nets: 100 mTL/piece x 8 pieces x 2* = **1,600 mTL/year**
  *Needs to be replaced twice a year.
- Sole nets: **500 mTL/year**
- Gill nets: **500 mTL/year**
- Run-around gill nets: **500 mTL/year**
- Longlines**: 800 mTL**
  *Needs to be replaced twice a year.
  Bait for longlines. sardine: 1.5 mTL/kg x 5 kg = 7.5 mTL/day
  7.5 mTL/day x 20 days x 10 months =**1,500 mTL/year**
- Fuel (oil): 1.2 mTL/L x 5 L/h x 6 hours (average. daily) = 36 mTL/day
  36 mTL/day x 20 days/month x 12 months = **8,640 mTL/year**
- Engine oil: 100 mTL x 2* = **200 mTL/year**
  *Needs to be replaced twice a year.
- Paints: 300 mTL x 4* = **1,200 mTL/year**
  *Needs to be repainted 4 times a year.
- Personnel: 10 mTL/person/day x 20 days/month x 12 months = **2,400 mTL/year**

Average yearly cost for a Yumurtalik fisherman (an owner of a fishing boat) is then calculated as **17,840,000 mTL.**

Profit

The summary of the above calculation is:

Income:	20,700,000,000 TL
Cost:	17,840,000,000 TL
Profit:	2,860,000,000 TL

A typical fisherman of Yumurtalik earns 2.86 billion TL per year, this means 238.3 million TL per month on average.

4.8.3. Incirli

Income

The annual income of a typical fisherman of Incirli was calculated according to the total catch and the selling price of the fish. Table 4.8.3-1 shows the details and the annual income is computed as about **11.4 billion TL (11,375,000,000TL).**

Table 4.8.3-1 Annual income of a Incirli fisherman.

	Total catch (kg)	Price (m TL /kg)*	Total sale (m TL)
Shrimps	250	15	3,750
Groupers	200	10	2,000
Sea bass	180	5	900
Sea bream	180	5	900
Grey mullets	50	2	100
Sole	225	5	1,125
Bluefish	250	10	2,500
Others (H.mackerel.etc)	50	2	100
Total	1,385		11,375

Cost

Besides the costs described in above two villages, the Incirli fishermen have to pay rent to the private company to use their jetty.

- Shrimp nets: 100 mTL/piece x 8 pieces x 2* = **1,600 mTL/year**
  *Needs to be replaced twice a year.
- Sole nets: **500 mTL/year**
- Gill nets: **300 mTL/year**
- Run-around gill nets: **500 mTL/year**
- Fuel (oil): 1.2 mTL/L x 5 L/h x 4 hours (average. daily) = 24 mTL/day
  24 mTL/day x 15 days/month x 10 months = **3,600 mTL/year**
- Engine oil: 100 mTL x 2* = **200 mTL/year**
  *Needs to be replaced twice a year.
- Paints: 300 mTL x 4* = **1,200 mTL/year**
  *Needs to be repainted 4 times a year.
- Personnel: 10 mTL/person/day x 15 days/month x 10 months = **1,500 mTL/year**
- Rent of port facilities: 30 mTLx12 months = **360 mTL**

Average yearly cost for a Incirli fisherman (an owner of a fishing boat) is then calculated as **9,760,000 mTL.**

Profit
The summary of the above calculation is:

Income:	11,375,000,000 TL
Cost:	9,760,000,000 TL
Profit:	1,615,000,000 TL

A typical fisherman of Incirli earns 1.615 billion TL per year, this means 134.6 million TL per month on average.

4.8.4. Summary

Table 4.8.4-1. Summary of income and cost of a typical fisherman of Golovasi, Yumurtalik, and Incirli (millionTL).

	Income	Cost	Profit /year
Golovasi	35,600	25,550	10,050
Yumurtalik	20,700	17,840	2,860
Incirli	11,375	9,760	1,615

The reasons for considerable difference among the earning of fishermen from three villages are assumed as follows.

- The fishing boats of Golovasi are more advanced, that is, they use machines to throw and haul nets. Due to this, their nets are longer, thus it results in more catch than other villages. For example, in Yumurtalik, only 25 out of 70 boats have these machines.
- The fishermen in Golovasi work 25 days a month while Yumurtalik 20 days and Incirli 15 days on average. Yumurtalik fishermen work less than Golovasi ones since Yumurtalik is located closer to the open sea, the weather condition is harsher there than Golovasi area. On the other hand, Incirli fishermen work less at the sea compared to others because they do not have their own port and they are also engaged in agriculture. Golovasi fishermen, 40 in number, are all professional fishermen, that is, they are not engaged in other sources of livelihood, such as animal husbandry and agriculture.
- For Incirli fishermen, the fishing ground is limited because of the BOTAS and Toros Fertilizer Facility exclusion zones. Therefore, they do not put much effort in fishing anymore.
- Most of the fishermen complain that they don't earn anything from fishing. This is partly because they have to keep paying their debt to the local tradesmen. Most of the fishermen started fishing with the credit with no interest in local currency from the tradesmen and keep purchasing nets, fuel oil and other necessary items from them by credit without interest.
- The consumption of fish within households is not included in the above figures, because they usually eat the fish they don't sell to the tradesmen.
- The past records of the catch and price were not found. Therefore, it is not possible to compare their present condition to the past.

4.9. NUMBER OF PEOPLE ENGAGED IN FISHING ACTIVITIES

Number of fishermen who own fishing boats in the CMT area is 40 in Golovasi, 10 in Incirli, and 70 in Yumurtalik, therefore 120 in total. It is assumed that there are 2 persons on average working on each boat. Therefore the total number of fishermen is 120 x 2 = 240.

Family members, such as children and women, help cleaning and repairing nets. But these are not included here because usually they are not paid.

Local fish markets are 7 in Yumurtalik and 2 in Incirli (not in Golovasi. but the tradesmen from Yumurtalik and Incirli come and buy their fish) shown in Plates 23 and 24 . At least 2 persons work at each market. Therefore, a total of 18 people work as local tradesmen in the area. Each market has 10-25 fishermen to buy fish from. The fishermen buy nets, oil, and all the other necessary items for fishing from these tradesmen as credit (without any interest). They sell fish in return.

4.10. PROBLEMS

Some of the problems in Iskenderun Bay (see Section 3.9) are also common in this region. The problems particular to this region are as follows:

- Trawlers: Non-local trawlers come into within 2-mile-zone from the coast, though it's illegal. They sweep away the set nets at night.
- Deline of the stocks: There has been decline of the catch, thus the decline of the stocks are of concern. Overfishing is cleary one of the reasons.
- Decrease of fishing grounds: The BOTAS secutity zone, Toros Fertilizer Facility security zone, Sugozu Thermic Power Plant security zone (being constructed) and sea traffic have caused much decrease of the fishing grounds in the area.
- Fuel: Fuel oil is very expensive. Because of this, they cannot go furthur to explore new resources.
- Blue crab: An exotic crab species, the blue crab, also cause problems in this area by damaging the nets and by eating the fish caught by the nets.
- Debt: The fishermen complain that they get debt from the state banks but the interest is very high.
- Sea bass and sea bream decreased probably due to the taking of fry in Iskenderun Bay.

5. LEGAL AND OPERATIONAL CONSTRAINTS ON FISHING

5.1. REGULATION ON BOTAS (CEYHAN) HARBOUR

There is only one article regarding the fishing activity in BOTAS Harbour as follows.

Part 5, Discipline at the Harbour, Article 23: Fishing with net is prohibited at the harbour. Furthermore, fishing with fishing line on the entrance and exit ways of the harbour and maneuvering area of the vessels is not permitted either.

5.2. FISHERIES ACT NO. 1380

The basic fisheries legislation in Turkey is Fisheries Act No. 1380 of 22 March 1971 as amended. According to Article 23, this regulation is reviewed every year by fishermen, fisheries scientists, fish exporters, importers and other stakeholders and circulars regulating commercial fishing activities are issued on a yearly basis.

The following is the extract of the articles in Circular No. 35/1 for the seasons 2002-2004, concerning the fisheries in Iskenderun Bay. A calendar of fisheries regulations according to fishing gear and species is shown in Fig. 5.2-1.

Bottom trawl regulations

Article 4-4. Bottom trawling is prohibited within 3 miles from the coast.
It is completely prohibited from 1 April to 31 August.

Article 4-5. Mesh size must be no less than 44 mm.

Midwater trawl regulations

Article 5. Midwater trawling is completely prohibited in the Aegean and the Mediterranean Seas.

Species and size restrictions

Article 6. Catch of the following species is prohibited: dolphins, seals, (brown) meagres, lobsters, sea turtles, sponges, tritons, pine shells, red and black corals, sea horses and sea grass (*Posidonia oceanica, Zostera noltii*).

Shrimp fishery

Article 7-3. Between 1 April and 31 August, except by set nets, it is prohibited to catch shrimps (i.e. trawls are prohibited). Trawl nets must not exceed 22 m in length and the mesh size of the bag must be no less than 44 mm.

Lobster, octopus, and blue crab fishery

Article 9. Lobster fishery is completely prohibited.
Octopus fishing is prohibited between 1 May and 1 October.
Blue crab fishery is prohibited between 1 May and 31 October.

Grouper and sole fishery

Article 11. Grouper fishery is prohibited between 15 June and 1 August.

Sole fishery is prohibited between 1 May and 31 August.

Bonito, tuna, sardine, and leerfish fishery

Article 12. Bonito fishery is prohibited between 1 April and 31 August.
Tuna fishery is prohibited between 16 July and 15 August.
Sardine fishery is prohibited between 15 May and 15 July, except set nets.
Leerfish fishery is prohibited between 1 May and 31 August.

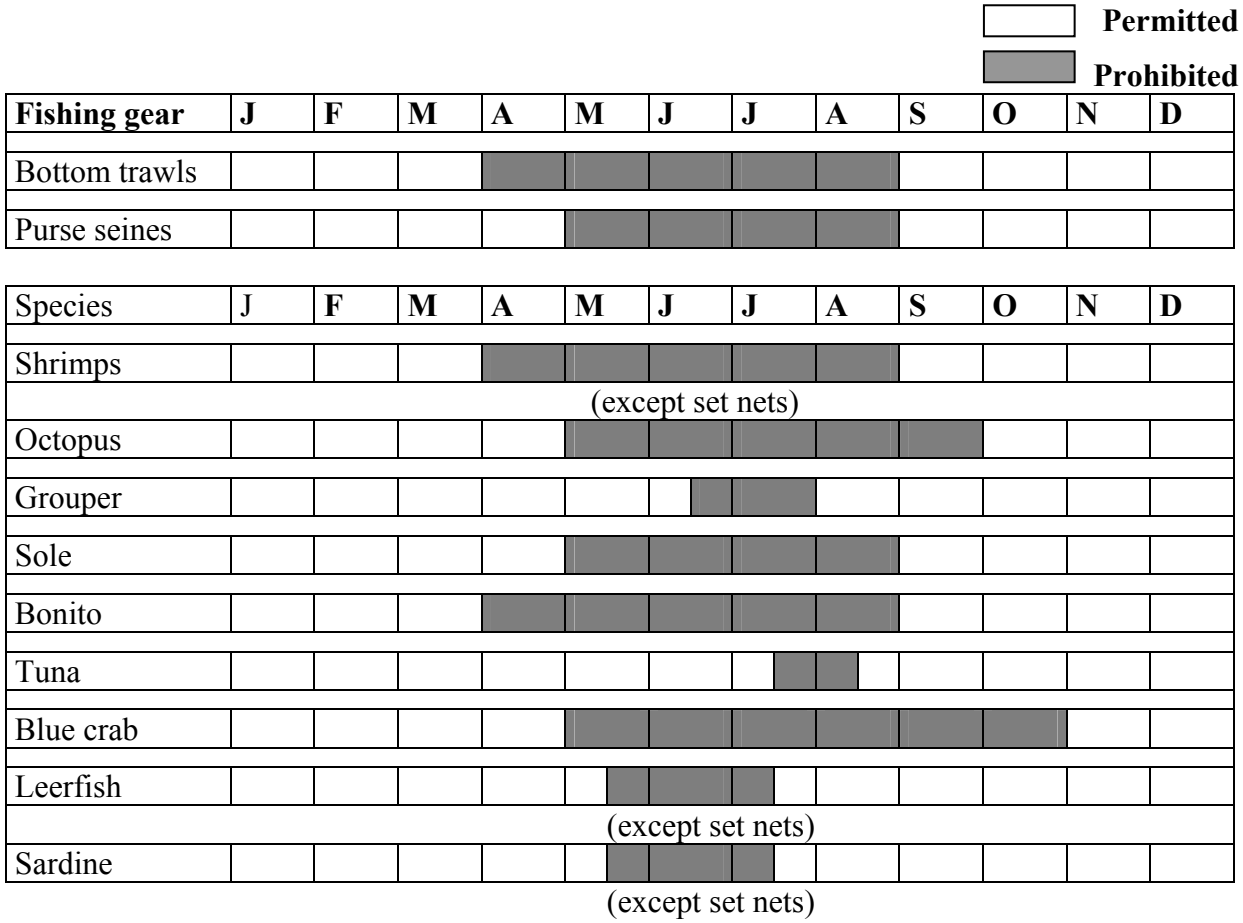


Fig. 5.2-1. A calendar of fisheries restrictions on fishing gears and commercially important species.

Size and weight restrictions

Article 15. The minimum landing sizes for species of economic importance are summarized in Table 5.2-1.

Table 5.2-1. The minimum landing sizes and weight for commercially important species in Iskenderun Bay.

Species	Minimum size in cm	Minimum weight in g
Octopus		1000
Clam	2.3	
Leerfish	20	
Striped mullet	13	
Hake	25	
Bream	15	
Anchovy	9	
Horse mackerel	13	
Oyster	6	
Turbot	40	
Two-banded bream	15	
Haarder	35	
Golden mullet	30	
Grey mullet	20	
Swordfish	130	
Sea bass	18	
Gurnard	35	
Goldband goatfish	10	
Blue crab	8	
Grouper	30	
Bonito	25	
Flounder	20	
Dentex	15	
Red mullet	11	
Bluefin tuna	90	
Mackerel	20	
Little tunny	45	
Bluefish	14	

Purse seine regulations

Article 16-2. Purse seining is prohibited between 1 May and 31 August. Purse seiners with a hydraulic hauler must operate in the areas deeper than 18m depth, those without it deeper than 11m.

Fishing with light

Article 17-3. Fishing with light is prohibited between Anamur and Syrian border in the Mediterranean Sea.

Trata fishing

Article 18. Trata fishing has been prohibited since 1 April 2001 all over Turkey.

Dalian (Coastal set nets in shallow water)

Article 19. It is prohibited to do other fishing activities within1 mile around the opening of the dalian when it is open and 0.5 mile when it is close.

Regional restriction

Article 20-3. The Mediterranean Sea.

d) Fishing, except set nets, is prohibited in the western side of the line connecting Cape Kokar and Yumurtalik fishing port (Adana).

e) Fishing is prohibited in the BOTAS security zone in Ceyhan (36° 52'08''N - 35° 55'06''E, 36°50'30''N - 35°56 02 E, 36°51'30''N - 35°58'24''E, 36°53'24''N - 35°56'42''E) and the BOTAS security zone in Dortyol (36°50'55''N - 36°07'24''E, 36°50'55''N - 36°08'40''E, 36°51'54''N- 36°07'24''E, 36°51'54''N - 36°08'40''E).

Other restrictions

Article 21-9. Set nets and longlines must be indicated at sea with buoys (during daytime) and buoys with lights (during night).

Set nets have to be used at night between sunset and sunrise.

Article 21-11. Except shrimp trawls, vessels smaller than 12 m in length are not permitted to trawl.

Article 21-13. Drift nets for pelagic fish are prohibited.

5.3. ENFORCEMENT OF THE REGULATIONS BY COAST GUARD AND FISHERIES CONTROL BOATS

As mentioned above, the basic law of the Turkish fisheries is Fisheries Act No.1380 of 22 March 1971. The responsible organization of this legislation is the Coast Guard and the Directorate of the Fisheries Control and Protection, Ministry of Agriculture and Rural Affairs. Their aim is to control all kinds of fishing activities by fishermen. These fishermen may be amateur or professional in all coasts of Turkey. This directorate has several boats (Plate 25) for patrolling the fishermen in case of violating the fisheries regulations described above, such as the restriction on seasons, species, landing size, fishing ground, and mesh size.

The Turkish Coast Guard is responsible for all coastlines from Sarp (Black Sea) to the Syrian border in the Mediterranean Sea. This organization has several boats, helicopters, and rescue teams.

Coast Guard Act No. 2692 gives permission to the Coast Guards for patrolling, when warned or notified by somebody, or when Coast Guard commanders decide to control illegal fishing in terms of time, size of fish, and place, according to the Fisheries Act No.1380.

In Iskenderun Bay, both Coast Guard and Fisheries Control Boats are patrolling for illegal fishing. In the last 5 years, these organizations have been improved by new boats, patrolling equipments and more educated staff. However, there is still complaint by the fishermen that there are not enough coast guards to control illegal fishing.

6. IMPACTS OF THE CMT TO FISHING ACTIVITIES IN THE REGION

6.1. EXTENT OF IMPACTS

The planned jetty can directly impact only the fishermen of Golovasi-Sahil Sitesi and not those of the other areas, such as Yumurtalik and Incirli, because this area is primarily the fishing ground for Golovasi fishermen. Yumurtalik and Incirli fishermen will be impacted indirectly. The most important species for Golovasi fishermen are shrimps and groupers in terms of amount and total sale. They use ZONE 2 most intensively for these species, because 1) there is no shrimp in ZONE 1; 2) they fish in ZONE 3 very rarely due to the distance they must travel to get there, and 3) they can fish in ZONE 4 only when the trawling is prohibited there. Therefore, when they are not allowed to fish in some part of ZONE 2 because of the CMT jetty maneuvering zone, they will lose a significant part of the source of livelihood.

The assumed impacts can be divided into three time spans: short-term, long-term, and permanent. Short-term impacts are caused during the construction of the new jetty. Long-term ones are caused during the operational period of the jetty. Permanent impacts are assumed even after the operational period of the jetty.

Short-term impacts
1. *Noise and turbidity*: During the construction of the new jetty, the noise and turbidity may distract the fish in the area and as a result they may escape from the area. This will create the decrease in the catch of Golovasi fishermen (possibly that of Incirli fishermen). If the construction takes place in spring and summer, the fish may lose their breeding grounds.

Long-term impacts
2. *Decrease of the fishing ground*: The restriction of the fishing ground due to the CMT jetty during the construction and operational periods cause a considerable decrease in the catch of Golovasi fishermen.

The total fishing area at the moment (ZONES 1 and 2) is 2,432 ha, and the fishing-prohibited area after the jetty starts to operate is 475 ha, which is about 20 % of the present fishing ground (Fig. 6.1-1). In a very small area like the primary fishing ground for Golovasi (ZONES 1 and 2), we can assume that the spatial and seasonal distribution patterns of fishery stocks are rather uniform, because temperature, salinity, dissolved oxygen, organic matters, depths and bottom types, e.g. muddy or rocky, are homogeneous. Thus, we can simply subtract 20 % from the total catch. The cost of fishing activities, however, would hardly decrease, if not any. Thus the fishermen's earning will decrease at least 20 %. This will pose a significant threat to the livelihood source of the Golovasi fishermen, combined with other problems already existing in the area. It should also be noted that the fishermen have a historical right there.

3. *Loss of time*: Because of the tanker traffic, the fishermen may have to wait at the sea for a few hours or they have to travel more distance to get to their fishing ground. Therefore, they cannot use time and fuel efficiently.

4. *Ship-originated pollution*: Due to increasing sea traffic around the jetty, there can be problems of pollution caused by those passing ships. This pollution includes wastes, TBTs (contained in anti-fouling paints, can be endocrinal disruptors in marine organisms), oil spill, and so on. When this pollution becomes severe in the area, this can result in the decrease of the fish stocks.

5. *Unwanted exotic species*: The unwanted exotic species can be brought to this region from other parts of the world with tanker ballast water. When this kind of organism finds this region suitable for their survival, they can establish a self-sustainable colony within a relatively short period of time. Sometimes, as the comb jelly fish in the Black Sea did, they destroy the native ecosystem, resulting in a total collapse of local fisheries. Ecological balance is already under threat because of some exotic species in Iskenderun Bay, such as blue crab and brushtooth lizard fish.

6. *Risk of sea accidents*: Increasing sea traffic of tankers can increase the risk of sea accidents, such as collision, grounding, fire and explosion, near or in the fishing grounds of Golovasi fishermen. Moreover, oil spill associated these accidents can cause great damage to the fish stocks as well as the quality of fish in that region.

7. *Conflicts among fishermen*: Conflicts are anticipated among the fishermen in Golovasi itself over the usage of the decreased fishing ground. The fishing ground become so limited but the nets and longlines are still very long. There can be also some conflicts between Golovasi fishermen and those from other areas when the latter come to fish in ZONE 2, even rarely. As said before, there is no such "gentleman agreement" over the fishing grounds off Golovasi, Yumurtalik and Incirli. They do not go to the other areas rather than the fishing ground just off their habitats simply because the fuel oil, thus traveling far, is very costly. However, when they learn that there is a rich fishing ground in ZONE 2 and it is worth going there in spite of the cost, they may travel to ZONE 2 to fish.

Permanent impacts:
8. *Illumination on the jetty*: Some fish species, such as bluefish, sardines and squids attract to illumination. In the CMT area, as already complained by Golovasi fishermen, the illumination on the jetty attracts those fish at night. Therefore, there is less fish in the area away from the jetty for the fishermen to catch.

9. *Decrease in the catch*: Because of the expected impacts mentioned above, that is, the decrease of the fishing ground, pollution, invasion of exotic species, loss of time due to increasing sea traffic, illumination of the jetty, and sea accidents, the total fish catch of Golovasi fishermen will substantially decrease, starting from the construction period, continuing during the operational period, and even permanently.

10. *Cumulative impacts*: There are other concerns in the area, that is, Sugozu Thermic Power Plant and Toros Fertilizer Facility. Because of their facilities, some of the fishing grounds in the region are partly closed. All these impacts have a cumulative effect on the fishing activities.

As a result, the new jetty will have a significant impact on the fishing activity of Golovasi fishermen.

6.2. MANAGEABILITY OF THE IMPACTS

Manageabilities and mitigation measures for each of the above mentioned impacts are considered as follows.

1. *Noise and turbidity*: The reproductive season of fish, spring and summer, should be avoided for construction. Technical measures to mitigate noise and turbidity should be sought by the construction companies.

2. *Decrease of the fishing ground*: This directly results in the decrease of the catch and it should be compensated by relevant stakeholders. The compensation measures are discussed later.

3. *Loss of time*: To mitigate the loss of time, the tanker passing the fishing ground should notify the relevant authorities, including the fishing cooperative president, well in advance. If tankers can pass the zone during daytime (10:00 - 18:00), when the fishermen are not at the sea, this impact can be greatly mitigated.

4. *Ship-originated pollution*; 5. *Unwanted exotic species*; 6. *Risk of sea accidents*: All these impacts are related to tanker traffic. Port facilities should be designed to mitigate such risks. A contingency plan should be made by BOTAS, the port authorities, and other relevant parties in case of tanker accidents, so that the risks of oil spills and fires are minimized.

7. *Conflicts among fishermen*: Since there is no legal constraint on users of a particular fishing ground, the anticipated conflicts among the fishermen over the usage of the fishing ground (ZONE 2) would be very difficult to solve.

8. *Illumination of the jetty*: Illumination does not attract all the species. A scientific study can be made to understand which species are most attracted to illumination and to investigate what is the minimum illumination for the sake of navigation safety. If the study reveals considerable loss in the catch of Golovasi fishermen, the below compensation measures should be applied.

9. *Decrease in the catch*: The decrease in the catch directly results in the loss of a source of livelihood. Since there are few alternatives for fishing in the area or the fishermen do not have any capacity for such alternatives in terms of capital, knowledge or experience, the compensation has to be made in one way or another, suggested below.

10. *Cumulative impacts*: There is no mitigation measures for cumulative impacts, other than choosing alternative livelihoods suggested below.

6.3. SUGGESTED COMPENSATION MEASURES

There has been no record of compensation by any governmental or private organizations for fishermen in any part of Turkey so far. This project is the first one to be concerned about fishermen and impacts of the enterprise and to look for some way for the compensation. That is why this measure should be carefully examined and applied as it can be a case model for all over Turkey. Basic criteria should be set and applied for the fishermen as an equitable and reasonable solution.

If the compensation measures are inapplicable or inequitable, it may be disappointing for the fishermen, making them angry, and causing conflicts among them or among regions. While the compensation measures must be applied carefully, only the fishermen who really in need for such compensation should be considered. As the expectation for the compensation in terms of cash has been raising high in the area, this in particular needs very sensitive approaches. In any case, the compensation measures and application should be clearly explained to the fishermen and stakeholders, who they may be affected from the decisions directly or indirectly.

For the compensation, only fishermen who own fishing boats (40 people) in Golovasi should be considered. The fishermen who work with wages will not be compensated, but alternative livelihoods can be suggested and may get financial support from the relevant parties.

First of all, the cash compensation can be negotiated. According to the proportion of the closed area of CMT maneuvering zone to the whole fishing ground (ZONES 1 and 2), the amount of decrease in the catch is estimated (in US dollars). The catch in ZONES 3 and 4 are neglected because the infrequent use

of these zones by Golovasi fishermen. The possible competition among the Golovasi fishermen over the decreased fish stocks in ZONES 1 and 2 are also neglected. If this is accepted by the fishermen at the negotiation, it should be paid every three months or so, not yearly, to avoid the misuse of this money for getting bigger ships or longer nets. This cash compensation can be paid for up to 5 years, depending on the financial strategy of the companies in charge. The fishermen can continue fishing on condition that they will not increase the size of the boat or the length or the number of the nets. It should be emphasized, however, that the stocks will be depleted in the near future if they continue to fish as they do now and the compensation will not change even when the stocks are depleted.

If the above compensation is not accepted, alternative sources of livelihood will be presented to the fisherman so that each of them can make his own choice. The relevant companies should support them with financial means and capacity building. Such alternatives are:

- Animal husbandry: Some fishermen show interest in this, but they do not have the capital to start with.
- Agriculture: Some fishermen may do this if they can rent some land, equipments, etc.
- Apiculture (Bee-keeping): The potential of apiculture should be investigated.
- Small-scale textile factories: In Adana, there is one of the major textile industries in Turkey. There should be demand for small-scale factories to do supplementary work. Younger generations and women are particularly suitable for this kind of work. This alternative source needs more investigation.
- Employees at the CMT for younger fishermen (<40 years old)
- Old fishermen (>40 years old) can continue fishing as it is very hard for them to adapt to changes because of their age and low level of education.
- Fishing unexploited resources: Some species, such as blue crab and spotted mantis shrimp (Plates **), are not consumed domestically and practically unexploited. The fishermen usually discard them when they are caught in the nets. In some countries, such as Italy, Spain, and France, however, there is a high demand for these species. A stock assessment study is necessary as they are exploited, but some fishermen remain fishing for these unexploited resources.
- Prawn or fish culture: Aquaculture facilities for prawns and other fish can be built to provide job opportunities for the local community, not at the sea, but on the land. Furthur investigations and large amount of investment is needed.

For the basic compensation criteria, factors such as age, gender, ownership of land properties, and education level should be considered. Financial support should be available for these fishermen to be able to start the above alternative sources of livelihood on the conditions as follows:

- Except those continuing the fishing, they must stop commercial fishing anymore. Nevertheless, they must not buy a new boat or other fishing equipment.
- When they start new jobs, they should continue at least 5 years.
- Capacity building may be necessary for those starting something completely new. Consultation with organizations like GEF (UNDP) and participation to training courses may be necessary.
- Those continuing the fishing must not increase the length of the nets or lines, nor change their boats.

6.4. OTHER FACTORS CONCERNING THE MANAGEABILITY OF THE IMPACTS

Since there is no record for the past catch of Golovasi fishermen, it is impossible to determine how big the stock is in their primary fishing ground or what is the maximum sustainable yield for some of the commercially important species like shrimps and groupers. Further studies are needed to determine these parameters.

These compensations should be monitored carefully by experts (economists, fisheries scientists, sociologists) and should be evaluated after 5 years (or less if possible) because it usually takes about 5 years to evaluate the performance of each alternative livelihood.

For the ability of the affected fishermen, as said above, the older fishermen, over 40 years old, will not be able to adapt themselves to changes. They have been depending on the sea for more than 20 years and their education level is low. Moreover, there will be less than 20 years left for them to do commercial fishing. On the other hand, the younger fishermen are willing to take up other opportunities if they find ways to do them. Women are not considered here for the compensation and it's out of the scope of this assignment, but they are also willing to support more stable jobs in general.

6.5. EXPECTATIONS AND CONCERNS OF STAKEHOLDERS

During the field survey in the CMT area, 16-19 August 2002, a wide range of local stakeholdrs listed in Table 6.5-1, other than fishermen, were interviewed. The questions asked were:

1. What is your expectation and concern about the BTC project (including the CMT)?
2. What is your opinion about the fishing activities in the area and how can the impacts be mitigated for the fishermen?
3. What are major problems in the area?

The comments of interviewed stakeholders (in alphabetical order by surnames) are as follows:

Tayfun Bahar: Commander, Coast Guard, Ceyhan

Mr. Bahar explained especially that the fishermen should not reach the security zone when the company starts to work. Most of the fishermen are violating the rules of 1380 Fisheries Law related with fisheries protection and control. He also added that most of the boats required equipments for safety and security. Fishermen don't even have a compass, life boats and other relevant papers such as a certificate of the boat, staff seamanship papers, etc.

He also explained that to manage traffic at sea was possible for trawlers and purse seiners, but not for small boats, because they did not obey most of the rules. Mr. Bahar also mentioned that the fisheries control boats were not sufficient for Iskenderun Bay.

Mahmut Bilen: Board Member, Chamber of Shipping of Iskenderun; Head, Iskenderun Fishing Cooperative

He thinks that the Baku-Ceyhan Project is very imporatant for the region and will give middle- and long-term positive results. He also pointed out that Iskenderun Bay was very polluted due to the industrial installation. This results in the decline of the fishery production and fishing grounds. In addition, Yumurtalik Lagoon is the main nursery ground for the fish in this region and it should be protected from illegal fishing and pollution.

Concerning Gölovasi and Sahil Sitesi, his opinion was that the fishermen should be compensated with money, but the amount was unknown. If these fishermen withdraw from the sea, the fishing pressure will be decreased partly. He also concluded that the fishermen cannot earn money as much as they did previously due to the depletion of the stocks and also because the costs like oil and nets were becoming more and more expensive.

Turan Cam: BOTAS Captain

Captain Cam expressed his opinion about the fisheries in Golovasi - Sahil Sitesi and according to his opinion, there was no problem for the fishermen in terms of navigation. He added that only one big ship less than 200 m will be transporting oil per day. The trawlers, purse seiners and other fishermen can catch fish in the bay and there is enough place for all of them. When many fishermen catch fish in the ship route, the ships change their course to aviod collision. He calculated that a security zone of one nautical mile was reasonable for the tanker operation there. He also added that the main problem was Sugozu Power Plant for the fishermen due to the lack of a harbour in Sugozu region.

.

Erdogan Cicek: Research Assistant, Fisheries Faculty, Cukurova Universty

Mr. Cicek said that illegal fishing was very common in Iskenderun Bay and it cannot be stopped because the punishments were not dissuading. On the other hand, pollution is increasing due to the industrial installions. Until two years ago, in this region, catching of juvenile of sea bass and sea bream from the sea for the fish farm caused important reducuction in the fishery stocks. After the decrease of stocks, arguments started among the fishermen (especially among artisanal fishermen, trawl and purse seine fishermen). The restriction of the fishing grounds may cause chaos among the fishermen.

Zehra Durak: Provincial Department of Environment, Adana Governorship

Mrs. Durak thought that the Baku-Ceyhan project would be very useful for the local people. She pointed out that in this region BOTAS, Toros Fertilizer Company and the other industrial installations constructed their own purifying systems, therefore they reduced environment damages to the minimum level. She also said that new industrial installations that would be built must be sensitive about this subject.

Mehmet Icli: Ceyhan Harbour Master (Interim)

Mr. Icli explained that all the records of fishermen's registations were available at his office and the total number of the registered boats was about 40. Most of them are less than 8 meters long. Some of the fishermen did not pay their yearly tax and thier registrations are not valid anymore. Most of the fishermen want to enter the forbidden area of BOTAS to catch more fish and sometimes the Coast Guard warns them.

To the question asked him about the ship traffic in Iskenderun Bay;
The average of 150 mixed-cargo ships per month enter Iskenderun Harbour
For LPG, 10 ships (mostly tankers) / month,
For Toros Fertilizer Factory, 25 mixed-cargo ships / month

For BOTAS, 22 tankers / month

Bekir Kara: Deputy Director, Fisheries Dept., Hatay, Ministry of Agriculture and Rural Affairs

Mr. Kara complained that the fishing statistics were not up-to-date because the fishermen were not cooperative. They mostly neglect rules and codes of the fisheries. Mr. Kara and his team try to collect all relevant information since Turkey is a candidate for European Union. His opinion for the compensation was that it should be done like paying the fishermen's debts to the government or some cash money for only the fishermen from Golovasi and Sahil Sitesi.

Cuney Kaytmaz and **Mustafa Gokberk**: Tradesmen, Ceyhan and Golovasi - Sahil Sitesi

They said that the fishing season should started in October, instead of September, so that fish may have more chance for the reproduction in Iskenderun Bay, thus it woud be useful for the fishing community. They also added that it was true that most fishermen had debts but they always made investment. When they started fishing, they did not have any capital, meaning that they established a fishing job with credits from the tradesmen, rather than banks
because bank interests are higher than those given by tradesmen. Debts are TL-based, not in US dollars nor in other currency. Therefore, the fishermen are not disturbed by increased currency.

Ufuk Sakalli: Fisheries Engineer, Fisheries Dept., Hatay, Ministry of Agriculture and Rural Affairs.

Mr. Sakalli metioned that the illegal fishing was common in Iskenderun Bay and mostly trawlers were violating the rules. For Golovasi and Sahil Sitesi, the compensation measures should be carefully determined. The restriction of the fishing ground of Golovasi may cause chaos among the fishermen.

Bulent Sari: Chamber of Environmenal Engineers

Mr. Sari said that they were against Sugozu Thermic Power Plant but not against the CMT project.

Mustafa Yalcin: Ceyhan Environmental Association

Mr. Yalcin is very positive for the BTC project and he beleives that this project will be very useful for the local people. He also paid attention for the Sugozu Power Plant and he emphasized that this plant would be very dangerous for the region and Sugozu. The fishermen should complain about this project as well. The report of EIA for the power plant was not realistic, he said, and sharing the information with local people had been totally unsuccessful.

Yakup Yuce: Fisheries Engineer, Fisheries Dept., Adana, Ministry of Agriculture and Rural Affairs.

Mr. Yuce complained that the fishing statistics were not-up-to date. He said that the fishermen didn't mention exactly the amount of fish they caught because of taxation. Mr. Yuce was very positive to the CMT project but he expressed that Golovasi fishermen would find them in a difficult position. He said that the fishermen were associated with the Ministry of Agriculture but they had not brought their complaints to the Ministry.

Prof.Dr. Ahmet Yuceer: Cukurova Universty, Department of Environmental Engineers

Prof. Yucer is not against the CMT project, but he said that it had to be under control to prevent further pollution in Iskenderun Bay.

Ahmet Zengin: Agriculture Directorate, Yumurtalik

Mr. Zengin mostly talked about the fishery resources in Yumurtalık 10 years ago. He mentioned that the fishery stocks were depleted during the last decade because of overfishing. The fishing vessels were few 10 years ago but now many small boats try to catch fish in the same area. There used to be the catch of 14-5 kg shrimp/day 10 years ago but today only 1-2 kg /day.

Table 6.5-1. List of the stakeholders interviewed during the field survey in Iskenderun Bay, 15-19 August 2002.

Date	Name	Status
16.08.2002	Mahmut Bilen	Board Member, Chamber of Shipping of Iskenderun and Head, Iskenderun Fisheries Cooperative
16.08.2002	Bekir Kara	Deputy Director, Fisheries Dept., Hatay, Ministry of Agriculture and Rural Affairs
16.08.2002	Ufuk Sakalli	Fisheries Engineer, Fisheries Dept., Hatay, Ministry of Agriculture and Rural Affairs
16.08.2002	Zehra Durak	Provincial Department of Environment, Adana Governorship
16.08.2002	Erdogan Cicek	Research Assistant, Faculty of Fisheries, Cukurova University
18.08.2002	Tayfun Bahar	Commander, Coast Guard, Ceyhan
18.08.2002	Mehmet Icli	Ceyhan Harbour Master (Interim)
18.08.2002	Ahmet Zengin	Agriculture Directorate, Yumurtalik
18.08.2002	Cuneyt Kaymaz Mustafa Gokberk	Tradesmen, Yumurtalik and Golovasi- Sahil Sitesi
19.08.2002	Turan Cam	BOTAS Captain
19.08.2002	Mustafa Yalcin	Ceyhan Environmental Association
19.08.2002	Yakup Yuce	Fisheries Engineer, Fisheries Dept., Adana, Ministry of Agriculture and Rural Affairs
19.08.2002	Prof. Dr.Ahmet Yuceer	Department of Environment Engineer, Cukurova University
19.08.2002	Bekir Sari	Chamber of Environmental Engineers

6.6. POTENTIAL BENEFIT TO FISH STOCKS AND FISHING COMMUNITY

Since a part of ZONE 2 is closed for fishing, the stocks will be protected from the fishing pressure. Therefore there may be an icrease in some stocks. However, this increase is likely to be mitigated if the fishing continues more intensively than now in the rest of fishing grounds.

The illumination on the jetty and presence of the jetty as a shelter for some fish species may contribute to the protection of some species. However, again, this is likely to be mitigated if the fishing continues more intensively than now in the rest of fishing grounds.

This project provides an opprtunity for all stakeholders, including fishermen, to review their activities, cost and profit, and cultural value, etc, that they have been taken for granted for a long time. There can be a change in their attitudes towards sustainable development and fisheries.

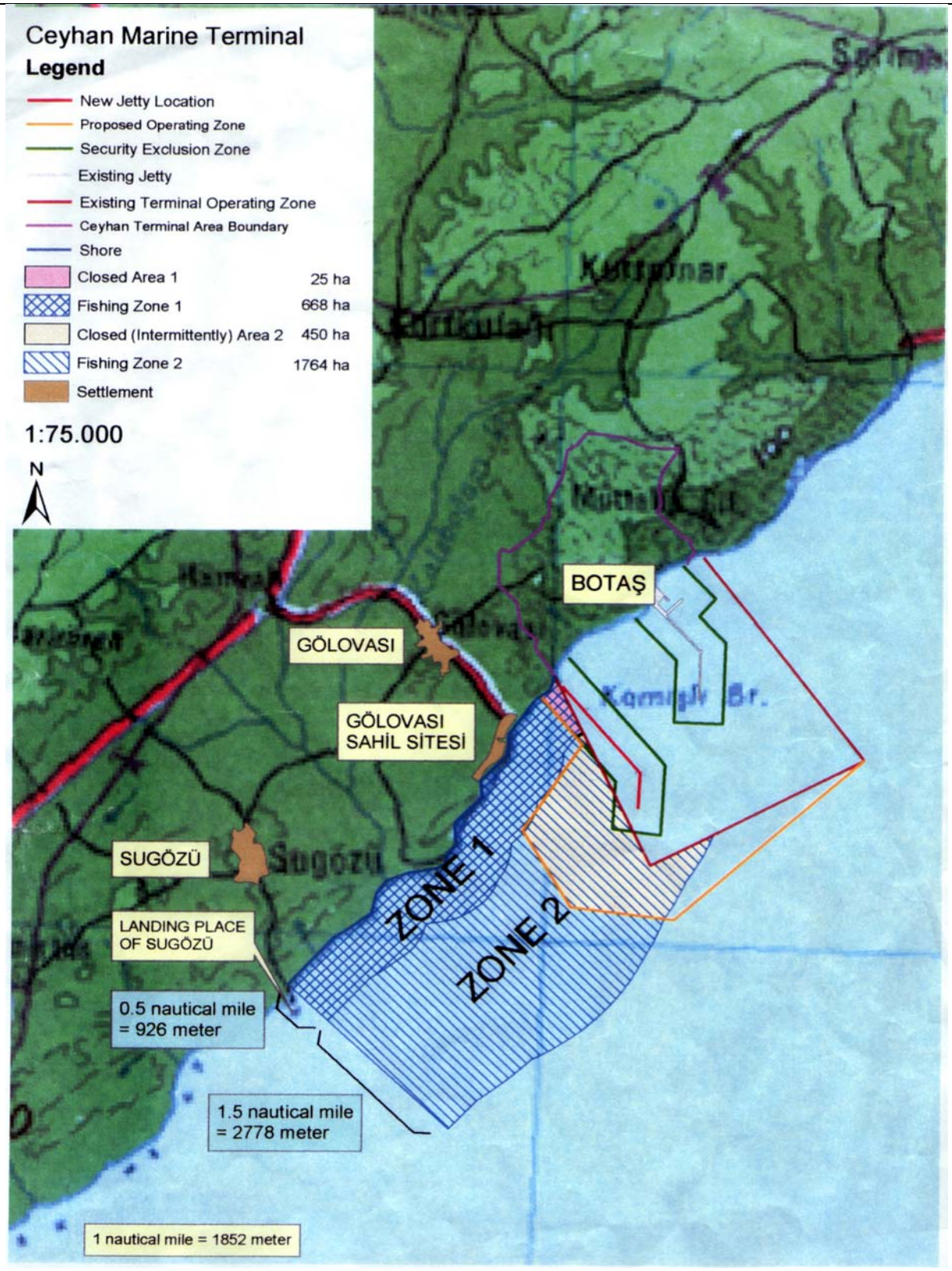


Fig. 6.1-1. Fishing ground and maneuvering area for CMT.

7. REFERENCES

Basusta, N., Erdem, U. 2000. A study on the pelagic and demersal fishes of Iskenderun Bay. Turk. J. Zool., 24: 1-19. (Turkish)

Basusta, N., Erdem, U., Sarihan, E. 1997. Lessepsian immigrant fish species in Iskenderun Bay. IX. Su Ürünleri Sempozyumu, Isparta, pp. 140-151.

Bingel, F. 1987. Project Report on the Stock Assessment of the Eastern Mediterranean Coastal Fisheries. ODTU-DBE, Erdemli, 312 pp. (Turkish)

BOTAS, ENVY. 2001. Marine Ecology Report (Winter Term) for BTC Crude Oil Pipeline Project. 46pp.

BOTAS, ENVY. 2002. Marine Ecology Report (Spring Term) for BTC Crude Oil Pipeline Project. 50pp.

Cekic, M., Demirhan, S.A., Basusta, N., Turan, C. 2000. State and general characteristics of longlines and longlining vessels in the southern part of Iskenderun Bay. Doğu Anadolu Bölgesi, IV.Su Ürünleri Sempozyumu, Erzurum, pp.1-7. (Turkish)

Coast Guard Command Headquarters. 1999. Crimes at the Sea. Publication No. 4, Ankara, 95pp. (Turkish)

Gucu, A.C. 2000. Fish stocks of the Northeastern Mediterranean 20 years time series. I. Ulusal Deniz Bilimleri Konferansı, ODTU, Ankara, pp.160-164. (Turkish)

Gucu, A.C., Bingel, F. 1994a. Trawlable species assemblages on the continental shelf of the Northeastern Levant Sea (Mediterranean) with an emphasis on Lessepsian migration. Acta Adriat., 35 (1/2): 83-100.

Gucu, A.C., Bingel, F. 1994b. State of the fisheries along the Turkish Mediterranean Coast. Turk. J. Zool., 18: 251-258.

Kara, O. F., Aktas, M. 2001. Investigation on Industrial Fishery of the Mediterranean Sea. T.C. Tarım ve Köyişleri Bakanlığı, Tarımsal Araştırmalar Genel Müdürlüğü, Su Ürünleri Araştırma Enstitüsü Müdürlüğü Yayın No: 7, Bodrum. 59 pp. (Turkish)

Kosswig. C. 1953. Some aspects of fisheries of Turkey. Hidrobiyoloji Mecmuası, Seri A, Cilt 1 (4): 145-153.

Ministry of Agriculture and Rural Affairs, General Directorate of Protection and Control. 2002. Circular No. 35/1 on Commercial Fishing for the Seasons 2002-2004. Ankara, 84pp. (Turkish)

State Institute of Statistics (SIS). 1992-1999. Fisheries Statistics. State Institute of Statistics, Prime Ministry, Ankara.

Tasdemir, O. 2002. Determination of the technical specification of fishing gears in Iskenderun Bay. Master Thesis, Cukurova University, Adana. 51 pp. (Turkish)

Turan, C., Can, M.F. 2000. Statistics of 21 fish species landed in Iskenderun region in the last eight years and their relationship to hydro-meteorological fluctuations. I. Ulusal Deniz Bilimleri Konferansı, ODTU, Ankara, pp.270-271. (Turkish)

Zengin, M., Bicer, N., Akyurt, I. 1999. A study on the purse seine fishery in Iskenderun Bay. X. Ulusal Su Ürünleri Sempozyumu, Adana, pp.204-224. (Turkish)

8. ABBREVIATIONS AND DEFINITIONS

BTC	: Baku-Tibilisi-Ceyhan
cm	: centimetre(s)
CMT	: Ceyhan Marine Terminal
g	: gram(s)
GEF(UNDP)	: Global Environmental Facility (United Nations Depelopment Porgramme)
ha	: hectare(s)
HP	: Horse Power
kg	: kilogram(s)
m	: metre(s)
1 mile	: 1852 m
mm	: millimetre(s)
mTL	: million Turkish Lira
sp.	: species (singular)
spp.	: species (plural)
t	: ton(s)
TBTs	: tributyltins
TL	: Turkish Lira

9. LIST OF PLATES

Plate 1. Field survey with Golovasi fishermen.

Plate 2. A trawling boat in Iskenderun

Plate 3. Blue crab damaging the net

Plate 4. Golovasi fishing port

Plate 5.Yumurtalik fishing port

Plate 6. Fishing boats of Incirli (Bayraktar Jetty)

Plate 7. Shrimp trammel net

Plate 8. A basket of longline

Plate 9. Red mullet (*Mullus barbatus*)

Plate 10. Saddled seabream (*Oblada melanura*)

Plate 11. Gilthead seabream (*Sparus aurata*)

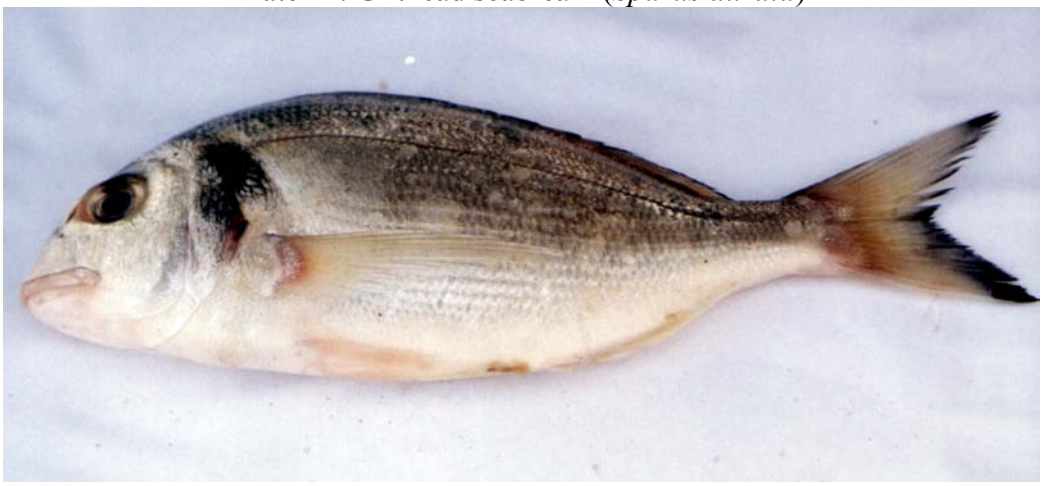


Plate 12. Grouper (*Epinephelus aeneus*)

Plate 13. Sole (*Solea vulgaris*)

Plate 14. Striped seabream (*Lithognathus mormyrus*)

Plate 15. Meagre (Argyrosomus regius)

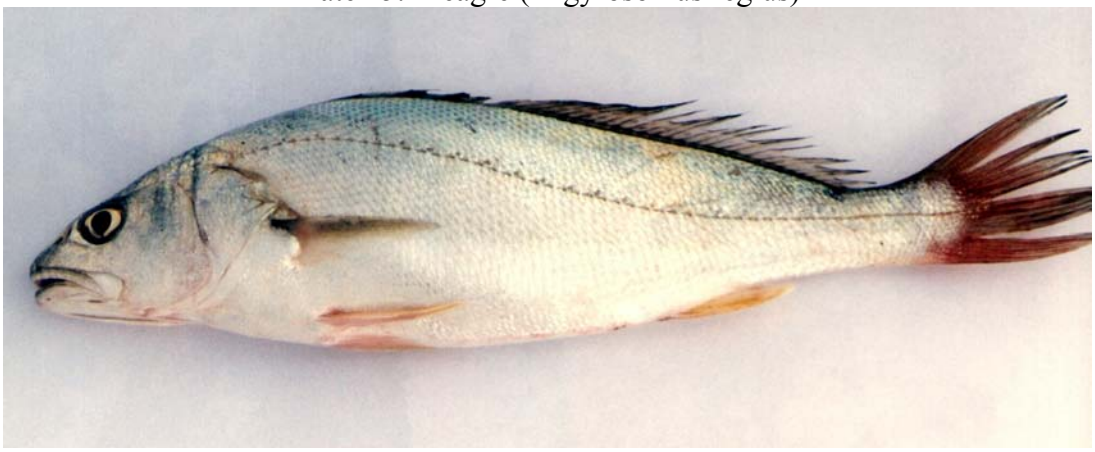


Plate 16. Common two-banded seabream (*Diplodus vulgaris*)

Plate 17. Salema (*Sarpa salpa*)

Plate 18. Common pandora (*Pagellus erythrinus*)

Plate 19. Golden grey mullet (*Liza aurata*)

Plate 20. Horse mackerel (*Trachurus mediterraneus*)

Plate 21. Shrimps (*Penaues sp.*)

Plate 22. A typical daily catch of a fisherman in Golovasi in August

Plate 23. Local tradesman's truck

Plate 24. Local tradesmen

Plate 25. Fisheries control boat

Plate 26. Blue crab (*Calinectes sapidus*)

Plate 27. Spotted mantis shrimp (*Squilla mantis*)