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GENERAL FISHERIES COMMISSION FOR THE MEDITERRANEAN

COMMITTEE ON AQUACULTURE

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PROGRESS OF MEDITERRANEAN AQUACULTURE SINCE THE THIRD SESSION OF THE COMMITTEE ON AQUACULTURE

INTRODUCTION

1. This paper is intended to complement and update the information that was provided at the previous three sessions of the General Fisheries Commission for the Mediterranean (GFCM) Committee on Aquaculture (CAQ) by presenting statistics for aquaculture production in the Mediterranean and Black Sea basins. The statistics are those related to the production in GFCM member countries with coastlines facing the Mediterranean or Black Sea. The figures also include freshwater aquaculture production and the aquaculture production of France and Spain from the Atlantic coast and of the Red Sea for Egypt. The reason for including these statistics is that the majority of the production from these two geographical areas outside the Mediterranean and the Black Sea ends up in the local domestic markets. In addition, the region of origin is not always clearly specified by reporting countries in those situations where the possiblity of ambiguity exists. The statistics provided cover the period 1995-2002 and have been obtained from the FAO Fishstat database.

OVERALL AQUACULTURE PRODUCTION TRENDS IN THE REGION

2. After showing steady growth in recent years, aquaculture production in the GFCM region has decreased from the peak level of production reported in 2000. From 2000 to 2002, total aquaculture production in GFCM member countries (excluding Japan) decreased by 6.3%, from 1.369 million tonnes to 1.284 million tonnes (Table 1). This represents a 3.2% annual reduction from 2000 to 2002. When considering the longer period from 1995-2002, a 5.1% annual growth is still observed. The top four producing countries remain the same as those based on the 2000 statistics - Egypt, Spain, France, and Italy. Egypt reported a 10.6% increase from 2000 to 2002, whereas the other three countries reported declines of 15.0%, 6.4% and 13.9%, respectively.

3. In Egypt, the Nile tilapia (*Oreochromis niloticus*) and especially the flathead grey mullet (*Mugil cephalus*) continue to contribute most to the increase with production of 157 000 t and 80 500 t, respectively, for 2002. The largest proportion of the production of these species comes from brackishwater culture. Over 88% of Egyptian aquaculture products continues to be produced in inland waters and along the eastern coastline. Approximately 36 000 t are produced along the Mediterranean coast.

4. In France and Spain, according to production statistics reported to FAO, the great majority of aquaculture production comes from culture practices carried out along the Atlantic coast. For France, the output from the Atlantic in 2002 was 65% of total production and was represented mainly by the Pacific cupped oyster (*Crassostrea gigas*) with 99 000 t and the blue mussel (*Mytilus edulis*) with 55 000 t. Atlantic aquaculture production in Spain for 2002 was reported to be 87% of the national output. The main species cultured in the northern and western coasts is the blue mussel, with an output of 201 000 t. Reported production in the Mediterranean for France and Spain in 2002 was considerably lower at 30 596 t and 1 024 t, or 12.5% and 0.4% of the national totals, respectively. Table 2 shows the ranking of the top producing countries in relation to geographical area.

5. However, it is known that there are problems regarding the breakdown of production between different marine areas. Generally, totals by species (but not by area) have been reported and FAO has assigned these totals to either the Mediterranean or the Atlantic. The assumptions used in making these distinctions may be outdated. For example, in Spain, it is known that there is also production of the Mediterranean mussel (*Mytilus galloprovincialis*) in Galicia and it is thought that there is some production of both species of mussels in each of the marine regions. To be able to properly analyze production trends in particular regions, it is imperative that countries with more than one marine area specify the area of the production in their reporting, or the breakdown of the production by area.

6. Despite the overall decline in aquaculture production, the marine and freshwater fish species groups continued to show modest increases in production. Aquaculture production of freshwater fishes increased from 295 476 t in 2000 to 311 816 t in 2002, a 2.7% annual growth rate. Production of marine fishes showed a smaller growth, increasing from 252 213 t in 2000 to 258 441 t in 2002, a 1.2% annual growth rate (Table 4). Molluscs continue to be the species group with the largest production but the amount dropped from 640 948 t in 2000 to 552 305 t in 2002 representing an annual decrease of 7.2%.

7. In terms of the value of aquaculture production, decreases have been seen from the peak-levels realized in 2000. The total “farm-gate” or “point-of-first-sale” value of aquaculture production in 2002 totalled US$ 2 399 million, a decrease from US$ 2 784 million in 2000 (Table 3). This corresponds to an average annual rate of decrease of 7.2% which would be even larger if inflation were considered. However, when viewed from 1995 to 2002, the total value continues to show a 3.2% average annual increase in value. All major species groups in the region showed declines in value from 2000 to 2002, except for the crustaceans species group which increased in value over this period (US$ 3.1 million to US$ 3.8 million). In terms of contribution to the economy of the aquaculture sector, marine finfish continue to rank first, with US$ 927 million (US$ 1 117 million in 2000). Molluscs rank second with a value of US$ 612 million and freshwater fishes are next at US$ 518 million.

TRENDS IN MEDITERRANEAN MARICULTURE AND BRACKISHWATER CULTURE

8. Considering exclusively the production of mariculture and brackishwater culture in the Mediterranean and the Black Sea, total production decreased from 370 613 t to 338 980 t (Table 2) – an annual rate of decrease of 4.4%. However, this still represents a large increase over 1995 levels (241 928 t) and the annual growth rate for the period 1995-2002 is 4.9%. Molluscs

(174 785 t) and marine finfish (151 654) together account for over 99% of the aquaculture production in the Mediterranean and Black Sea with small amounts of crustaceans (223 t) and diadromous finfish (1 883 t) also produced. The Mediterranean mussel accounted for over one-third of total production in the region (135 016 t). Production of the gilthead seabream production was next highest at 63 916 t.

9. The production value of mariculture and brackishwater products in the Mediterranean and in the Black Sea was US$ 782 million in 2002 – an overall decrease of 26.9% from the highest reported value of US$ 1 069 million in 2000. This decrease is mostly attributable to decreases in the value of species in the marine finfish species group. The faster decrease in value relative to production indicates a decrease in the overall per kilogram value as well.

10. In the Mediterranean and Black Sea marine and brackishwater aquaculture sector, Italy remains by far the leading producer with about 146 000 t recorded in 2002, but this represents a 7% annual decrease from the 2000 total of 167 775 t. The countries in the region can be classified into roughly four groups. The first group includes the countries that do not report production in marine and brackish waters – Lebanon, Libya, Romania and Syria. A second group contributes a limited amount (below 1 000 t/country) and includes Albania, Algeria, Bulgaria, Morocco, Serbia and Montenegro and Slovenia. A third group with production between 1 000 t and 5 000 t includes Croatia, Cyprus, Israel, Malta, Spain and Tunisia. The final group includes countries with productions over 25 000 t and includes Egypt, France, Greece, Italy and Turkey. In this group only France has shown an increase in Mediterranean production from 2000 to 2002. Again, there may be reporting issues that have an impact on these figures and rankings. It is likely that the contribution of Spain to aquaculture production in the Mediterranean is greater than has been reported (1 024 t).

PRODUCTION TRENDS BY SPECIES GROUPS

11. Table 5 lists the top 15 species produced by all GFCM member countries (including Atlantic and Red Sea production, but excluding Japan) accounting for 97% of the total production of 1 283 555 t. The top three species are represented by the blue mussel, Nile tilapia and the Mediterranean mussel. Production of the blue mussel decreased from 2000 to 2002 with the other two species continuing to show modest increases in production. From the top 15 species, the only species with growth in production in the 2000-2002 period were the flathead grey mullet (16.0% annual increase), European flat oyster (*Ostrea edulis*) (6.9%), grass carp (*Ctenopharyngodon idellus*) (6.4%) and tilapias not reported to species level (*Oreochromis* spp.) (3.9%). The increase in production of the flathead grey mullet was primarily due to increases in Egypt which accounted for 93% of the total. Israel also reported increased production of flathead grey mullet in 2002. Egypt solely accounted for the increase in production of grass carp. Increases in production of the European flat oyster in Spain and Croatia offset a decrease in production from France.

12. The other nine species on the top 15 list had declines in aquaculture production from 2000 to 2002. The largest declines by percentage were for the Japanese carpet clam (*Ruditapes philippinarum*) (13.0% annual decrease), trouts not reported to species level (*Salmo* spp.) (-11.9%), Pacific cupped oyster (-10.4%), seabasses not reported to species level (*Dicentrarchus* spp.) and the European seabass (*Dicentrarchus labrax*).

13. Among freshwater species, the Nile tilapia had the greatest production in 2002 with Egypt producing all 167 735 t reported in the FAO statistics. The growth of this aquaculture practice has been fast and Egypt tripled its production since 1998, but this growth has slowed considerably for the period 2000-2002. Other major tilapia species producing countries are Israel (7 819 t) and the Syrian Arab Republic (2 571 t), with Spain and Lebanon also reporting aquaculture production of tilapias for the first time in 2002. The rainbow trout (*Oncorhynchus mykiss*) ranked second among the freshwater species with an overall production of 117 759 t in 2002 with France, Italy and Spain accounting for 95% of the production. The 2002 production of rainbow trout represents a

2.8% annual decrease from the 2000 level of 124 525 t. Among the other freshwater species, the flathead grey mullet and the grass carp showed increases in production from 2000 to 2002.

14. Currently six Mediterranean countries are farming bluefin tuna (Croatia, Cyprus, Italy, Malta, Spain and Turkey) with Spain leading the industry with regards to the number of registered companies followed by Croatia. Turkey, although a relatively new player in the industry (farming started in 2002) is third followed by Italy and Malta. Bluefin tuna (BFT) cages are located in areas with water depths ranging from 25-75 m and 1-6 km from the shoreline. BFT farms largely use circular ring-type open-sea floating net cages. The sizes of the cages vary from 30-90 m in diameter with net depths commonly ranging from 15-20/30 m.

15. Most countries start stocking their bluefin tuna cages in late spring (May) with the input season often lasting for a couple of months. In the case of Croatia and Malta the season may extend up to late summer. Tuna farms usually operate their own fleet of boats mainly for positioning nets, transportation and feeding. Some farms also own vessels used for towing cages. Seed material is obtained from both local fishing fleets as well as boats beating other flags. Italian, Tunisian and Maltese registered vessels have all been supplying the Spanish industry in the past three years through pre-arranged contracts. Malta obtains 100% of all its “seed” fish from foreign vessels. With regards to fish size stocked in the cages, Croatia reports the largest range size, from 5-200 kg/specimen, while Malta stocked the largest specimens, ranging from 80-620 kg with a mean size of around 350 kg.

16. In most Mediterranean countries the BFT farming season starts in June and it extends for about 6-7 months in most cases. For Croatia the season may last for a minimum of 4 months to a maximum of around 20 months. Harvesting time is generally agreed between the producer and the purchaser as it is strongly related to the market demand and price offer. Commercialization of the tuna may start as early as September; however, the main months are November and December. Japan is the main importer of farmed Mediterranean BFT, purchasing the entire production from Croatia and Turkey and most of the production from Italy and Spain. Other markets are slowly emerging with small quantities exported to the People’s Republic of China and the USA.

VALUE CONTRIBUTION OF MAIN SPECIES

17. Table 6 lists the top 15 species by value for 2002. These species accounted for 93% of the total aquaculture value in the GFCM countries. In the Mediterranean and Black Sea, without including freshwater species, the two principal species remained the gilthead seabream and the European seabass although both species recorded large drops in value from 2000 levels (-15.3% and -17.0% annual rate, respectively). These declines in value are greater than their associated production declines (-6.2% and -10.3%), thus there have also been decreases in the average price per kilogram that producers have been receiving. Among freshwater species, the flathead grey mullet (US$ 273 million), the Nile tilapia (US$ 257 million) and the rainbow trout (US$ 242 million) contributed the highest values.

18. Clams, mussels and oysters combined represented a total value in 2002 of US$ 612 million. For each of the four major species (blue mussel, Mediterranean mussel, Japanese carpet clam and Pacific cupped oyster), the average price per kilogram has increased from 2000 to 2002, reversing a period of decrease in per kilgram prices. Total value for Pacific cupped oyster increased from US$ 198 million in 2000 to US$ 212 million (an annual rate of 3.4%) despite an annual rate of decrease in production of -10.4%. The Mediterranean mussel increased in value from $US 74 million to US$ 91 million over the same period – an average increase of 10.4% per year, surpassing the observed 3.0% annual increase in production. Both the blue mussel and the Japanese carpet clam showed decreases in total value but smaller decreases than those reflected in the production.

19. Note that "tuna-like fishes nei (order Scombroidei)" appears in the table with continued large annual increases in value. This only partially reflects the actual value of the recent farming of bluefin tuna (*Thunnus thynnus*) in the Mediterranean. According to FAO statistical definitions, the difference between the weight of the wild-caught tuna and the harvested weight should be considered as aquaculture. To date, only Spain has reported any production in this way. Thus, the value reported here represents only a fraction of the total aquaculture value that should be attributed to this practice. There is a GFCM/ICCAT *Ad Hoc* Working Group considering issues related to sustainable tuna farming including appropriate practices and procedures for reporting statistics (see document GFCM:CAQ/IV/2004/Inf.9).

REPORTING OF STATISTICS FOR AQUACULTURE

20. Two issues concerning the reporting of statistics by member countries to FAO have already been highlighted. First, countries with more than one marine area should report their production statistics including the area of the production. For example, it is difficult to analyze trends for the Mediterranean region when there are concerns over the correct assignment of area to the aquaculture production in Spain and France. Attribution of all Spanish production of mussels to the Atlantic area is almost surely an error. Second, the issue of proper reporting of bluefin tuna aquaculture production has been noted above and is being reviewed by the *Ad Hoc* Working Group.

21. A third data issue involves the reporting of values for aquaculture. In the annual questionnaire of aquaculture production, FAO requests its member nations to provide an estimate of the average price for the aquaculture production. This price is defined to be the price at the point-of-first-sale, or the price that a producer would expect to receive for his product. This is also known as the "farm-gate price" because it does not include the price of getting the products to the market. It appears that there is confusion in this definition and sometimes prices even higher than retail prices are reported. Also, because many countries have no requirement to collect these data and it is not a EU requirement, countries may not report any value figures. Often when this happens, and there are no other data readily available to FAO, old value data will be repeated, often for several years. Thus, any trends in prices may be masked. FAO is working to clarify the instructions and questionnaire forms sent to national offices. In addition, member nations should increase their efforts to provide accurate and reliable value data for aquaculture.

CONCLUSION

22. An overview of the trends in aquaculture production and value has been presented and will provide the context and information for the discussions of the Fourth Session of the GFCM Committee on Aquaculture. Since the Third Session of the GFCM Committee on Aquaculture, the strong growth of aquaculture in the GFCM member countries has slowed and, in fact, overall decreases were observed in production and total value from 2000 to 2002. The sector continues to face a number of constraints related to the evolution of markets, the availability of culture sites, inputs (mainly seeds), diseases, planning, infrastructures and human resources.

23. Mediterranean aquaculture can be divided into different sub-sectors, each at a different level of development and facing different constraints. Thus, in fish production, whilst the trout sector faces the constraint of an ageing industry, the seabass and seabream industry could be described as a sector already entering a mature phase. Competition has increased, and prices and margins have significantly diminished, demanding additional efficiency, productivity and economies of scale. This is driving industry in developing more efficient production systems and new technologies, such as offshore aquaculture and recirculation aquaculture systems.

In this context, the constraints for the future development of the sector can be grouped into different categories, each requiring not only specific actions, but also proper coordination. Some of the main constraints that need addressing are related to:

(a) biological and technical aspects, mainly referring to disease problems, but also including biodiversity concerns due to the introduction of new species in the region;
(b) market constrains, such as fluctuation of prices, food safety, quality control problems, image of aquaculture products, etc.;
(c) zoo-technical constraints, such as seasonality of production, and uncompleted life-cycles for certain species (e.g., eels and tuna);
(d) environmental concerns, linked to the location of farms and the impact of their effluents on the surrounding environment;
(e) access to coastal areas, i.e. scarcity of potential sites for new aquaculture projects, and competition with other coastal users (urbanization, tourism, navigation, wildlife park projects, harbours, maritime traffic, etc.); and
(f) scarce administrative organization with regards to the integration of aquaculture activities in coastal areas.

24. The importance of aquaculture has been recognized by the European Commission, which has, in October 2002, designed a strategy document (COM, 2002, 511 final) for the sustainable development of European aquaculture. This strategy is designed to strengthen the role of aquaculture in providing jobs and in supplying fisheries products in a way that does not harm the environment. Furthermore, appropriate planning, providing regulations and incentives for developing and improving sustainable aquaculture practices, is not only an objective of states, but is being recognized by aquaculture producers (e.g., the Code of Conduct of European Federation of Aquaculture Producers).

Table 1. Aquaculture production in the GFCM member countries - Includes freshwater and Atlantic production (tonnes).

Country	1990	1995	1996	1997	1998	1999	2000	2001	2002	APR 95-02	APR 00-02
Albania	4 961	340	323	97	124	310	307	286	860	14.2%	67.4%
Algeria	407	369	322	322	283	250	351	454	476	3.7%	16.5%
Bulgaria	7 849	4 615	4 727	5 437	4 252	7 780	3 654	2 938	2 308	-9.4%	-20.5%
Croatia	-	4 007	2 889	3 510	5 958	6 228	6 674	10 166	8 416	11.2%	12.3%
Cyprus	125	452	787	969	1 178	1 422	1 878	1 883	1 862	22.4%	-0.4%
Egypt	61 916	71 815	91 137	85 704	139 389	226 276	340 093	342 864	376 296	26.7%	5.2%
France	256 653	280 786	285 526	287 243	267 850	264 857	266 802	251 655	249 734	-1.7%	-3.3%
Greece	9 523	32 644	39 852	48 838	59 926	84 274	95 418	97 512	87 928	15.2%	-4.0%
Israel	14 638	16 180	17 553	18 264	18 556	18 777	20 098	21 318	22 261	4.7%	5.2%
Italy	153 744	214 725	189 373	195 719	208 625	210 368	216 525	218 269	183 962	-2.2%	-7.8%
Lebanon	80	300	350	300	400	300	400	300	790	14.8%	40.5%
Libyan Arab Jamahiriya	70	100	100	100	100	100	100	100	-	-	-
Malta	3	904	1 552	1 800	1 950	2 002	1 746	1 235	1 116	3.1%	-20.1%
Morocco	415	2 072	2 084	2 329	2 161	2 781	1 875	1 403	1 670	-3.0%	-5.6%
Romania	34 950	19 830	13 900	11 168	9 614	8 998	9 727	10 818	9 248	-10.3%	-2.5%
Serbia and Montenegro	-	2 404	2 863	3 490	6 558	3 438	2 844	2 688	2 448	0.3%	-7.2%
Slovenia	-	789	869	917	909	1 206	1 181	1 262	1 290	7.3%	4.5%
Spain	203 766	223 965	231 633	239 136	315 477	321 145	312 171	312 647	263 762	2.4%	-8.1%
Syrian Arab Republic	2 729	5 857	6 355	5 596	7 233	6 079	6 797	5 880	5 988	0.3%	-6.1%
Tunisia	1 023	960	1 351	1 875	1 842	1 095	1 553	1 868	1 975	10.9%	12.8%
Turkey	5 782	21 607	33 201	45 450	56 700	63 000	79 031	67 244	61 165	16.0%	-12.0%
TOTAL	**758 634**	**904 721**	**926 747**	**958 264**	**1 109 085**	**1 230 686**	**1 369 225**	**1 352 790**	**1 283 555**	**5.1%**	**-3.2%**

Note: APR refers to the Average **A**nnual **P**ercentage **R**ate (average annual growth rate)
Source: FAO Fishstat Plus v. 2.30. Aquaculture Production: quantities 1950-2002. http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp

Table 2. Aquaculture production by environment and area in the GFCM member countries - (tonnes).

Environment / Area	1995	1998	1999	2000	2001	2002	APR 95-02	APR 00-02	Top producers	2002 production
Brackishwater culture	167 031	236 230	306 960	427 326	422 513	389 941	12.9%	-4.5%		
Freshwater culture	229 598	243 878	257 821	266 810	275 433	257 817	1.7%	-1.7%		
Mariculture	508 092	628 977	665 905	675 089	654 844	635 797	3.3%	-3.0%		
TOTAL	**904 721**	**1 109 085**	**1 230 686**	**1 369 225**	**1 352 790**	**1 283 555**	**5.1%**	**-3.2%**		
Atlantic, Eastern Central	160	202	196	177	156	255	6.9%	20.0%	Morocco	255
Asia - Inland waters	34 618	57 677	60 584	67 844	61 934	60 360	8.3%	-5.7%	Turkey Israel Syrian A.R.	34 297 19 205 5 988
Atlantic, Northeast	390 239	466 497	475 623	469 771	438 939	391 483	0.0%	-8.7%	Spain France	229 743 161 740
Africa - Inland waters	67 766	126 336	211 145	300 178	314 954	342 459	26.0%	6.8%	Egypt	340 556
Europe - Inland waters	170 010	168 430	159 596	160 642	169 124	150 018	-1.8%	-3.4%	France Italy Spain other[1]	57 398 37 636 32 995 21 989
Mediterranean and Black Sea	241 928	289 943	323 542	370 613	367 683	338 980	4.9%	-4.4%	Italy Greece Egypt France Turkey other[2]	146 326 84 874 35 740 30 596 26 868 14 576

Note: APR refers to the Average **A**nnual **P**ercentage **R**ate (average annual growth rate)
Source: FAO Fishstat Plus v. 2.30. Aquaculture Production: quantities 1950-2002. http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp
[1] Romania, Croatia, Greece, Serbia and Montenegro, Bulgaria, Slovenia and Albania.
[2] Croatia, Israel, Cyprus, Malta, Tunisia, Spain, Morocco, Albania, Slovenia, Algeria, Bulgaria and Serbia and Montenegro

Table 3. Value of aquaculture production in the GFCM member countries - Includes freshwater and Atlantic production (US$ 1 000).

Country	1990	1995	1996	1997	1998	1999	2000	2001	2002	APR 95-02	APR 00-02
Albania	3 003	251	276	223	195	540	478	529	1 862	33.1%	97.4%
Algeria	1 062	971	860	860	794	678	938	1 230	1 283	4.1%	17.0%
Bulgaria	20 471	12 374	13 147	14 858	11 066	17 025	7 335	7 867	5 389	-11.2%	-14.3%
Croatia	-	12 472	8 963	11 303	23 037	23 481	26 487	32 597	29 245	12.9%	5.1%
Cyprus	1 690	4 467	7 512	8 173	9 013	9 574	10 304	9 527	10 487	13.0%	0.9%
Egypt	124 602	115 194	167 902	183 878	327 263	447 146	815 046	756 980	655 565	28.2%	-10.3%
France	527 595	663 176	600 133	626 884	560 326	487 921	425 054	453 763	472 127	-4.7%	5.4%
Greece	63 135	157 307	235 864	246 589	274 997	330 408	291 318	307 364	243 891	6.5%	-8.5%
Israel	39 819	48 906	52 470	63 415	64 386	69 866	76 393	77 523	61 208	3.3%	-10.5%
Italy	336 511	419 288	394 937	397 984	449 366	365 101	455 774	415 318	337 129	-3.1%	-14.0%
Lebanon	280	1 500	1 750	1 500	2 000	900	1 200	900	2 361	6.7%	40.3%
Libyan Arab Jamahiriya	84	150	150	150	150	150	150	150	-	-	-
Malta	18	8 127	10 119	10 336	10 560	8 509	5 011	3 080	3 747	-10.5%	-13.5%
Morocco	3 659	12 254	11 970	8 907	8 036	8 579	5 031	3 375	4 478	-13.4%	-5.7%
Romania	87 650	47 982	35 130	16 572	15 783	16 544	15 637	17 441	16 559	-14.1%	2.9%
Serbia and Montenegro	-	6 028	6 884	8 389	13 138	8 302	7 145	6 769	5 692	-0.8%	-10.7%
Slovenia	-	3 190	3 702	3 539	3 679	4 333	3 617	3 515	3 538	1.5%	-1.1%
Spain	353 836	250 015	250 131	247 943	307 611	344 357	377 800	392 112	354 062	5.1%	-3.2%
Syrian Arab Republic	13 447	26 912	28 986	25 892	32 876	28 079	32 090	28 716	50 761	9.5%	25.8%
Tunisia	4 448	5 454	6 826	9 489	8 846	4 306	7 107	9 196	8 746	7.0%	10.9%
Turkey	31 380	127 197	182 569	227 960	280 745	306 408	219 775	142 315	130 482	0.4%	-22.9%
TOTAL	**1 612 690**	**1 923 215**	**2 020 281**	**2 114 844**	**2 403 867**	**2 482 207**	**2 783 690**	**2 670 267**	**2 398 612**	**3.2%**	**-7.2%**

Note: APR refers to the Average **A**nnual **P**ercentage **R**ate (average annual growth rate)
Source: FAO Fishstat Plus v. 2.30. Aquaculture Production: values 1984-2002. http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp

Table 4. Aquaculture production and value of main species groupings - Includes freshwater and Atlantic production.

	Production (tonnes)										
Species group	**1990**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**APR 95-02**	**APR 00-02**
Molluscs	498 543	566 615	549 835	554 376	633 607	647 139	640 948	621 682	552 305	-0.4%	-7.2%
Freshwater fishes	127 110	117 054	127 571	123 733	162 981	236 929	295 476	298 515	311 816	15.0%	2.7%
Marine fishes	19 707	68 457	87 089	99 508	136 945	176 988	252 213	253 172	258 441	20.9%	1.2%
Diadromous fishes	105 510	147 222	156 607	174 890	171 932	166 318	177 280	179 105	160 607	1.3%	-4.8%
Crustaceans	2 758	273	583	695	560	277	276	278	351	3.7%	12.8%
Aquatic plants	5 006	5 100	5 062	5 062	3 060	3 032	3 032	38	35	-50.9%	-89.3%
Misc. aquatic animals	-	-	-	-	-	3	-	-	-	-	-
TOTAL	**758 634**	**904 721**	**926 747**	**958 264**	**1 109 085**	**1 230 686**	**1 369 225**	**1 352 790**	**1 283 555**	**5.1%**	**-3.2%**

	Value (US$ 1 000)										
Species group	**1990**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**APR 95-02**	**APR 00-02**
Marine fishes	178 601	460 728	588 038	645 045	866 028	964 886	1 177 216	1 081 774	927 091	10.5%	-11.3%
Molluscs	704 538	801 356	660 898	630 202	657 960	644 513	655 626	635 823	612 306	-3.8%	-3.4%
Freshwater fishes	298 039	238 454	272 811	260 170	335 233	423 676	546 825	549 082	517 605	11.7%	-2.7%
Diadromous fishes	384 262	416 511	478 462	559 964	525 491	436 682	391 145	400 453	337 813	-2.9%	-7.1%
Crustaceans	44 740	4 317	10 348	10 640	8 782	3 726	2 834	3 133	3 795	-1.8%	15.7%
Aquatic plants	2 509	1 848	9 724	8 823	10 371	8 714	10 046	3	2	-62.3%	-98.6%
Misc. aquatic animals	-	-	-	-	-	9	-	-	-	-	-
TOTAL	**1 612 690**	**1 923 215**	**2 020 281**	**2 114 844**	**2 403 867**	**2 482 207**	**2 783 690**	**2 670 267**	**2 398 612**	**3.2%**	**-7.2%**

Note: APR refers to the Average **A**nnual **P**ercentage **R**ate (average annual growth rate)
Source: FAO Fishstat Plus v. 2.30. Aquaculture Production. http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp

Table 5. Top 15 aquaculture species items (by quantity) in 2002 - Includes freshwater and Atlantic production (tonnes).

Species	1990	1995	1996	1997	1998	1999	2000	2001	2002	APR 95-02	APR 00-02
Blue mussel (*Mytilus edulis*)	219 942	231 444	238 424	241 143	311 862	313 569	308 549	301 205	256 025	1.5%	-8.9%
Nile tilapia (*Oreochromis niloticus*)	24 918	21 969	27 854	30 416	52 755	103 988	157 425	152 515	167 735	33.7%	3.2%
Mediterranean mussel (*Mytilus galloprovincialis*)	107 626	110 956	104 820	106 631	118 482	126 091	127 305	141 110	135 016	2.8%	3.0%
Rainbow trout (*Oncorhynchus mykiss*)	93 366	124 797	128 275	135 792	127 813	118 069	124 525	132 799	117 759	-0.8%	-2.8%
Flathead grey mullet (*Mugil cephalus*)	9 811	19 255	25 230	21 461	33 639	48 170	86 036	102 443	115 711	29.2%	16.0%
Pacific cupped oyster (*Crassostrea gigas*)	143 132	145 388	150 829	148 378	137 446	137 876	134 259	108 213	107 854	-4.2%	-10.4%
Grass carp (=White amur) (*Ctenopharyngodon idellus*)	9 087	12 873	18 520	28 408	39 044	52 878	67 675	73 300	76 602	29.0%	6.4%
Gilthead seabream (*Sparus aurata*)	4 415	24 049	32 679	40 730	53 156	65 777	85 390	80 347	75 099	17.7%	-6.2%
Japanese carpet shell (*Ruditapes philippinarum*)	16 710	60 000	40 385	40 140	49 630	51 826	56 244	57 293	42 581	-4.8%	-13.0%
European seabass (*Dicentrarchus labrax*)	3 657	19 209	20 768	26 999	34 602	41 148	52 122	43 746	41 976	11.8%	-10.3%
Common carp (*Cyprinus carpio*)	59 550	51 228	52 286	38 052	45 728	52 882	42 643	42 759	41 049	-3.1%	-1.9%
Trouts nei (*Salmo* spp)	3 252	12 691	18 511	28 505	34 641	38 581	44 543	38 081	34 570	15.4%	-11.9%
Seabasses nei (*Dicentrarchus* spp)	102	2 773	5 210	6 300	8 660	12 000	17 877	15 546	14 339	26.5%	-10.4%
Tilapias nei (*Oreochromis (=Tilapia)* spp)	5 391	7 070	7 987	7 107	8 068	7 475	9 685	11 412	10 455	5.7%	3.9%
European flat oyster (*Ostrea edulis*)	4 077	4 896	5 154	4 929	4 911	5 408	5 453	5 641	6 231	3.5%	6.9%
SUB-TOTAL	**705 036**	**848 598**	**876 932**	**904 991**	**1 060 437**	**1 175 738**	**1 319 731**	**1 306 410**	**1 243 002**	**5.6%**	**-3.0%**
Other species (109 items)	53 598	56 123	49 815	53 273	48 648	54 948	49 494	46 380	40 553	-4.5%	-9.5%
TOTAL	**758 634**	**904 721**	**926 747**	**958 264**	**1 109 085**	**1 230 686**	**1 369 225**	**1 352 790**	**1 283 555**	5.1%	-3.2%

Table 6. Top 15 aquaculture species items (by value) in 2002 - Includes freshwater and Atlantic production (US$ 1 000).

Species	1990	1995	1996	1997	1998	1999	2000	2001	2002	APR 95-02	APR 00-02
Gilthead seabream (*Sparus aurata*)	61 820	192 897	273 201	288 325	362 596	375 897	407 820	344 675	292 552	6.1%	-15.3%
Flathead grey mullet (*Mugil cephalus*)	38 146	51 914	67 808	68 265	103 911	137 759	299 172	349 403	272 534	26.7%	-4.6%
Nile tilapia (*Oreochromis niloticus*)	49 844	37 347	49 134	62 596	111 672	177 638	272 184	263 851	257 214	31.7%	-2.8%
Rainbow trout (*Oncorhynchus mykiss*)	294 634	295 233	338 383	385 875	346 618	250 913	258 409	300 729	241 537	-2.8%	-3.3%
Pacific cupped oyster (*Crassostrea gigas*)	285 594	339 385	261 929	243 248	228 169	231 286	198 121	200 684	211 758	-6.5%	3.4%
European seabass (*Dicentrarchus labrax*)	60 274	160 386	170 296	197 865	257 462	259 077	290 368	225 689	200 244	3.2%	-17.0%
Blue mussel (*Mytilus edulis*)	219 942	145 664	141 737	135 729	152 995	145 671	159 763	153 641	141 640	-0.4%	-5.8%
Japanese carpet shell (*Ruditapes philippinarum*)	46 100	147 360	105 050	95 046	120 372	107 756	164 386	140 149	134 126	-1.3%	-9.7%
Grass carp (=White amur) (*Ctenopharyngodon idellus*)	17 767	14 682	28 089	42 222	57 996	79 152	117 432	125 017	102 824	32.1%	-6.4%
Mediterranean mussel (*Mytilus galloprovincialis*)	91 335	76 467	77 240	72 093	82 645	81 300	74 426	82 493	90 689	2.5%	10.4%
Common carp (*Cyprinus carpio*)	138 043	108 495	117 935	95 613	107 582	107 636	87 870	87 872	74 465	-5.2%	-7.9%
Tuna-like fishes nei (order *Scombroidei*)	3 580	195	1 078	-	29 385	50 190	57 071	66 690	73 755	133.5%	13.7%
Trouts nei (*Salmo* spp)	17 786	49 111	69 789	99 780	114 317	133 875	86 873	56 385	51 889	0.8%	-22.7%
Seabasses nei (*Dicentrarchus* spp)	1 326	27 813	47 880	56 700	77 074	92 640	73 832	48 348	43 017	6.4%	-23.7%
Tilapias nei (*Oreochromis (=Tilapia)* spp)	15 221	18 662	21 378	18 525	21 059	18 893	33 036	36 518	42 713	12.6%	13.7%
SUB-TOTAL	**1 341 412**	**1 665 611**	**1 770 927**	**1 861 882**	**2 173 853**	**2 249 683**	**2 580 763**	**2 482 144**	**2 230 957**	**4.3%**	**-7.0%**
Other species (109 items)	271 278	257 604	249 354	252 962	230 014	232 524	202 927	188 123	167 655	-6.0%	-9.1%
TOTAL	**1 612 690**	**1 923 215**	**2 020 281**	**2 114 844**	**2 403 867**	**2 482 207**	**2 783 690**	**2 670 267**	**2 398 612**	3.2%	-7.2%