FISHERY COUNTRY PROFILE	Food and Agriculture Organization of the United Nations	FID/CP/ISR  October 2007
PROFIL DE LA PÊCHE PAR PAYS	Organisation des Nations Unies pour l'alimentation et l'agriculture	
RESUMEN INFORMATIVO SOBRE LA PESCA POR PAISES	Organización de las Naciones Unidas para la Agricultura y la Alimentación	

THE STATE OF ISRAEL

GENERAL GEOGRAPHIC AND ECONOMIC DATA

.

Area:	20,330 km²
Water area:	440 km²
Population (2005):	6,832,062
GDP current (2006):	140,460 billion $US
GDP per head (2006):	17,828 $US
Agricultural GDP (2005):	3.21 billion $US
Fisheries GDP (2005):	74,383 million $US

FISHERIES DATA

2003	Production	Imports	Exports	Total Supply	Per Caput Supply
	tonnes liveweight				kg/year
Fish for direct human consumption	24,831	118,104	1,052	141,883	22.1
Fish for animal feed and other purposes	-	-	-	-	

Estimated Employment (2005):	
(i) Primary sector (including aquaculture):	1503
(ii) Secondary sector:	2300

Gross value of fisheries output (2005)	74,383 million $US
Trade (2005):	
Value of fisheries imports:	164.5 million $US
Value of fisheries exports:	12.8 million$US

FISHERY AREAS AND MAIN RESOURCES

Fishing and fish farming are the domestic sources for fish production (26 556 t) in Israel. Fishing is dividing into two main areas, marine (the Mediterranean Sea) and freshwater (Lake Kinneret [Sea of Galilee]). While there is some fishing in the Gulf of Akaba (Elat), it is of minor importance (averaging some 90–100 t/yr). The marine sector (Mediterranean and Elat) fishery caught 11 percent of total fish produced, while Lake Kinneret yielded 5 per cent. Fish farming (aquaculture and mariculture) is the main producer of fish in Israel, accounting for 84 percent of domestic fish production in 2005.

Table 1. Domestic fish production in Israel in 2005.

Source	Catch (tonne)	As proportion of total catch
Marine	2 756	10.4%
Lake Kinneret	1 396	5.3%
Aquaculture	19 208	72.3%
Mariculture	3 196	12.0%
Total	26 556	100%

THE MARINE CAPTURE FISHERY SECTOR

The Israeli Mediterranean coastline is 273 km, with 6 main fishing ports. Fishing is concentrated along the narrow continental shelf, which, though 50 km wide in the south (along Gaza) narrows to only 10 km in the north (Haifa–Carmel Mountains). The fishery has several segments: trawl, gillnets, longlines (both floating and bottom) and purse seines. Fishing is influenced by the oligotrophic nature of the Eastern Mediterranean Basin, pollution, overfishing of the coastal waters, political events and overdevelopment of these areas (i.e. the Aswan Dam in Egypt, desalinization plants, chemical and oil plants). Fishery statistics only include landings in Israel proper. Gaza is not represented by these numbers, though fish is marketed to and from Gaza and to Judea and Samaria (Palestinian Authority).

Table 2. Fishing fleet composition by vessel size, gear and port.

Anchorage	Gear				Vessel size (LOA)			
	Trawl	Pelagic	Inshore	Total	>11 m	7–11 m	<7m	Total
North of Akko			13	13			13	13
Akko		12	75	87		25	62	87
Haifa Kishon	14	7	81	102	14	43	45	102
CarmelHaifa-Dor			52	52			52	52
Hasera-Tel Aviv			106	106		10	96	106
Jaffo	8	6	91	105	9	31	65	105
Asdod + Ashklon	10	3	101	114	10	14	90	114
Subtotal Mediterranean	32	28	519	579	33	123	423	579

Elat		12	12		2	10	12
Total	32	531	591	33	125	433	591

Trawling

While a total of 32 trawlers are registered and licensed in Israel, only 28 worked during 2005. The trawl fleet (14–25 m LOA) is well equipped with electronic gear, hydraulic winches and refrigerated fish holds, but the fleet is quite old. Many fishing days are lost to slip time and repairs. The trawls caught 1 320 t in 2005 (an increase of 300 t from 2004) using a locally developed 4-panel bottom trawl (22 mm mesh, 48 mm in the cod end). They usually fish at depths ranging up to 400 m. The trawl fleet is prohibited from fishing at depths less than 15 m. There are two main ports: Haifa-Kishon in the north and Jaffo in the south.

Inshore and artisanal

In 2005, 519 small (up to 11 m LOA) boats were licensed. These fishers can switch between gillnets and bottom or floating longlines, depending on the availability of fish and the season. The legal mesh size is 35 mm (knot to knot). The gillnet fishery caught 689.6 t, while the longlines caught 313.5 t (total inshore for 2004 = 800 t). These boats land along the entire Israeli coast, either drawn up on the beaches or in small protected inlets, as well as the major ports and or marinas (Kishon, Jaffo, Akko, Ashkelon and Ashdod).

Purse seining

Although 28 purse seiners were registered in 2005, many boats fished only sporadically. The boats range in size from 10 to 12 m LOA and are equipped with power blocks and echolocation systems. This fishery has been affected in the long term by many environmental changes, which have caused pelagic species, such as sardines, to disappear from the Israeli coast. Since 2001, the purse seines have caught less than 500 t/yr. They did manage to catch 357 t in 2005 (up from 342 t in 2004) of medium- to low-priced species. Purse seiners are located in the major ports, but most are concentrated in the north (Kishon and Akko).

While a freeze on trawl fishing effort (by freezing ship numbers) since 1990 resulted in increases in both catch and gross income in 2005, the same cannot be said of the purse seine, gillnet, and longline fisheries. These three suffer from fishing similar species within the same areas and their catches have stagnated in recent years (2003–2005). Recent efforts to direct the fishermen to fish other species (i.e. tuna, swordfish and other migratory species) have not succeeded because of the large initial investment for new equipment (nets, winches, etc.), coupled with the ever-increasing cost of fuel. Probably technical advances (i.e. larger engines, bigger nets) have also offset any effort decreases resulting from a freeze on boat numbers.

INLAND FISHERY – LAKE KINNERET

Israel has only one freshwater body, Lake Kinneret or Sea of Galilee. The lake is not only used for fishing and tourism but also serves as the main freshwater reservoir for the country. It is the most northern of the Rift Valley (Syria-African Rift) lakes and serves as meeting place for many fish species from different climates.

There are three fishing methods currently in use in the lake: purse seines, gillnets and entangling or trammel nets. Three purse seiners operate in Lake Kinneret. They are equipped with echolocation and sonar, power blocks and winches, and use similar nets to those used in the Mediterranean. The mesh sizes are different, using a 14 mm mesh in the cod end. The purse seines caught 858 t in 2005. Some 68 small (up to 11 m LOA) boats use gill and or trammel nets. Most of the boats use echo sounders. The legal mesh size is 40 mm (knot to knot). The gill and trammel net fisheries caught 538 t. The Department of Fisheries, in order to balance and preserve the various valuable fish species in the lake has taken several steps:

- stocking of three species (*Sarotherodon galilaeus* – since 1952; *Mugil* spp. – since 1958; and

Hypopthalmicthys molitrix – since 1969;

- no new boat licences issued; and
- a 3-month fishing ban during the tilapia spawning season.

FISH FARMING

Aquaculture

The main bulk of fish production in Israel comes from aquaculture (72% in 2005), with 55 farms on 2 800 ha of land producing over 19 000 t, with a value of almost US$ 54 million in 2005. Most of the production is based upon traditional earthen ponds; however, there is a growing trend to use highly intensive industrial systems utilizing oxygen or ozone in concrete ponds or raceways. There are also an increasing number of farms producing ornamental fish (both cold- and warm-water species). The ornamental fish branch accounted for US$ 8 million in 2005.

Apart from the traditional fish species cultured (carp, tilapia, grey mullets and silver carp), in recent years new species have been introduced in new areas that previously were unavailable for fish farming (brackish waters, either on the coast or in the desert). These species include barramundi, red drum and the hybrid of striped and white bass.

Mariculture

In the 10 years since 1996, mariculture has grown from 4 percent of fish production to 12 percent in 2005, or from 963 t/yr 3 196 t/yr. The major fish species grown is Gilthead seabream (*Sparus auratus*) (3 185 t). While most of the mariculture production is concentrated in Elat (on the Red Sea), other farms have been established on the Mediterranean coast. Unfortunately, the days of fish farming at the present level in Elat are numbered due to concerns over possible adverse environmental effects of the Elat farms (cage culture). In the foreseeable future, mariculture fish production will probably decrease from its present level due to the elimination of the farms in Elat and the remaining farms not being able to expand production sufficiently.

Catch profile

Table 3. The 2005 catch (tonne) by species and gear or source. The major species in each category are shaded. These are catch quantity and do not necessarily reflect commercial value.

	FAO code	Mediterranean				Lake Kinneret		Aquaculture	
		Purse seine	Entang-ling net	Longline	Trawl	Purse seine	Entang-ling net	Fresh-water	Mari-culture
MARINE FISH									
Argyrosomus regius	MGR		5.5	0.6					
Boops boops	BOG	0.5	39.0		80.0				
Dicentrachus labrax	BSS							193.0	6.0
Elasmobranchii	DWS		18.8	156.8	104.0				
Epinephelus spp.	GPX		17.1	114.3	30.0				
Euthynus spp. + *Auxis* spp.	FAX	51.7	25.0	1.1	11.0				
Merluccius merluccius	HKE				36.0				
Misc. species	MZZ	86.2	52.0		92.0				2.0
Morone chrysops × *M. saxatilis*	FRF							453.0	
Mugilidae	MUL	6.8	68.2			77.7	173.3	2108.0	
Mullus spp.	MUX		65.0		192.0				
Sparidae	SBP		65.0	36.8	127.0				
Sardinella aurita	SAA	92.3			76.0				
Engraulis encrasciolus	ANE				22.0				

	FAO code	Mediterranean				Lake Kinneret		Aquaculture	
		Purse seine	Entang-ling net	Longline	Trawl	Purse seine	Entang-ling net	Fresh-water	Mari-culture
Saurida spp.	LIB				119.0				
Sciaenops ocellatus	SJI							295.0	2.0
Scombroidiae	TUX	8.2			14.0				
Seriola dumerii	AMB		237.1	4.0	35.0				
Sparus auratus	SBG							181.0	3 185.3
Sphyraena spp.	BAR	35.8	74.0		52.0				
Trachurus spp.	TRE	75.9	22.0		27.0				
Misc. Red Sea fishes	—		75.2						
INVERTEBRATES									
Cephalopods	CEP				56.0				
Penaeus japonicus	KUP				104.0				
Shrimps (other)	—				143.0				
FRESHWATER FISH									
Acanthobrama terrasnctae	FCY					557.7			
Barbus spp.	PTB					14.1	27.9		
Lates calcarifer	GIP							90.0	
Cyprinius carpio	FCP					36.1	51.9	6 413.0	
Hypothalmichthys molitrix	SVC					23.4	90.5	1 607.0	
Misc. species	MZZ							40.0	
Onchorhynchus mykiss	TRR							424.0	
Oreochromis aureus	OEA						21.1		
Sarotherodon galileus	SAR					146.5	169.4		
Tilapias	TLP							7 404.0	
Tristramella spp.	TMR					2.0	4.0		
TOTAL	26 553.8	357.4	763.9	313.6	1320.0	857.5	538.1	19208.0	3195.3

The Mediterranean fishery catch profile is quite mixed, reflecting its multi-species nature. Several fishing methods share several species, but certain species stand out as the most important for each fishing method. Red mullets, *Saurida* spp. and shrimps constitute the most important of the species caught by the trawls. Sharks, rays and groupers are significant species caught by the longliners. *Trachurus* spp. and sardines are the principal pelagic species caught by the purse seines. The entangling or trammel net fishery shares most of these species with the other gear, but the chief fish caught is *Seriola dumerili.*

Except for the bleak (*Acanthobrama terraesanctae*) both the purse seines and entangling nets compete for the two most valuable of the fish of Lake Kinneret, *Sarotherodon galilaeus* and Mugilidae.

The freshwater aquaculture industry has increased the number of species grown, but carp, tilapia Mugilidae are the main species. Denise (*Sparus auratus*) accounts for 99% of the fish grown by the mariculture industry.

Sport fishing has grown tremendously over the last two to three years. Boats have cruised to the limits of Israel maritime borders (12 n.mi.) to fish for Bluefin tuna, swordfish, dolphin fish and *Seriola dumerili*. Sport fishing for carp in Lake Kinneret has become a popular attraction (a yearly tournament).

POST-HARVEST USE

Fish utilization and marketing

The majority of the Israeli catch is intended for human consumption. The catch is for the most part sold fresh or chilled. Some part of the freshwater catch from Lake Kinneret, namely the bleak (*A. terraesanctae*) is used as bait for Mediterranean longliners and is also canned under the name of Kinneret sardine.

Some 39 715 t of fish (60%) were imported in addition to 26 556 t of total domestic production. The great majority of fish imported were frozen Nile perch (*Lates niloticus*) and salmon (whole, gutted or fillet).

Fish from aquaculture (both freshwater and mariculture) are sold fresh or chilled. Trout, denise and bass are also sold frozen (gutted and whole), while tilapia and carp are also processed into fillets and fish burgers. Tilapia is exported to Europe as fillets. Silver carp (*H. molitrix*) is sold smoked.

Nearly all of the Mediterranean and Lake Kinneret catch is sold by the fishermen to fish store owners and traders on a daily basis. A minor percentage is sold directly by fishermen or by farmers. Marketing aquaculture products was once done by a national fish grower's organization, but with more privatization, fish farms now sell their catch direct to fish traders or store owners.

FISHERY SECTOR PERFORMANCE

There is concern regarding overfishing of the Mediterranean Sea and Lake Kinneret fisheries. Fishing effort is probably at a maximum for the stocks, adversely affecting fish stocks present and future. Stock depletions have been observed (decrease in average fish size and catch per unit effort) in important species such as red mullet (Mediterranean Sea) and St. Peter's fish (*S. galilaeus* – Lake Kinneret). Aquaculture (freshwater and mariculture) has since 2000 supplied the greater part of total domestic fishery production. Its ability to offer new species for an increasingly critical population (as opposed to the stagnating fisheries of the Mediterranean Sea and Lake Kinneret) has given aquaculture a distinct advantage. However, imported fish still constitute the main source of fish for the Israeli consumer (60% in 2005).

Economically, the fisheries constitute a minor segment of total Israel GDP, only 0.06 percent. Although annual fish consumption per capita averages about 10 kg (less than most countries in Europe and the USA, and far below that of Japan), domestic fish production is still a valuable source of animal protein and food for the population.

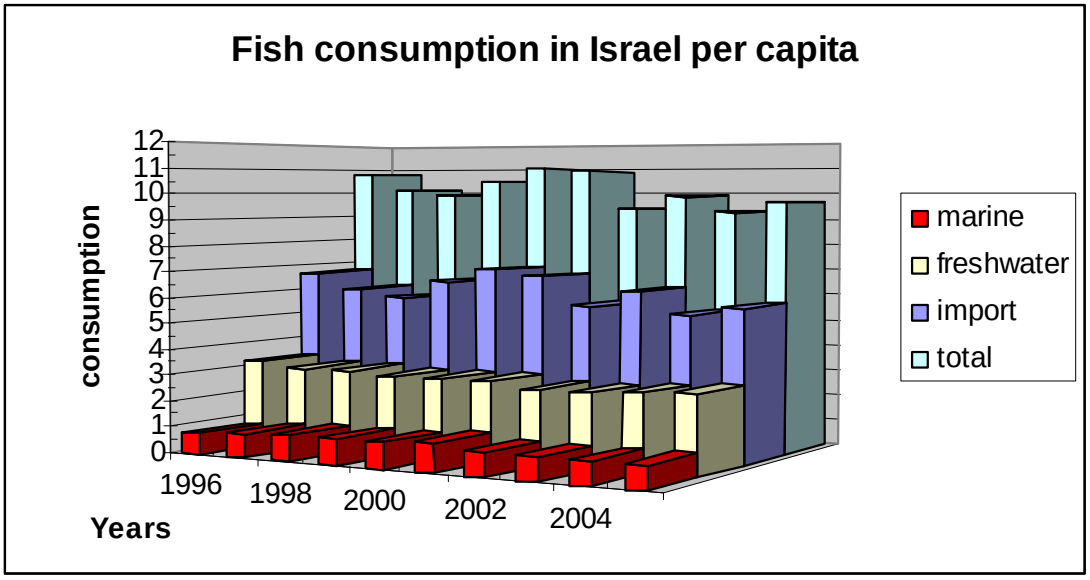

Figure 1. Change in annual per capita fish consumption (kg) broken down by major source.

DEVELOPMENT PROSPECTS

The capture fishing industry in both the Mediterranean Sea and Lake Kinneret have reached their exploitation limits. Ecological considerations in the lake have prevented any new stocking of new species for catch improvement. Therefore, to develop the fishing in the future, effort limitations must go into effect. The Department of Fisheries has been trying to introduce new methods or new areas (off-shore fishing) to the various fisheries in the Mediterranean Sea. While some success has been made in fishing for various migratory species that appear off the Israeli coast (blue fin tuna, dolphin-fish, deep water sharks, jellyfish), the results have not warranted the necessary expense of refitting the fleet. Possible more drastic actions will have to take place before recovery can take place.

Freshwater aquaculture has continued to develop, searching for new, high value, species to be used for export. Former unused areas with saline or brackish water are now being converted into farms that grow both food fish and ornamental fish. A prime example would be the desert areas of the Negev and Arava, used for farming barramundi, bass, tilapia and tropical ornamental fish.

Mariculture is faced by a number of challenges that will have to be overcome in order growth to occur. The centre of mariculture in Israel—the cage farms in the Gulf of Elat/Akaba—are being closed down. While a pilot programme of saltwater ponds is being established onshore, it will be some time before any appreciable (equivalent to the present day Elat farms) production will get to market. As Elat is off limits, there remain the farms on the Mediterranean coast. However, as the population increases, land is becoming increasing valuable and most likely not to be used for mariculture or any other agricultural purpose. Conventional cage culture is abortive because of the violent nature of the storms, with waves up to 9 m. Commercial trials have begun to establish a practical cage farm in the open ocean. If this succeeds, the potential exists for a growth spurt in the mariculture industry.

Ornamental fish production continues to improve. The branch has undertaken a programme to genetically improve the stock. The fish are all home grown, in contrast to many areas where ornamental fish are captured in the wild. The home-grown fish are superior in terms of health, and while their price might be higher, the advantage of selling healthy fish is clear.

International agreements will probably affect the amount of imported fish and fish products. The availability of highly valued imported species (i.e. salmon and Nile perch) will always present stiff competition for local species. Recent trends suggest that fish consumption will probably stay at a level between 10 and 12 kg/per person/year.

RESEARCH

Research has, historically, always been at the forefront for fishery development. Government, universities, and the private sector have cooperated to improve both production and product.

The Department of Fisheries, under the Ministry of Agriculture, is directly responsible for fishery research and development. The department operates several units dealing with research in the various sectors. The Fish Health Laboratory at Nir David is instrumental in addressing disease problems in intensive aquaculture. The Dor and Genossar Research Stations deal with development of new species for aquaculture, improving fish genetics, intensive pond culture, and improving feeding regimes. The Fish Technology Unit, based in Haifa and Tiberias (Kinneret Fisheries Laboratory) carry out stock monitoring, fishery surveys and gear development through Israel.

The Israel Oceanographic and Limnology Company were pioneers in mariculture (cage culture of denise – *Sparus auratus*) research in Israel. They continue to further knowledge to grow different invertebrate and vertebrate species (grouper, oysters, etc.). They directly cooperate with the Department of Fisheries (Fish Technical Unit) on acoustic fish surveys, population dynamics, and indirectly with ecological monitoring along the Mediterranean coast and in Lake Kinneret.

Universities (Tel Aviv, Haifa, Hebrew – Rehovot and Jerusalem and Bar-Ilan) contribute with research in fish genetics and population surveys. They were historically responsible for the establishment of the laboratories at Nir David and Dor. Private companies, such as Sub-Flex (cage technology), and kibbutzim, such as Gan Shmuel and Maagan Michal, cooperate with the above agencies in developing healthier fish, adaptation and spawning of new species.

Fishermen's organizations, in both the Mediterranean Sea and Lake Kinneret, work together with the Department of Fisheries to support and maintain the fisheries. Recently, amateur fishermen have established their own organization (see Internet links below).

INTERNET LINKS

www.vetserv.moag.gov.il/fishery	Department of Fisheries, Min. of Agric.
www.ocean.org.il	Israel Oceanographic & Limniology Co.
www.amd.org.il	Israeli Fish Growers
www.huji.ac.il	Hebrew University Jerusalem/Rehovot
www.tau.ac.il/lifesci/departments/zoology	Tel Aviv University- Zoology
www.biu.ac.il	Bar-Ilan University
www.haifa.ac.il	Haifa University
www.israfish.com	First Israeli Fishing Club

MANAGEMENT

If, in the past, aquaculture products were governed by a strict price and quota system, governed by the Fish Growers' Organization, today the market is more or less governed by market conditions. The Fish Growers' Organization has taken on a more advisory function.

Management regulations were initially inherited from the British mandate rules of 1937. Over the years, these have changed, becoming stricter, as effort and technologies changed and fish populations decreased.

No new fishing boats or amateur fishermen are allowed in Lake Kinneret. Fishing is prohibited during the spring in the northeast end of the lake (the prime breeding grounds for *S. galilaeus*). Professional fishermen are allowed to fish only from their boats. Trammel nets have a minimum eye size of 80 mm stretched while the purse seines must be no less than 28 mm stretched in the bunt end. There are minimum sizes for all commercial fish in the lake.

No new fishing vessels (trawls, launches, etc.) have been allowed in the Mediterranean Sea since 1995. Minimum mesh sizes for the trawls are 44 mm stretched in cod ends, 20 mm stretched in the bunt ends of the purse seines, 20 mm stretched for trammels nets and gillnets 28 mm stretched. There are minimum legal sizes for all commercial fish. Special licences are given for the capture of live grey mullet fry for use the aquaculture and for stocking in Lake Kinneret. It is forbidden to fish in any of the harbours because of pollution.

While there are no quotas or total allowable catches (TACs) at the present time, the present situations in both Lake Kinneret and the Mediterranean Sea may require the Department of Fisheries to employ new methods in order to prevent any future collapse of these fisheries.