

PART 1: EU-15 (AUSTRIA, BELGIUM, DENMARK, FINLAND, FRANCE, GERMANY, GREECE, IRELAND, ITALY, LUXEMBOURG, NETHERLANDS, PORTUGAL, SPAIN, SWEDEN AND UNITED KINGDOM)

AUSTRIA

Austria has a population of approximately eight million people. It is a landlocked country and the fishery sector does not have a great economic role. Fish consumption is not very high but has increased over the last decades and imports of fish products remain significant.

Production: captures, aquaculture and commodities 1989-1998

The Austrian fishery sector is small, comprising of fish farming and inland fishing only. The sector provided full-time employment for some 300 people, 500 part-time jobs and around 1 500 seasonal jobs. There are a further 100 people employed in processing and related activities. In 1998, inland capture fisheries produced 450 t, with a value of EUR 2.7 million. Employment extended to about 150 part-time jobs.

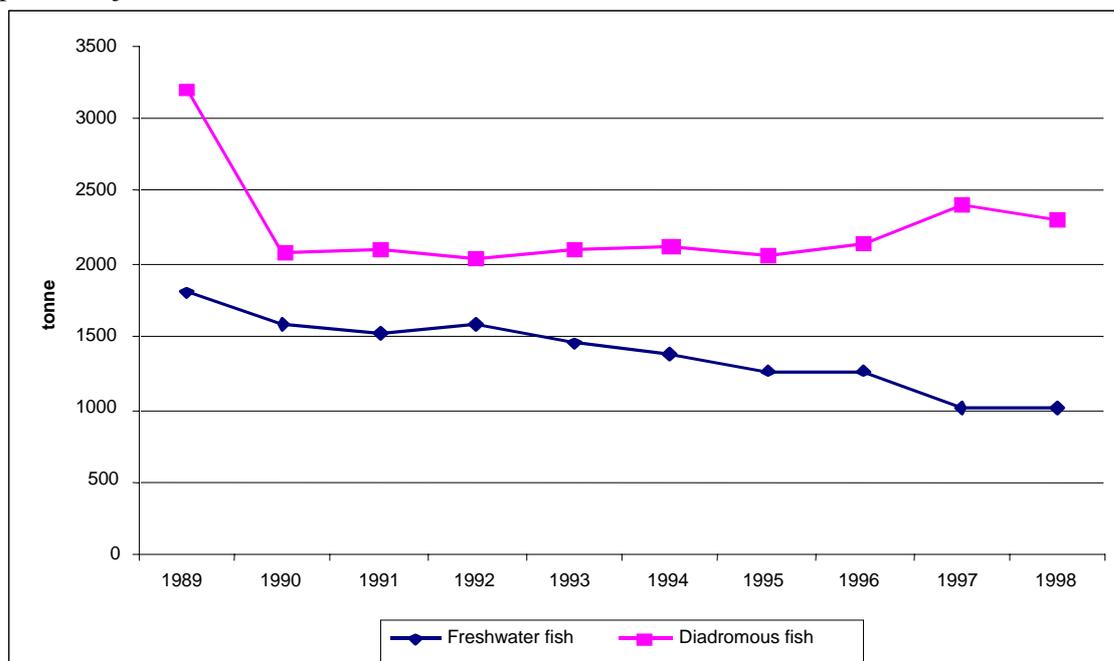


Figure 2: Austria - capture and aquaculture production 1989-1998

Austria's 1998 production was approximately 3 300 tonnes in live weight. As the figure above shows, this volume recorded a strong fall after 1989 when it was estimated at 5 000 tonnes¹⁴. Austrian production is dominated by aquaculture, which represented nearly 90 percent of the total in 1997. Production of freshwater species remains comparatively high.

Captures

Captures were estimated at 450 tonnes for 1998. They have decreased since 1990 when the volume was estimated at 550 tonnes. Competition from neighbouring countries has contributed to a decrease

¹⁴ No clear-cut explanation for this drop in production of around 1 000 tonnes could be found. It could be attributed either to the disappearance of a company, either to a revision of the dataset that could previously have been overestimating the production. This last explanation seems more likely as Austrian statistics were also reviewed in 1996 to reflect a production level of around 3 000 tonnes instead of the 4000 tonnes + indicated for the previous years (Butz, 2003).

in the production of freshwater fish over the last decade. The main species caught are rainbow trout (diadromous) and carp (freshwater).

Table 2: Austria - Captures by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	550	533	500	479	420	388	404	450	465	451	464
Total gp of species	550	533	500	479	420	388	404	450	465	451	464

Source: database

Aquaculture

Freshwater fish production and consumption has been more significant historically in Austria before markets gained access to marine stocks. Austrian aquaculture production was in excess of 4 000 tonnes in 1989, mainly comprised of trout (FAO, 1999). Today, about 2 800 tonnes of trout are farm produced in the country per year. Carp (freshwater), which used to make up a significant portion of production with 1 200 tonnes in 1989 has also declined with only 565 tonnes produced in 1998.

Table 3: Austria - Aquaculture by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	1250	1050	1030	1110	1030	990	860	810	540	565	924
Diadromous fish	3200	2076	2105	2030	2110	2113	2058	2139	2400	2296	2253
Total gp of species	4450	3126	3135	3140	3140	3103	2918	2949	2940	2861	3176

Source: database

Commodities production

Food use commodities production

Commodities production of Austria consists mainly of smoked freshwater fish like trout. The two tables below present the evolution of commodities production from 1989 to 1998 both by OECD group of commodities, and by FAO group of species, which happen to coincide. Overall, the production follows the same pattern as for capture and aquaculture productions. This means that the Austrian production sector didn't substitute national raw material with imports from other countries. In other words, national production of commodities still relies on national freshwater and diadromous production.

Table 4: Austria - FU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish, cured	5000	3659	3635	3619	3560	3491	3322	3399	3405	3312	3640
Total FU Production	5000	3659	3635	3619	3560	3491	3322	3399	3405	3312	3640

Source: database

Table 5: Austria - FU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	5000	3659	3635	3619	3560	3491	3322	3399	3405	3312	3640
Total FU Production	5000	3659	3635	3619	3560	3491	3322	3399	3405	3312	3640

Source: database

Non-food use commodities production

Austria does not produce any non-food use commodities.

Non-food use: trade and net supply 1989-1998

Austria imported more than 30 000 tonnes and exported some 500 tonnes of aquatic products for non-food use on average during the period 1989-98.

Non-food use imports

Non-food use imports are mainly designated for the aquaculture production of trout and the poultry production sector. Over the last ten years a significant decrease of flour and meal has been observed.

The diminution of the proportion of animal flour in animal feed is the main cause of the phenomena, observed elsewhere in Europe. The main share of the decrease concerns small pelagic species.

Table 6: Austria - NFU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	4462	4778	3441	3244	2216	2365	2987	2466	2995	3194	3215
Flour, meal unfit for human cons.	35550	37154	31849	31752	30707	28170	26738	16491	21864	20169	28044
Total NFU Imports	40011	41933	35290	34996	32923	30536	29725	18957	24859	23363	31259

Source: database

Table 7: Austria - NFU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	35400	34922	29551	29376	28297	25710	24025	14346	19198	16708	25753
Marine fish, others	4464	5194	3840	3907	3023	3582	4336	3484	3555	3991	3938
Crustaceans	147	26	167	97	196	29	0	0	0	0	66
Aquatic animals	0	1790	1732	1616	1407	1214	1121	567	839	989	1127
Aquatic mammals	0	0	0	0	0	0	244	560	1267	1675	375
Total NFU Import	40011	41933	35290	34996	32923	30536	29725	18957	24859	23363	31259

Source: database

Non-food use exports

Since Austria is not a producer of non-food use, its export market is restricted to exports to some neighbouring countries. So, it is more re-exports than direct exports. The following two tables present the evolution of exports by OECD group of commodities, and by FAO group of species. Overall, exports have been increasing over the period while imports have been decreasing, giving a clear indication that the national use of flour and fishmeal has been decreasing.

Table 8: Austria - NFU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	18	57	69	21	76	12	6	35	223	93	61
Flour, meal unfit for human cons.	3	121	63	210	96	322	868	1631	1482	446	524
Total NFU Exports	21	178	132	231	172	334	874	1665	1705	539	585

Source: database

Table 9: Austria - NFU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	0	30	2	6	5	0	785	1589	1445	380	424
Marine fish, others	21	148	129	200	146	308	3	74	69	6	110
Crustaceans	0	0	1	25	21	24	0	0	0	0	7
Aquatic animals	0	0	0	0	0	3	74	0	113	147	34
Aquatic mammals	0	0	0	0	0	0	12	3	78	7	10
Total NFU Export	21	178	132	231	172	334	874	1665	1705	539	585

Source: database

Non-food use net supply

The net supply for non-food use was approximately 23 000 tonnes in 1998, with Germany and non-OECD countries supplying approximately 85 percent of this (OECD, 2000). The following two tables show net supply of fish meal and flour to the aquaculture and the animal production (mainly poultry) sector in Austria. Over the last decade, the net supply has nearly halved, from 40 000 tonnes in 1989 to only 23 000 tonnes in 1998.

Table 10: Austria - NFU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish/marine mammal, fat, oil	4444	4721	3372	3223	2140	2353	2982	2431	2772	3101	3154
Flour, meal unfit for human consumption	35547	37033	31786	31542	30611	27848	25869	14860	20381	19724	27520
Total NFU net supply	39991	41755	35158	34765	32751	30201	28851	17291	23153	22824	30674

Source: database

Table 11: Austria - NFU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, pelagic, small	35400	34892	29549	29370	28292	25710	23240	12757	17752	16328	25329
Marine fish, others	4444	5046	3711	3707	2877	3275	4333	3411	3486	3986	3828
Crustaceans	147	26	166	72	175	5	0	0	0	0	59
Aquatic animals	0	1790	1732	1616	1407	1212	1047	567	726	843	1094
Aquatic mammals	0	0	0	0	0	0	232	557	1189	1668	365
NFU net supply	39991	41755	35158	34765	32751	30201	28851	17291	23153	22824	30674

Source: database

Market for human consumption 1989-1998

The average net supply for food use was nearly 80 000 tonnes from 1989 to 1998. As national production is very weak, the majority of fish for human consumption is supplied by imports.

Trade

From 1989 to 1998, Austria imported on average 80 000 tonnes of aquatic products for human consumption by year. These imports came mainly from European countries and there was a gradual but consistent decrease in total imports over this period. Denmark and Germany provide the majority of product to Austria, (OECD, 2001). Canned fish, fresh/chilled fish and fish fillets make up most of the volume imported (FAO, 1999). Austria exported around 1 500 tonnes of canned fish and an increasing volume of fresh/chilled fish.

Food use imports

The table below shows that imports of prepared/preserved products has been the main factor of imports growth over the period 1989-1998, followed by the fresh/chilled and fish fillet categories. Diadromous species (mainly trout and river eel) and marine demersal species (plaice, Alaska pollock, cod) and tuna are the key species responsible for this growth.

Table 12: Austria - FU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	413	521	587	718	654	677	661	843	976	914	696
Crus., mol. & other aquatic inv., prepared	1072	1306	1154	1308	1277	1679	1331	2084	2031	1956	1520
Crustaceans	1349	1560	1879	2088	2081	2825	2289	2530	2351	2494	2145
Fish, cured	1317	1471	2045	1960	1883	2182	3029	3046	2781	4501	2421
Fish, fillets	14645	13251	13671	13767	12806	13651	17628	19103	16369	16797	15169
Fish, fresh/chilled	11714	12540	12530	12144	11839	13268	6767	12335	14277	15962	12337
Fish, frozen	2555	2750	2505	2687	2404	2763	5399	2693	4495	5192	3344
Molluscs	131	172	258	353	370	432	836	744	778	895	497
Prepared/preserved fish	31786	33991	34233	43279	42343	56306	38933	48237	44863	41348	41532
Total FU Imports	64981	67563	68862	78304	75658	93781	76872	91615	88920	90060	79662

Source: database

Table 13: Austria - FU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	1874	1759	2087	2487	2362	2877	2721	3411	4529	5904	3001
Diadromous fish	3743	4794	5060	5384	5361	6771	18204	22365	20197	20698	11257
Marine fish, pelagic, tunas	8287	8563	9447	10649	11212	21409	5503	8952	13232	11916	10917
Marine fish, pelagic, small	19678	20275	19163	26918	22985	25692	23980	26346	20805	21431	22727
Marine fish, demersal	8805	10181	10778	11528	13065	13791	14469	18195	16591	16229	13363
Marine fish, others	19629	18433	18449	16872	16291	17629	6879	6143	7431	7622	13538
Crustaceans	1349	1560	1879	2088	2081	2825	2601	3218	2929	3019	2355
Molluscs	1203	1479	1412	1662	1647	2111	1826	2125	2217	2294	1798
Cephalopods	413	521	587	718	654	677	661	843	976	914	696
Aquatic animals	0	0	0	0	0	0	28	15	14	32	9
Total FU Import	64981	67563	68862	78304	75658	93781	76872	91615	88920	90060	79662

Source: database

Food use exports

During the period 1989-1998, exports of fish, which were less than 1000 tonnes in 1989, were multiplied by a factor of 4 (as shown in the two tables below). Exports mainly concern fresh fish and prepared and preserved fish products. Since Austria doesn't produce fresh marine fish and prepared/preserved categories, the current exports are in fact re-exports of imported products that are repackaged locally.

Table 14: Austria - FU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Crus., mol. & other aquatic inv., prepared	8	16	46	35	16	56	8	10	32	8	23
Crustaceans	2	4	4	6	23	22	12	44	16	5	14
Fish, cured	8	4	12	10	14	16	41	8	11	8	13
Fish, fillets	33	28	73	90	58	80	243	173	185	150	111
Fish, fresh/chilled	329	385	361	351	285	268	245	1023	1384	2014	665
Fish, frozen	23	0	0	0	8	42	2	57	719	59	91
Prepared/preserved fish	438	545	630	1636	1700	2086	6662	3595	1633	1593	2052
Total FU Exports	841	982	1126	2128	2103	2570	7212	4908	3980	3837	2969

Source: database

Regarding species, small canned pelagic, such as herring, and live freshwater fish, such as carp, form the bulk of Austrian food use commodities exports.

Table 15: Austria - FU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	103	155	254	194	143	126	190	266	829	1395	366
Diadromous fish	334	304	159	229	213	242	387	462	443	362	314
Marine fish, pelagic, tunas	8	44	55	57	124	250	3806	1445	46	30	587
Marine fish, pelagic, small	257	368	361	1358	1376	1531	2438	1806	1746	1564	1281
Marine fish, demersal	0	4	46	59	68	108	214	203	81	81	86
Marine fish, others	129	89	200	190	140	236	158	673	786	391	299
Crustaceans	2	4	4	6	23	22	12	44	16	5	14
Molluscs	8	16	46	35	16	56	8	10	32	8	23
Total FU Export	841	982	1126	2128	2103	2570	7212	4908	3980	3837	2969

Source: database

Distribution

A continuous process of concentration marks Austria. Today, Austrian food trade shows the highest degree of concentration in Europe and as many as 200 municipalities are currently without any grocery store (BMLFUW, 1999).

Net supply and consumption

During 1989-1998, Austria's net fish supply was 80 000 tonnes per year, with an average consumption per capita (live weight) of 11 kg. The most import supply category is prepared and preserved products such as canned fish (mainly herring, mackerel and pilchard and tuna) and ready to eat products (with a more erratic evolution and a decrease over 1997-98). The share of tuna has been increasing while that of small pelagic species has stayed around the same level of apparent consumption.

Table 16: Austria - FU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	413	521	587	718	654	677	661	843	976	914	696
Crus., mol. & other aquatic inv., prepared	1064	1290	1108	1273	1261	1623	1323	2074	1999	1948	1496
Crustaceans	1347	1557	1875	2082	2058	2803	2277	2487	2335	2489	2131
Fish, cured	6309	5127	5668	5569	5430	5657	6310	6437	6175	7805	6049
Fish, fillets	14612	13223	13599	13677	12748	13571	17385	18930	16184	16647	15058

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish, fresh/chilled	11385	12154	12169	11793	11554	13000	6522	11312	12893	13948	11673
Fish, frozen	2532	2750	2505	2687	2396	2721	5397	2636	3776	5133	3253
Molluscs	131	172	258	353	370	432	836	744	778	895	497
Prepared/preserved fish	31348	33446	33603	41643	40643	54220	32271	44642	43230	39755	39480
Total FU net supply	69140	70240	71371	79795	77115	94702	72982	90106	88345	89535	80333

Source: database

As in many countries, more flexible working hours have led to more variable and shorter mealtimes. This situation has increased consumer demand for food products that are fast to prepare and nutritious. Meals are now cooked regularly in two thirds of Austrian households at least once a day. In the remaining households meals are cooked less often and simpler dishes are prepared (BMLFUW, 1999).

There is also a new wave of health consciousness in household diets, which has led to a shift towards “taking bad food out” and demanding products with less salt, less fat, and fewer calories, and looking for food with added benefits (OECD 2001). In addition, more and more Austrians are consuming organic products.

Table 17: Austria - FU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	6771	5263	5468	5912	5778	6242	5852	6544	7105	7820	6276
Diadromous fish	3408	4490	4900	5154	5147	6529	17817	21903	19753	20336	10944
Marine fish, pelagic, tunas	8279	8519	9393	10592	11088	21159	1697	7508	13186	11886	10331
Marine fish, pelagic, small	19420	19907	18802	25560	21609	24161	21543	24540	19059	19867	21447
Marine fish, demersal	8805	10177	10732	11469	12997	13683	14255	17992	16510	16148	13277
Marine fish, others	19500	18344	18249	16682	16151	17393	6721	5471	6645	7232	13239
Crustaceans	1347	1557	1875	2082	2058	2803	2589	3174	2913	3015	2341
Molluscs	1194	1463	1365	1627	1632	2055	1818	2116	2185	2286	1774
Cephalopods	413	521	587	718	654	677	661	843	976	914	696
Aquatic animals	0	0	0	0	0	0	28	15	14	32	9
FU net supply	69140	70240	71371	79795	77115	94702	72982	90106	88345	89535	80333

Source: database

Consumption of fish has increased since the beginning of the 1980s when it was 6 kg per capita. Fish represents approximately 4 percent of the total animal proteins consumed per day in 1998. Below is presented the evolution of annual fish consumption per capita since 1989. Overall, fish consumption in Austria has been fluctuating between 9 and 12 kg per capita per year over the period 1989-1998.

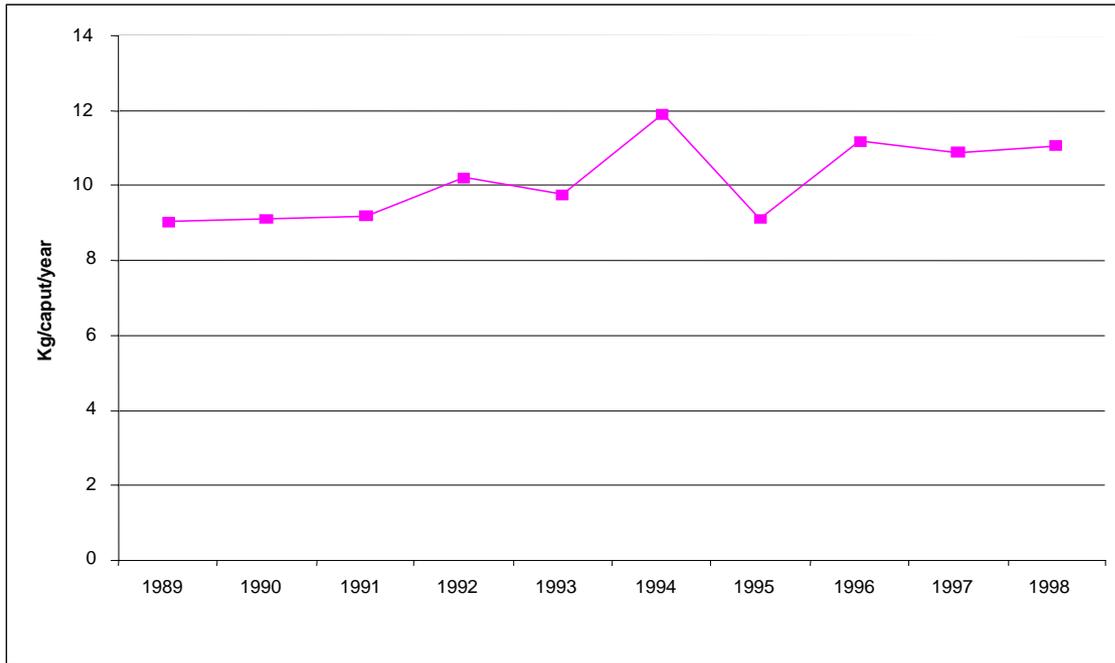


Figure 3: Fish consumption per capita per year in Austria 1989-1998

The main species consumed in 1998 were freshwater/diadromous (eel, trout, carp, nei), and marine (tuna, salmon, herring, mackerel).

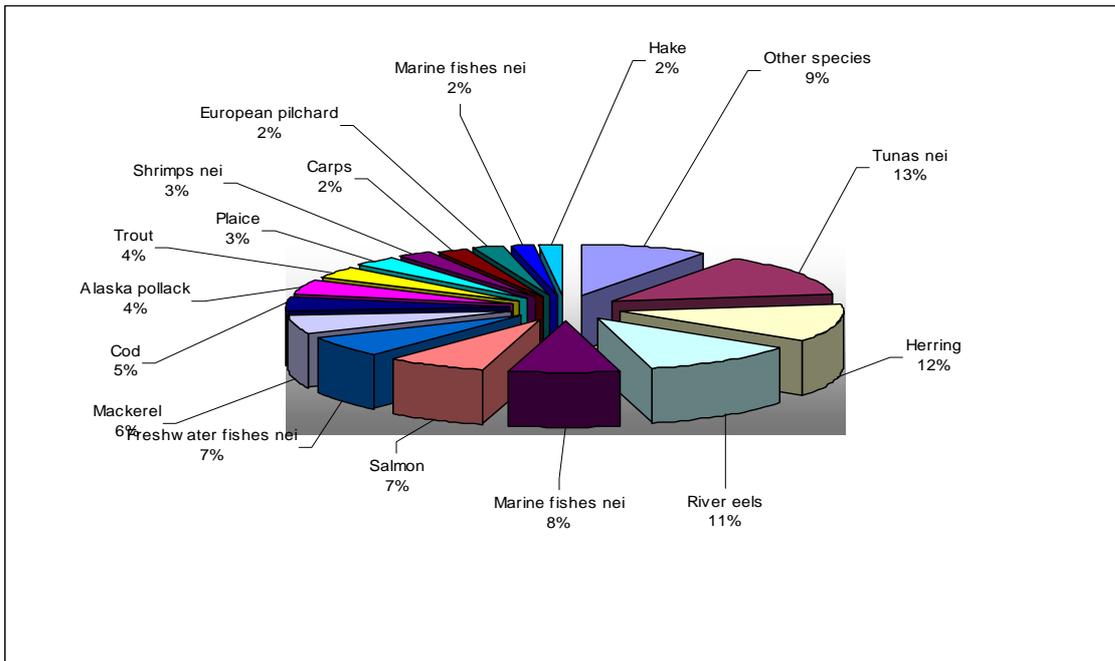


Figure 4: Austria - Main species consumed in 1998

Assumptions for projection 2005-2030 and main results

As specified in the methodology section (see Part One of the study), assumptions have been made on the consumption trend of the OECD group of products. Further assumptions are made regarding production, imports and exports and Austria's need for fish in 2005 up to 2030 by taking into account and extrapolating previous trends.

For Austria, main consumption trends for seafood for the period 2005-2030 assume:

An important increase of the demand for cephalopods, crustacean, molluscs and other aquatic invertebrate prepared, fish cured, fish fillets, fish frozen and molluscs;

A stagnation of the demand for crustaceans, fresh/chilled fish and prepared and preserved fish (mostly canned products).

One of the main factors influencing the evolution of consumption in Austria will be the diminishing amount of time spared for meal preparation, leading to an increase in demand for convenience food (Spencer and Shull, 2002) reflected here in the increase of prepared crustaceans and molluscs products, and frozen foods that include ready to eat frozen preparations. Prepared/preserved products are here mostly canned products and are therefore not expected to increase as these products progressively lose popularity.

Another important factor affecting future Austrian consumption is the trend towards healthier eating and organic produce (OECD 2001). This is reflected by the overall increase in seafood consumption, as seafood's reputation as a high protein/low fat food grows.

To satisfy this consumer demand, imports have been increased accordingly since Austria is not producing most of the seafood products consumed in its territory. Finally, the national production of smoked fish has been assumed to decrease, continuing the trend recorded since the beginning of the 1990s.

Table 18: Austria - Assumptions for projection

OECD group	94-98%	Annual %	Prod % 1999- 2030	Imp % 1999- 2030	Exp % 1999- 2030	Cons % 1999- 2030	Prod % Annual	Imp % Annual	Exp % Annual	Annual Cons %
Cephalopods	22%	4%		100%		100%		2.2%		2.2%
Crus., mol. & other aquatic inv., prepared	10%	2%		50%	0%	50%		1.3%	0.0%	1.3%
Crustaceans	-20%	-4%		0%	0%	0%		0.0%	0.0%	0.0%
Fish, cured	50%	10%	-180%	152%	0%	60%	-3.3%	2.9%	0.0%	1.5%
Fish, fillets	12%	2%		60%	0%	61%		1.5%	0.0%	1.5%
Fish, fresh/chilled	-1%	0%		0%	0%	0%		0.0%	0.0%	0.0%
Fish, frozen	55%	11%		50%	0%	51%		1.3%	0.0%	1.3%
Molluscs	65%	13%		100%		100%		2.2%		2.2%
Prepared/preserved fish	-37%	-7%		0%	0%	0%		0.0%	0.0%	0.0%
Fish/marine mammal, fat, oil	21%	4%		0%	0%	0%		0.0%	0.0%	0.0%
Flour, meal unfit for hum. Cons.	-35%	-7%		0%	0%	0%		0.0%	0.0%	0.0%

Source: database

Regarding non-food use products, the assumptions are for a stagnation of consumption and consequently a stagnation of imports.

The table below presents the main results for Austria up to 2030. Food use exports will remain stable, imports will increase by 20%, but due to a decrease in aquaculture production, production will be quartered, although captures will remain stable. The apparent consumption per capita will increase from 11 to 13 kg per capita per year with the major force behind the increased seafood consumption in Austria as a result of the trend towards healthier eating

Table 19: Austria - Main results for 2015-2030

Nature	Average 94-98	2005	2010	2015	2020	2025	2030
Exports FU (t live wt)	4502	3837	3837	3837	3837	3837	3837
Imports FU (t live wt)	92226	93846	96872	100201	103865	107905	112362
Production FU (t live wt)	3386	2624	2222	1882	1594	1350	1143
Fish supply FU (t live wt)	87134	92634	95258	98246	101622	105417	109669
Population (X1000)	8034	8220	8326	8384	8443	8502	8562
Per caput supply (kg/h)	11	11	11	12	12	12	13

Nature	Average 94-98	2005	2010	2015	2020	2025	2030
Production NFU (t live wt)	0	0	0	0	0	0	0
Imports NFU (t live wt)	25609	23363	23363	23363	23363	23363	23363
Exports NFU (t live wt)	1023	539	539	539	539	539	539
Net supply NFU (t live wt)	24585	22824	22824	22824	22824	22824	22824
Aquaculture (t live wt)	2954	2084	1707	1436	1244	1113	1029
Capture (t live wt)	432	432	432	432	432	432	432
Production total (t live wt)	3386	2516	2139	1867	1675	1545	1461

Source: database

Food use net supply and human consumption 2005-2030

The increase in the net supply of nearly 20 percent is a direct result of the growth of imports. Consequently, the main products that will be supplied in Austria in 2030 are prepared and preserved fish, fish fillets and, to a lesser extent, fresh/chilled fish. Because of the hypothesis of a zero export growth, net supply growth is similar to import in terms of species and commodities. The main group of species available on the Austrian market will be the diadromous fish (salmon and trout), small pelagic (herring), and demersal fish (plaice, pollock, cod).

Table 20: Austria - FU net supply by OECD group of commodities 2005-2030 (tonne live weight)

Gp of commodities	Ave. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	814	1063	1185	1320	1471	1640	1827
Crus., mol. & other aquatic inv., prepared	1794	2130	2270	2419	2577	2746	2927
Crustaceans	2478	2489	2489	2489	2489	2489	2489
Fish, cured	6477	8126	8580	9228	10083	11159	12477
Fish, fillets	16543	18466	19885	21411	23054	24822	26725
Fish, fresh/chilled	11535	13948	13948	13948	13948	13948	13948
Fish, frozen	3932	5615	5986	6381	6802	7251	7729
Molluscs	737	1042	1161	1294	1442	1607	1791
Prepared/preserved fish	42824	39755	39755	39755	39755	39755	39755
Total FU net supply	87134	92634	95258	98246	101622	105417	109669

Source: database

Table 21: Austria - FU net supply by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	6713	7312	7050	6861	6735	6665	6646
Diadromous fish	17268	21021	21584	22216	22927	23729	24634
Marine fish, pelagic, tunas	11087	11888	11890	11891	11893	11895	11897
Marine fish, pelagic, small	21834	20695	21373	22135	22992	23958	25048
Marine fish, demersal	15717	17563	18668	19859	21142	22524	24015
Marine fish, others	8692	7430	7589	7763	7954	8164	8395
Crustaceans	2899	3063	3101	3141	3184	3229	3277
Molluscs	2092	2562	2781	3021	3282	3568	3881
Cephalopods	814	1063	1185	1320	1471	1640	1827
Aquatic animals	18	35	38	40	43	46	49
FU net supply	87134	92634	95258	98246	101622	105417	109669

Source: database

The figure below presents the evolution of the apparent consumption per capita in Austria between 2005 and 2030. The consumption will move from 11 kg to nearly 13 kg per capita per year, as the Austrian population will grow more slowly (6 percent) than the net supply (22 percent) over the period considered. One of the most interesting features of Austrian consumption is the demand for health foods and organic products (OECD 2001) that will increase interest in seafood products as these enjoy a reputation for healthiness.

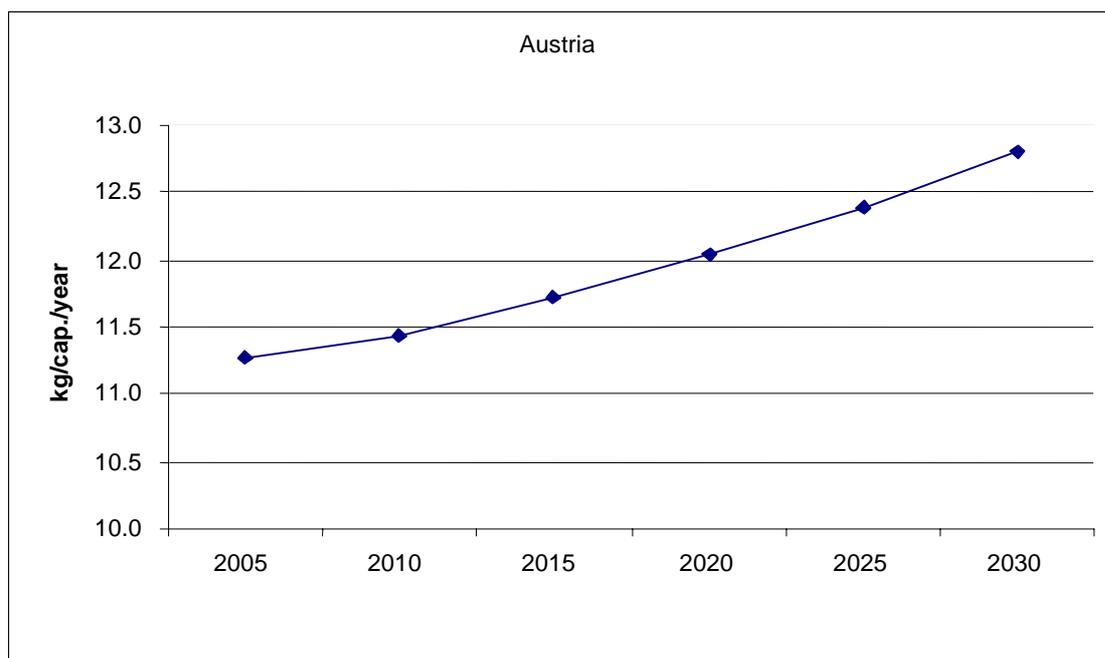


Figure 5: Fish consumption per capita per year in Austria 2005-2030

The main species that Austrian consumers are likely to find at their local market in 2030 are presented in the figure below. The assumed shift from freshwater to marine is clearly visible, with various freshwater fish decreasing by 3%, while river eels fall by 2%.

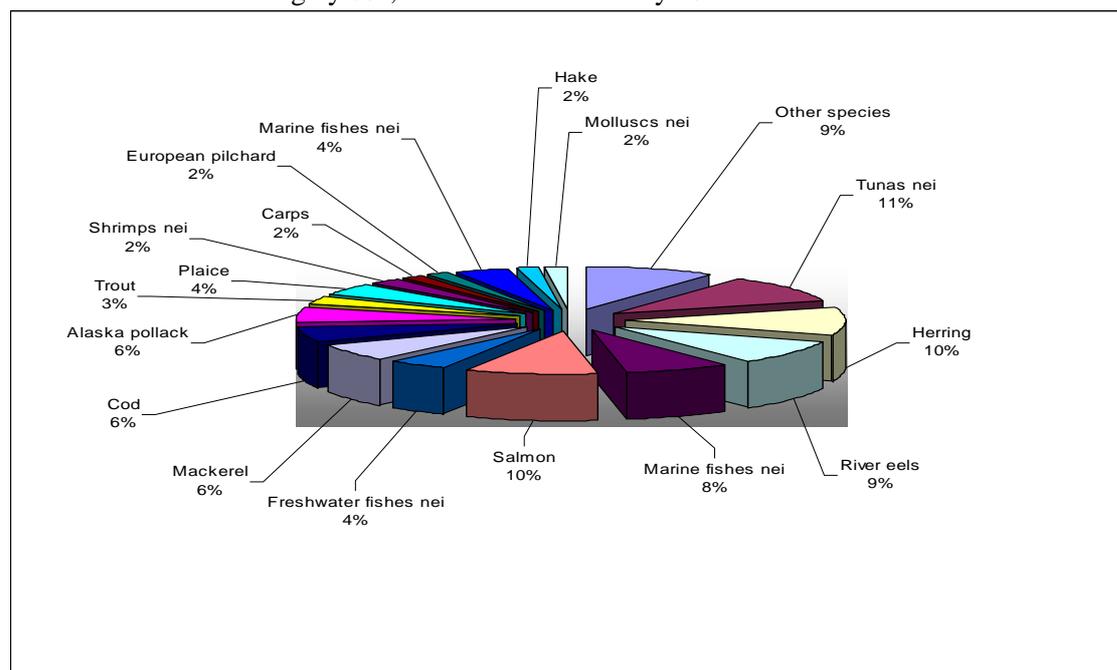


Figure 6: Austria - Main species consumed in 2030

Non-food use net supply 2005-2030

The non-food use net supply is considered stable over the period 2005-2030 and consequently keeps its 1998 level: 23 000 tonnes.

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Total FU Imports	88250	93846	96872	100201	103865	107905	112362

Source: database

Table 27: Austria - FU Commodities Imports by FAO group of species 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	3888	6083	6223	6374	6536	6711	6899
Diadromous fish	17647	21383	21946	22578	23289	24091	24996
Marine fish, pelagic, tunas	12202	11918	11920	11922	11923	11925	11927
Marine fish, pelagic, small	23651	22259	22937	23699	24557	25523	26613
Marine fish, demersal	15855	17644	18750	19940	21223	22606	24096
Marine fish, others	9141	7821	7979	8153	8344	8554	8786
Crustaceans	2918	3068	3106	3146	3188	3234	3282
Molluscs	2115	2570	2789	3029	3290	3576	3889
Cephalopods	814	1063	1185	1320	1471	1640	1827
Aquatic animals	18	35	38	40	43	46	49
Total FU Import	88250	93846	96872	100201	103865	107905	112362

Source: database

Exports

Exports will remain at the same level that they were in 1998: 3 800 tonnes.

BELGIUM AND LUXEMBOURG

Belgium is a major fish trading nation and the domestic market is mainly supplied by imports. Fish consumption has increased over the last decades and comprises mainly fresh fish. The population is approximately 11 million inhabitants. Luxembourg is a landlocked country and doesn't have any significant aquaculture and capture production. Its trade is quite insignificant compared to Belgium. Therefore, whilst the information below mainly refers to Belgium, it does also include Luxembourg.

Production: captures, aquaculture and commodities 1989-1998

Production was 32 000 tonnes (live weight) for the year 1998, decreasing from 40 000 tonnes over the last decade. The share of aquaculture in this total was negligible and represented approximately 3 percent in 1998. There are no commercial freshwater fisheries of significance (FAO, 2000).

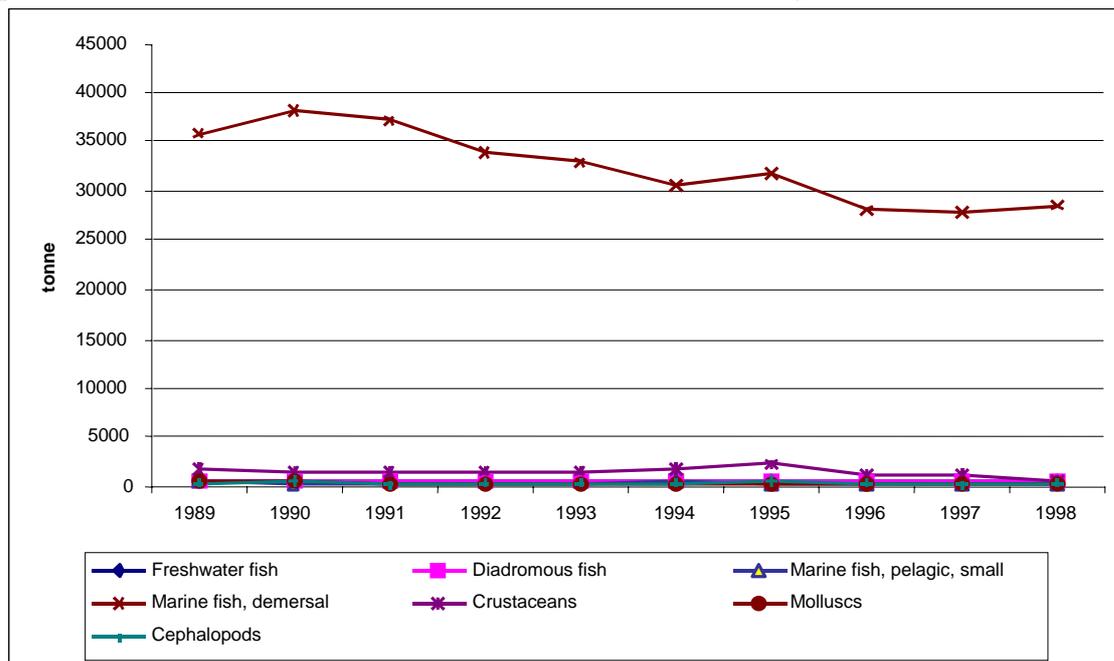


Figure 7: Belgium-Lux. - capture and aquaculture production 1989-1998

Captures

The volume of captures decreased regularly during the last decade from 40 000 tonnes to 31 000 tonnes. Most of the landings are realised in the three main ports of Zeebrugge, (65 percent of the total catch), Oostende (31 percent) and Nieuwpoort (4 percent).

Table 28: Belgium-Lux. - Captures by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	361	375	375	375	375	375	375	375	375	375	374
Diadromous fish	153	135	135	135	135	135	135	135	135	135	137
Marine fish, pelagic, small	492	241	341	390	336	577	180	101	135	150	294
Marine fish, demersal	35894	38275	37095	34002	32832	30647	31762	28091	27952	28683	32523
Crustaceans	1775	1373	1413	1544	1673	1773	2248	1266	1281	798	1514
Molluscs	567	516	363	394	410	361	321	419	405	367	412
Cephalopods	391	544	168	279	336	387	574	435	216	326	366
Total gp of species	39633	41459	39890	37119	36097	34255	35595	30822	30499	30834	35620

Source: database

Species targeted by the Belgian fleet are sole, plaice, cod, whiting, turbot, lemon sole and rays. Sole represented 47 percent of landings by value in 1998, but only 18 percent by volume. Plaice, by contrast, contributed 24 percent of the total volume of landings, but only 12 percent of the total value. Cod represented 19 percent of the landings by volume and 10 percent by value. The most valuable

species in 1998 was turbot: 1 percent of the landings represented almost 4 percent of the value (FAO, 2000).

Aquaculture

Aquaculture production in Belgium is rather small, less than 900 tonnes in 1998 with production of trout, carp, tilapia, European eels, sea bream and sea bass (FAO, 2000). Although the number of suitable sites limits Belgian aquaculture, it is also characterised by diversity in both production and imported products. There has been some commercial production of African catfish, sturgeon and significant catches of coarse fish such as pike, perch, tench, roach and others (Rudiger, 1998).

Table 29: Belgium-Lux. - Aquaculture by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	255	225	300	300	300	300	300	300	300	300	288
Diadromous fish	480	450	545	545	545	545	545	645	545	545	539
Total gp of species	735	675	845	845	845	845	845	945	845	845	827

Source : database

Commodities production

Food use commodities production

Belgium is a major European fish-trading nation. Therefore, a substantial part of the local production and imports are exported, mainly to other EU member states. 16 firms operated in the fishing processing industry in Belgium in 1998. Globally, commodity production has declined by 20 percent since 1989. The main production of commodities is dedicated to prepared and preserved products and this category has experienced a significant fall during the last decade. The drop in demersal landings and difficulties in obtaining demersal fish at good prices on the EU market are the main reason for the decrease in processing activities.

Table 30: Belgium-FU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Crus., mol. & other aquatic inv., prepared	969	1563	1628	1248	1381	1296	1660	1657	1886	1911	1520
Crustaceans	9686	10133	10011	9202	9381	8823	11297	11205	7531	6329	9360
Fish, cured	4791	4333	4738	4486	4192	4036	3581	2932	3439	3519	4005
Fish, fillets	4951	4533	4952	5307	4789	4724	5610	4688	4306	4477	4834
Fish, fresh/chilled	5065	5538	4773	3971	3987	3580	3124	2516	2906	5150	4061
Fish, frozen	2153	1687	1717	1387	1371	1274	1803	1012	1368	1694	1547
Prepared/preserved fish	14737	16507	15302	14579	13948	13481	11613	10065	12022	10553	13281
Total FU Production	42351	44292	43121	40181	39049	37214	38687	34076	33458	33632	38606

Source: database

Table 31: Belgium - FU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Diadromous fish	3076	2810	3141	3100	2789	2720	2505	2502	2954	2890	2849
Marine fish, pelagic, small	6282	5700	5565	4954	4943	4652	4080	3072	3674	3289	4621
Marine fish, others	22338	24087	22777	21676	20556	19722	19145	15639	17412	19214	20257
Crustaceans	10629	11682	11479	10436	10740	10073	12897	12796	9342	8164	10824
Molluscs	26	14	160	14	22	47	60	66	75	76	56
Total FU Production	42351	44292	43121	40181	39049	37214	38687	34076	33458	33632	38606

Source: database

Non-food use commodities production

The non-food use production of Belgium is very low compared to other EU member states like Denmark for example. Because of the reduction of the share of animal protein against the vegetal protein in animal feed, the Belgian non-food production is following the same trend as other EU member states: a decline of both production and use of fish meal and fish oil in aquaculture and poultry production.

Table 32: Belgium - NFU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Flour, meal unfit for human cons.	1129	1096	838	844	847	725	761	390	465	422	752
Total NFU Production	1129	1096	838	844	847	725	761	390	465	422	752

Source: database

Table 33: Belgium - NFU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	791	848	700	546	548	518	547	284	339	294	542
Marine fish, demersal	338	249	138	298	299	207	215	106	126	128	210
Total NFU Production	1129	1096	838	844	847	725	761	390	465	422	752

Source: database

Non-food use: trade and net supply 1989-1998

The majority of landings are directed to human consumption. Non-food consumption is mainly supplied by imports.

Non-food use imports

During the period 1989-98, Belgium imported an average of 84 000 tonnes per year of non-food use products. The Netherlands and France remained the main suppliers of non-food imports, but total amounts have been decreasing annually (OECD, 2000).

Table 34: Belgium - NFU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	59128	55993	57481	54596	58416	74196	61226	56412	69337	52502	59929
Marine fish, others	36002	35359	15065	12498	10416	37460	17175	9820	8477	7350	18962
Aquatic animals	0	7634	10026	6851	1987	2429	3604	3885	3727	3606	4375
Aquatic mammals	1637	626	295	347	945	974	904	759	607	505	760
Total NFU Import	96766	99612	82866	74293	71763	115059	82909	70877	82148	63963	84026

Source: database

Table 35: Belgium - NFU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	10919	8001	5576	4691	7229	9253	16254	9064	6710	6708	8440
Flour, meal unfit for human cons.	85847	91611	77291	69602	64534	105806	66655	61813	75437	57255	75585
Total NFU Imports	96766	99612	82866	74293	71763	115059	82909	70877	82148	63963	84026

Source: database

Non-food use exports

Belgium exported nearly 13 000 tonnes, on average, during the decade 1989-1998. If the imports are decreasing, that didn't seem to affect exports, which were quite erratic over the period and were at the same level in 1998 as in 1989. Non-food use products are mainly derived from small pelagic and various second value marine fish.

Table 36: Belgium - NFU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	3052	1872	1340	1009	2935	2175	7422	5336	3394	1952	3049
Flour, meal unfit for human cons.	6348	10577	5692	4507	5160	15011	12994	10695	15895	9202	9608
Total NFU Exports	9400	12450	7032	5516	8095	17185	20416	16031	19290	11154	12657

Source: database

Table 37: Belgium - NFU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
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Marine fish, pelagic, small	6313	8545	3481	2254	8395	4388	9502	6712	11738	6215	6754
Marine fish, others	2911	2947	2615	2243	1408	11522	9856	8709	6825	4253	5047
Aquatic animals	0	946	793	1006	896	1044	625	359	579	509	676
Aquatic mammals	176	11	143	12	212	230	434	251	148	177	179
Total NFU Export	9400	12450	7032	5516	8095	17185	20416	16031	19290	11154	12657

Source: database

Non-food use net supply

The non-food use net supply is for 98 percent the result of the difference between imports and exports because of low level of the national production. If Belgium is using less and less non-food use products for animal feeding, the net supply in 1998 was still considerable, at 53 000 tonnes. The chicken feed scandal in 1999 will certainly encourage the decrease of the use of fish fat and oil and marine species flour in animal diet (Trachet, 1999).

Table 38: Belgium-Lux. - NFU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish/marine mammal, fat, oil	7868	6128	4236	3682	4295	7078	8832	3728	3316	4756	5392
Flour, meal unfit for human consumption	80627	82130	72437	65939	60221	91521	54422	51507	60007	48475	66729
Total NFU net supply	88495	88259	76672	69621	64516	98599	63254	55235	63323	53232	72121

Source: database

The species that compose the net supply are mainly small pelagic species like the capelin and sprat. The net supply of other marine fish has declined because of the shortfall of imports of Norwegian pout and sandeels.

Table 39: Belgium-Lux. - NFU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, pelagic, small	53606	48296	54700	52889	50569	70326	52271	49985	57938	46582	53716
Marine fish, demersal	338	249	138	298	299	207	215	106	126	128	210
Marine fish, others	33090	32412	12450	10255	11824	25938	7318	1111	1652	3097	13915
Aquatic animals	0	6688	9232	5845	1091	1384	2979	3526	3148	3097	3699
Aquatic mammals	1461	615	152	335	733	744	470	508	459	328	581
NFU net supply	88495	88259	76672	69621	64516	98599	63254	55235	63323	53232	72121

Source: database

Market for human consumption

Trade

Belgium is a major fish-trading nation. A substantial part of landings and imports, mainly sole, cod and plaice, are exported (FAO, 2000). Exports represented nearly 100 000 tonnes per year on average during the period 1989-98 while exports accounted for 290 000 tonnes. 15 percent of the imports and 25 percent of exports by volume were traded fresh. In 1998, shellfish contributed to 27 percent of the volume of imports and 42 percent of exports. In value, shellfish contributed a major share in 1997: 55 percent of exports and 42 percent of imports (FAO, 2000). Belgium is the third highest importer of scallops, mussels and oysters in the EU (Monfort, 1999).

Food use imports

Food use imports concerned mainly crustacean, fresh/chilled fish, molluscs and prepared/preserved fish. The decrease in landings has resulted in a significant increase in imports (more than 50 percent in ten years). Except for the preserved/prepared/preserved products that are consumed in Belgium, the majority of imports are re-exported to other EU countries. In terms of species, demersal fish, crustacean and molluscs are the three main groups of species to be imported, which confirms the role of Belgium as a trade nation for high value species.

Table 40: Belgium - FU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
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Cephalopods	3424	3512	2889	3129	3753	9166	9444	9364	9923	8662	6327
Crus., mol. & other aquatic inv., prepared	4682	4855	5435	5652	5380	5987	6051	4068	4660	4403	5117
Crustaceans	35445	37609	38102	40897	42800	53851	61840	59672	65785	65906	50191
Fish, cured	5044	5570	5270	5140	7572	6886	8175	8366	9810	10715	7255
Fish, fillets	21067	26440	26888	26192	30038	37719	38148	36553	45361	58114	34652
Fish, fresh/chilled	60136	63437	68648	69797	64514	71957	65158	58416	76449	80748	67926
Fish, frozen	13718	16810	17740	18285	14444	15423	21981	17936	17840	14234	16841
Molluscs	49112	51740	37666	41130	37910	49388	48486	46109	50847	48522	46091
Prepared/preserved fish	44248	57854	56800	61111	51223	53562	63285	59544	67094	69635	58436
Total FU Imports	236876	267826	259439	271333	257635	303940	322568	300029	347769	360938	292835

Source: database

Table 41: Belgium - FU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	2135	2242	2865	3822	3958	8759	9747	9240	24187	29574	9653
Diadromous fish	28775	31320	36197	34201	33799	40121	36989	35145	41628	42876	36105
Marine fish, pelagic, tunas	13550	23748	21751	25677	16260	18639	27403	21649	23351	27313	21934
Marine fish, pelagic, small	24078	26868	27908	27172	25716	25411	23918	21937	23304	27288	25360
Marine fish, demersal	48358	57955	58784	59001	65027	66684	66236	60731	68107	74234	62512
Marine fish, others	27318	27976	27842	30651	23030	25934	32455	32114	35976	32161	29546
Crustaceans	35445	37609	38102	40897	42800	53851	61840	59672	65785	65906	50191
Molluscs	53075	55831	41906	45600	41851	53835	53313	48776	53912	51611	49971
Cephalopods	3424	3512	2889	3129	3753	9166	9444	9364	9923	8662	6327
Aquatic animals	719	764	1194	1183	1440	1541	1224	1401	1595	1314	1237
Total FU Import	236876	267826	259439	271333	257635	303940	322568	300029	347769	360938	292835

Source: database

Food use exports

Like imports, exports of fish products have increased significantly during the period 1989-1998 (130 percent). Here again, it is essentially the high value species like demersal fish (fresh and chilled), molluscs and crustacean (fresh) that are re-exported.

Table 42: Belgium - FU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	1079	1170	1006	856	3393	6323	6932	8721	8443	7391	4531
Crus., mol. & other aquatic inv., prepared	1876	1424	1555	1882	1947	3176	1846	1785	1875	1751	1912
Crustaceans	17506	18338	17436	17916	24215	33319	32878	37369	47659	45188	29182
Fish, cured	1614	2052	1973	1718	3229	3124	2428	2305	2201	1843	2249
Fish, fillets	3551	4287	3798	4508	6273	11812	12474	11124	15887	25834	9955
Fish, fresh/chilled	29634	31300	30427	25696	25974	26535	26248	26438	45503	51907	31966
Fish, frozen	4662	5761	5112	4511	3760	6083	11479	13563	8777	6800	7051
Molluscs	382	357	394	429	1485	3939	6716	6591	6517	2105	2892
Prepared/preserved fish	7540	12230	11581	11712	8344	10722	10614	10764	11179	17049	11174
Total FU Exports	67844	76918	73282	69227	78620	105033	111617	118661	148043	159867	100911

Source: database

Table 43: Belgium - FU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	1883	2112	2778	3779	3898	6713	6456	6856	22693	27486	8466
Diadromous fish	4263	4805	4728	4650	7515	7916	7910	7390	10188	10999	7036
Marine fish, pelagic, tunas	609	4675	4567	5180	1969	2770	4386	2314	4535	6153	3716
Marine fish, pelagic, small	2674	2122	2288	2394	4834	3742	3627	4808	1737	2128	3036
Marine fish, demersal	29571	31592	30202	24402	23384	25633	26869	28012	31741	42399	29381
Marine fish, others	8000	10324	8329	7739	5980	11502	13995	14815	12654	14267	10760
Crustaceans	17506	18338	17436	17916	24215	33319	32878	37369	47659	45188	29182

Molluscs	1961	1523	1747	1654	3302	5724	8257	7850	7872	3228	4312
Cephalopods	1079	1170	1006	856	3393	6323	6932	8721	8443	7391	4531
Aquatic animals	297	258	202	656	129	1391	306	526	521	628	491
Total FU Export	67844	76918	73282	69227	78620	105033	111617	118661	148043	159867	100911

Source: database

Food use net supply and consumption

The apparent consumption tables below reveal the consumption trend of Belgium and Luxembourg during the period 1989-1998. Overall, the net supply of the majority of products is largely the same in 1998 as in 1989, even if some of them experienced an up and down evolution. Fish fillets and prepared/preserved fish were consumed more at the end of the period than at the beginning.

Table 44: Belgium-Lux. - FU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	2345	2342	1884	2273	360	2843	2512	644	1480	1271	1795
Crus., mol. & other aquatic inv., prepared	3775	4993	5507	5019	4814	4108	5865	3939	4671	4564	4726
Crustaceans	27625	29405	30677	32182	27966	29355	40258	33508	25657	27046	30368
Fish, cured	8221	7850	8035	7908	8536	7798	9328	8993	11047	12390	9011
Fish, fillets	22467	26685	28042	26991	28553	30631	31284	30117	33780	36757	29531
Fish, fresh/chilled	35567	37674	42994	48072	42527	49002	42033	34494	33851	33991	40021
Fish, frozen	11209	12736	14346	15161	12055	10614	12305	5385	10431	9128	11337
Molluscs	48730	51384	37272	40701	36426	45449	41770	39518	44330	46416	43200
Prepared/preserved fish	51445	62130	60521	63978	56827	56321	64284	58845	67937	63138	60543
Total FU net supply	211383	235200	229278	242286	218064	236121	249638	215444	233184	234703	230530

Source: database

All groups of fish are consumed in Belgium and Luxembourg. Molluscs like mussels are still predominant in the apparent consumption, followed by diadromous (salmon mainly) and demersal species.

Table 45: Belgium-Lux. - FU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	252	130	87	43	60	2046	3290	2384	1494	2087	1187
Diadromous fish	27587	29325	34610	32651	29072	34925	31584	30257	34394	34766	31917
Marine fish, pelagic, tunas	12941	19073	17184	20497	14291	15869	23017	19335	18817	21159	18218
Marine fish, pelagic, small	27686	30446	31185	29732	25826	26320	24372	20202	25241	28449	26946
Marine fish, demersal	18786	26363	28582	34599	41643	41051	39367	32719	36366	31835	33131
Marine fish, others	41656	41739	42290	44589	37606	34154	37604	32938	40734	37109	39042
Crustaceans	28568	30954	32145	33416	29325	30605	41858	35099	27469	28882	31832
Molluscs	51141	54322	40319	43960	38570	48158	45117	40992	46115	48459	45715
Cephalopods	2345	2342	1884	2273	360	2843	2512	644	1480	1271	1795
Aquatic animals	422	506	992	527	1311	149	918	874	1075	686	746
FU net supply	211383	235200	229278	242286	218064	236121	249638	215444	233184	234703	230530

Source: database

Seafood consumption in Belgium is largely buoyed by sales outside of the home, in restaurants and places of work and the market is still slowly expanding (Trachet, 1999). During the period 1989-98, the consumption per capita was 22 kg per annum with some variations around this average. Fish represented 9 percent of the total animal proteins consumed per day in 1997 (FAO, 1999).

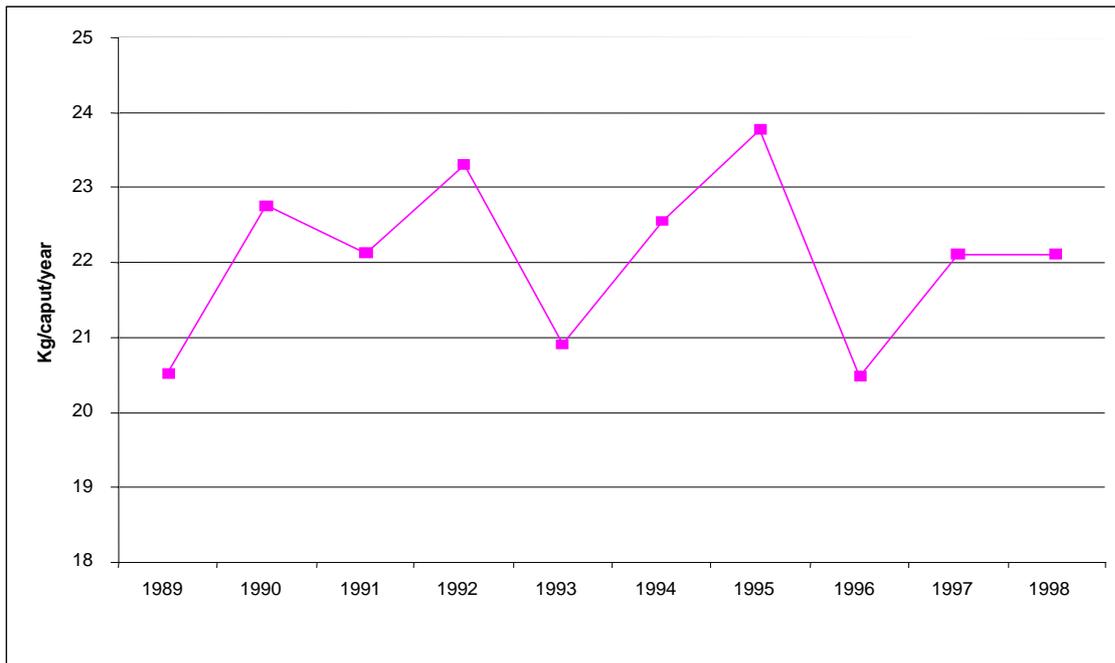


Figure 8: Fish consumption per capita per year in Belgium and Luxembourg 1989-1998

Expenditure on sea products accounted for 7.4 percent of food spending in 1996 (FAO, 2000). Due to substantial price increases compared to other food items, in particular during the 1980s, the share of fish in total food expenditures has doubled since 1981. Some 70 percent of expenditure on fish products goes on fresh fish. In 1999, after the chicken crisis, the consumption of fish increased strongly because people felt safer buying seafood, particularly when it was supplied by a fishmonger. The most popular of all seafood species is the mussel, the majority of which are imported from the Netherlands, while salmon has become the most popular fish in the last decade by exceeding sales of the traditionally popular trout and sole (Trachet, 1999). Demand for convenience products is expected to increase in the future. Some regional disparities exist with seafood consumption being higher in the north of Belgium (Flanders, closer to the coast) than in Brussels (-1 kg per capita per year) or Wallonia (-2 kg per capita per year) (in the south of Belgium). Freshwater fish are also more popular in Wallonia than in any other part of the country, and Brussels is reputed to be open to a larger variety of seafood products (CFCE, 2002).

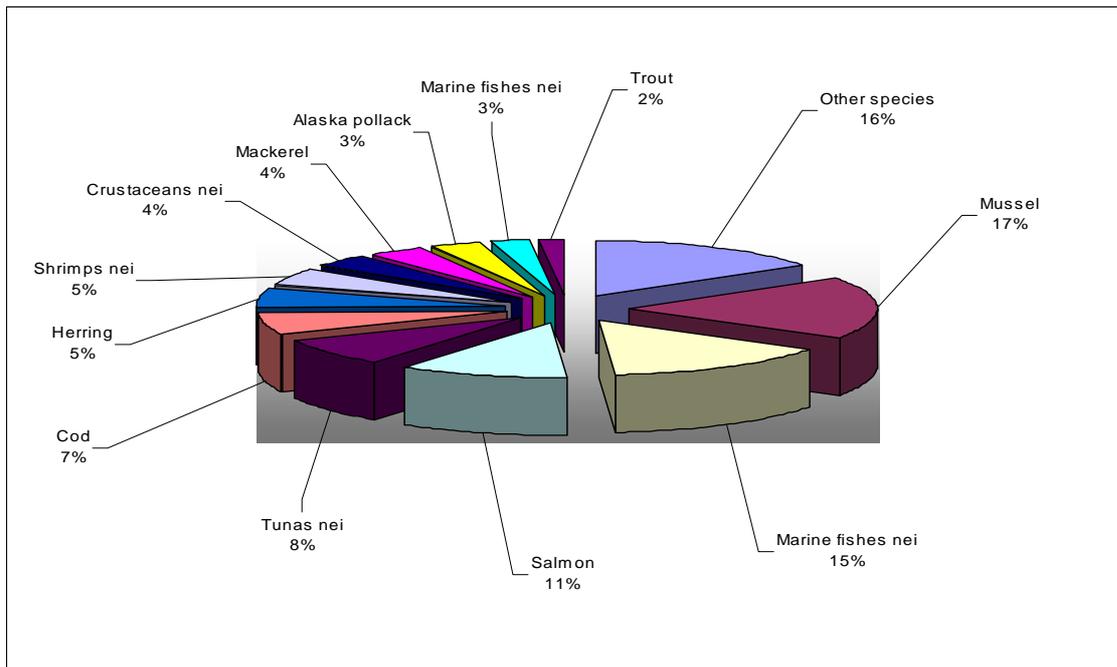


Figure 9: Belgium - Main species consumed in 1998

With respect to freshwater fish, imported or farmed trout, eel and carp are increasingly popular in Belgium and Luxembourg (other species in the figure above). Exotic species such as Nile perch are also now popular (other species in the figure above). Freshwater fish consumption in Belgium and Luxembourg was 780 g per capita per year in 1995 (Rudiger, 1998).

Assumptions for projection 2005-2030

As specified in the methodology section (see Part One of the study), assumptions have been made on the consumption trend of the OECD group of products. Further assumptions are made regarding production, imports and exports and Belgium's need for fish in 2005 up to 2030, by taking into account and extrapolating previous trends.

For Belgium, main consumption trends for consumption of seafood for the period 2005-2030 assume:

An important increase in the demand for cured fish (smoked products, +100 percent), fish fillets (50 percent), crustacean, molluscs and other aquatic invertebrate prepared, and prepared/preserved products.

A large decrease in cephalopods (-60 percent), fresh and frozen fish (-40 percent and -50 percent respectively), and a smaller decrease in crustaceans and molluscs.

The main feature influencing the evolution of consumption in Belgium will be the diminishing amount of time spared for meal preparation due to the increased pace of life and to the higher number of working women. Fresh pre-packed, frozen, consumer-ready, microwave dishes and take-away meals make life more convenient for households in which two people work (Polet and Perkins, 2002).

This leads to an increase in demand for convenience food reflected here in the increase of prepared crustaceans and molluscs products, fish fillets and prepared products and in the diminution in demand for fresh fish and frozen fish (whole) that are time consuming in their preparation. This trend is also likely to benefit the dynamic restaurant sector that represented up to 35 percent of seafood sales in Belgium in 2000 (CFCE, 2002).

Increasing health awareness is another dominant trend in the Belgian market and products which are fresh, organic, GMO free, low calorie or without any additives get more consumer attention in Belgium (Polet and Perkins, 2002), which is likely to have a positive influence on seafood consumption in general.

The increasing share of supermarkets in the distribution of seafood is also likely to boost Belgian seafood consumption by offering lower prices and diversity in the range of products. In 2000, supermarket chains were reported to account for 70 percent of the Belgian market and the number of smaller retail outlets has been reported to be shrinking for several years now (CFCE, 2002).

Table 46: Belgium-Luxembourg - Assumptions for projection

OECD group	94-98% annual %	Prod % 99-30	T Imp % 99-30	T % 99-30	Exp % 99-30	T % 99-30	Cons % 99-30	T Prod % Annual	Imp % Annual	Exp % Annual	Cons % Annual
Cephalopods	-75%	-15%		-10%	0%	-60%		-0.3%	0.0%	-1.5%	
Crus., mol. & other aquatic inv., prepared	4%	1%	0%	52%	0%	50%	0.0%	1.3%	0.0%	1.3%	
Crustaceans	-18%	-4%	0%	-9%	0%	-20%	0.0%	-0.3%	0.0%	-0.6%	
Fish, cured	25%	5%	0%	116%	0%	100%	0.0%	2.4%	0.0%	2.2%	
Fish, fillets	10%	2%	0%	32%	0%	50%	0.0%	0.9%	0.0%	1.3%	
Fish, fresh/chilled	-35%	-7%	0%	-20%	0%	-40%	0.0%	-0.6%	0.0%	-1.1%	
Fish, frozen	-18%	-4%	0%	-46%	0%	-50%	0.0%	-1.2%	0.0%	-1.3%	
Molluscs	-7%	-1%		-10%	0%	-10%		-0.3%	0.0%	-0.3%	
Prepared/preserved fish	0%	0%	0%	45%	0%	50%	0.0%	1.2%	0.0%	1.3%	
Fish/marine mammal, fat, oil	-43%	-9%		0%	0%	0%		0.0%	0.0%	0.0%	
Flour, meal unfit for hum. Cons.	-51%	-10%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%	

Source: database

Regarding the projection for the non-food use products, the assumptions are a zero growth rate of consumption, which means imports and exports remaining at their 1998 level.

Belgium and Luxembourg don't have any significant aquaculture production and natural conditions are not in favour of a development of this type of seafood production: no more development potential on the shore and in the countryside (lakes or reservoirs). Furthermore, because of the hypothesis of stable capture for the next three decades (see Part One of the study), the total production will be at the same level in 2030 as in 1998.

Imports of cured fish (mainly smoked salmon), fish fillet, prepared/preserved fish, and crustacean, molluscs & other aquatic invertebrates prepared categories will increase in order to satisfy the demand for these products, while imports of cephalopods, crustaceans, fresh and chilled fillets and molluscs will diminish because of the expected decrease in consumption of these products.

Exports will stay stable until 2030 because of the absence of aquaculture production and subsequent surplus to sell out of the country.

Table 47: Belgium-Luxembourg - Principal results for 2015-2030

Nature	Average 94-98	2005	2010	2015	2020	2025	2030
Exports FU (t live weight)	128644	159867	159867	159867	159867	159867	159867
Imports FU (t live weight)	327049	366120	370663	375952	382032	388953	396769
Production FU (t live weight)	35413	33632	33632	33632	33632	33632	33632
Fish supply FU (t live weight)	233818	239885	244427	249717	255797	262717	270533
Population (X1000)	10528	10812	10955	11056	11159	11263	11368
Per caput supply (kg/h)	22	22	22	23	23	23	24
Production NFU (t live weight)	553	422	422	422	422	422	422
Imports NFU (t live weight)	82991	63963	63963	63963	63963	63963	63963
Exports NFU (t live weight)	16815	11154	11154	11154	11154	11154	11154
Net supply NFU (t live weight)	66729	53232	53232	53232	53232	53232	53232
Aquaculture (t live weight)	865	802	789	789	801	824	857

Nature	Average 94-98	2005	2010	2015	2020	2025	2030
Capture (t live weight)	32401	32401	32401	32401	32401	32401	32401
Production total (t live weight)	33266	33203	33190	33190	33202	33225	33258

Source: database

Food use net supply and human consumption 2005-2030

Net supply of fish for the human consumption will increase by nearly 10 percent until 2030. The commodities that will benefit the most from consumer demand will be the same as those for which exports will increase, because national production meets only 15 percent of the national needs of Belgium and Luxembourg. Net supply will therefore increase substantially for some groups of commodities (fish cured, fish fillets, prepared/preserved fish, crustacean, mol. & other aquatic invertebrate prepared) and slightly diminish for some others (cephalopods, fish fresh/chilled, fish frozen, crustacean and molluscs).

Table 48: Belgium-Lux. - FU net supply by OECD group of commodities 2005-2030 (tonne live weight)

Gp of commodities	Ave. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	1750	1098	977	858	740	624	510
Crus., mol. & other aquatic inv., prepared	4629	4986	5313	5661	6033	6430	6854
Crustaceans	31165	25852	25011	24182	23364	22556	21758
Fish, cured	9911	14356	15978	17807	19869	22196	24819
Fish, fillets	32514	40345	43042	45858	48796	51863	55064
Fish, fresh/chilled	38674	30816	28625	26496	24427	22417	20463
Fish, frozen	9573	7984	7223	6507	5833	5197	4599
Molluscs	43497	45412	44708	44014	43330	42656	41993
Prepared/preserved fish	62105	69035	73550	78334	83405	88779	94474
Total FU net supply	233818	239885	244427	249717	255797	262717	270533

Source: database

Net supply of the groups of species will follow the same pattern as imports: more diadromous fish (salmon mainly), tuna, small pelagic fish (like herring and mackerel) and marine fish in general; and less molluscs, crustaceans, freshwater fish.

Table 49: Belgium-Lux. - FU net supply by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	2260	1709	1480	1287	1129	1006	919
Diadromous fish	33185	35259	35783	36463	37313	38347	39581
Marine fish, pelagic, tunas	19639	23375	25076	26880	28795	30827	32982
Marine fish, pelagic, small	24917	29792	30900	32141	33526	35064	36767
Marine fish, demersal	36268	33943	35639	37501	39538	41759	44174
Marine fish, others	36508	38457	39540	40728	42029	43449	44995
Crustaceans	32783	27687	26847	26018	25199	24391	23594
Molluscs	45768	47785	47335	46913	46518	46153	45819
Cephalopods	1750	1098	977	858	740	624	510
Aquatic animals	740	778	850	927	1009	1097	1192
FU net supply	233818	239885	244427	249717	255797	262717	270533

Source: database

The growth of the population is lower (7 percent) than the growth of the net supply (15 percent) over the next 30 years, so the apparent consumption per capita will be increasing regularly until 2030. It will move from 22 to nearly 24 kg per capita per year. Supermarkets represent the main distribution channels for seafood products with 70 percent of the retail sales in 2000. Fishmongers and smaller retail outlets are declining and have seen their numbers shrink for several years now. Restaurants are an important outlet for seafood products (especially fresh fish, mussels and shrimps), which could represent up to 35 percent percent of seafood sales (CFCE, 2002).

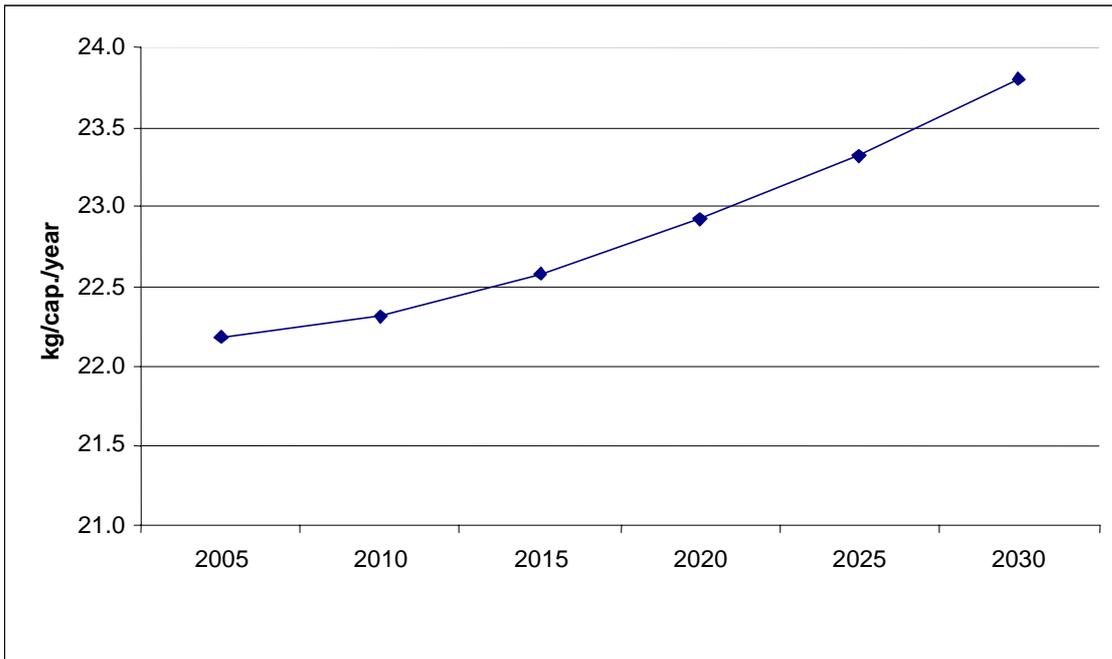


Figure 10: Fish consumption per capita per year in Belgium-Lux. 2005-2030

Main species consumed in 2030 will be the same as those consumed in 1998. Only their share will be affected by consumer preferences. Mussels and herring will lose some ground while tuna and salmon will increase their market share (Figure below).

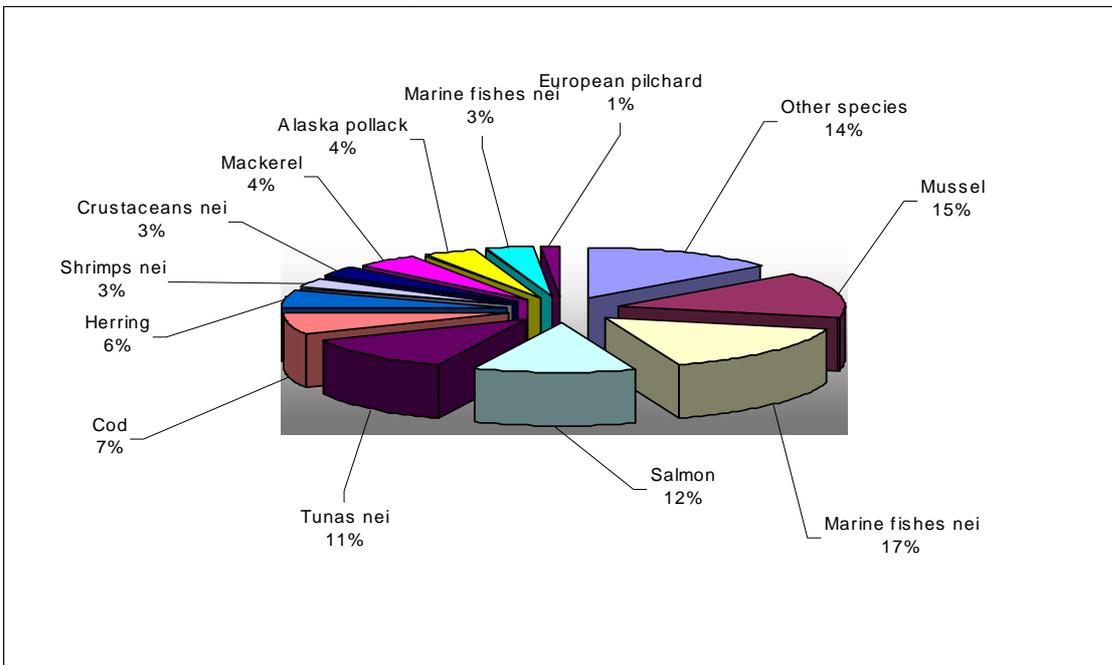


Figure 11: Belgium - Main species consumed in 2030

Non-food use net supply 2005-2030

The net supply of non-food use products like fish meal and fish oil will remain at the same level as it was in 1998: 53 000 tonnes.

Production 2005-2030

Capture and aquaculture

Capture production will stay the same as it was in 1998 (31 000 tonnes), aquaculture production will increase slightly but will not make any significant difference to the national supply.

Table 50: Belgium-Lux. - Aquaculture by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	300	296	296	297	301	307	316
Diadromous fish	565	506	493	491	499	516	541
Total gp of species	865	802	789	789	801	824	857

Source: database

Table 51: Belgium-Lux. - Total production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	675	671	671	672	676	682	691
Diadromous fish	700	641	628	626	634	651	676
Marine fish, pelagic, small	229	229	229	229	229	229	229
Marine fish, demersal	29427	29427	29427	29427	29427	29427	29427
Crustaceans	1473	1473	1473	1473	1473	1473	1473
Molluscs	375	375	375	375	375	375	375
Cephalopods	388	388	388	388	388	388	388
Total gp of species	33266	33203	33190	33190	33202	33225	33258

Source: database

Commodities

Production commodities will remain at 1998 levels until 2030 according to the projection assumptions. Therefore, more or less, national plants will produce per year 33 000 tonnes of seafood products. Therefore, national plants will produce approximately 33 000 tonnes of seafood products per annum.

Trade 2005-2030

Imports

As mentioned below, imports will grow substantially for some groups of commodities (fish cured, fish fillets, prepared/preserved fish, crustacean, mol. & other aquatic invertebrate prepared), and slightly decline for some others (cephalopods, fish fresh/chilled, fish frozen, crustacean and molluscs).

Table 52: Belgium - FU Commodities Imports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	9312	8489	8368	8249	8131	8015	7901
Crus., mol. & other aquatic inv., prepared	5034	4826	5152	5500	5872	6269	6693
Crustaceans	61411	64711	63871	63042	62223	61415	60618
Fish, cured	8790	12681	14302	16131	18193	20520	23144
Fish, fillets	43179	61702	64399	67215	70153	73220	76421
Fish, fresh/chilled	70546	77573	75382	73253	71184	69174	67220
Fish, frozen	17483	13090	12330	11613	10939	10304	9705
Molluscs	48670	47518	46813	46119	45435	44762	44098
Prepared/preserved fish	62624	75531	80046	84831	89901	95275	100970
Total FU Imports	327049	366120	370663	375952	382032	388953	396769

Source: database

With regard to species, the changes in apparent consumption (and consequently imports), will have a positive impact on diadromous fish (salmon mainly), tuna, small pelagic fish (like herring and mackerel) and marine fish in general, a negative impact on molluscs, crustaceans, and a neutral impact on freshwater fish.

Table 53: Belgium - FU Commodities Imports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	16301	29195	28967	28773	28615	28493	28405
Diadromous fish	39352	43369	43893	44573	45423	46456	47691
Marine fish, pelagic, tunas	23671	29529	31229	33034	34948	36980	39135
Marine fish, pelagic, small	24372	28631	29739	30981	32365	33903	35606
Marine fish, demersal	67199	76343	78039	79901	81938	84159	86573
Marine fish, others	31728	33510	34593	35781	37082	38502	40048
Crustaceans	61411	64711	63871	63042	62223	61415	60618
Molluscs	52289	50937	50487	50065	49670	49305	48971
Cephalopods	9312	8489	8368	8249	8131	8015	7901
Aquatic animals	1415	1406	1478	1555	1637	1725	1820
Total FU Import	327049	366120	370663	375952	382032	388953	396769

Source: database

Exports

As mentioned earlier, exports will stay at the 1998 level: 160 000 tonnes per year.

DENMARK

Denmark is one of the world's most important fishing nations. The population of Denmark is approximately 5 million. The country's geographically strategic position has allowed it to develop into one of the principal exporters of products based on fishing, aquaculture and processing. Thus it plays a major role in the international supply of fish. Although exports are crucial to Denmark and constitute 95 percent of processed products, there is evidence that fish consumption has slightly increased recently. This has come about partly as a result of a policy to actively promote domestic consumption, and there is a high demand for white fish species. The processing industry is very significant and has adapted in recent years to supply this growing domestic market.

Production: captures, aquaculture and commodities 1989-1998

In 1998, total production of seafood was 1 600 000 tonnes and the production of farmed fish was negligible (FAO, 2000). Approximately 75 percent of this total was for non-food purposes.

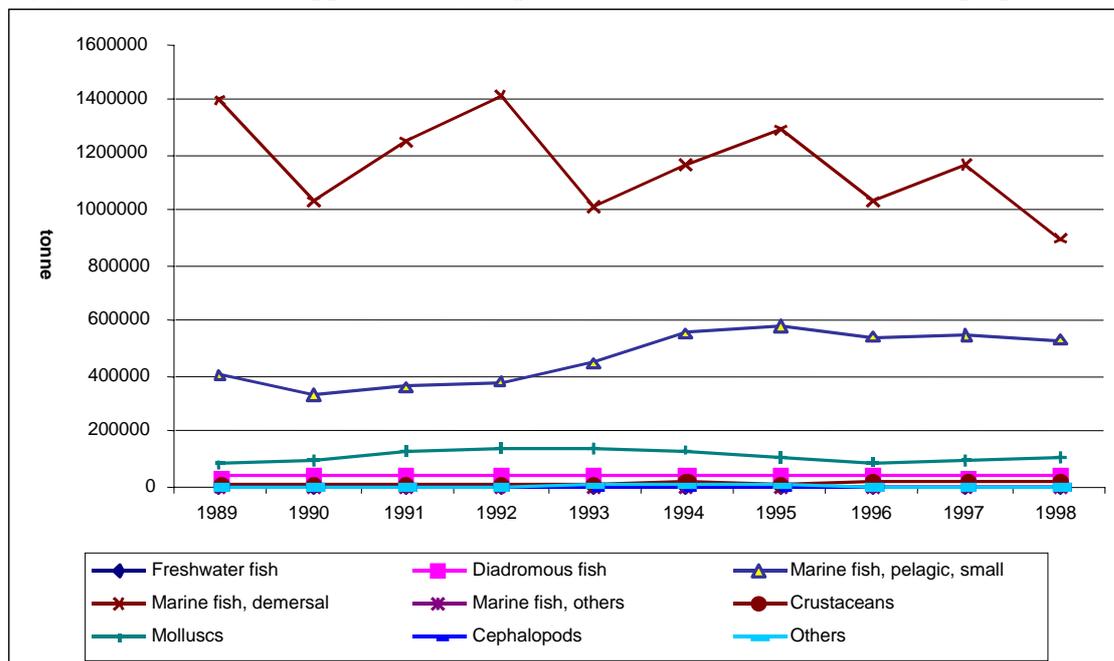


Figure 12: Denmark - Capture and aquaculture production 1989-1998

Captures

Total captures were about 1 560 000 tonnes in 1998. The most important sub-sector, representing about 1 200 000 tonnes of total catches, is the fishery for reduction and non-food uses, targeting mainly industrial demersal species like sandeels and Norway pout and small pelagic species like capelin and sprat (FAO, 2000). Due to the high dependency of production on environmental conditions for these short-lived species, captures are quite erratic over the 1989-1998 period. Cod, herring, mackerel and flatfish species have always dominated the fishery for human consumption and constitute about 400 000 tonnes of catches.

Table 54: Denmark - Captures by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	365	384	421	661	392	276	272	195	280	399	365
Diadromous fish	2873	2650	2297	2304	1840	2119	1680	1436	1412	1203	1981
Marine fish, pelagic, small	403916	336763	362373	382023	451995	558523	580127	544643	548560	528519	469744
Marine fish, demersal	1394877	1028433	1246847	1413694	1009387	1163729	1290747	1033106	1166551	900666	1164804
Marine fish, others	213	238	182	1224	1094	400	545	118	103	116	423
Crustaceans	13910	10785	12894	14325	10579	16184	15123	15945	16512	15972	14223
Molluscs	80022	96391	126083	139178	138946	132068	110525	86016	93392	110328	111295

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	18	32	22	53	5	2	3	2	0	0	14
Others	102	0	92	119	4449	4449	7000	0	0	0	1621
Total gp of species	1896296	1475676	1751211	1953581	1618687	1877750	2006022	1681461	1826810	1557203	1764470

Source: database

Aquaculture

Although the volume of aquaculture production is small compared to that of capture fisheries, Denmark is one of Europe's major aquaculture producers, and by far the principal exporter of trout. The Danish aquaculture sub-sector produced nearly 40 000 tonnes of trout and more than 2 000 tonnes of eels in 1998, constituting an increase of about 10 000 tonnes over the last decade (Rudiger, 1998). The main species reared is the rainbow trout, with some 200 tonnes of sea trout. The Danish trout farming industry has been a pioneer in the development and supply of technology in the European aquaculture industry. Restrictive policies with tight controls on inputs and scales of production put in place in 1989 prevented Danish trout farmers from further increasing their production over the last 15 years (Dalsgaard, 2000).

Table 55: Denmark - Aquaculture by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Diadromous fish	33059	41946	42098	43264	43231	42892	44730	41424	38908	42364	41392
Total gp of species	33059	41946	42098	43264	43231	42892	44730	41424	38908	42364	41392

Source: database

Today, approximately 300 freshwater farms and 40 sea-farms operate in Denmark, generally consisting of many small and medium-sized companies (Dalsgaard, 2000). In addition to trout, there is also a small glass eel fishery, which produces about 1 200 tonnes, mainly for export to Japan.

Commodities production

Food use commodities production

Food use production is mainly oriented toward the value-added for demersal species, through filleting and the preparation of ready to eat commodities. Even if the production of fish fillets has undergone a significant reduction during the recent period it remains one of the main forms of processing for cod and other food use demersal species. Production of prepared/preserved commodities is growing significantly and became the main processing commodities production in 1998 for both demersal species, and small food use pelagic species like herring.

Table 56: Denmark -FU Commodities Production by OECD group of products 1989-98 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	0	0	0	0	0	27	13	1	0	0	4
Crus., mol. & other aquatic inv., prepared	17155	18523	18103	54757	62279	24981	21712	22658	23697	21679	28554
Crustaceans	19143	15785	17589	20001	13144	31999	8020	12357	17353	26769	18216
Fish, cured	40259	47719	61080	44193	36515	34888	35767	43132	46771	46551	43687
Fish, fillets	155541	159331	179065	146035	157995	142940	132147	122295	118129	98443	141192
Fish, fresh/chilled	29454	27264	19988	24348	29341	28037	25938	31985	32659	31602	28062
Fish, frozen	33194	36217	34620	35316	45016	36278	35954	53482	52024	50196	41230
Molluscs	12359	19487	49177	49602	24620	14491	18490	22083	28976	38770	27805
Prepared/preserved fish	78275	80830	107733	105353	115198	100051	98751	118302	118185	117625	104030
Total FU Production	385380	405155	487356	479606	484107	413690	376793	426294	437794	431636	432781

Source: database

Main processed species groups are small pelagic fish such as herring and mackerel, diadromous species like salmon and trout, and demersal species such as cod and halibut. The tendency over the last ten years has been towards a reduction of demersal species used in processing, due in part of a reduction of landings and import supply difficulties (cod for example was not available on the European, North American or even Russian export markets at a convenient price for the Danish

industry (Anon., 2001b)). Eating habits of Danish consumers regarding blue fish like herring and mackerel has lead to an increased production of marinades and other prepared and preserved commodities.

Table 57: Denmark - FU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	445	424	902	1119	1191	807	758	2020	1838	1098	1060
Diadromous fish	44934	48167	53299	48438	57257	59161	63378	81992	96404	99534	65256
Marine fish, pelagic, tunas	0	37	38	119	132	23	21	0	0	0	37
Marine fish, pelagic, small	108715	111609	145128	129815	139526	107812	118513	117699	118268	119882	121697
Marine fish, demersal	131849	143594	154091	122924	135232	134548	114544	109636	96382	80397	122320
Marine fish, others	50781	47529	49028	52831	50725	39842	31342	57849	54876	43507	47831
Crustaceans	25736	22659	26380	52426	55415	36021	12827	19699	24251	33132	30855
Molluscs	22921	31136	58489	71934	44627	35450	35396	37398	45775	54086	43721
Cephalopods	0	0	0	0	0	27	13	1	0	0	4
Total FU Production	385380	405155	487356	479606	484107	413690	376793	426294	437794	431636	432781

Source: database

Non-food use commodities production

Denmark has the largest industrial fishing sub-sector in the EU. The majority of Danish capture and import tonnages are used by industry for reduction into fish meal and fish oil, mainly for export. The production of non-food use has fluctuated around 1.3 Mt per year over the last ten-year period, with peaks at 1.6 Mt.

Table 58: Denmark - NFU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	234560	185358	241324	341455	192719	275049	335626	230635	241524	222749	250100
Flour, meal unfit for human cons.	1333643	946866	1063795	1228146	984067	1203573	1272739	1010082	1137885	1035248	1121605
Total NFU Production	1568203	1132224	1305119	1569601	1176786	1478622	1608365	1240717	1379410	1257998	1371704

Source: database

Demersal species like Norwegian pout and sandeels and small pelagic species like sprat and capelin are the main species used for fish reduction in Denmark. Production of flour and oil is highly dependant on national production since imports are only 7 percent of the national production. Therefore, fluctuations in captures have direct repercussions on the fish reduction commodity production.

Table 59: Denmark - NFU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, demersal	1314859	934857	1053025	1224393	984067	1203573	1272739	1010082	1137885	1035248	1117073
Marine fish, pelagic, small	253344	197367	252094	345208	192719	275049	335626	230635	241524	222749	254632
Total NFU Production	1568203	1132224	1305119	1569601	1176786	1478622	1608365	1240717	1379410	1257998	1371704

Source: database

Non-food use: trade and net supply 1989-1998

From 1989 to 1998, imports were on average 194 000 tonnes whilst exports were 1.3 Mt. Denmark is the main fish reduction commodities provider to the other EU member states. Globally, exports follow production trends while imports don't seem to be directly linked to fish reduction production.

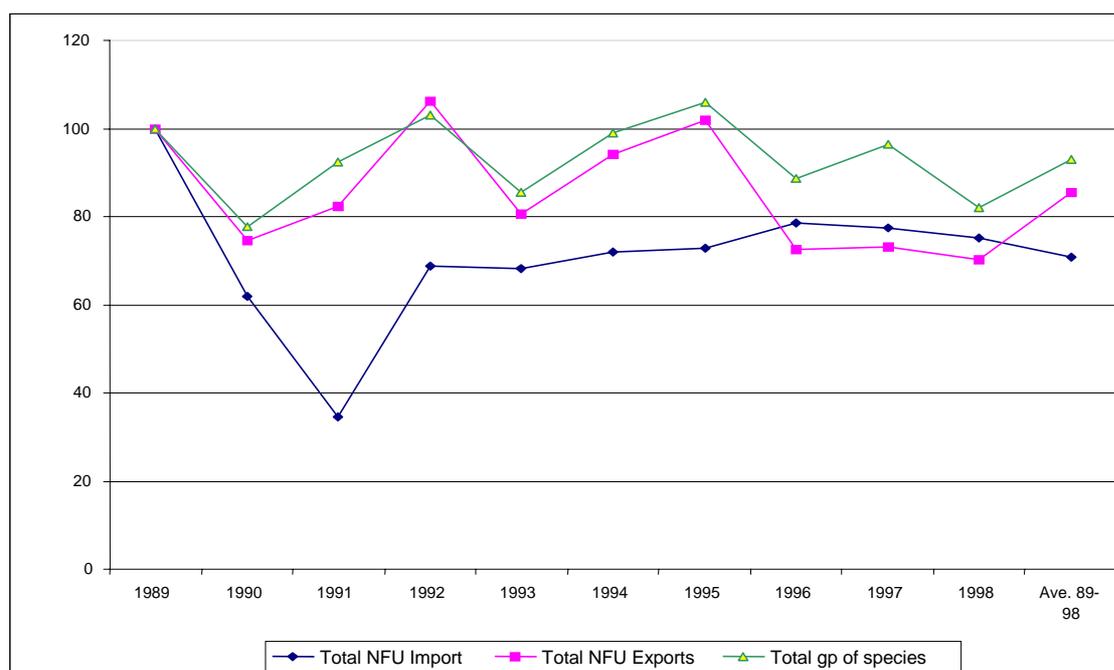


Figure 13: Denmark - NFU production, imports, exports evolution (index 100 in 1989)

Non-food use imports

Danish non-food use imports concern mostly fishmeal and some oil (see table below) as well as offal from the human consumption fish that do not figure here. Imports come from Iceland, Norway and the Faroe Islands, and within EU-15, from Germany and Sweden that provide gateways to the Baltic States' distant fleet. After an increase in 1992, non-food use fish commodities imports have remained stable under 100 000 tonnes.

Table 60: Denmark - NFU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	40026	41106	31637	37038	39963	8901	5596	5360	11460	6791	22788
Flour, meal unfit for human cons.	93084	41203	14449	54353	50735	86840	91474	99066	91391	93212	71581
Total NFU Imports	133110	82309	46086	91391	90698	95741	97070	104426	102851	100002	#94368

Source: database

Table 61: Denmark - NFU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, demersal	14696	31048	13422	53254	50715	13523	19390	25737	15603	15940	25333
Marine fish, pelagic, small	118402	51158	32652	36308	39984	82174	77040	78672	87243	84059	68769
Aquatic animals	0	0	0	0	0	42	124	15	4	4	19
Aquatic mammals	12	103	12	1829	0	2	516	2	0	0	248
Total NFU Import	133110	82309	46086	91391	90698	95741	97070	104426	102851	100002	94368

Source: database

Non-food use exports

An important part of the Danish non-food use production and imports are exported as higher-grade meal and oil. Within the EU-15, Danish exports service the steady demand from aquaculture in most member states, notably Italy, Spain, the UK and France, as well as from Norway, Japan and Poland.

Table 62: Denmark - NFU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	205850	214490	262098	336323	227652	269667	340279	233333	251681	229348	257072

Flour, meal unfit for human cons.	1276991	889422	958507	1239858	966920	1125776	1172335	841562	832322	811018	1011471
Total NFU Exports	1482841	1103912	1220605	1576181	1194572	1395443	1512614	1074894	1084003	1040366	1268543

Source: database

Table 63: Denmark - NFU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, demersal	1116038	873791	940970	1238628	964965	1053350	1164934	826737	828895	787640	979595
Marine fish, pelagic, small	366801	230118	279632	337303	229607	342086	347558	248157	255107	252724	288909
Aquatic animals	0	0	0	0	0	5	123	0	1	2	13
Aquatic mammals	2	3	3	250	0	1	0	0	0	0	26
Total NFU Export	1482841	1103912	1220605	1576181	1194572	1395443	1512614	1074894	1084003	1040366	1268543

Source: database

Non-food use net supply

The net supply has been almost 200 000 tonnes during the 1989-1998 period, with an increase after 1995 for meal, and a net decrease for fish oil after 1994 that matches a decrease in imports.

Table 64: Denmark - NFU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish/marine mammal, fat, oil		68736	11973	10864	42170	5030	14283	942	2662	1303	15816
Flour, meal unfit for human consumption	149736	98647	119737	42641	67882	164638	191878	267586	396954	317442	181714
Total NFU net supply		218472	110621	130600	84811	72912	178921	192820	270248	398257	197530

Source: database

The fluctuations in species groups over the years is linked to fluctuations in ocean climate as well as heavy regulatory pressure.

Table 65: Denmark - NFU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, demersal	213517	92114	125477	39019	69817	163746	127195	209082	324594	263548	162811
Marine fish, pelagic, small	4945	18407	5114	44213	3095	15137	65108	61150	73660	54084	34491
Aquatic animals	0	0	0	0	0	37	1	15	3	2	6
Aquatic mammals	10	100	9	1579	0	1	516	2	0	0	222
NFU net supply	218472	110621	130600	84811	72912	178921	192820	270248	398257	317634	197530

Source: database

Market for human consumption

Trade

Denmark is the main exporter of fish products for human consumption and the main producer and exporter of fishmeal in the EU – the fourth largest exporter of fisheries products in the world (Anon., 2001m). It should be noted that the value of fish landings for human consumption is more than twice the value of fish landings for reduction. For human consumption products, exports were 800 000 tonnes on average in 1989-98 and imports were 490 000 t. In terms of value, Denmark imported DKK 7.7 millions worth of food use commodities production in 1997, while exports amounted to DKK 1.7 millions (OECD, 2000).

A large share of Danish imports is destined to be re-exported. A substantial part of the fish caught for human consumption and landed in Denmark is exported unprocessed as whole fresh fish or as fresh fillets. The Danish processing industry makes a variety of products, including frozen retail packed commodities and canned products, primarily of herring, mackerel and blue mussels (FAO, 2000). Over the last few years the processing industry has attempted to develop new techniques and products in response to limited supplies of raw product (Urch, 1998).

Food use imports

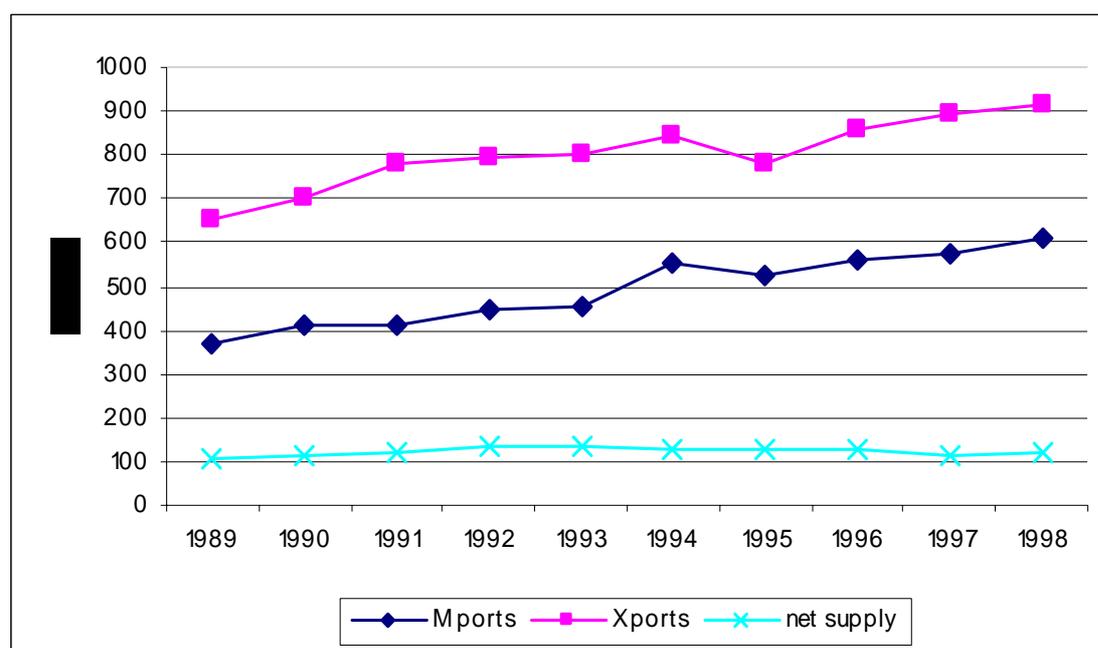


Figure 14: Denmark - Food use trade and net supply

With a fairly stable net supply the growth in imports is explained by the very high level of re-exportation (see figure above), confirming Denmark as a prime fish trader. Danish food use commodities imports have been increasing steadily since the beginning of the decade from their 1989 level of 370 000 tonnes to reach 600 000 tonnes in 1998. Fresh fish represents 45 percent on average of total imports and has seen its exported volume double since the beginning of the decade. Fresh fish imports are not directed towards the domestic market but mostly consist in re-exportation. Crustaceans come next with 80 000 tonnes followed by frozen fish with 70 000 tonnes.

Table 66: Denmark - FU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	193	137	97	132	238	730	1120	1147	1544	1310	665
Crus., mol. & other aquatic inv., prepared	80	129	53	762	948	1151	645	1240	1219	998	723
Crustaceans	70495	69898	73301	68529	66324	103023	84570	99274	99486	93180	82808
Fish, cured	18242	19960	13940	20874	29723	52493	50308	53380	47553	33899	34037
Fish, fillets	54146	55858	43018	49493	50805	59279	55221	57429	54842	71021	55111
Fish, fresh/chilled	154806	179048	169957	180517	200383	235923	246264	258815	271895	306103	220371
Fish, frozen	55409	68126	90795	107879	76085	72009	59321	54973	59307	64367	70827
Molluscs	3297	2370	2276	1637	1669	2589	2486	2094	1695	2259	2237
Prepared/preserved fish	13804	14538	14454	20175	26609	28428	26496	31475	33915	33729	24362
Total FU Imports	370473	410065	407891	449997	452784	555624	526430	559828	571457	606866	491142

Source: database

Demersal species such as cod, saithe, haddock and plaice account for the bulk of Danish food use imports. Cod imports amounted to more than 100 000 tonnes in 1998. Pelagic imports are mostly made of herring and mackerels, while shrimps, prawns and Norway lobsters are the most important crustaceans imported. Salmon and trout represent the majority of diadromous fish imported by Denmark.

Table 67: Denmark - FU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	485	306	541	1171	2319	2263	1655	1640	2151	2235	1477

Diadromous fish	23494	31919	42525	48911	52606	65374	88162	96862	110910	123055	68382
Marine fish, pelagic, tunas	681	5065	5372	7496	5958	7082	6230	6007	7742	6399	5803
Marine fish, pelagic, small	66770	93250	93550	92285	109240	127781	121424	117314	120634	161685	110393
Marine fish, demersal	186011	191097	174419	204238	190356	213991	191872	206046	199009	186456	194350
Marine fish, others	18965	15893	15757	24835	23126	31640	28266	28204	27065	29288	24304
Crustaceans	70495	69898	73301	68529	66324	103023	84570	99274	99486	93180	82808
Molluscs	3378	2500	2329	2400	2617	3740	3131	3333	2915	3257	2960
Cephalopods	193	137	97	132	238	730	1120	1147	1544	1310	665
Total FU Import	370473	410065	407891	449997	452784	555624	526430	559828	571457	606866	491142

Source: database

Food use exports

Danish food use exports have been growing from the 1989 level of 650 000 tonnes to reach 915 000 in 1998. The main export commodity is fresh fish, accounting for 200 000 tonnes on average (which nearly corresponds to the level of imported fresh fish). The trend in exports of fresh fish quite clearly follows the trend in fish imports, which confirms the high level of re-exportation in Denmark. The second biggest commodity is fish fillets, which account for 180 000 tonnes on average. However, fish fillets have seen their volume decrease from 200 000 tonnes at the beginning of the decade, to 130 000 tonnes in 1998. Frozen fish and crustaceans follow, with 100 000 tonnes and 95 000 tonnes respectively.

Table 68: Denmark - FU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	54	29	54	59	138	558	914	1112	1465	1307	569
Crus., mol. & other aquatic inv., prepared	8069	9246	9293	22995	23805	23886	21151	12002	11389	14491	15633
Crustaceans	89317	82039	86168	79596	72955	110727	86378	107308	114579	118307	94737
Fish, cured	54881	66016	69761	61865	57650	86126	82839	96472	92149	79608	74737
Fish, fillets	203845	205295	217310	189557	203124	198534	171648	141081	129071	130304	178977
Fish, fresh/chilled	129758	128712	158368	145760	189706	192178	201699	263691	287574	304836	200228
Fish, frozen	80280	102519	98172	137332	119905	98246	82626	79507	97332	111327	100725
Molluscs	13213	20776	50705	51076	21633	13703	16644	22225	29929	39694	27960
Prepared/preserved fish	72723	85200	88246	103592	114540	116861	115117	133372	130274	115182	107511
Total FU Exports	652140	699833	778078	791831	803457	840819	779016	856771	893763	915058	801076

Source: database

The main species exported from Denmark are salmon (diadromous), Atlantic herring (small pelagic), cod, haddock, plaice and saithe (demersal), shrimps and prawns (crustaceans) and mussels (molluscs).

Table 69: Denmark - FU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	842	724	1390	1840	2933	2950	2409	3464	3832	3221	2360
Diadromous fish	56647	61996	71543	80338	109417	110002	106568	123310	152730	179363	105191
Marine fish, pelagic, tunas	169	187	93	220	728	292	575	633	1032	551	448
Marine fish, pelagic, small	155607	179134	218904	221555	244736	233619	231839	207216	214927	237225	214476
Marine fish, demersal	279697	288575	275385	260274	258440	282911	253564	293571	282217	250839	272547
Marine fish, others	48525	57127	64542	73878	68672	62170	58974	85929	81662	70058	67154
Crustaceans	89317	82039	86168	79596	72955	110727	86378	107308	114579	118307	94737
Molluscs	21282	30022	59998	74071	45439	37589	37795	34227	41318	54185	43593
Cephalopods	54	29	54	59	138	558	914	1112	1465	1307	569
Total FU Export	652140	699833	778078	791831	803457	840819	779016	856771	893763	915058	801076

Source: database

The major importers of Danish seafood are Germany (whole and smoked salmon, prawns, frozen saithe and herring), the UK (prawns, frozen cod and ready made meals), France (whole salmon, prawns and fresh cod), Italy (Norway lobster, prawns, smoked salmon and fresh cod) and the

Netherlands (Clink, 2000). Important non-EU markets are Japan, Switzerland and the USA. The main importer of Danish aquaculture products is Germany, representing 66 percent of all trout exports, for instance (Rudiger, 1998).

Food use net supply and consumption

Danish net supply was estimated at 130 000 tonnes per year (live weight) on average over the period 1989-98. The relative low level of the net supply compared to the level of imports and exports confirm Denmark as a major fish-trading nation. The main commodity of the Danish net supply is fresh fish with an average of 50 000 tonnes, followed by prepared/preserved commodities and fish fillets with 20 000 and 17 000 tonnes a year respectively between 1989 and 1998.

Table 70: Denmark - FU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	139	108	43	72	100	199	219	36	79	3	100
Crus., mol. & other aquatic inv., prepared	9166	9407	8863	32525	39421	2247	1206	11895	13527	8186	13644
Crustaceans	321	3644	4722	8934	6513	24294	6213	4323	2260	1642	6286
Fish, cured	3620	1662	5259	3203	8588	1255	3236	40	2174	842	2988
Fish, fillets	5841	9893	4773	5970	5676	3684	15719	38642	43900	39160	17326
Fish, fresh/chilled	54502	77600	31578	59106	40018	71782	70503	27109	16980	32870	48205
Fish, frozen	8324	1825	27243	5863	1196	10040	12649	28948	14000	3236	11332
Molluscs	2444	1081	747	163	4656	3376	4332	1951	742	1335	2083
Prepared/preserved fish	19356	10168	33941	21936	27267	11618	10130	16405	21827	36172	20882
Total FU net supply	103713	115387	117170	137772	133434	128495	124207	129351	115488	123444	122846

Source: database

The main species consumed in Denmark are salmon (diadromous), cod saithe and halibut (demersal), herring and mackerel (small pelagic), shrimps (crustaceans) and scallops (molluscs).

Table 71: Denmark - FU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	88	6	53	451	578	119	4	196	157	112	176
Diadromous fish	11781	18090	24281	17011	446	14533	44972	55544	54584	43226	28447
Marine fish, pelagic, tunas	513	4915	5318	7395	5363	6814	5677	5373	6711	5848	5393
Marine fish, pelagic, small	19878	25726	19774	545	4030	1974	8098	27797	23976	44342	17614
Marine fish, demersal	38163	46116	53126	66889	67148	65628	52853	22111	13173	16014	44122
Marine fish, others	21222	6295	243	3788	5179	9311	634	124	280	2737	4981
Crustaceans	6914	10518	13513	41359	48784	28316	11019	11665	9158	8005	18925
Molluscs	5017	3614	819	263	1806	1601	731	6504	7372	3158	3088
Cephalopods	139	108	43	72	100	199	219	36	79	3	100
FU net supply	103713	115387	117170	137772	133434	128495	124207	129351	115488	123444	122846

Source: database

Although the per capita consumption over the same period was 21 kg per capita per year, the consumption of shellfish, fish and fish products is relatively low compared to most EU countries. In 1997, according to the FAO, fish represented 10 percent of daily consumption (FAO, 1999). However, the Danish market for seafood has recently shown a positive development, with a continued increase in demand for cod and other white fish (Danish Fish Marketing Board, 1999). In part, this can be attributed to an increase in health awareness, along with better diet made possible by improved incomes in Denmark over the last 25 years (Clink, 2000).

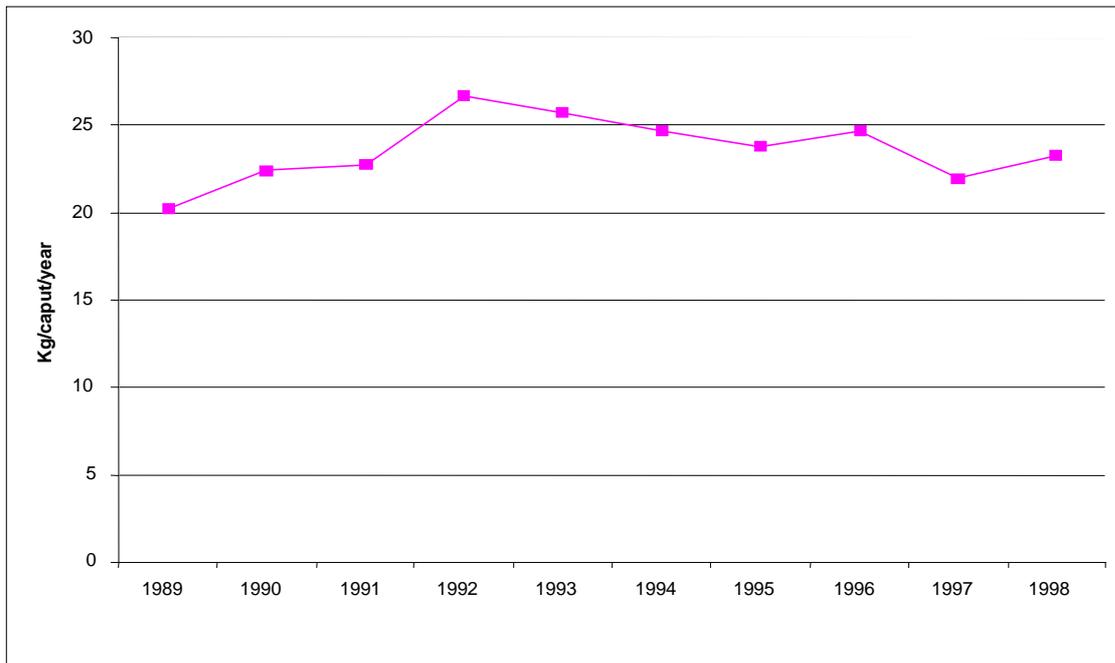


Figure 15: Fish consumption per capita per year in Denmark 1989-1998

Over the years the Danish seafood industry has largely concentrated on exporting its production. Now the Danish industry is focusing more on domestic consumption. A massive EU-funded campaign promoting a range of seafood was launched in 1996. The target of the campaign was to increase domestic shellfish and fish consumption by 25 percent and in 1999, the Danish Fish Marketing Board said that the success of this campaign can be measured by a reported 15 percent increase in fish consumption among Danish households since 1996 (Moustgaard, 1997). With regards to the aquaculture industry, it is hoped that a new niche will be found in the market for organically-reared fish (Dalsgaard, 2000).

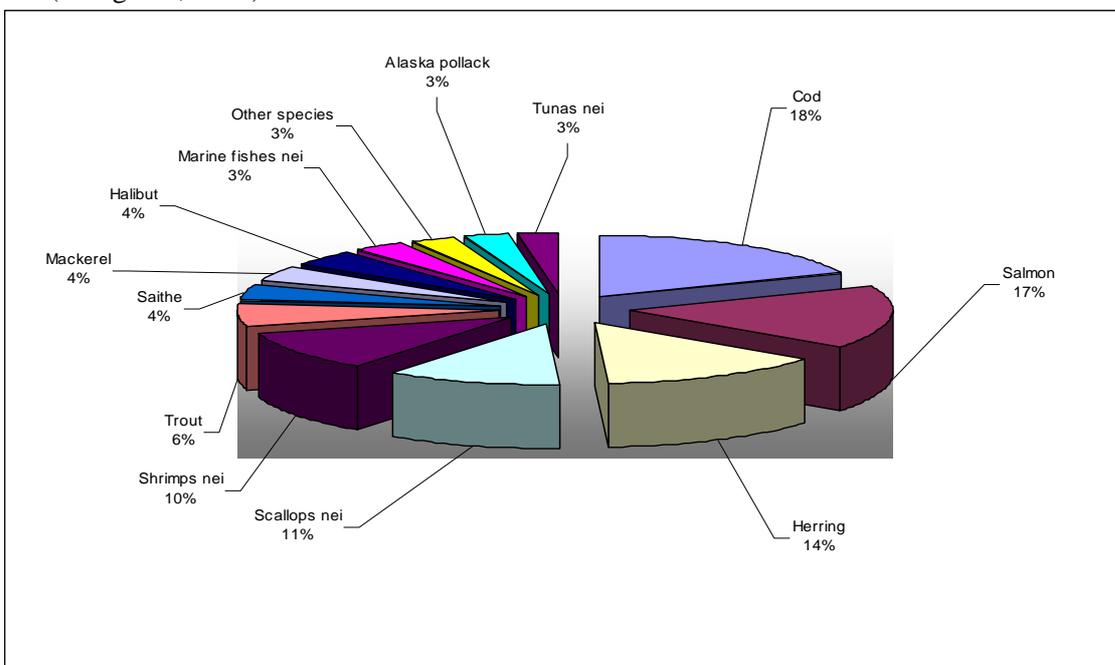


Figure 16: Denmark - Main species consumed in 1998

Assumptions for projection 2005-2030

Consumption trends for the OECD group of products form the basis of the model's assumptions (see methodology in Part One of the study). Further assumptions regarding production, imports and exports and the need for fish in Denmark between 2005 and 2030 take into account and extrapolate previous trends.

Denmark's main consumption trends for the period 2005-2030 ("Cons T 1999-2030" and last column "Annual Cons %" in next Table) assume:

An increase in demand for fish fillets, frozen fish and, to a lesser extent, for prepared crustaceans and molluscs;

A decrease in demand for traditional cured fish products and fresh crustaceans;

A stagnation of the demand for all other commodities groups.

Seafood consumption will be positively influenced in Denmark by the increasing health awareness of Danish consumers (Clink, 2000). Fish is being perceived as an important part of a healthy and well-balanced diet, and this perception is being emphasised by the Danish media (Kristensen, 2002). The growing importance of supermarket chains in seafood retailing is also likely to have a positive influence on seafood consumption by ensuring lower prices, and better distribution and hygiene standards (Kristensen, 2002).

Table 72: Denmark - Assumptions for projection

OECD group	94-98%	Annual %	Prod % 99-30	T Imp % 99-30	T Exp % 99-30	T Cons 99-30	T Prod Annual	% Imp Annual	% Exp Annual	Cons Annual %
Cephalopods	-57%	-11%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Crus., mol. & other aquatic inv., prepared	58%	12%	0%	168%	0%	20%	0.0%	3.1%	0.0%	0.6%
Crustaceans	-267%	-53%	0%	-1%	0%	-50%	0.0%	0.0%	0.0%	-1.3%
Fish, cured	-171%	-34%	0%	-3%	0%	-100%	0.0%	-0.1%	0.0%	-2.2%
Fish, fillets	366%	73%	20%	0%	0%	50%	0.6%	0.0%	0.0%	1.3%
Fish, fresh/chilled	-69%	-14%	20%	0%	0%	0%	0.6%	0.0%	0.0%	0.0%
Fish, frozen	52%	10%	0%	34%	0%	50%	0.0%	0.9%	0.0%	1.3%
Molluscs	-186%	-37%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Prepared/preserved fish	-350%	-70%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Fish/marine mammal, fat, oil	123%	25%	0%	0%	0%		0.0%	0.0%	0.0%	0.0%
Flour, meal unfit for hum. Cons.	-7%	-1%	0%	0%	0%		0.0%	0.0%	0.0%	0.0%

Source: database

Consumer demand increases with an apparent per capita consumption rise from 24 in the 1994-98 reference period to 29 kg per capita per year in 2030. Over the 2005 to 2030 simulation period, exports remain stable, imports increase, fish production of fillets and fresh increase slightly (see tables below).

Table 73: Denmark - Main results for projection

Nature	Average 94-98	2005	2010	2015	2020	2025	2030
Exports FU (t live wt)	857085	915058	915058	915058	915058	915058	915058
Imports FU (t live wt)	564041	610941	614054	617348	620836	624532	628450
Production FU (t live wt)	417241	435656	438628	441685	444831	448068	451398
Fish supply FU (t live wt)	124197	131540	137624	143976	150610	157542	164790
Population (X1000)	5245	5386	5452	5489	5526	5563	5601
Per caput supply (kg/h)	24	24	25	26	27	28	29
Production NFU (t live wt)	1393022	1257998	1257998	1257998	1257998	1257998	1257998
Imports NFU (t live wt)	100018	100002	100002	100002	100002	100002	100002
Exports NFU (t live wt)	1221464	1040366	1040366	1040366	1040366	1040366	1040366
Net supply NFU (t live wt)	271576	317634	317634	317634	317634	317634	317634
Aquaculture (t live wt)	42064	45565	48013	50604	53347	56252	59328
Capture (t live wt)	1789849	1789849	1789849	1789849	1789849	1789849	1789849
Production total (t live wt)	1831913	1835414	1837862	1840453	1843197	1846101	1849177

Source: database

Food use net supply and human consumption 2005-2030

Danish food use net supply will increase by 25 percent over the period considered to reach 165 000 tonnes by 2030. The refurbishing of the only Danish fishmarket in Copenhagen has been well accepted by consumers and is seen as a positive reinforcement of the efforts to boost consumption of fish and fish products (Anon., 2003d).

The changes in consumer demand assumed for various commodities, based on the evolution of the market during the last years of the past decade, lead to some redistribution between production groups, with a net increase of the fish fillets and frozen fish groups. Prepared molluscs consumption also increases but in a lesser way, while cured fish and fresh crustaceans consumption is on a downward trend.

Table 74: Denmark - FU net supply by OECD group of commodities 2005-2030 (tonne live weight)

Gp of commodities	Ave. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	107	3	3	3	3	3	3
Crus., mol. & other aquatic inv., prepared	7412	8426	8632	8873	9154	9481	9863
Crustaceans	7746	1463	1336	1209	1082	955	829
Fish, cured	1509	655	523	391	259	128	2
Fish, fillets	28221	43165	46126	49172	52306	55530	58848
Fish, fresh/chilled	43849	32885	32896	32907	32919	32931	32943
Fish, frozen	13775	7436	10602	13915	17380	21006	24799
Molluscs	2347	1335	1335	1335	1335	1335	1335
Prepared/preserved fish	19230	36172	36172	36172	36172	36172	36172
Total FU net supply	124197	131540	137624	143976	150610	157542	164790

Source: database

Main species affected by the increase will be found under the small pelagic (herring, mackerel) and diadromous (salmon, trout) group of species, while crustaceans will be the only group to decrease.

Table 75: Denmark - FU net supply by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	118	156	188	221	255	290	326
Diadromous fish	42572	44413	45299	46217	47169	48156	49179
Marine fish, pelagic, tunas	6085	5859	5868	5876	5885	5895	5905
Marine fish, pelagic, small	21237	46845	48705	50628	52617	54673	56799
Marine fish, demersal	33956	20278	23478	26811	30285	33904	37675
Marine fish, others	2617	2762	2781	2803	2826	2851	2878
Crustaceans	13633	7826	7699	7572	7445	7318	7192
Molluscs	3873	3398	3604	3845	4125	4452	4834
Cephalopods	107	3	3	3	3	3	3
FU net supply	124197	131540	137624	143976	150610	157542	164790

Source: database

The apparent per capita consumption will increase from 25 to reach nearly 30 kg per capita per year by 2030, as the net supply will grow by more than 30 percent while the Danish population will increase by a mere 6 percent between 2005 and 2030. Seafood consumption will increase thanks to consumer perception influenced by the media that continues to stress that eating fat fish is healthy, with some even reported saying that eating fat fish once or twice a week reduce the likelihood of senility by as much as 35 percent. In addition supermarket shares in the distribution of seafood increase: while they accounted for about 15 percent of the sales just a few years ago, their share is now estimated at about 50%. Their influence on consumption is through ensuring lower prices and higher quality through fast sales and special packing (Kristensen, 2002).

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Molluscs	106466	106466	106466	106466	106466	106466	106466
Cephalopods	1	1	1	1	1	1	1
Others	2290	2290	2290	2290	2290	2290	2290
Total gp of species	1831913	1835414	1837862	1840453	1843197	1846101	1849177

Source: database

Commodities

The future competitiveness of the commodities production sector will depend on continued sustainability, product innovation and development, as well as finding and developing new markets. The enlargement of the European Union will therefore bring some opportunities, in terms of new markets, but is also likely to increase competition for some products (Clink, 2003). Commodities production is thus expected to rise slightly to reach 450 000 tonnes by 2030. The predicted increase in trout farming (diadromous) will also lead to some increase in fish production (fresh, fillets).

Table 78: Denmark - FU Commodities Production by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	8	0	0	0	0	0	0
Crus., mol. & other aquatic inv., prepared	22945	21679	21679	21679	21679	21679	21679
Crustaceans	19300	26769	26769	26769	26769	26769	26769
Fish, cured	41422	46551	46551	46551	46551	46551	46551
Fish, fillets	122791	102448	105409	108455	111589	114814	118131
Fish, fresh/chilled	30044	31617	31628	31640	31652	31664	31676
Fish, frozen	45587	50196	50196	50196	50196	50196	50196
Molluscs	24562	38770	38770	38770	38770	38770	38770
Prepared/preserved fish	110583	117625	117625	117625	117625	117625	117625
Total FU Production	417241	435656	438628	441685	444831	448068	451398

Source: database

Table 79: Denmark - FU Commodities Production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	1304	1141	1172	1205	1238	1273	1308
Diadromous fish	80094	100233	100751	101283	101831	102394	102974
Marine fish, pelagic, tunas	9	0	0	0	0	0	0
Marine fish, pelagic, small	116435	121702	123048	124432	125857	127322	128830
Marine fish, demersal	107101	81854	82931	84040	85180	86353	87560
Marine fish, others	45483	43507	43507	43507	43507	43507	43507
Crustaceans	25186	33132	33132	33132	33132	33132	33132
Molluscs	41621	54086	54086	54086	54086	54086	54086
Cephalopods	8	0	0	0	0	0	0
Total FU Production	417241	435656	438628	441685	444831	448068	451398

Source: database

Trade 2005-2030

With a flat production curve over the 2005 to 2030 period, increased consumer demand is met mostly by increased imports (frozen fish, prepared molluscs), except for those commodities group that are growing less popular (cured fish, fresh crustaceans). Imports are assumed to increase only slightly as heavy fluctuations are going to affect the raw material supply upon which the Danish industry is so dependent (Anon., 2001m).

Imports

Danish food use commodities imports will slowly increase to reach around 630 000 tonnes by 2030. Prepared molluscs will be the commodities rising the most swiftly with a more than two fold increase. Frozen fish are also on the increase while cured fish and fresh crustaceans imports decrease slightly.

However, these changes will not be significant enough to affect the overall pattern of imports, with fresh and chilled fish remaining the main commodities imported in Denmark.

Table 80: Denmark - FU Commodities Imports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	1170	1310	1310	1310	1310	1310	1310
Crus., mol. & other aquatic inv., prepared	1051	1238	1445	1685	1966	2293	2675
Crustaceans	95907	93002	92874	92747	92620	92494	92367
Fish, cured	47527	33713	33580	33448	33317	33186	33055
Fish, fillets	59558	71021	71021	71021	71021	71021	71021
Fish, fresh/chilled	263800	306103	306103	306103	306103	306103	306103
Fish, frozen	61995	68567	71733	75046	78512	82137	85930
Molluscs	2224	2259	2259	2259	2259	2259	2259
Prepared/preserved fish	30809	33729	33729	33729	33729	33729	33729
Total FU Imports	564041	610941	614054	617348	620836	624532	628450

Source: database

The main species to be affected by the rise in imports will be herring (small pelagic), cod, Greenland halibut and redfish (demersal), salmon (diadromous) and mussels (molluscs).

Table 81: Denmark - FU Commodities Imports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	1989	2236	2236	2237	2238	2238	2239
Diadromous fish	96873	123543	123911	124297	124701	125125	125568
Marine fish, pelagic, tunas	6692	6410	6419	6427	6436	6446	6456
Marine fish, pelagic, small	129768	162368	162882	163421	163985	164576	165194
Marine fish, demersal	199475	189263	191386	193611	195944	198390	200953
Marine fish, others	28892	29313	29332	29354	29377	29402	29429
Crustaceans	95907	93002	92874	92747	92620	92494	92367
Molluscs	3275	3497	3703	3944	4224	4552	4934
Cephalopods	1170	1310	1310	1310	1310	1310	1310
Total FU Import	564041	610941	614054	617348	620836	624532	628450

Source: database

Exports

Exports are assumed to remain the same as for the 1994-98 simulation reference period. In 2001, exports of processed fish for consumption were already reported to be stagnating (Anon., 2001m). However, it is important to remember that the assumptions of the model do not take re-exportations into account. Exports are only considered to emanate from a surplus of domestic production and influence of international trade is not reflected in the model, hence a stagnation of exports over the period considered.

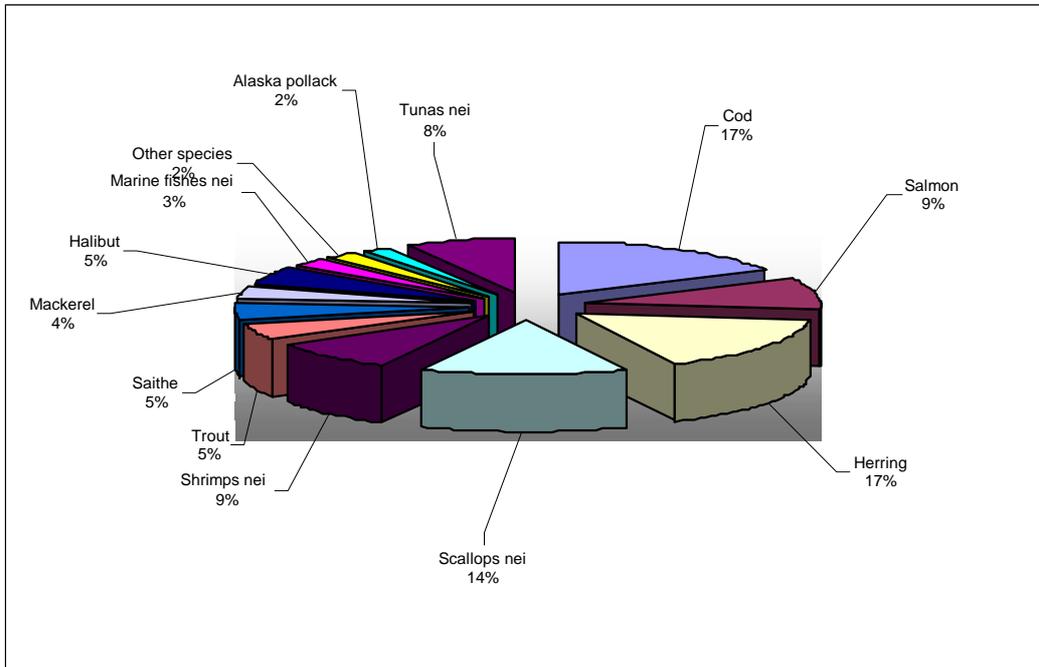


Figure 18: Denmark - Main species consumed in 2030

FINLAND

Finland is known as the land of a thousand lakes and Europe's largest producer and consumer of wild freshwater fish, but it also has a substantial coastline and marine/freshwater fishery. The population is approximately 5 million and fish provides a principal part of the national diet. Finland does not, however, possess an oceanic fishery or large markets due to its geographic position and the sector concentrates on supplying the national population that has a heritage of fish consumption. This heritage is reflected in the fact that nearly 2 million Finns are recreational fishers. The fisheries sector is characterised by a high demand for small Baltic herring for feed within the fur farming industry and the high value and production of inland species such as European perch, pike and vendace.

Production: captures, aquaculture and commodities 1989-1998

Finnish production was approximately 197 000 tonnes (live weight) in 1998, with aquaculture representing nearly 8 percent of this total. The extent of leisure and non-commercial exploitation is uncertain, but Ahvonen (1998) suggests that there may be an unofficial supply of domestic salmon of up to 33%. Several species and products such as lamprey and the roe of vendace, burbot, lumpfish and capelin, are quite specific to Finland and rarely produced elsewhere in the EU (Monfort, 1998).

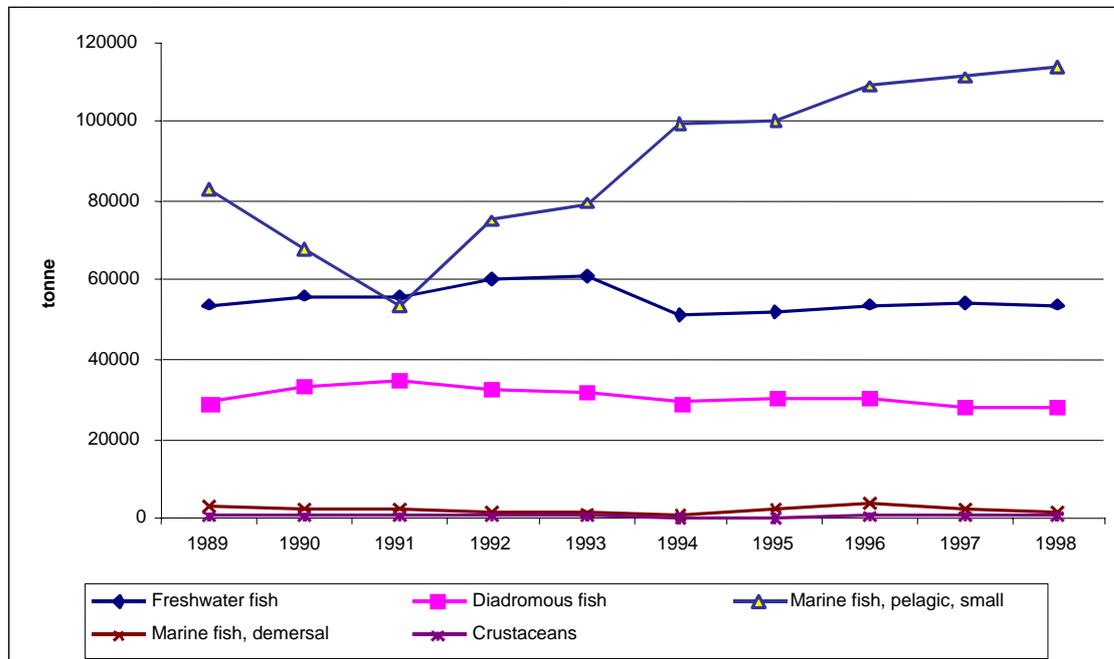


Figure 19: Finland - Capture and aquaculture production 1989-1998

Captures

In 1998 captures were 181 000 tonnes and the highest volumes came from marine fishing. The majority of marine captures were Baltic herring and sprat.

Table 82: Finland - Captures by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	53715	56045	56045	60356	60701	51009	51821	53665	54181	53872	55141
Diadromous fish	10511	14925	15845	14531	14470	12521	13035	12432	12050	11699	13202
Marine fish, pelagic, small	83051	67910	53315	74943	79439	99455	100001	108899	111395	113769	89218
Marine fish, demersal	2893	2495	2506	1561	1322	1093	2436	3854	2245	1737	2214
Crustaceans	366	458	458	362	362	191	191	227	227	227	307
Total gp of species	150536	141833	128169	151753	156294	164269	167484	179077	180098	181304	160082

Source: database

Inland fisheries account for 20 percent of the total production (Hempel, 1999) and Finland is Europe's biggest producer of wild-caught freshwater species. In 1996, 62 000 tonnes of inland fish were harvested, representing over a third of all EU production (Rudiger, 1998). The main species caught are the European perch, northern pike and vendace. European whitefish is also an important species. Recreational fisheries, covering both traditional fishing for household consumption and more modern forms of sport fishing, are popular in Finland. According to FAO, captures are approximately 40 000-50 000 tonnes per year (FAO, 1999).

Aquaculture

Aquaculture developed rapidly in the 1980s and reached 19 000 tonnes by 1991. Production has declined slowly since then, to approximately 16 000 tonnes in 1998. Finish aquaculture production consists mainly of rainbow trout but there are also 122 crayfish farms providing product for the domestic market (Yrjölä, 2000).

Table 83: Finland - Aquaculture by FAO group by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	0	72	2	36	16	36	76	57	50	39	38
Diadromous fish	18479	18321	19123	17788	17510	16646	17269	17602	16376	15985	17510
Total gp of species	18479	18393	19125	17824	17526	16682	17345	17659	16426	16024	17548

Source: database

In earlier years there was some culture of salmon and salmon trout, but this has now been mostly abandoned (FAO, 1999). 80 percent of fish culture for human consumption takes place in the South West coastal areas. Although aquaculture has struggled in Finland in recent years, considerable research and effort are being channelled towards the development of new aquaculture schemes and species such as arctic char and perch (Setälä *et al.*, 1998).

Commodities production

Baltic herring provides Finland's highest volume of both food and non-food use commodity production in Finland.

Food use commodities production

Marine fish produced commercially is mostly prepared before being sold. The production of fish fillets, fresh or chilled is the most important single category, followed by that of cured and smoked fillets, and frozen fish. Production volumes have fluctuated over the years, following the fluctuations of herring, its main species, and changes in salinity leading to fluctuations in cod production in the Eastern Baltic Sea.

Table 84: Finland - FU Commodities Production by OECD group by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish, cured	33684	34782	33693	36346	26823	31240	37932	25233	22231	34000	31596
Fish, fillets	49173	55847	54855	62143	64911	47265	66078	53994	47250	49054	55057
Fish, fresh/chilled	3344	3429	3072	2872	1906	2307	2186	5894	9237	6998	4124
Fish, frozen	5262	4507	3657	4073	3159	9740	15156	36884	42312	31201	15595
Prepared/preserved fish	718	690	594	2203	8329	3691	6658	3190	2738	4130	3294
Total FU Production	92179	99255	95872	107637	105127	94243	128011	125196	123768	125383	109667

Source: database

Freshwater species, including those caught in the low salinity Gulf of Bothnia, are sold directly on the domestic market and poorly accounted for in the commodities statistics.

Table 85: Finland - FU Commodities Production by FAO group by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	5311	5389	4779	4439	2894	1718	370	3890	4867	1434	3509
Diadromous fish	19669	21555	20967	22455	30602	19932	31543	19111	21414	33351	24060

Marine fish, pelagic, small	53451	57905	56221	61412	55837	47091	56686	70541	69150	69536	59783
Marine fish, others	13748	14407	13906	19332	15793	25502	39412	31655	28338	21062	22315
Total FU Production	92179	99255	95872	107637	105127	94243	128011	125196	123768	125383	109667

Source: database

Non-food use commodities production

The production of non-food use commodities is mostly in the form of silage and based on herring. Average production was around 26 000 tonnes between 1989 and 1998.

Table 86: Finland - NFU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Flour, meal unfit for human cons.	28099	19596	15831	17642	13169	40290	42595	40241	31500	10190	25915
Total NFU Production	28099	19596	15831	17642	13169	40290	42595	40241	31500	10190	25915

Source: database

Table 87: Finland - NFU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, others	28099	19596	15831	17642	13169	40290	42595	40241	31500	10190	25915
Total NFU Production	28099	19596	15831	17642	13169	40290	42595	40241	31500	10190	25915

Source: database

Non-food use: trade and net supply 1989-1998

The net supply for non-food use was on average 140 000 tonnes over the 1989-1998 period, mainly comprising small Baltic herring for feed for local fish and fur farms (Yrjölä, 2000).

Non-food use commodities imports

Since a large part of the domestic small pelagic production is used for human consumption, fish meal and oil producers have been supplied by imports of fish waste meal and oils. Imports were on average 110 000 tonnes over the period 1989-1998.

Table 88: Finland - NFU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	84859	52248	43362	39662	40711	28261	39347	34035	26130	24698	41331
Marine fish, others	26381	59352	53025	62903	54896	88867	74270	77513	81473	73149	65183
Aquatic animals	0	2945	2101	1932	1526	541	280	365	177	168	1003
Aquatic mammals	0	0	0	0	0	0	411	93	5	710	122
Total NFU Import	111241	114544	98488	104497	97133	117669	114307	112006	107785	98725	107640

Source: database

Table 89: Finland - NFU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	26381	11813	10904	18079	17261	14444	18490	17481	12522	12462	15984
Flour, meal unfit for human cons.	84859	102731	87585	86418	79872	103224	95817	94524	95263	86263	91656
Total NFU Imports	111241	114544	98488	104497	97133	117669	114307	112006	107785	98725	107640

Source: database

Non-food use commodities exports

Exports of non-food use commodities were fairly small with volumes of around 1 400 tonnes per year during the period 1989-98. Years of higher exports coincide with sudden changes in peak herring or sprat capture production.

Table 90: Finland - NFU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish/marine mammal, fat, oil	6	1002	0	0	54	16	26	8	29	3	114
Flour, meal unfit for human cons.	5	212	164	116	185	2214	6996	1386	328	1326	1293
Total NFU Exports	11	1214	164	116	238	2230	7022	1394	357	1329	1408

Source: database

Table 91: Finland - NFU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, pelagic, small	5	55	118	25	185	198	163	65	32	1	85
Marine fish, others	6	1159	46	91	54	2032	6781	1329	323	1260	1308
Aquatic mammals	0	0	0	0	0	0	78	0	2	68	15
Total NFU Export	11	1214	164	116	238	2230	7022	1394	357	1329	1408

Source: database

Non-food use commodities net supply

Finland produces less than 20 percent of the non-food use commodities it needs to supply its domestic fish and fur farming industries. The rest is imported from European or other countries. The decrease in net supply between 1989 and 1998 reflects decreased imports as well as a decrease in production linked with the use of alternative feed components. Exports have remained marginal throughout the period.

Table 92: Finland - NFU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish/marine mammal, fat, oil	26375	10811	10904	18079	17208	14428	18464	17473	12493	12460	15870
Flour, meal unfit for human consumption	112953	122114	103252	103944	92856	141301	131416	133379	126434	95127	116278
Total NFU net supply	139329	132926	114156	122023	110064	155728	149880	150853	138927	107587	132147

Source: database

Table 93: Finland - NFU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, pelagic, small	84854	52193	43244	39637	40526	28063	39184	33970	26097	24697	41247
Marine fish, others	54474	77788	68810	80454	68011	127124	110084	116425	112650	82080	89790
Aquatic animals	0	2945	2101	1932	1526	541	280	365	177	168	1003
Aquatic mammals	0	0	0	0	0	0	333	93	3	642	107
NFU net supply	139329	132926	114156	122023	110064	155728	149880	150853	138927	107587	132147

Source: database

Market for human consumption**Trade**

The volume of fish imports over the decade is larger than the volume of exports. On average, imports for human consumption are approximately 70 000 tonnes, nearly eight times that of the export tonnage which stood at around 9 000 tonnes per annum during the period 1989-1998. In terms of value, exports represented FIM 105 000, whilst imports amounted to FIM 550 000 in 1997 (OECD, 2000).

The most important export commodities are farmed rainbow trout, Baltic herring products and roe and caviar substitutes. More than 80 percent of the volume was exported to Russia, but exports to Japan were the greatest by value. In recent years, fish export to Russia has grown strongly (Setälä *et al.*, 1998) but the crash of the rouble in 1998 has restricted the projected increase in trade of Baltic herring and trout with Russian markets (Abbors, 2000). The largest import items for human consumption are frozen salmon, frozen whitefish, saithe fillets, canned tuna, canned herring and canned shrimp.

Food use imports

Finland imports a large variety of commodities for human consumption, mostly prepared or in the form of fish fillets and whole, fresh and frozen.

Table 94: Finland - FU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	46	31	32	48	56	42	17	35	48	57	41
Crus., mol. & other aquatic inv., prepared	0	0	0	0	0	0	2802	4069	3875	3926	1467
Crustaceans	6062	6084	6005	5036	5786	6075	1455	910	1151	1131	3970
Fish, cured	5545	5108	4391	5183	4585	6644	1838	2628	2895	2340	4116
Fish, fillets	19891	18445	16436	14323	15026	17544	9893	10562	10547	9340	14201
Fish, fresh/chilled	3156	3440	3955	4807	6166	8347	10354	11188	11567	14022	7700
Fish, frozen	4327	3779	3387	2963	2903	4259	3265	4138	11348	7830	4820
Molluscs	105	99	82	74	89	94	78	97	144	167	103
Prepared/preserved fish	34256	31750	33219	32814	34329	43352	22271	29269	26996	29196	31745
Total FU Imports	73388	68736	67506	65249	68940	86355	51975	62896	68571	68009	68162

Source: database

The highest volume single import commodities in 1998 were canned tuna, frozen, prepared and canned herring, and frozen saithe fillets, followed by prepared shrimps and prawns (crustaceans and crus. prepared in table above). Apart from herring products, imports are therefore augmenting the diversity of domestic capture production. These imports have been increasing over the decade and are set to increase with consumer demand unless the species concerned can be farmed locally.

Table 95: Finland - FU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	0	0	0	0	0	0	143	152	167	144	61
Diadromous fish	7682	7671	7698	6840	7280	12030	9106	12308	12158	15905	9868
Marine fish, pelagic, tunas	11278	9654	12225	10664	11648	15526	5588	7310	7081	8403	9938
Marine fish, pelagic, small	16463	15286	14448	15300	16344	19639	15078	15145	20007	15975	16369
Marine fish, demersal	15406	14009	10851	10434	10176	12387	11450	11036	12563	11946	12026
Marine fish, others	16346	15902	16165	16853	17562	20563	6256	11834	11376	10355	14321
Crustaceans	6062	6084	6005	5036	5786	6075	3888	4506	4597	4525	5256
Molluscs	105	99	82	74	89	94	409	436	541	670	260
Cephalopods	46	31	32	48	56	42	17	35	48	57	41
Aquatic animals	0	0	0	0	0	0	38	134	32	29	23
Total FU Import	73388	68736	67506	65249	68940	86355	51975	62896	68571	68009	68162

Source: database

The most important single source of Finnish imports is Norway, which provided nearly 50 000 tonnes of fish products to Finland in 1998. In recent years, these Norwegian imports have decreased with respect to non-food products and increased with respect to products for human consumption (Yrjölä, 2000). Sweden, Denmark and Iceland are the next most important sources of imports to the country.

Food use exports

Finland is a net importer of food use commodities, and export volumes are mostly negligible apart from herring (frozen and fresh) and sprat (frozen). Trout and char (diadromous fish - see table below) are also exported frozen and fresh/chilled.

Table 96: Finland - FU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Crus., mol. & other aquatic inv., prepared	0	0	0	0	0	0	29	18	109	84	24
Crustaceans	5	42	25	71	72	93	83	19	11	49	47
Fish, cured	9	15	7	27	108	255	171	380	444	241	166
Fish, fillets	55	1580	84	393	366	549	464	386	241	202	432
Fish, fresh/chilled	2308	1019	245	598	357	1234	1698	3290	5984	2446	1918
Fish, frozen	1140	1231	1185	1327	1340	5307	4959	8109	13533	13317	5145

Prepared/preserved fish	452	623	524	687	879	1210	1054	1295	1015	903	864
Total FU Exports	3969	4509	2070	3104	3122	8648	8457	13499	21336	17243	8596

Source: database

The increase in exports since 1994 follows the increase in national capture fishery production.

Table 97: Finland - FU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	0	0	0	0	0	0	184	131	150	150	61
Diadromous fish	2951	3547	1344	2202	1906	1888	1536	1525	1755	1601	2026
Marine fish, pelagic, tunas	16	47	21	120	47	40	93	70	83	118	65
Marine fish, pelagic, small	136	128	124	137	441	5724	5542	10460	18112	14230	5503
Marine fish, demersal	590	238	92	36	1	20	147	202	122	32	148
Marine fish, others	270	506	463	538	654	884	843	1073	995	980	721
Crustaceans	5	42	25	71	72	93	111	30	108	94	65
Molluscs	0	0	0	0	0	0	1	7	12	40	6
Total FU Export	3969	4509	2070	3104	3122	8648	8457	13499	21336	17243	8596

Source: database

Food use net supply and consumption

The net fish supply for human consumption was an average of 170 000 tonnes per year between 1989 and 1998. Most important commodities were fish fillets with 70 000 tonnes on average, followed by cured fish and prepared/preserved products with 36 000 and 34 000 tonnes respectively. Cured fish products are mostly made of smoked, salted, dried or in brine commodities.

Table 98: Finland - FU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Crus., mol. & other aquatic inv., prepared	0	0	0	0	0	0	2773	4050	3767	3841	1443
Crustaceans	6058	6042	5980	4965	5714	5982	1372	890	1141	1082	3923
Fish, cured	39220	39875	38077	41502	31300	37629	39599	27481	24682	36099	35547
Fish, fillets	69009	72712	71207	76073	79571	64260	75508	64169	57555	58191	68826
Fish, fresh/chilled	4191	5850	6782	7081	7715	9419	10843	13793	14820	18574	9907
Fish, frozen	8449	7055	5859	5709	4722	8692	13462	32913	40126	25713	15270
Molluscs	105	99	82	74	89	94	78	97	144	167	103
Prepared/preserved fish	34522	31817	33289	34330	41778	45832	27876	31164	28720	32423	34175
Total FU net supply	161599	163482	161309	169782	170945	171950	171528	174593	171003	176148	169234

Source: database

Finnish net supply is mostly composed of small pelagic, with herring representing the largest share of this group of species. Second come diadromous fish, with salmon and rainbow trout.

Table 99: Finland - FU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	5311	5389	4779	4439	2894	1718	330	3910	4884	1428	3508
Diadromous fish	24399	25679	27322	27093	35976	30074	39112	29894	31816	47656	31902
Marine fish, pelagic, tunas	11262	9607	12204	10544	11600	15486	5496	7239	6998	8284	9872
Marine fish, pelagic, small	69778	73062	70544	76575	71739	61006	66222	75226	71045	71281	70648
Marine fish, demersal	14816	13770	10759	10399	10174	12367	11303	10835	12442	11914	11878
Marine fish, others	29824	29803	29608	35646	32702	45181	44825	42416	38720	30437	35916
Crustaceans	6058	6042	5980	4965	5714	5982	3777	4476	4490	4432	5191
Molluscs	105	99	82	74	89	94	408	428	529	630	254
Cephalopods	46	31	32	48	56	42	17	35	48	57	41
Aquatic animals	0	0	0	0	0	0	38	134	32	29	23
FU net supply	161599	163482	161309	169782	170945	171950	171528	174593	171003	176148	169234

Source: database

Fish is consumed once a week on average, with a per capita consumption of more than 34 kg per year in 1998, one of the highest consumption rates in Europe. Consumption of freshwater species is also the highest in Europe, at over 12 kg per capita (Rudiger, 1998)

According to FAO, fish represented approximately 15 percent of total animal proteins consumed per day in 1997 (FAO, 1999). In terms of consumer preferences and habits, the older age groups tend to eat fish more than younger age groups (Honkanen *et al.*, 1998). Older age groups and pensioners tend to purchase Baltic herring, while rainbow trout is the fish species most frequently purchased by all age groups.

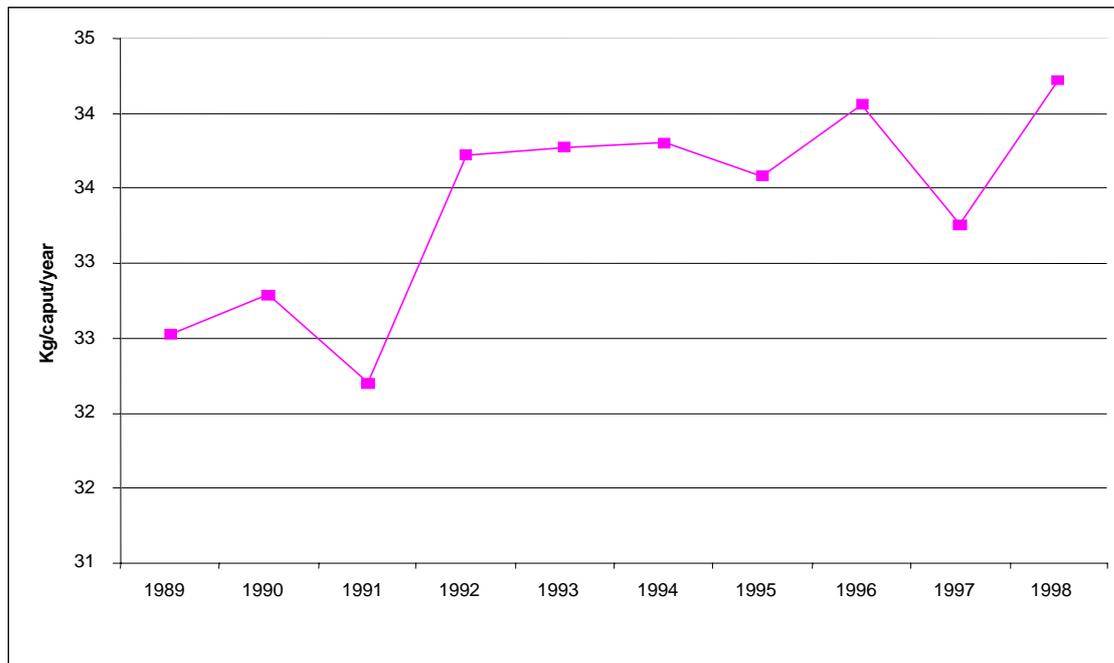


Figure 20: Fish consumption per capita per year in Finland 1989-1998

Some young people consider eating fish difficult and they do not share the tradition of handling and preparing self-caught fish with older generations (Honkanen *et al.*, 1998). Therefore, the processing industry has had to develop new easy-to-use fish products to meet the requirements of modern lifestyles. Consumers also demand high-quality food products at a competitive price. Thus, future improvements of quality and diversification in processing are needed (Setälä *et al.*, 1998).

Fish is generally consumed either chilled or fresh, and either whole or filleted. The two most important species consumed are Baltic herring and rainbow trout. Salmon, whitefish (char) and vendace are also commonly consumed. During the last decade, the consumption of salmon has increased remarkably due to increased imports from Norway. A growth in supply, extension of product range, and low prices has made salmon more popular among Finnish consumers (Setälä *et al.*, 1998).

The most important outlets for fresh fish are supermarkets and local shops. Rainbow trout and Baltic herring are frequently sold in supermarkets and local shops whereas other fish species are mainly sold in dedicated fish shops, at market halls and market places (Honkanen *et al.*, 1998). Freezing and ice-making facilities for retailers and wholesalers in Finland are now considered to be excellent so that good quality products are assured for caterers and the market in general. Education and the building of awareness at various levels in the distribution and processing chain have resulted in increased product quality in recent years (FAO, 1999 country profile). It is expected that the next challenge for producers and retailers will be the establishment of a system of certification for high quality products for the domestic market. This may be accompanied by consolidation of the processing and distribution chains that are currently numerous, small-scale concerns (Monfort, 1998).

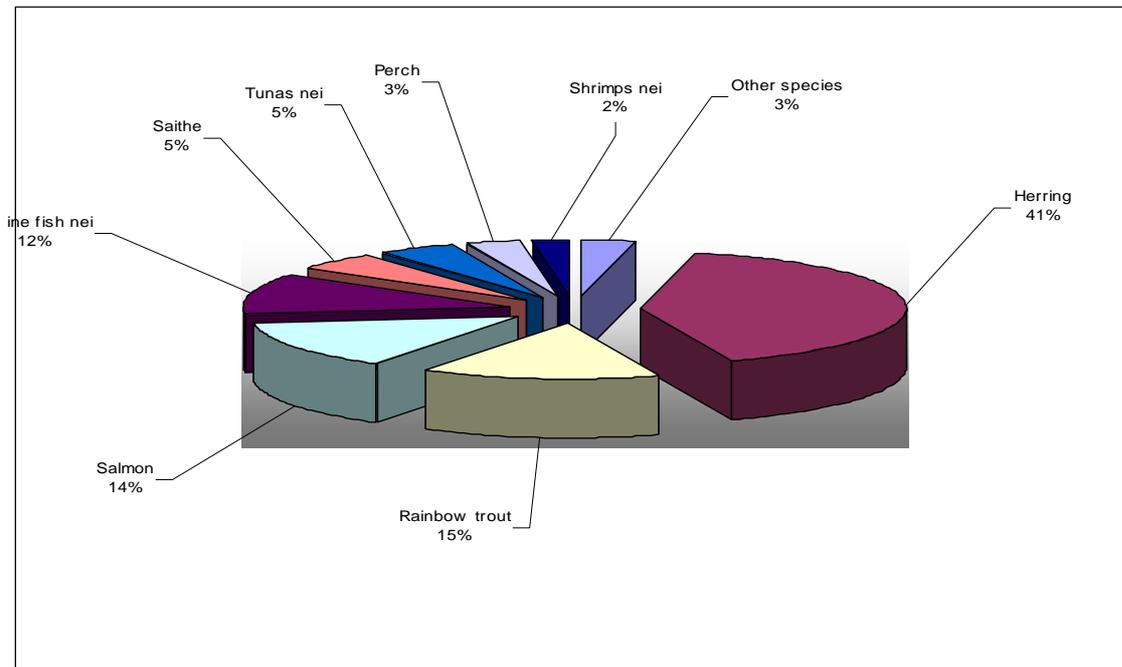


Figure 21: Finland - Main species consumed in 1998

Assumptions for projection 2005-2030

As specified in the methodology section (see Part One of the study), assumptions have been made on the consumption trend of the OECD group of products. Further assumptions are made regarding production, imports and exports and Finland's need for fish in 2005 up to 2030 by taking into account and extrapolating previous trends.

For Finland, main consumption trends for consumption of seafood for the period 2005-2030 assume: An important increase of the demand for crustacean, molluscs and other aquatic invertebrate prepared (+150 percent), cephalopods (100 percent) and fresh fish.

A decrease in crustaceans (-20 percent).

A stagnation of cured fish, frozen products, fish fillets and prepared/preserved products.

Young consumers are increasingly demanding easy to use products to fit with their modern lifestyle (Honkanen *et al.*, 1998). However, although the demand for convenience food is increasing in Finland, this is not clearly reflected in the evolution of the prepared/preserved commodities group that is assumed to stagnate. This is due to the fact that the increase in ready to use products is offset by the decrease in canned products, as both these commodities are to be found under the prepared and preserved commodities denomination. However, the trend for easy to use products is reflected in the increase in demand for prepared molluscs and crustaceans.

Generally speaking, fish consumption is also set to increase in Finland as it has a very good reputation among the population for being an important part of a healthy and balanced diet (Guillotreau and Le Grel, 2001). This trend is in line with the general Western European trend towards healthier eating.

Table 100: Finland - Assumptions for projection

OECD group	94-98% Annual %	Prod % 99-30	T Imp % 99-30	T Exp % 99-30	T Cons % 99-30	T Prod % Annual	% Imp Annual	% Exp Annual	Cons % Annual
Cephalopods	47%	9%	100%	0%	100%	2.2%	2.2%		
Crus., mol. & other aquatic inv. prepared	1577%	315%	147%	0%	150%	2.9%	0.0%	2.9%	
Crustaceans	-158%	-32%	-24%	0%	-20%	-0.7%	0.0%	-0.6%	

OECD group	94-98%	Annual %	Prod % 99-30	T Imp % 99-30	T Exp % 99-30	T Cons 99-30	T Prod % Annual	% Imp Annual	% Exp% Annual	Cons Annual	%
Fish, cured	-39%	-8%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fish, fillets	-36%	-7%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fish, fresh/chilled	72%	14%	10%	128%	0%	100%	0.3%	2.6%	0.0%	2.2%	
Fish, frozen	-190%	-38%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%	0.0%
Prepared/preserved fish	0%	0%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fish/marine mammal, fat, oil	-14%	-3%	0%	0%	0%			0.0%	0.0%	0.0%	0.0%
Flour, meal unfit for hum. cons.	-28%	-6%		0%	0%		0.0%	0.0%	0.0%	0.0%	0.0%

Source: database

The main results illustrate the assumed constant export tonnage, and increasing demand met by steady capture fisheries production, a marginal decrease in aquaculture production and a steady increase in imports. The apparent consumption per capita will increase from 34 to 37 kg per capita per year.

Table 101: Finland - Main results for 2015-2030

Nature	Average 94-98	2005	2010	2015	2020	2025	2030
Exports FU (t live wt)	13837	17243	17243	17243	17243	17243	17243
Imports FU (t live wt)	67561	71622	74650	78110	82062	86576	91731
Production FU (t live wt)	119320	125530	125637	125746	125856	125969	126082
Fish supply FU (t live wt)	173045	179909	183044	186612	190675	195302	200570
Population (X1000)	5122	5230	5290	5320	5350	5380	5411
Per caput supply (kg/h)	34	34	35	35	36	36	37
Production NFU (t live wt)	32963	10190	10190	10190	10190	10190	10190
Imports NFU (t live wt)	110098	98725	98725	98725	98725	98725	98725
Exports NFU (t live wt)	2467	1329	1329	1329	1329	1329	1329
Net supply NFU (t live wt)	140595	107587	107587	107587	107587	107587	107587
Aquaculture (t live wt)	16827	14431	13397	12443	11563	10752	10005
Capture (t live wt)	174446	174446	174446	174446	174446	174446	174446
Production total (t live wt)	191274	188878	187844	186890	186009	185198	184451

Source: database

Food use net supply and human consumption 2005-2030

Finnish net supply will increase by around 20 percent on the period 1998-2030, thanks to the positive Finnish attitude towards fish. Fish is considered to be a light foodstuff with a high nutritional value and a reasonable price (Guillotreau and Le Grel, 2001). This trend towards healthier and environmentally responsible foods is likely to benefit seafood consumption.

It will rise from 180 000 tonnes in 1998 to reach 200 000 tonnes by 2030. Most of the increase will be based on increased consumption of prepared crustaceans and molluscs, as well as fresh/chilled fish.

Table 102: Finland - FU net supply by OECD group of commodities 2005-2030 (tonne live weight)

Gp of commodities	Ave. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	40	67	75	83	93	103	115
Crus., mol. & other aquatic inv., prepared	2886	4700	5426	6262	7225	8334	9612
Crustaceans	2093	1030	994	959	926	893	862
Fish, cured	33098	36099	36099	36099	36099	36099	36099
Fish, fillets	63937	58191	58191	58191	58191	58191	58191
Fish, fresh/chilled	13490	21491	23906	26640	29736	33244	37221
Fish, frozen	24181	25713	25713	25713	25713	25713	25713
Molluscs	116	194	217	241	269	300	334
Prepared/preserved fish	33203	32423	32423	32423	32423	32423	32423
Total FU net supply	173045	179909	183044	186612	190675	195302	200570

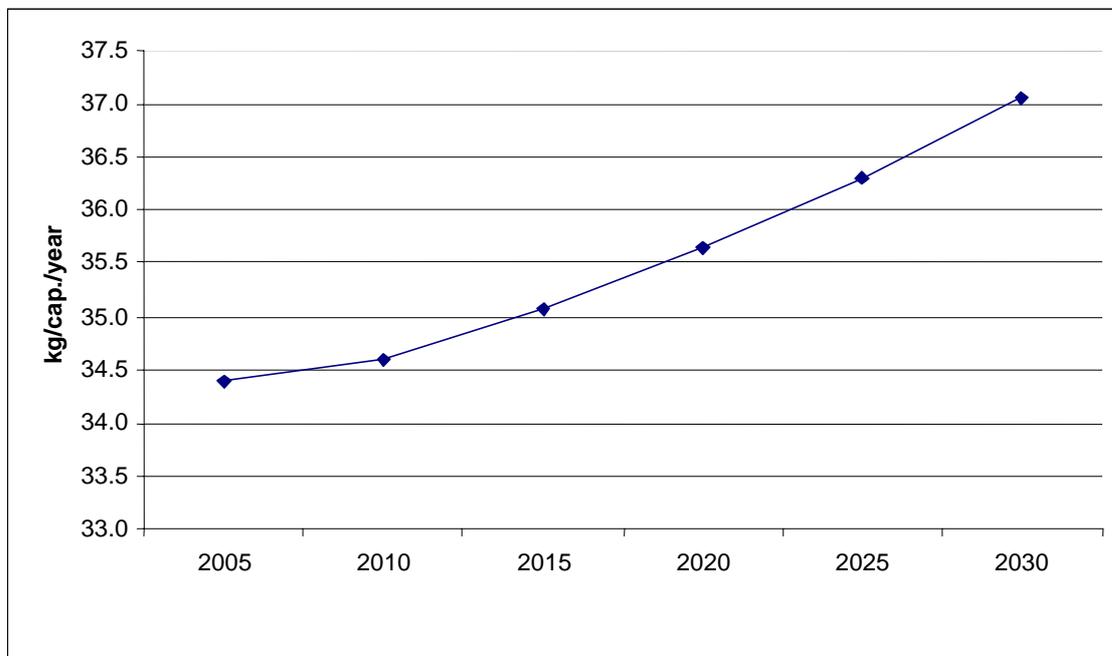
Source: database

Table 103: Finland - FU net supply by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	2454	1458	1480	1502	1525	1548	1571
Diadromous fish	35710	50140	52210	54564	57242	60288	63753
Marine fish, pelagic, tunas	8701	8284	8284	8284	8284	8284	8284
Marine fish, pelagic, small	68956	71485	71654	71847	72066	72315	72599
Marine fish, demersal	11772	11935	11952	11972	11995	12021	12050
Marine fish, others	40316	30616	30752	30897	31051	31215	31391
Crustaceans	4631	5122	5714	6402	7201	8128	9201
Molluscs	418	767	883	1014	1165	1338	1536
Cephalopods	40	67	75	83	93	103	115
Aquatic animals	47	35	40	46	54	62	71
FU net supply	173045	179909	183044	186612	190675	195302	200570

Source: database

The figure below shows the assumed change in apparent annual consumption of fish products per capita. A figure of 37 kg per capita per year is quite high although not totally unrealistic, as Finnish net supply will increase by 14%, while population will only grow by 5 percent between 2005 and 2030.

**Figure 22: Fish consumption per capita per year in Finland 2005-2030**

Herring remains the main species consumed in Finland but its share is decreasing. With regard to diadromous species, the share of salmon is increasing, whilst rainbow trout decreases, reflecting the intense competition between these two species on the domestic market.

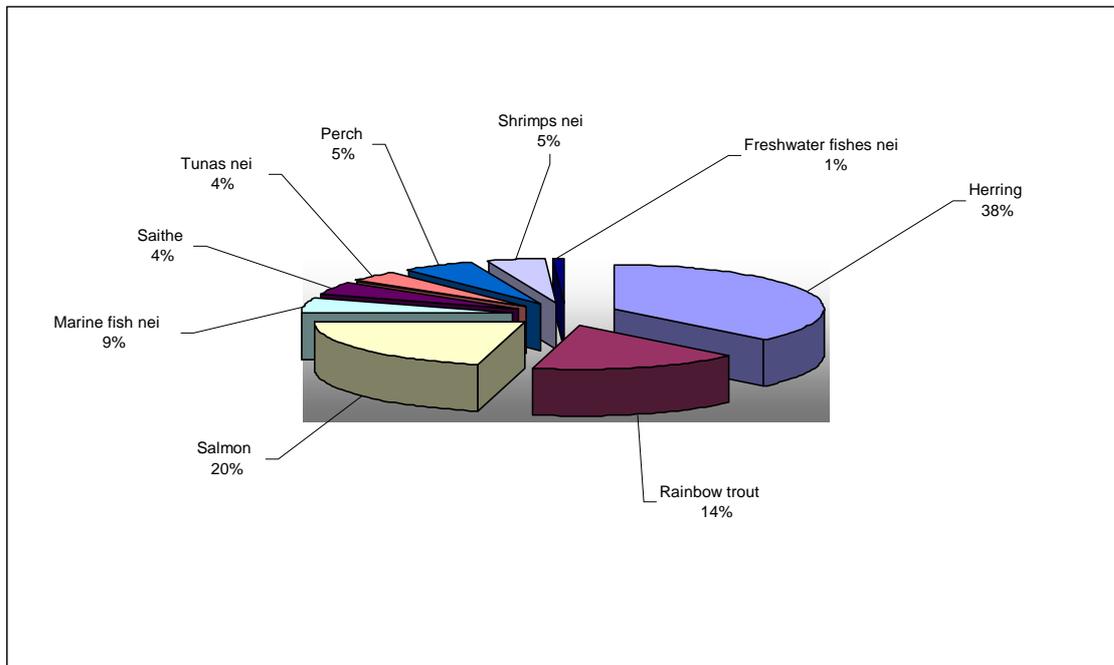


Figure 23: Finland - Main species consumed in 2030

Non-food use net supply 2005-2030

The production of non-food use commodities is assumed to decrease annually over the whole period, for both oil (-3 percent) and meal (-6 percent), in line with the decrease observed during the 94-98 period.

Production 2005-2030

The following tables give the predicted aquaculture, commodities and total productions. The decrease in farmed production concerns mostly rainbow trout (a diadromous fish) marketed as fillets.

Capture and aquaculture

The decreasing trend in aquaculture production experienced in recent years has been projected steadily, leading to an overall production of 10 000 tonnes by 2030. One reason for this decrease in production is the competition from Norwegian salmon (Abbors, 2000). This competition will firstly decrease the demand for rainbow trout on the domestic market, and secondly bring down prices as cheap salmon floods the market, causing profitability problems to Finnish rainbow trout production (OECD, 1997). The introduction of a minimum import price for Norwegian salmon by the European Commission did not seem to improve the situation (OECD, 2000).

Another factor having a negative impact on the development of Finnish aquaculture consists in the different strategies pursued by producers in the industry. Indeed, some of the producers see trout farming only as a strategy to diversify their income base and are not willing to specialize in it. They want to keep their production small and flexible (Edvardsen, 2000), and will not therefore expand their business.

Thirdly, strict environmental regulations, namely the water protection programme and the water law, limit the future development of the aquaculture industry in Finland, and already forced some producers to transfer their production to Sweden in the late 1990's (Abbors, 2000).

Table 104: Finland - Aquaculture by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	52	45	49	55	60	67	73
Diadromous fish	16776	14387	13348	12389	11503	10685	9931
Total gp of species	16827	14431	13397	12443	11563	10752	10005

Source: database

A decrease in the production of rainbow trout will decrease the share of diadromous fish in Finnish production overall, bringing total production down to 185 000 tonnes in 2030.

Table 105: Finland - Total production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	52961	52954	52959	52964	52970	52976	52983
Diadromous fish	29123	26734	25695	24736	23850	23033	22279
Marine fish, pelagic, small	106704	106704	106704	106704	106704	106704	106704
Marine fish, demersal	2273	2273	2273	2273	2273	2273	2273
Crustaceans	213	213	213	213	213	213	213
Total gp of species	191274	188878	187844	186890	186009	185198	184451

Source: database

Commodities

Finnish commodities production will increase nearly imperceptibly by a mere 1 000 tonnes between 2005 and 2030, thanks to a small increase in both freshwater and marine fresh fish production.

Table 106: Finland - FU Commodities Production by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Fish, cured	30127	34000	34000	34000	34000	34000	34000
Fish, fillets	52728	49054	49054	49054	49054	49054	49054
Fish, fresh/chilled	5324	7145	7253	7361	7472	7584	7698
Fish, frozen	27059	31201	31201	31201	31201	31201	31201
Prepared/preserved fish	4082	4130	4130	4130	4130	4130	4130
Total FU Production	119320	125530	125637	125746	125856	125969	126082

Source: database

Table 107: Finland - FU Commodities Production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	2456	1464	1486	1508	1531	1554	1577
Diadromous fish	25070	33351	33351	33351	33351	33351	33351
Marine fish, pelagic, small	62601	69536	69536	69536	69536	69536	69536
Marine fish, others	29194	21179	21265	21351	21439	21528	21618
Total FU Production	119320	125530	125637	125746	125856	125969	126082

Source: database

Trade 2005-2030

Increasing consumer demand will stimulate imports. By 2030, there is a predicted 35 percent increase over the 1998 baseline.

Imports

In volumes, imports in fresh/chilled fish will increase markedly, as will those of prepared shrimp/molluscs while the more traditional preserved fish will remain stable. Imports increase to answer the growing domestic demand in these products, as national production fails to cope with this increase.

Table 108: Finland - FU Commodities Imports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	40	67	75	83	93	103	115
Crus., mol. & other aquatic inv., prepared	2934	4784	5510	6346	7310	8419	9696
Crustaceans	2144	1079	1043	1008	975	942	911
Fish, cured	3269	2340	2340	2340	2340	2340	2340
Fish, fillets	11577	9340	9340	9340	9340	9340	9340
Fish, fresh/chilled	11096	16792	19100	21725	24710	28106	31969
Fish, frozen	6168	7830	7830	7830	7830	7830	7830
Molluscs	116	194	217	241	269	300	334
Prepared/preserved fish	30217	29196	29196	29196	29196	29196	29196
Total FU Imports	67561	71622	74650	78110	82062	86576	91731

Source: database

The shortfall in domestic aquaculture production for trout and char will be made up by increased imports. Popular new imports of crustaceans, molluscs and cephalopod species will increase.

Table 109: Finland - FU Commodities Imports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	121	144	144	144	144	144	144
Diadromous fish	12301	18390	20460	22814	25492	28538	32003
Marine fish, pelagic, tunas	8782	8403	8403	8403	8403	8403	8403
Marine fish, pelagic, small	17169	16179	16348	16541	16760	17009	17293
Marine fish, demersal	11877	11967	11984	12004	12026	12052	12081
Marine fish, others	12077	10416	10467	10525	10591	10667	10752
Crustaceans	4718	5215	5807	6495	7295	8221	9294
Molluscs	430	807	922	1054	1205	1378	1576
Cephalopods	40	67	75	83	93	103	115
Aquatic animals	47	35	40	46	54	62	71
Total FU Import	67561	71622	74650	78110	82062	86576	91731

Source: database

Exports

Exports are assumed to remain constant throughout the projection period.

FRANCE

The population of France is approximately 60 million inhabitants. France is a major producer of seafood and production is characterised by a diverse range of species (over 70 species are regularly landed). In addition, French consumption is one of the most important in Europe, particularly of fresh products. The sector has experienced significant changes in the last decade. In particular the number of middlemen has decreased as upstream operators have consolidated. There is also increasing pressure on domestic operators from the globalisation of trade, cheaper imports and the natural limits to national supplies. Although the market in France is considered to be an established and stable one, consumer preferences are slowly moving demand away from fresh products towards a more diverse array of processed products more reliant on technology and marketing.

Production: captures, aquaculture and commodities 1989-1998

In 1998 total production was about 877 000 tonnes. During the 1980s, total quantities produced fluctuated around 750 000 tonnes. Production increased in 1990, with a peak of 980 000 tonnes, and decreased from 1995. In 1998, captures represented 69 percent of the national production, down from 74 percent in 1989.

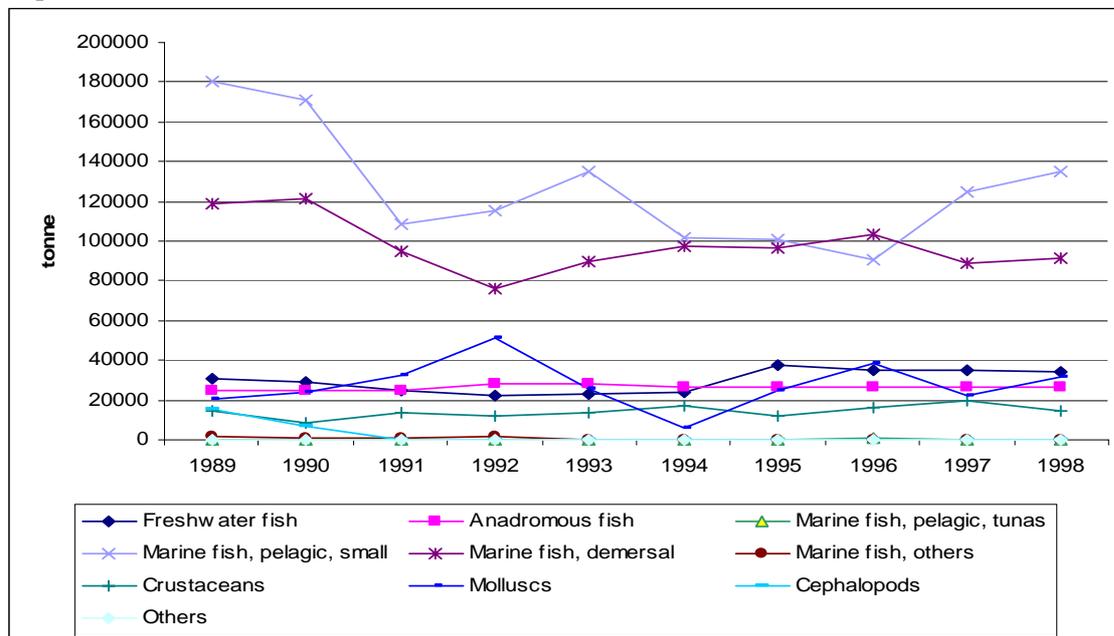


Figure 24: France - Capture and aquaculture production 1989-1998

Captures

In 1998, the French fleet landed 603 000 tonnes of fish, shellfish and molluscs. Demersal species produced by local and distant fleet were the most abundant category of marine fish ten years ago, but have decreased with the declining production of traditional fisheries for species such as hake, saithe, cod and ling. Production of large pelagic species, dominated by tropical tuna, saw a marked increase until 1994 before recording a slight decrease (Girard, 1999). The wild production of shellfish molluscs (scallop, whelks, clams) has increased, while that of crustaceans (mainly langoustines, crab and spider crab) and cephalopods (cuttlefish and squid) has remained stable and has represented approximately 15 percent of total landings.

Table 110: France - Captures by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	3000	3500	4000	4340	4400	4450	4500	4500	4500	4460	4165
Anadromous fish	1776	2166	1963	1691	1129	1698	477	576	1963	535	1397
Marine fish, pelagic, tunas	146768	159790	167658	174882	191869	199936	176150	166523	140133	126622	165033

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, pelagic, small	98435	89772	88830	89819	100954	106243	117769	92709	108318	122129	101498
Marine fish, demersal	297559	263639	225835	218925	227121	221979	207570	207894	215878	195070	228147
Marine fish, others	8645	11380	10819	15671	17051	13632	18296	17857	13988	14983	14232
Crustaceans	21042	22054	20048	22703	23030	22601	22109	20490	20700	17283	21206
Molluscs	32945	36857	38907	37902	29068	30673	34682	25287	42400	32137	34086
Cephalopods	21990	28983	19569	18828	23349	21864	30039	24303	19512	22875	23131
Others	84211	78873	75676	82947	62487	79882	75654	84501	75901	67171	76730
Total gp of species	716371	697014	653305	667708	680458	702958	687246	644640	643293	603265	669626

Source: database

The most important species in terms of value is sole, which represents 14 percent of the total non-pelagic fish value and approximately 4 percent of the total volume. Cod has a 7 percent value market share and 10 percent volume market share. The decrease in cod landings has not reduced its economic share over the last decade, due to the general down trend of the demersal category (Girard, 1999). In 1998, tropical tuna represented the main value (70 percent) for pelagic fish, followed by anchovy, mackerel, sardine and herring.

Aquaculture

The French aquaculture production reached nearly 274 000 tonnes in 1998, an increase from 224 000 tonnes in 1990. The most important farmed species group (table 111) is that of shellfish molluscs (76 percent of total 1998 production) followed by diadromous fish (rainbow trout and some sea trout and salmon, 18 percent) and freshwater fish (carp mostly, 4 percent).

France is a major producer of farmed shellfish, particularly of Japanese cupped oysters. Shellfish farming is the most common and the most established activity in France and is carried out along most of the French coast. Shellfish (averaging 208 000 tonnes over 1989-98) is the single most important aquaculture production category, both in terms of volume and value with oysters (68 percent of 1998 production) and mussels (29 percent of 1998 production) dominating production. With an average annual production of 150 000 tonnes, France is the main supplier of oysters in Europe and production has been increasing over the last 10 years (Girard, 1999). France is also the second largest producer of mussels in the EU after the Netherlands, with about 60 000 tonnes produced annually (FAO, 1996).

Table 111: France - Aquaculture by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	7580	7580	7620	8520	8550	8700	8710	10123	11716	10758	8986
Diadromous fish	32990	39230	40759	44460	48974	50930	52415	54403	54629	48505	46730
Marine fish, pelagic, small	250	250	250	250	250	250	0	0	0	0	150
Marine fish, demersal	285	345	554	750	1809	3841	4334	2708	4436	5530	2459
Marine fish, others	0	0	0	0	0	0	29	20	0	0	5
Crustaceans	5	11	5	10	15	48	32	130	255	101	61
Molluscs	182884	208651	195836	196212	217655	217098	215165	218178	216400	208900	207698
Others	43	6	53	52	70	87	100	54	54	54	57
Total gp of species	224037	256073	245077	250254	277323	280954	280785	285616	287490	273848	266146

Source: database

France produces intensively farmed freshwater species such as Rainbow trout, and sturgeon production has been developed in coastal waters. Other fish farms produce mainly carp – some 2 500 tonnes produced in small farms in the north of the country (Rudiger, 1998) – pike and eels.

Marine fish – mainly seabass, sea bream and turbot – are reared in about forty farms in western and southern France and New Caledonia. Farmed crustaceans include crayfish in France, and Karuma prawn in tropical New Caledonia (FAO, 1996).

Commodities production

Food use commodities production

The two tables below present the evolution of commodities production from 1989 to 1998 by OECD group of commodities and by FAO group of species. Molluscs are the primary commodity produced in

France with 180 000 tonnes on average between 1989 and 1998, followed by fresh fish and prepared/preserved products with a slightly lower output. Next come fish fillets (135 000 tonnes) and frozen fish products (135 000 tonnes) but on a declining trend.

Table 112: France - FU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	13901	5748	18478	37402	21468	18725	16961	8531	17402	18451	17707
Crus., mol. & other aquatic inv., prepared	5858	4990	3912	3998	5001	4784	4166	3362	3786	5220	4508
Crustaceans	17649	17436	16535	16117	17240	18463	17677	16067	15721	14274	16718
Fish, cured	49187	47372	43505	42971	39372	36753	39943	34840	36770	36419	40713
Fish, fillets	151849	140609	126624	133382	145359	140901	150595	136768	118697	106605	135139
Fish, fresh/chilled	195132	195591	193441	192397	176908	185191	171248	175150	165325	171162	182154
Fish, frozen	93448	103361	88788	100947	122767	155431	144827	148492	132002	106656	119672
Molluscs	160317	183655	178157	180219	186360	188137	189386	188230	196134	183280	183387
Prepared/preserved fish	175045	181443	172315	164961	178674	173963	171092	162320	185029	181315	174616
Total FU Production	862386	880206	841756	872393	893149	922348	905896	873759	870866	823382	874614

Source: database

Frozen fish concern mostly tuna (Skipjack and yellowfin) followed by trout and char, cod and big-eye tuna. Tuna and small pelagic species (Atlantic mackerel, European sardine), and others (salmon) are mostly canned (preserved/prepared), or cured and smoked. Aquatic animals are prepared/preserved sea urchins (in brine). The bulk of mollusc production is made up of oysters, mussels and scallops. Demersal species such as cod, haddock, pollock, redfish, anglerfish, halibut and grenadier are mostly sold fresh or filleted.

Table 113: France - FU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	9702	10233	10888	12222	12076	12327	12362	13735	15172	14286	12300
Diadromous fish	31882	38231	40029	43860	46722	49335	49497	51640	52949	46036	45018
Marine fish, pelagic, tunas	134591	147571	157090	166201	178922	187426	164843	156410	131112	118865	154303
Marine fish, pelagic, small	121403	112277	111847	117149	117709	129816	138566	118846	129771	139890	123728
Marine fish, demersal	317173	285320	252564	253731	246733	254420	238711	243081	246639	224282	256265
Marine fish, others	7928	10510	10137	14893	15900	12779	17149	16791	13088	14065	13324
Crustaceans	19301	20378	18789	21586	21490	21232	20720	19368	19606	16319	19879
Molluscs	197922	226734	219947	222492	230074	232268	233810	228679	242140	226271	226034
Cephalopods	20166	26767	18336	17893	21773	20496	28111	22827	18256	21474	21610
Aquatic animals	2318	2185	2129	2366	1750	2249	2127	2383	2132	1893	2153
Total FU Production	862386	880206	841756	872393	893149	922348	905896	873759	870866	823382	874614

Source: database

Non-food use commodities production

France produced an average of 88 000 tonnes of non-food commodities in the 1989-98 reference period, mostly as meal from its small pelagic directed fishery and from offal in other marine fisheries.

Table 114: France - NFU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	16370	16799	13713	15208	15387	14048	13997	12727	13603	13753	14560
Flour, meal unfit for human cons.	85108	79514	68566	76038	76934	71872	71692	65115	70670	68767	73428
Total NFU Production	101477	96313	82280	91246	92320	85920	85689	77842	84273	82521	87988

Source: database

Table 115: France - NFU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	85108	79514	68566	76038	76934	71872	71692	65115	70670	68767	73428
Marine fish, others	16370	16799	13713	15208	15387	14048	13997	12727	13603	13753	14560
Total NFU Production	101477	96313	82280	91246	92320	85920	85689	77842	84273	82521	87988

Source: database

Non-food use: trade and net supply 1989-1998

Domestic capture fisheries production is mainly used for human consumption. The non-food use sector production is only 88 000 tonnes per year, from small pelagic species, unsold products and fish offal from domestic production. The net supply of non-food use commodities was 222 000 tonnes on average between 1989 and 1998, with imports of 234 000 tonnes and exports of 74 000 tonnes per year.

Non-food use imports

Some 210 000 tonnes of meal and oil were imported in fluctuating quantities during the 1989-1998 reference period. Increases in non-food use imports have mostly concerned oil rather than meal, produced from small pelagic industrial species and other marine fish.

Table 116: France - NFU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	59994	64224	43805	74566	75019	87028	132803	80136	118572	82277	81842
Flour, meal unfit for human cons.	91251	116575	120733	122809	156888	171375	129813	127543	121089	121169	127925
Total NFU Imports	151245	180800	164539	197375	231907	258402	262616	207679	239661	203447	209767

Source: database

Table 117: France - NFU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	88516	96960	102827	105349	121704	135106	98083	87504	99065	99653	103477
Marine fish, others	62029	69540	47714	78709	102545	114895	154923	108792	131438	93859	96445
Aquatic animals	329	14052	13970	13316	7657	7921	9501	11333	9152	9931	9716
Aquatic mammals	372	248	28	0	0	481	109	50	6	3	130
Total NFU Import	151245	180800	164539	197375	231907	258402	262616	207679	239661	203447	209767

Source: database

Non-food use exports

French exports of non-food use fish oil and meal increased in the early 90s to decrease again, around an average of 75 000 tonnes per year over the 1989-1998 period.

Table 118: France - NFU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	41549	42293	33361	46071	62555	64183	63336	47138	52312	31798	48460
Flour, meal unfit for human cons.	22379	27477	37961	38948	29773	28023	18693	19072	20712	24133	26717
Total NFU Exports	63928	69770	71322	85019	92328	92205	82029	66210	73024	55931	75177

Source: database

Table 119: France - NFU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	9337	6535	12474	14587	22573	22830	12020	10205	8648	10606	12982
Marine fish, others	54382	55905	48163	61895	69162	68943	69680	55588	62769	43649	59014
Aquatic animals	94	7295	10661	8536	593	256	288	375	1607	1676	3138
Aquatic mammals	115	34	24	0	0	177	40	43	0	0	43
Total NFU Export	63928	69770	71322	85019	92328	92205	82029	66210	73024	55931	75177

Source: database

Non-food use net supply

The overall growth in net supply of non-food use commodities has followed the increase in France's diadromous aquaculture production and in supplies to the manufacturing of other feed (poultry, pets) as well as to the cosmetic industry, which have experienced higher growth. The gradual replacement of non-animal protein in aquaculture feed is therefore not evident from these figures.

Table 120: France - NFU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	34815	38731	24158	43702	27851	36893	83464	45725	79863	64233	47943
Flour, meal unfit for human consumption	153980	168613	151339	159899	204048	215224	182812	173586	171047	165804	174635
Total NFU net supply	188795	207343	175496	203602	231899	252117	266277	219311	250910	230037	222579

Source: database

Table 121: France - NFU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	164286	169939	158919	166800	176064	184148	157755	142414	161086	157815	163923
Marine fish, others	24017	30434	13265	32022	48770	60001	99240	65931	82272	63964	51992
Aquatic animals	235	6756	3308	4780	7064	7665	9213	10959	7545	8255	6578
Aquatic mammals	257	214	4	0	0	304	68	7	6	3	86
NFU net supply	188795	207343	175496	203602	231899	252117	266277	219311	250910	230037	222579

Source: database

Market for human consumption**Trade**

During the period 1989 to 1998, French foreign trade in seafood remained active despite a lower growth rate in the volume of imports and exports than in the previous decade (Girard, 1999). Over the same period, the trade deficit in value and volume increased due to the growth in imports. On average, between 1989 and 1998, imports for human consumption were in excess of 1.3 Mt, and exports were nearing 430 000 tonnes per annum. National production was 670 000 tonnes per annum over the same period. The market in France is considered "mature", and has been stable with respect to trade and consumption over the last decade (Costas, 2000). In terms of value, imports represented FRF 17.5 billion in 1997, whilst exports amounted to FRF 5.9 billion (OECD, 2000).

Food use imports

The most important commodity groups making up the 1.3 M total annual average French food use imports have been, in decreasing order of importance, fresh/chilled fish (24 percent), prepared/preserved fish (19 percent) and fish fillets (17 percent). Import categories are very diverse, both in terms of OECD groups of products and FAO groups of species (tables 122 and 123).

Table 122: France - FU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	47921	47760	46152	46073	36693	38695	41708	33164	36193	40074	41443
Crus., mol. & other aquatic inv., prepared	25484	29582	29254	28226	27484	30647	31690	30347	34134	33439	30029
Crustaceans	142757	170012	175023	182589	199024	170685	181019	181835	175556	197319	177582
Fish, cured	29572	27531	30921	27209	28451	32615	33462	35100	46010	38975	32985
Fish, fillets	191930	245365	234822	216315	214625	219102	227898	232713	230076	256407	226925

Fish, fresh/chilled	234458	264256	280300	315042	297589	319820	333063	366538	354499	366936	313250
Fish, frozen	191529	216549	196116	182627	138115	135916	137786	141331	123669	135894	159953
Molluscs	101646	93932	96792	86896	83803	78524	84593	97660	103902	134283	96203
Prepared/preserved fish	208716	229928	239097	229579	246300	271607	281437	279100	262466	292522	254075
Total FU Imports	1174013	1324913	1328477	1314559	1272085	1297612	1352657	1397788	1366505	1495849	1332446

Source: database

Demersal are the most important group of species within French imports with 340 000 tonnes average. Pollock, cod, saithe, haddock and grenadiers are the most common demersal fish. Second come crustaceans with 180 000 tonnes followed closely by large pelagic with 170 000 tonnes. Shrimps and prawns are the main crustaceans imported, while tunas account for the bulk of large pelagic. Atlantic salmon is the main species among diadromous imports.

Table 123: France - FU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	10222	11004	11392	11268	10796	11865	10641	13299	19221	22535	13224
Diadromous fish	122019	152847	171230	167722	157213	167785	182707	187455	183402	187068	167945
Marine fish, pelagic, tunas	139188	164896	150744	152737	158182	178276	189190	198469	175883	212345	171991
Marine fish, pelagic, small	144819	150491	155428	144083	134868	128471	134990	131988	127604	132645	138539
Marine fish, demersal	294602	356100	344588	322270	321651	342997	350398	372309	344800	356292	340601
Marine fish, others	145355	148291	147873	172694	142371	149668	145722	151262	165810	179848	154889
Crustaceans	142757	170012	175023	182589	199024	170685	181019	181835	175556	197319	177582
Molluscs	116585	112390	111600	102345	95597	96035	102349	114884	121519	153225	112653
Cephalopods	47921	47760	46152	46073	36693	38695	41708	33164	36193	40074	41443
Aquatic animals	10545	11123	14445	12778	15690	13135	13934	13123	16517	14498	13579
Total FU Import	1174013	1324913	1328477	1314559	1272085	1297612	1352657	1397788	1366505	1495849	1332446

Source: database

In terms of value, imports are mainly made up of frozen shrimps, canned tuna and fresh salmon. The French fleet lands tuna to the processing industry based in ACP countries, which is then imported into France. In 1998, by volume, salmon imports represented approximately 50 percent of the value of fresh fish imports (Paquette, 1999).

Food use exports

The growth of frozen fish products exports of the mid 1990s has slowed down, and transferred to prepared crustacean and molluscs and fish products. Exports in crustaceans (shrimp, prawn) and molluscs (oysters, mussels) have experienced a net overall growth over the reference period.

Table 124: France - FU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	24525	28456	22799	17277	22587	20832	22680	22223	23086	24365	22883
Crus., mol. & other aquatic inv., prep.	2454	2953	3320	3128	4084	5707	6244	5433	6987	5992	4630
Crustaceans	16182	15420	15663	14661	14880	14635	16704	24583	19454	21231	17341
Fish, cured	6861	7322	8348	8185	7979	11084	14032	11866	8155	8874	9271
Fish, fillets	7158	8937	8148	11060	7486	11567	14110	13393	13388	12890	10814
Fish, fresh/chilled	112102	125150	115103	112778	88215	100705	83761	83364	92204	104147	101753
Fish, frozen	150920	166699	171621	198164	241535	255976	252020	245940	234291	204603	212177
Molluscs	10852	13034	15184	17219	20386	15836	15184	15063	18475	22167	16340
Prepared/preserved fish	12394	12522	12761	14278	20362	24445	47429	53490	63305	49478	31046
Total FU Exports	343448	380493	372948	396751	427514	460786	472164	475354	479346	453746	426255

Source: database

Table 125: France - FU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	1660	1178	1199	1340	2821	3751	1399	2119	2059	1660	1919
Diadromous fish	11378	10767	10690	9561	12317	14780	13924	12887	14381	21944	13263

Marine fish, pelagic, tunas	78461	73781	86869	82762	123586	108508	123034	126528	127453	103649	103463
Marine fish, pelagic, small	106907	125673	111828	154305	160619	196633	190560	192294	186654	169396	159487
Marine fish, demersal	36209	44640	44690	31782	30390	38620	44852	42407	43350	41933	39887
Marine fish, others	54821	64591	60705	64716	35845	41483	37583	31818	37445	41409	47042
Crustaceans	16182	15420	15663	14661	14880	14635	16704	24583	19454	21231	17341
Molluscs	8583	10083	10602	9488	16881	17446	17920	16698	21511	23168	15238
Cephalopods	24525	28456	22799	17277	22587	20832	22680	22223	23086	24365	22883
Aquatic animals	4723	5904	7903	10859	7590	4096	3507	3797	3951	4992	5732
Total FU Export	343448	380493	372948	396751	427514	460786	472164	475354	479346	453746	426255

Source: database

The main export products are frozen tuna, frozen shrimps and prawns, and fresh or chilled anchovies. The composition of exports changed during the 1990s, with an increase in more elaborate products that target specialist markets such as surimi and smoked fish for delicatessens (Len-Corrail, 1997). The share of fresh fish has decreased from approximately 40 percent to 30%, whilst the share of frozen fish has increased from 10 percent to 20%, partly as a result of a growth in production and increased exports for cooked dishes and breaded fish (prepared/preserved fish – Table 124).

However, the opposite trend is true of imports, due to an increase in the import of non-processed goods. For example, the share of fresh fish and non-processed crustaceans and molluscs has increased, whilst the share of frozen and processed seafood has decreased. France is now the largest importer of scallops and mussels in the EU (Monfort, 1999), with the UK and Norway are by far the largest suppliers of seafood to France. The UK is the leading supplier of crustaceans, and in value terms is also the premier supplier of molluscs. Norway's exports to France are dominated by chilled round finfish (mainly salmon and cod), while France's exports are mainly directed to the Spanish and Italian markets. With regard to imports, there is growing concern that the sourcing of homogenous and reliable supplies of products from outside France is undermining the national industry, and worsening working conditions for the small scale producers and operators that remain (Mariojouis, 1997). However, despite constraints in production, and the high level of domestic consumption, there has been some noticeable diversification and intra-industry trade within the processing sector which has managed to support a competitive export industry supplying specialist products (Len-Corrail, 1997).

Distribution

The seafood market in France is strongly marked by the development of large-scale distribution. The share of products distributed in hyper- and supermarkets reached 55 percent in 1997, versus 36 percent in 1988. This proportion can vary up to 80 percent or more for some products (prepared and cured fish). These changes had very significant consequences for the entire sector including increased pressure on prices, a progressive disappearance of certain intermediaries and a concentration of operators upstream (Len-Corrail, 1997).

Food use net supply and consumption

The net supply of seafood for human consumption was on average 1.8 Mt per year between 1989 and 1998. The top commodity among the net supply between 1989 and 1998 is prepared/preserved products (canned products and ready to eat dishes) with a 20 percent share of the average net supply, followed by fresh fish with a slightly smaller volume. Fish fillets come next with 350 000 tonnes followed by molluscs with 260 000 tonnes a year.

Table 126: France - FU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	37297	25052	41831	66198	35574	36588	35989	19472	30509	34160	36267
Crus., mol. & other aquatic inv., prepared	28888	31619	29846	29096	28401	29724	29612	28276	30933	32667	29906
Crustaceans	144224	172028	175895	184045	201384	174513	181992	173319	171823	190362	176959
Fish, cured	71898	67581	66078	61995	59844	58284	59373	58074	74625	66520	64427

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish, fillets	336621	377037	353298	338637	352498	348436	364383	356088	335385	350122	351251
Fish, fresh/chilled	317488	334697	358638	394661	386282	404306	420550	458324	427620	433951	393652
Fish, frozen	134057	153211	113283	85410	19347	35371	30593	43883	21380	37947	67448
Molluscs	251111	264553	259765	249896	249777	250825	258795	270827	281561	295396	263251
Prepared/preserved fish	371367	398849	398651	380262	404612	421125	405100	387930	384190	424359	397645
Total FU net supply	1692951	1824626	1797285	1790201	1737720	1759173	1786389	1796193	1758025	1865484	1780805

Source: database

The main species of the net supply include salmon (diadromous), tuna (large pelagic), pilchard, herring and mackerel (small pelagic), Alaska pollock, hake, cod, saithe, anglerfish and grenadier (demersal), oyster and mussels (molluscs) and lobster, crab, spiny lobster, shrimps and prawns (crustaceans).

Table 127: France - FU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	18264	20059	21081	22150	20051	20441	21604	24915	32334	35161	11306
Diadromous fish	142523	180311	200569	202021	191618	202340	218280	226208	221970	211160	200457
Marine fish, pelagic, tunas	195318	238686	220965	236176	213518	257194	230999	228351	179542	227561	424836
Marine fish, pelagic, small	159315	137095	155447	106927	91958	61654	82996	58540	70721	103139	404460
Marine fish, demersal	575566	596780	552462	544219	537994	558797	544257	572983	548089	538641	307703
Marine fish, others	98462	94210	97305	122871	122426	120964	125288	136235	141453	152504	142616
Crustaceans	145876	174970	178149	189514	205634	177282	185035	176620	175708	192407	160852
Molluscs	305924	329041	320945	315349	308790	310857	318239	326865	342148	356328	100057
Cephalopods	43562	46071	41689	46689	35879	38359	47139	33768	31363	37183	18748
Aquatic animals	8140	7404	8671	4285	9850	11288	12554	11709	14698	11399	9768
FU net supply	1692951	1824626	1797285	1790201	1737720	1759173	1786389	1796193	1758025	1865484	1780805

Source: database

Consumption per capita was 31 kg. Fish represented approximately 9 percent of the total animal proteins consumed per day in 1997 (FAO, 1999). Demand for seafood has constantly increased since 1960 when the per capita supply was almost 18 kg. This growth can be attributed to improvements in living standards and the positive image of fish as perceived by modern consumers (Monfort, 1997).

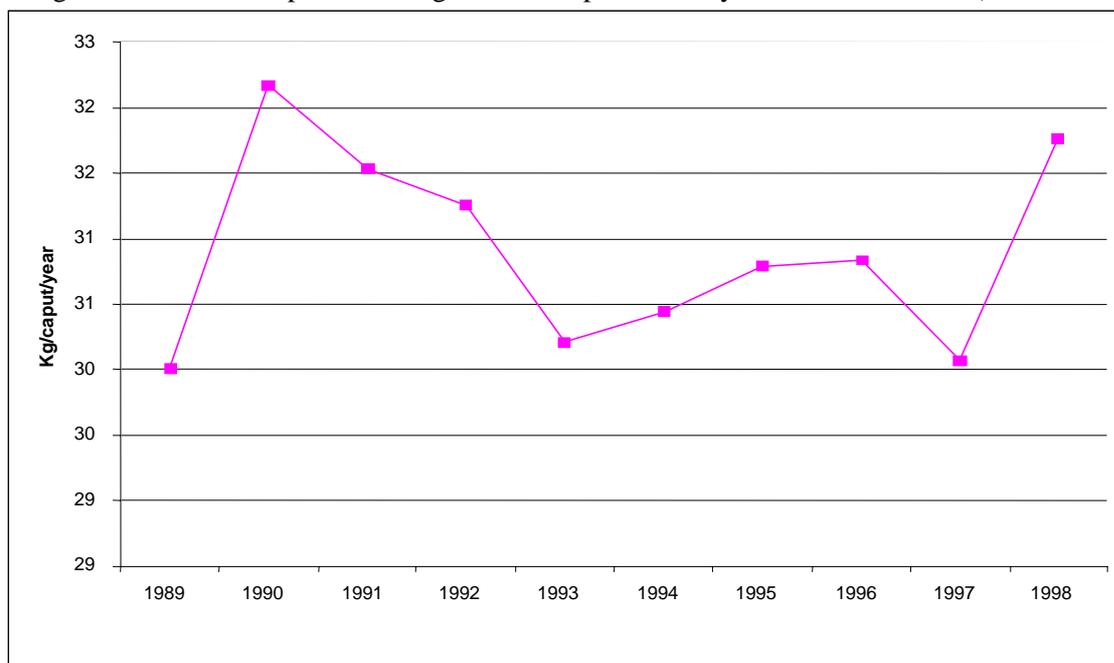


Figure 25: Fish consumption per capita per year in France 1989-1998

The French market is known for the large variety of products it offers. The principal species consumed are tuna, salmon and cod for fish, oysters (of which France is the major consumer in the EU) and mussels, and shrimps and crabs. Whitefish is more frequently used by the processing industry than it once was because it is suited to the production of prepared dishes. In 1995, the majority of seafood products were consumed fresh (53 percent). The remainder were consumed either as processed products (25 percent) or in frozen form (22 percent). In 1994, tuna and small pelagic fish (sardine, mackerel) represented more than 80 percent of canned products. Two thirds of seafood products used by households are consumed within the family unit, the remainder being consumed in restaurants or in canteens. The share of the budget allocated to seafood products accounted for approximately 5 percent of total food expenditure (Papageorgiou and Girard, 2000).

Many changes have been recorded in consumer preferences during the last decades. The increasing time spent on transport and the greater involvement of women in professional activities has developed a time saving attitude favourable to products that are easy and quick to prepare. In 1994, 77 percent of French women aged between 22 and 49 worked. A change in family structure with a growing number of smaller households (fewer than three people) has also boosted demand for smaller food portions (for one or two person). In the fresh and frozen fish sector, the visible effect has been an increase in demand for fillets, steaks and small-sized fish at the expense of whole larger fish. In addition, in common with many European consumers, French people consider seafood as a healthy food, and despite the power of tradition, they constantly want to taste new commodities that match their changing requirements better than products from the past. Surimi is an interesting example of a product launched in the mid 1980s that immediately achieved huge success in France (Monfort, 1997).

With these changes, the structure of the processing industry has also changed markedly during recent years. The industry is producing more value added products such as cooked dishes and breaded fish. The phenomenon is expected to continue to grow in the coming years. In addition, to meet the desire for healthier food, a growing number of companies are adopting quality standards such as ISO 9000 (Monfort, 1997).

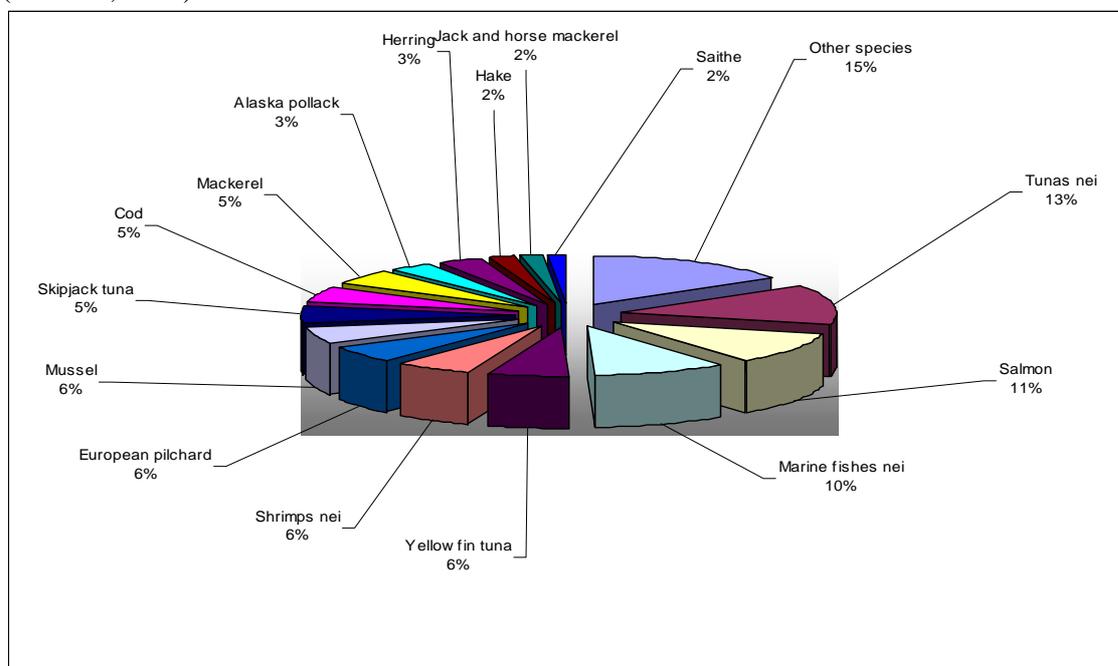


Figure 26: France - Main species consumed in 1998

Assumptions for projection 2005-2030

As specified in the methodology section (see Part One of the study), assumptions have been made on the consumption trend of the OECD group of products. Further assumptions are made regarding

production, imports and exports and France's need for fish in 2005 up to 2030 by taking into account and extrapolating previous trends.

For France, main consumption trends for the period 2005-2030 ("Cons T 1999-2030" and last column "Annual Cons %" in next Table) assume:

An important increase of the demand for crustacean, molluscs and other aquatic invertebrate prepared (100 percent), crustaceans (50 percent) and to a lesser extent for fresh fish (25 percent) fish fillets (20 percent) and molluscs (10 percent).

A stagnation of the demand for cephalopods, cured, preserved (canned) and frozen fish.

One of the main features of future French consumption is a trend towards higher value commodities. Consumers are ready to pay a price premium for quality products, usually identified through the use of labels. This trend towards labelling has been developing lately for fresh fish and is coherent with the growing demand for more traceability and safety for these products (Klinkhardt, 2002).

In addition, working consumers or those living alone (30 percent) have no time to prepare meals. These market segments are moving toward easy-to-prepare foods, single and double portion packs, and frozen or microwave meals (Gauthier, 2002). This increasing trend towards convenience food (Girard, 1999) does not appear that clearly in these assumptions as the prepared/preserved group of products is also affected by the downward trend of canned products, which offsets the positive evolution of the convenience food market.

In addition, seafood consumption will benefit from the increased attention of supermarkets, towards fish (fresh especially) that they use as an image bearer for freshness and quality (Klinkhardt, 2002).

BSE and other food crisis have also raised consumer concerns about sanitation and safety issues. These concerns have led to greater demand for "natural" and "organic" food products, with fish and seafood among others (Gauthier, 2002).

Table 128: France - Assumptions for projection

OECD group	94-98% %	Annual %	Prod % 99-30	T Imp % 99-30	T % %	Exp % 99-30	T % %	Cons % 99-30	T Prod %	Imp %	Exp %	Cons %
Cephalopods	-19%	-4%	0%	0%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Crus., mol. & other aquatic inv., prepared	4%	1%	20%	89%	20%	100%	0.6%	2.0%	0.6%	2.2%		
Crustaceans	13%	3%	10%	46%	10%	50%	0.3%	1.2%	0.3%	1.3%		
Fish, cured	23%	5%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%		
Fish, fillets	18%	4%	0%	19%	0%	20%	0.0%	0.5%	0.0%	0.6%		
Fish, fresh/chilled	25%	5%	0%	20%	0%	25%	0.0%	0.6%	0.0%	0.7%		
Fish, frozen	0%	0%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%		
Molluscs	63%	13%	20%	8%	0%	10%	0.6%	0.2%	0.0%	0.3%		
Prepared/preserved fish	4%	1%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%		
Fish/marine mammal, fat, oil	58%	12%	0%	0%	0%		0.0%	0.0%	0.0%	0.0%		
Flour, meal unfit for hum. Cons.	-30%	-6%	0%	0%	0%		0.0%	0.0%	0.0%	0.0%		

Source: database

Consumer demand increases; exports grow, and so do aquaculture production for molluscs and crustaceans. Imports are increased to make for the capture production shortfall. The apparent consumption per capita will increase from 31 to 33 kg per capita per year.

Freshwater fish	26891	35909	36462	37031	37615	38217	38835
Aquatic animals	12329	12435	13264	14175	15178	16283	17498
FU net supply	1793053	1914031	1950669	1989055	2029297	2071509	2115815
Freshwater fish	26891	35909	36462	37031	37615	38217	38835

Source: database

The apparent per capita consumption of fish products will increase by 31 kg per capita per year to nearly 33 kg per capita per year in 2030 as the French population growth rate (10 percent) will be lower than the one of the net supply (13 percent). Despite the large number of processed convenience products, fresh fish still plays a central role on the French seafood market. Supermarkets have recognized the importance of fresh fish and accounted for 67 percent of all fresh fish sales in 2001. Fish is used by these mass retailers as an image bearer for freshness and quality (Klinkhardt, 2002).

Supermarket chains are also increasingly becoming involved throughout the production chain in order to secure more control and influence over product quality and safety and to ensure supply. One French retail group even owns the biggest fishing fleet in the French fish industry (Klinkhardt, 2002).

The trend in smoked salmon reflects another evolution of the French market towards higher value commodities. Indeed, highly priced labelled smoked salmon was reported to be more popular than cheap smoked salmon in 2001. Sales of expensive wild salmon were also reported on the increase. On a similar trend, sales of shrimps and prawns of all kind are also reported to be on the rise (Klinkhardt, 2002).

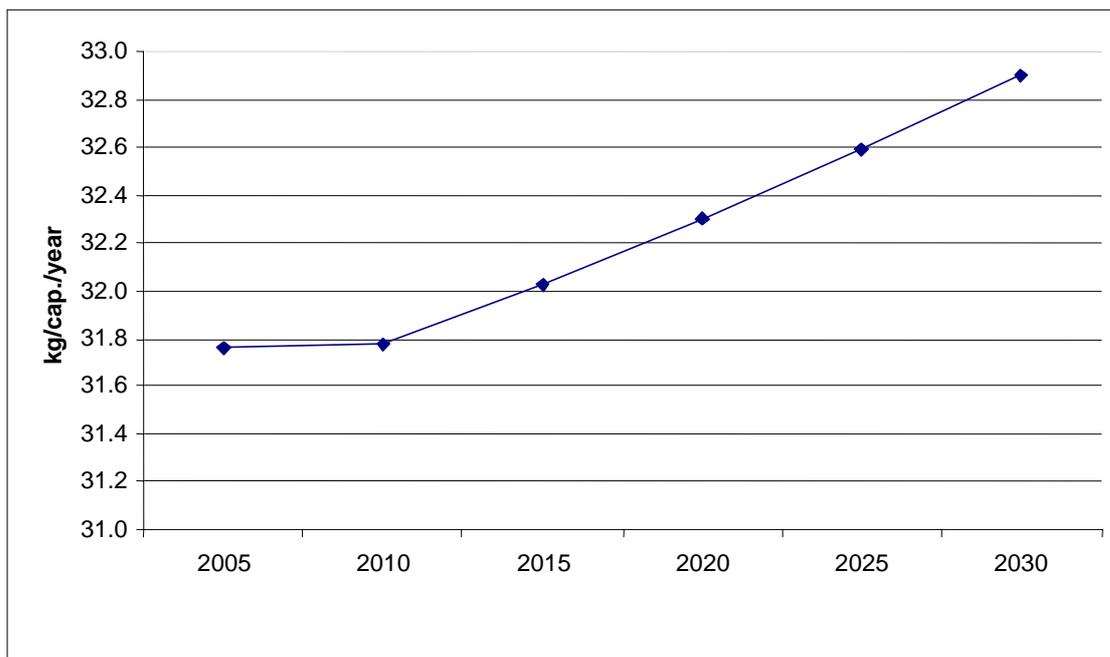


Figure 27: Fish consumption per capita per year in France 2005-2030

The diversity and relative shares of species groups consumed is not predicted to change noticeably.

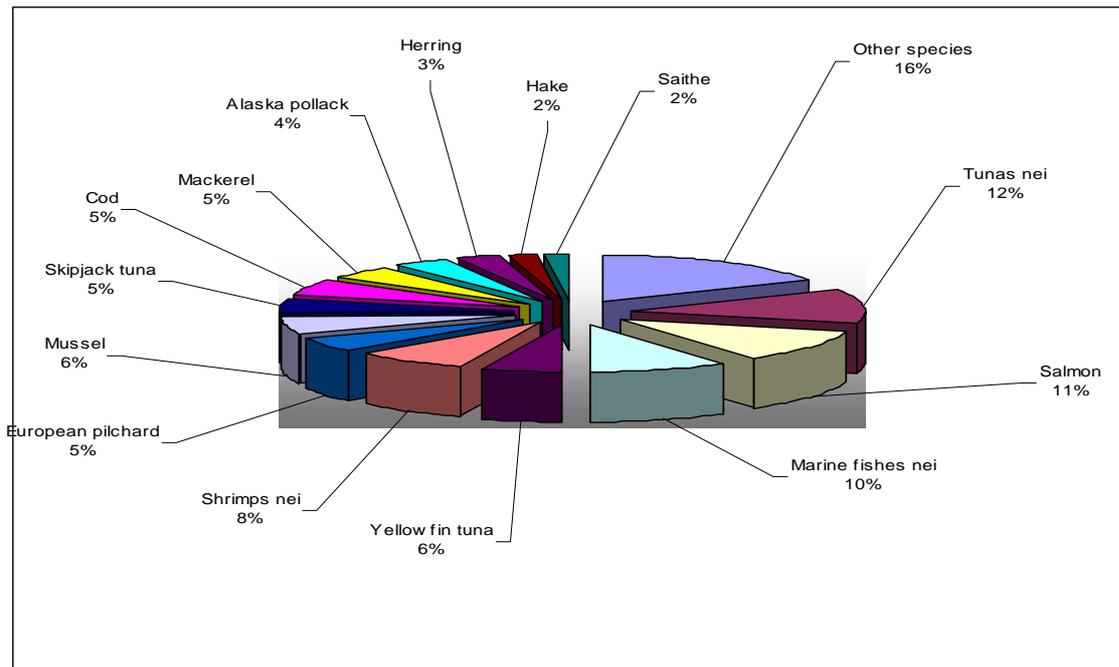


Figure 28: France - Main species consumed in 2030

Non-food use net supply 2005-2030

The non-food use net supply is considered stable over the period 2005-2030, remaining at its 1998 level of 223 000 tonnes (tables 120 and 121).

Production 2005-2030

The set of tables below presents the aquaculture, total production (aquaculture and capture) and commodities production by OECD products and FAO species groups.

Capture and aquaculture

Aquaculture production will increase at its 94-98 rate of increase from 280 000 tonnes in 2005 to around 330 000 tonnes in 2030, driving the increase in total production. Nearly all sectors of aquaculture will contribute to this expansion, with crustacean farming experiencing the largest growth rate with a 40 percent increase over the period. However, quantities produced remain very limited. Demersal production will rise by 30 percent until 2030, while diadromous production will increase by 20%. Molluscs and freshwater fish production will increase more slowly with a 10 percent increase over the whole period.

Table 132: France - Aquaculture by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	10001	11027	11260	11528	11834	12179	12566
Diadromous fish	52176	52026	54714	57551	60546	63705	67037
Marine fish, pelagic, small	50	0	0	0	0	0	0
Marine fish, demersal	4170	6352	7013	7743	8549	9439	10422
Marine fish, others	10	0	0	0	0	0	0
Crustaceans	113	116	128	141	156	172	190
Molluscs	215148	213378	217243	221578	226323	231437	236884
Others	70	63	71	79	89	99	111
Total gp of species	281739	282963	290429	298621	307497	317031	327211

Source: database

Total production increases due to the increase in aquaculture production. Species on the increase are therefore only farmed species such as catfish and pike-perch for freshwater fish; rainbow trout for

diadromous fish; sea bass, sea bream and turbot for demersal; and Pacific cupped oyster and blue mussel for molluscs.

Table 133: France - Total production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	14483	15509	15742	16010	16316	16661	17048
Diadromous fish	53226	53076	55764	58601	61595	64754	68087
Marine fish, pelagic, tunas	161873	161873	161873	161873	161873	161873	161873
Marine fish, pelagic, small	109484	109434	109434	109434	109434	109434	109434
Marine fish, demersal	213848	216030	216692	217422	218227	219117	220100
Marine fish, others	15761	15751	15751	15751	15751	15751	15751
Crustaceans	20750	20753	20765	20778	20793	20809	20827
Molluscs	248184	246414	250279	254613	259359	264473	269920
Cephalopods	23719	23719	23719	23719	23719	23719	23719
Others	76691	76685	76692	76701	76710	76721	76733
Total gp of species	938019	939243	946709	954902	963777	973311	983491

Source: database

Commodities

Food use commodities production will rise slightly due to a 20 percent increase in crustaceans and prepared and fresh molluscs. Fresh crustaceans are also on the increase but at a slower pace, as they will only rise by 10 percent between 2005 and 2030.

This rise in production confirms the trend of the past decade, where the fish processing sector in France has doubled its turnover between 1988 and 1999 (Guillotreau and Le Grel, 2001). However, the assumptions assume a more modest increase for the next 30 years as development of the French processing industry cannot sustain that rate of growth, especially with supply problems set to increase due to the combination of rising global consumption and dwindling stocks.

Table 134: France - FU Commodities Production by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	16014	18451	18451	18451	18451	18451	18451
Crus., mol. & other aquatic inv., prepared	4264	5444	5609	5779	5955	6135	6322
Crustaceans	16441	14577	14797	15020	15247	15477	15710
Fish, cured	36945	36419	36419	36419	36419	36419	36419
Fish, fillets	130713	106605	106605	106605	106605	106605	106605
Fish, fresh/chilled	173615	171162	171162	171162	171162	171162	171162
Fish, frozen	137481	106186	105843	105491	105134	104768	104395
Molluscs	189033	183280	183280	183280	183280	183280	183280
Prepared/preserved fish	174744	181315	181315	181315	181315	181315	181315
Total FU Production	879250	823438	823480	823522	823567	823612	823659

Source: database

Table 135: France - FU Commodities Production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	13576	14286	14286	14286	14286	14286	14286
Diadromous fish	49891	46036	46036	46036	46036	46036	46036
Marine fish, pelagic, tunas	151731	118865	118865	118865	118865	118865	118865
Marine fish, pelagic, small	131378	139890	139890	139890	139890	139890	139890
Marine fish, demersal	241427	224282	224282	224282	224282	224282	224282
Marine fish, others	14774	14065	14065	14065	14065	14065	14065
Crustaceans	19449	16375	16417	16459	16504	16549	16596
Molluscs	232634	226271	226271	226271	226271	226271	226271
Cephalopods	22233	21474	21474	21474	21474	21474	21474
Aquatic animals	2157	1893	1893	1893	1893	1893	1893
Total FU Production	879250	823438	823480	823522	823567	823612	823659

Source: database

Trade 2005-2030

Imports will be stimulated by a general increase in demand for fish and prepared shellfish. Imports will also sustain some of the growth in exports of shellfish (crustaceans, molluscs) over the period 2005-2030.

Imports

French imports will rise over the period considered to reach 1.75 Mt in 2030. Fresh fish remain the largest of the French food use commodities imports, increasing to reach 440 000 tonnes in 2030. Fish fillets will overtake prepared/preserved (canned) products to become the second largest import category, with nearly 300 000 tonnes at the end of the period. The import of crustaceans and molluscs (both prepared and raw) are also on the increase, whilst frozen fish, cephalopods and cured fish will remain static.

Table 136: France - FU Commodities Imports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	37967	40074	40074	40074	40074	40074	40074
Crus., mol. & other aquatic inv., prepared	32051	38435	42455	46895	51799	57216	63200
Crustaceans	181283	214349	227406	241258	255954	271545	288086
Fish, cured	37232	38975	38975	38975	38975	38975	38975
Fish, fillets	233239	266352	273690	281231	288980	296942	305124
Fish, fresh/chilled	348171	381866	392901	404255	415937	427957	440324
Fish, frozen	134919	135894	135894	135894	135894	135894	135894
Molluscs	99793	136563	138215	139887	141580	143293	145026
Prepared/preserved fish	277427	292522	292522	292522	292522	292522	292522
Total FU Imports	1382082	1545030	1582132	1620991	1661715	1704417	1749224

Source: database

Species on the rise are pollock, cod and hake for demersal (fresh and fillets), shrimp, prawns, crabs and lobsters for crustaceans; mussels and scallops for molluscs.

Table 137: France - FU Commodities Imports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	15512	23283	23836	24405	24989	25591	26209
Diadromous fish	181683	193473	198207	203076	208085	213238	218539
Marine fish, pelagic, tunas	190833	212954	213403	213865	214341	214829	215332
Marine fish, pelagic, small	131140	135017	136770	138572	140427	142334	144296
Marine fish, demersal	353359	367659	376051	384680	393550	402669	412044
Marine fish, others	158462	183223	185716	188280	190917	193629	196418
Crustaceans	181283	214349	227406	241258	255954	271545	288086
Molluscs	117602	159377	164154	169288	174813	180768	187197
Cephalopods	37967	40074	40074	40074	40074	40074	40074
Aquatic animals	14242	15622	16516	17494	18566	19741	21029
Total FU Import	1382082	1545030	1582132	1620991	1661715	1704417	1749224

Source: database

Exports

French exports of seafood products will increase only slightly during the period considered as surplus coming from aquaculture production will be limited. They will reach nearly 460 000 tonnes by 2030. Some increase will be seen in the crustaceans and prepared molluscs sector.

Table 138: France - FU Commodities Exports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	22637	24365	24365	24365	24365	24365	24365
Crus., mol. & other aquatic inv., prepared	6072	6236	6416	6602	6793	6989	7191
Crustaceans	19321	21678	22003	22334	22669	23009	23354

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Fish, cured	10802	8874	8874	8874	8874	8874	8874
Fish, fillets	13070	12890	12890	12890	12890	12890	12890
Fish, fresh/chilled	92836	104147	104147	104147	104147	104147	104147
Fish, frozen	238566	204603	204603	204603	204603	204603	204603
Molluscs	17345	22167	22167	22167	22167	22167	22167
Prepared/preserved fish	47629	49478	49478	49478	49478	49478	49478
Total FU Exports	468279	454438	454943	455459	455984	456521	457068

Source: database

Table 139: France - FU Commodities Exports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	2198	1660	1660	1660	1660	1660	1660
Diadromous fish	15583	21944	21944	21944	21944	21944	21944
Marine fish, pelagic, tunas	117835	103649	103649	103649	103649	103649	103649
Marine fish, pelagic, small	187107	169396	169396	169396	169396	169396	169396
Marine fish, demersal	42232	41933	41933	41933	41933	41933	41933
Marine fish, others	37948	41409	41409	41409	41409	41409	41409
Crustaceans	19321	21678	22003	22334	22669	23009	23354
Molluscs	19349	23323	23439	23557	23679	23804	23934
Cephalopods	22637	24365	24365	24365	24365	24365	24365
Aquatic animals	4069	5080	5145	5212	5281	5351	5424
Total FU Export	468279	454438	454943	455459	455984	456521	457068

Source: database

GERMANY

With a population of approximately 82 million inhabitants, Germany represents a sizeable market for seafood and freshwater fish and is a major importer of fish products. Although the national fleet (particularly cutter and coastal fleets targeting flatfish and brown shrimp) still manages to support an important processing sector, a decline in distant water operations has forced processors to turn to cheaper, imported sources of products. It is expected that the industry will go through a process of consolidation and diversification in the future. With regards to consumption, seafood is now seen as a healthy alternative to meat products and is playing a more important role in the national diet. Although German consumers are very attached to traditional products, new fish species and product innovations are currently being developed and promoted.

The unification of Germany in 1990 has generated some discrepancies in the data over the 1989-1998 reference period. The complexities of sectoral re-structuring and those involved in merging two different statistical systems are not discussed, but the 1989-1998 average values are not used to the same extent as for other countries as a result.

Production: captures, aquaculture and commodities 1989-1998

In 1998, the total production of aquatic products was 330 000 tonnes, having experienced a strong decrease during the 1990s. The volume of aquaculture production was stable during the 1990s and accounted for approximately 20 percent of the production total in 1998.

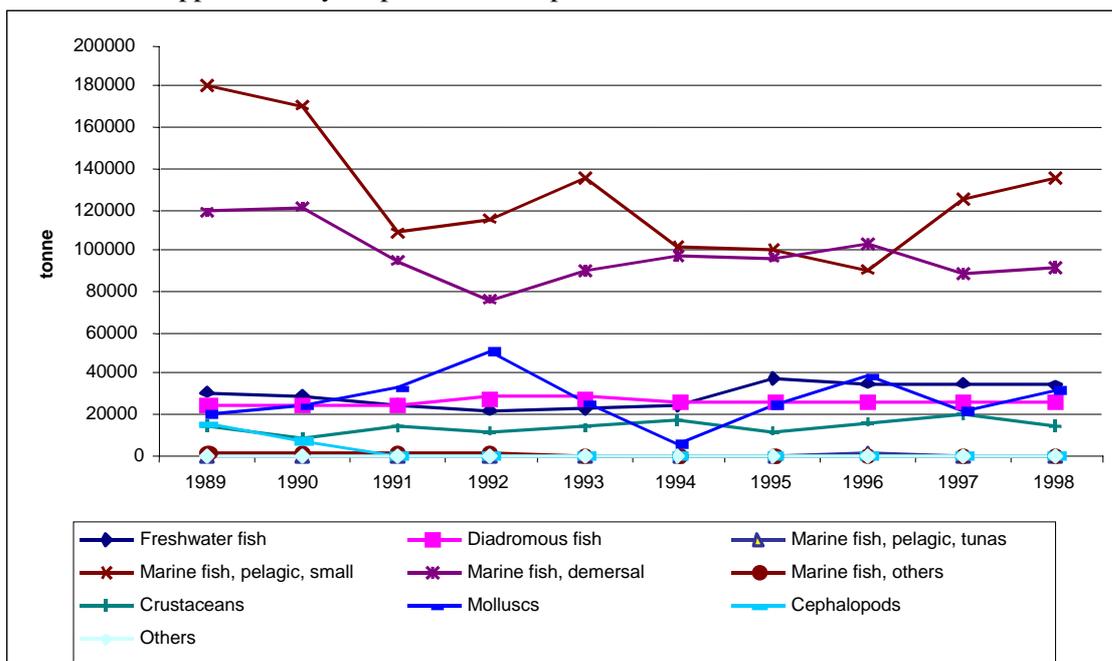


Figure 29: Germany - Capture and aquaculture production 1989-1998

Captures

The decrease in total production has mainly concerned the production of marine species. Landings decreased from 330 000 tonnes in 1990 to 260 000 tonnes in 1997 (Eurostat, 1997) especially due to the collapse of the distant water fleet that provided a high proportion of lower value pelagic species such as herring and mackerel, as well as cephalopods until 1990 (FAO, 1999). The main species caught by German fishermen comprise herring and horse mackerel for pelagic, cod and redfish for demersal and shrimps for crustaceans.

Table 140: Germany - Captures by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	9783	9848	8866	8825	10060	11616	23617	23200	23361	23302	15248
Diadromous fish	2088	2461	2616	2437	2438	1132	1098	1240	1356	1279	1815
Marine fish, pelagic, tunas	0	53	0	0	0	0	0	714	417	42	123
Marine fish, pelagic, small	180501	170594	108535	115724	135236	101456	101161	90994	125056	135054	126431
Marine fish, demersal	119166	121137	94639	75812	89986	97840	96587	103824	88788	91740	97952
Marine fish, others	1544	1094	1087	1645	0	248	316	310	336	217	680
Crustaceans	14108	8160	13989	11610	13507	16806	11646	16100	20010	14940	14088
Molluscs	2013	3721	2615	495	1301	1034	5410	0	0	0	1659
Cephalopods	15521	6819	0	0	0	0	0	0	0	0	2234
Others	0	21	30	9	12	18	8	6	4	5	11
Total gp of species	344724	323908	232377	216557	252540	230150	239843	236388	259328	266579	260239

Source: database

Lake and river fishing is a very significant sector where 1.5 million people take part in recreational fishing. In 1997, this type of capture increased to 13 000 tonnes (FAO, 1999).

Aquaculture

In 1997, aquaculture produced 67 000 tonnes and the main species were rainbow trout (25 000 tonnes, diadromous) and carp (12 000 tonnes, freshwater) (FAO, 1999). Carp production is concentrated in Bavaria and Lower Saxony where the fish is still consumed traditionally and rearing occurs on fairly small family-owned enterprises (Stippl, 1999). Mussels culture along the North Sea and Baltic coasts dominates marine culture (31 213 tonnes in 1998).

Table 141: Germany - Aquaculture by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	21331	19145	15500	13300	12700	12300	14000	12000	12000	10700	14298
Diadromous fish	23080	22220	22515	25813	25550	25100	25050	25024	25028	25030	24441
Molluscs	18641	20328	30077	50906	24750	4952	19046	38213	22405	31288	26061
Total gp of species	63052	61693	68092	90019	63000	42352	58096	75237	59433	67018	64799

Source: database

Commodities production

Germany has a diverse range of commodities production, with strong fish canned/prepared, frozen and fillet components. Average production was around 320 000 tonnes a year between 1989 and 1998. Prepared/preserved products accounted for 35 percent of the average production with 110 000 tonnes. Frozen fish have been increasing from their 1989 level of 70 000 tonnes to reach 130 000 tonnes in 1998.

Food use commodities production

Table 142: Germany - FU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Crustaceans	5405	4935	5016	4893	6028	4970	4459	3794	3464	3951	4692
Fish, cured	34014	28954	16695	17103	14372	13351	12924	12917	12434	12525	17529
Fish, fillets	98915	103815	86246	90627	98820	87069	82738	90742	106587	114967	96053
Fish, fresh/chilled	16472	10546	10131	11387	12460	10589	15099	14746	10421	8627	12048
Fish, frozen	69319	65960	51441	48202	61013	69106	82874	94192	114521	129816	78644
Prepared/preserved fish	154385	145776	116576	112531	102706	86445	100469	100543	108720	109651	113780
Total FU Production	378510	359987	286105	284742	295399	271531	298562	316933	356148	379538	322746

Source: database

Small pelagic fish (herring and various clupeoids) dominate the species groups, although demersal species (saithe, cod, redfish and various flatfish) are more important than the absence of precise classification would lead to believe (Marine fish, others).

Table 143: Germany - FU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	539	417	277	48	0	0	335	335	237	233	242
Diadromous fish	5276	3134	2861	3314	3694	4090	4359	3867	3793	4281	3867
Marine fish, pelagic, small	74722	62634	51008	55944	56871	41519	49785	40498	53268	53488	53974
Marine fish, demersal	11862	12426	9627	9311	20942	21599	29391	31673	35229	35246	21730
Marine fish, others	280706	276441	217317	211232	207864	199353	210234	236767	260157	282340	238241
Crustaceans	5405	4935	5016	4893	6028	4970	4459	3794	3464	3951	4692
Total FU Production	378510	359987	286105	284742	295399	271531	298562	316933	356148	379538	322746

Source: database

Non-food use commodities production

Non-food use commodities are meal, mostly from small pelagic industrial species (95 percent of 12 718 tonnes produced in 1998) and white-fish offal (5 percent) and oil to a lesser extent. Production has decreased over the 1989-98 reference period by 30 percent to nearly 17 000 tonnes per year in 1998.

Table 144: Germany - NFU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	5777	5683	5491	5621	5661	4433	4125	3486	3219	4086	4758
Flour, meal unfit for human cons.	19725	17848	14438	15153	17205	12476	10437	9271	9270	12718	13854
Total NFU Production	25502	23531	19929	20774	22865	16909	14562	12757	12489	16805	18612

Source: database

Table 145: Germany - NFU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	16785	14711	11919	12520	14154	10208	9187	8520	8045	12084	11813
Marine fish, demersal	2940	3137	2519	2632	3051	2267	1250	751	1226	634	2041
Marine fish, others	5777	5683	5491	5621	5661	4433	4125	3486	3219	4086	4758
Total NFU Production	25502	23531	19929	20774	22865	16909	14562	12757	12489	16805	18612

Source: database

Non-food use: trade and net supply 1989-1998

Non-food use domestic production is very small (16 805 in 1998) compared to the capture fisheries landings for human consumption (26 000 tonnes in 1998). Thus, non-food use products are mainly supplied by imports. A significant share of non-foodstuff products is re-exported. From 1989 to 1998, imports were 693 000 tonnes and exports were 269 000 tonnes on average per year.

Non-food use imports

Over the 1989-98 reference period, more than 30 percent of the annual 693 000 tonnes of imported non-food use commodities were oil, the rest meal. Imported fish meal comes mostly from Denmark's industrial fisheries production. More than 100 000 tonnes out of 523 000 tonnes of meal imported in 1998 were in the form of sileage (fish waste). Aquatic animals (corals) imports have fluctuated wildly, as have those of whale oil.

Table 146: Germany - NFU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	581993	319104	333897	204423	215988	269254	262696	199165	163634	45731	259588
Flour, meal unfit for human cons.	612519	527127	395246	412408	386113	368227	330326	319815	464502	523058	433934
Total NFU Imports	1194512	846231	729142	616830	602101	637481	593022	518980	628136	568789	693523

Source: database

Table 147: Germany - NFU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	546406	446754	275450	305881	272893	356764	321623	312498	456802	393044	368811
Marine fish, others	647869	378924	432564	288924	312142	278462	269465	204407	168896	158041	313970
Aquatic animals	20	20162	21051	21873	16024	1722	1448	1377	1813	17584	10307
Aquatic mammals	217	391	78	152	1042	533	487	698	625	121	434
Total NFU Import	1194512	846231	729142	616830	602101	637481	593022	518980	628136	568789	693523

Source: database

Non-food use exports

German exports were on average 270 000 tonnes a year between 1989 and 1998, most of which consisted in re-exportation. Germany re-exports the equivalent of 48 percent of its non-food use commodities imports.

Table 148: Germany - NFU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	33862	17831	22162	26163	10628	11887	49301	13484	9650	18019	21299
Flour, meal unfit for human cons.	328521	235517	142217	149637	218038	341937	256868	253245	307382	245792	247915
Total NFU Exports	362383	253348	164379	175800	228666	353823	306169	266729	317033	263811	269214

Source: database

Table 149: Germany - NFU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	320882	230993	138676	147736	215108	340634	256262	252140	306326	244261	245302
Marine fish, others	41480	21855	25316	27380	13083	12948	49769	14550	10684	19382	23645
Aquatic animals	14	276	331	570	447	43	62	39	22	168	197
Aquatic mammals	6	223	56	115	28	198	74	0	0	0	70
Total NFU Export	362383	253348	164379	175800	228666	353823	306169	266729	317033	263811	269214

Source: database

Non-food use net supply

The net supply was an average 442 000 tonnes per year during the 1989-98 period, with some years of sharp decrease followed by recovery, affecting both imports and exports.

Table 150: Germany - NFU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish/marine mammal, fat, oil	553908	306957	317226	183881	211021	261801	217520	189167	157202	31798	243048
Flour, meal unfit for human consumption	303723	309458	267468	277924	185279	38766	83895	75840	166390	289984	199873
Total NFU net supply	857631	616415	584693	461805	396300	300567	301416	265007	323593	321783	442921

Source: database

Table 151: Germany - NFU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, pelagic, small	242308	230472	148694	170666	71939	26338	74547	68877	158521	160866	135323
Marine fish, demersal	2940	3137	2519	2632	3051	2267	1250	751	1226	634	2041
Marine fish, others	612166	362752	412739	267166	304720	269948	223820	193344	161431	142745	295083
Aquatic animals	6	19886	20719	21303	15577	1680	1386	1338	1791	17416	10110
Aquatic mammals	211	167	22	37	1014	335	412	698	625	121	364
NFU net supply	857631	616415	584693	461805	396300	300567	301416	265007	323593	321783	442921

Source: database

Market for human consumption

Trade

The overall domestic production is smaller than domestic demand and the German market is strongly dependant on imports. Between 1989-98 the net supply for human consumption was around 1 Mt per year on average, with domestic production accounting for one third of this total. During the same period, some 410 000 tonnes were exported per year, mainly by the fish processing industry. German imports represented DEM 3.8 billion in 1997, while exports amounted to DEM 1.5 billion.

Food use imports

Imports are highly diverse. They concern mainly fish fillets, fresh and prepared fish. The most important species (Alaska pollock, saithe, cod, herring, hake, plaice) were imported as fillets fresh and frozen, and whole fresh and frozen. Prawns were imported fresh and frozen, and mussels fresh and canned. Prepared/preserved fish included dried and salted cod (klipfisk) and fish fillets coated in batter, cooked or not. Tuna was imported mostly canned. Frozen fish fillets used as raw material by the fish processing industry constituted the principal product of importation (FAO, 1999). The most important supplying nations are the Scandinavian countries of Denmark and Norway, followed by the Netherlands and Russia. Germany also imports large quantities of freshwater fish species (the largest importer in the EU), particularly of rainbow trout, char and carp. Total freshwater fish imports in 1995 were in excess of 33 000 tonnes (Rudiger, 1998). Salmon was imported mostly fresh (86 000 tonnes in 1998), as well as frozen (12 000 tonnes) and smoked (10 000 tonnes in 1998).

Table 152: Germany - FU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	10788	11949	12767	13005	12644	14337	14640	13348	14127	12621	13023
Crus., mol. & other aquatic inv., prepared	12041	13776	14741	15669	15930	18890	14743	14118	12692	10425	14303
Crustaceans	33746	38601	43151	45341	41845	49782	46101	47549	49415	52769	44830
Fish, cured	38320	56098	59781	56495	58750	56009	54265	59299	59502	56734	55525
Fish, fillets	261342	355717	372359	382507	359604	416006	439535	377480	404841	469940	383933
Fish, fresh/chilled	248217	228395	218322	226542	241045	277249	251366	244312	228256	208319	237202
Fish, frozen	77396	94366	105525	115069	85040	85778	84972	86672	84136	84129	90308
Molluscs	15611	23262	36827	37005	31340	34415	33999	24623	23074	33956	29411
Prepared/preserved fish	103076	136608	160890	152035	188285	242603	232792	315175	356020	402161	228964
Total FU Imports	800537	958771	1024362	1043666	1034482	1195067	1172412	1182576	1232062	1331055	1097499

Source: database

Table 153: Germany - FU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	9510	9152	10802	15095	13370	20329	20957	21752	28004	23287	17226
Diadromous fish	69985	78062	83633	96503	116681	157780	154402	173379	167853	171862	127014
Marine fish, pelagic, tunas	51517	66043	76432	73990	64320	80456	76142	89024	77473	88522	74392
Marine fish, pelagic, small	204907	239829	258494	260372	259931	292712	281226	206238	234971	282021	252070
Marine fish, demersal	328791	395611	389998	391878	403628	435062	450264	439681	471752	522230	422889
Marine fish, others	63642	82486	97517	94809	74793	91304	79938	152864	152701	133363	102342
Crustaceans	33746	38601	43151	45341	41845	49782	46101	47549	49415	52769	44830
Molluscs	27141	36174	50461	51493	46127	51609	47473	37104	34129	42644	42436
Cephalopods	10788	11949	12767	13005	12644	14337	14640	13348	14127	12621	13023
Aquatic animals	511	864	1107	1181	1143	1696	1269	1636	1637	1737	1278
Total FU Import	800537	958771	1024362	1043666	1034482	1195067	1172412	1182576	1232062	1331055	1097499

Source: database

Food use exports

Germany has a strong processing base and exports some of its own production and imports after freezing or some other degree of primary treatment into prepared/preserved fish. This concerns mostly small pelagic species (frozen, semi-preserved and canned horse mackerel, herring and Atlantic mackerel) and demersal fish (battered and/or fresh or frozen fillets). Mussels (molluscs) are exported fresh. The principal buyers of German exports are France, the Netherlands and the United Kingdom.

Table 154: Germany-FU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	517	782	703	488	446	553	809	1227	1138	780	744
Crus., mol. & other aquatic inv., prepared	2895	4720	4654	3912	1532	1848	2523	3898	1629	707	2832
Crustaceans	9590	7121	10730	9920	9340	14036	12306	14244	18258	15537	12108
Fish, cured	6184	7512	5936	7207	3427	4137	6723	10752	8049	14973	7490
Fish, fillets	60374	59230	56685	49950	51066	64241	58109	59181	67358	65407	59160
Fish, fresh/chilled	13969	19177	33773	32543	27203	55828	59512	74963	52285	37009	40626
Fish, frozen	109321	125800	155878	156983	144826	154592	165691	179130	197958	204608	159479
Molluscs	6797	15073	23404	25013	29832	6668	8129	23370	16827	29429	18454
Prepared/preserved fish	82035	97295	109416	103322	102286	111681	106341	136978	138599	140523	112848
Total FU Exports	291681	336711	401178	389339	369959	413582	420141	503744	502101	508974	413741

Source: database

Table 155: Germany - FU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	2112	1381	9722	11458	1765	2015	2112	2077	1641	2639	3692
Diadromous fish	2959	3201	3097	3646	15799	23074	35770	49708	34458	27020	19873
Marine fish, pelagic, tunas	3813	4112	6067	3632	3829	5756	7975	12543	10471	12178	7038
Marine fish, pelagic, small	85514	104848	140141	143265	121265	123972	140551	150368	181915	183444	137528
Marine fish, demersal	146759	162311	156183	150113	131311	191343	180855	221821	209161	209363	175922
Marine fish, others	30726	33162	46477	37892	54840	44317	29111	24488	26603	27876	35549
Crustaceans	9590	7121	10730	9920	9340	14036	12306	14244	18258	15537	12108
Molluscs	9659	19752	27909	28824	31297	8408	10520	27092	18246	29988	21169
Cephalopods	517	782	703	488	446	553	809	1227	1138	780	744
Aquatic animals	32	41	149	101	67	109	132	176	209	148	116
Total FU Export	291681	336711	401178	389339	369959	413582	420141	503744	502101	508974	413741

Source: database

Distribution

Supermarkets control 27 percent of fresh seafood and 75 percent of frozen products sales, but traditional fishmongers are still important, retaining more than 45 percent of fresh seafood sales (Straessler and Joerg, 1999). German wholesalers struggled in the late 1990s due to constraints in the supply of raw materials and increasing prices at the first point of sale through growing demand (Anon., 1999l). According to the FAO (1999) there is some evidence that port and distribution facilities are suffering as German vessels increase their landings in foreign ports (136 000 tonnes in 1997). It is also expected that, as the global supply of fisheries products slows down, German processing and distribution networks will merge and consolidate to remain competitive. To a certain extent, infrastructure problems have become more critical since reunification.

Food use net supply and consumption

Fish plays a significant role in the diet and buying behaviour of German consumers. Nearly 70 percent of Germans eat fish at least once a month and nearly half eat fish once or several times a month. Only a small minority of 9 percent never eat fish (Anon., 1998f). Per capita consumption increased during the last 10 years from 11 kg in 1989 to 13 kg in 1998 or, according to one source, to a record level of 15 kg (Worldfish, 1998).

The increase would have been higher without the inclusion of East Germany in 1990 as per capita consumption in the ex-East Germany was nearly half that in West Germany in 1988 (Strauessler and Joerg, 1999). Fish represented 7 percent of animal proteins input per day in the German diet in 1997 (FAO, 1999).

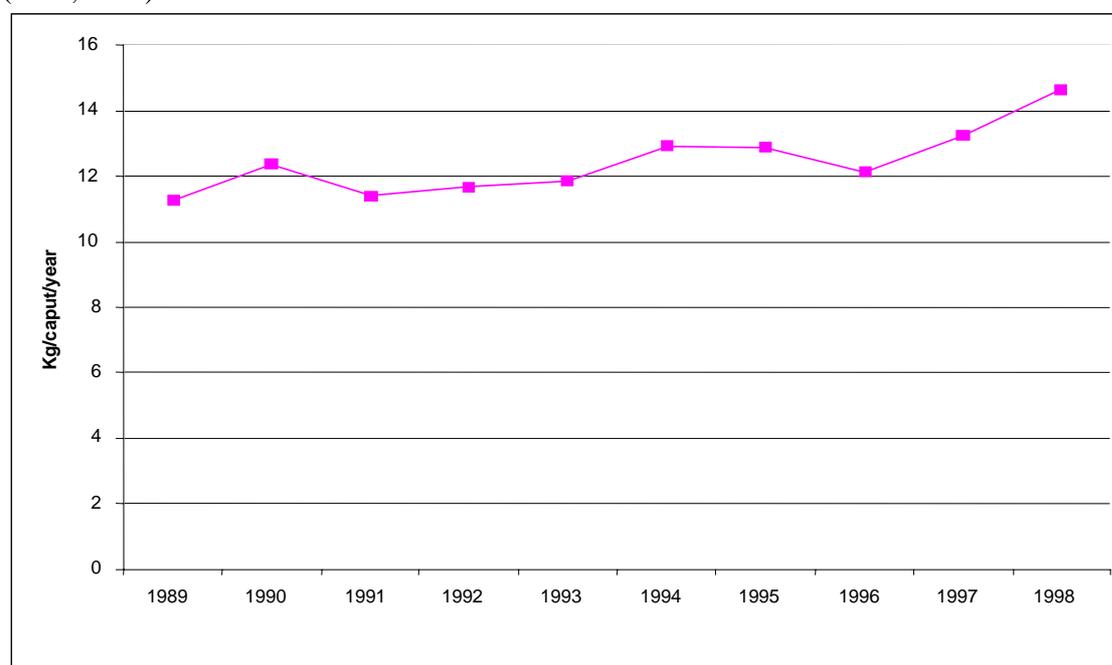


Figure 30: Fish consumption per capita per year in Germany 1989-1998

Consumption of fresh fish, which accounts for a share of 13 percent of the fish products sold in Germany, plays only a subordinate role. More than half of the fish eaten in Germany is consumed as canned products and marinades (29 percent) or frozen fish (25 percent). Crustaceans and molluscs as fresh, frozen or prepared products account for 15 percent of fish consumption, whereas the product categories fish salad (4 percent) and smoked fish (3 percent) are lower down on the list in volume terms. There continues to be a notable increase in the range of innovative fish products and new fish species on the market (Anon., 2001f).

Table 156: Germany - FU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	10271	11167	12063	12517	12197	13785	13831	12120	12989	11841	12278
Crus., mol. & other aquatic inv., prepared	9146	9056	10087	11757	14399	17042	12220	10220	11063	9719	11471
Crustaceans	29561	36415	37437	40314	38534	40716	38254	37099	34620	41183	37413
Fish, cured	66151	77540	70540	66390	69695	65223	60466	61464	63888	54286	65564
Fish, fillets	299883	400302	401920	423184	407357	438834	464165	409041	444070	519500	420825
Fish, fresh/chilled	250720	219764	194681	205385	226301	232010	206953	184095	186393	179938	208624
Fish, frozen	37395	34525	1088	6288	1228	292	2154	1733	699	9337	9474
Molluscs	8815	8189	13424	11992	1507	27747	25870	1253	6247	4527	10957
Prepared/preserved fish	175425	185089	168050	161243	188704	217367	226920	278740	326140	371288	229897
Total FU net supply	887366	982048	909289	939069	959922	1053016	1050833	995765	1086108	1201620	1006504

Source: database

Table 157: Germany - FU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	7937	8188	1357	3685	11605	18314	19179	20010	26600	20881	13775
Diadromous fish	72302	77996	83397	96171	104576	138796	122991	127538	137189	149123	111008
Marine fish, pelagic, tunas	47704	61931	70364	70358	60491	74700	68167	76481	67002	76344	67354
Marine fish, pelagic, small	194114	197614	169361	173051	195537	210259	190460	96368	106323	152064	168515

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998 Ave. 89-98	
Marine fish, demersal	193893	245726	243441	251076	293258	265318	298800	249534	297820	348112	268698
Marine fish, others	313622	325765	268357	268149	227817	246341	261061	365143	386255	387827	305034
Crustaceans	29561	36415	37437	40314	38534	40716	38254	37099	34620	41183	37413
Molluscs	17482	16422	22552	22669	14830	43202	36952	10012	15882	12657	21266
Cephalopods	10271	11167	12063	12517	12197	13785	13831	12120	12989	11841	12278
Aquatic animals	479	824	959	1080	1076	1587	1138	1461	1428	1589	1162
FU net supply	887366	982048	909289	939069	959922	1053016	1050833	995765	1086108	1201620	1006504

Source: database

One of the big sellers in 1998 was herring (15% of market share), and more recently Alaskan pollock (17%), followed by cod, salmon and tuna have done well. It is worth noting that herring, which has traditionally been eaten in Germany, has experienced a decrease, whilst whitefish, used to create frozen products by the processing industry, is becoming increasingly popular (Strauessler and Joerg, 1999). The recent increase in consumption of fish products has been attributed to the growing concern regarding the safety of meat products following the BSE (bovine spongiform encephalitis) crisis (Anon., 2001f). In addition, rising incomes have resulted in the increased consumption of luxury products such as lobster and shrimp (crustaceans). The increase in the consumption of salmon follows the same trend.

Changes in consumption habits in former East Germany differ from those in former West Germany, with people in what was East Germany consuming cheaper fish. There is also a gradient between fish-consuming coastal areas (25 kg per capita per year) and inland areas like Bavaria (4 kg per capita per year). In former West Germany, consumption is 20 percent in the northern regions than in the south. Finally, it should be noted that freshwater fish species feature very strongly in the national diet, representing some 15 percent of all fish and seafood consumption in Germany. Approximately 25 000 tonnes of portion-sized trout fillets are produced annually. Carp are traditionally very popular around the Christmas and New Year period with about 16 000 tonnes sold annually. Although the German market for seafood and fish is notoriously one of the most traditional in Europe, more exotic species such as Nile perch, catfish and sander/pike-perch fillets are becoming more fashionable and gaining a foothold (Rudiger, 1998). At the moment these fish products fill a rather exclusive niche in the market but there are signs that growing familiarity is increasing the popularity of catfish and other species (Neubacher and Griffin, 1997).

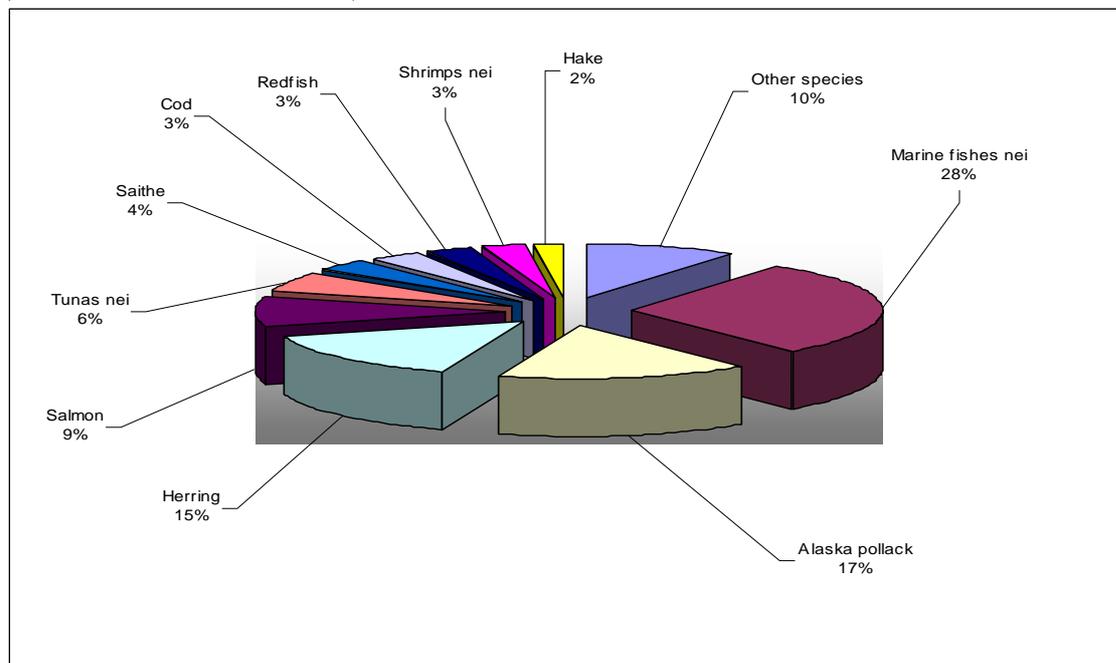


Figure 31: Germany - Main species consumed in 1998

Assumptions for projection 2005-2030

As specified in the methodology section (see Part One of the study), assumptions have been made on the consumption trend of the OECD group of products. Further assumptions are made regarding production, imports and exports and Germany's need for fish in 2005 up to 2030 by taking into account and extrapolating previous trends.

For Germany, main consumption trends for consumption of seafood for the period 2005-2030 assume:

An important increase in the demand for prepared/preserved products (50 percent) and fish fillets (30 percent).

A decrease in demand for molluscs (50 percent), frozen and fresh fish (20 percent), crustaceans, cephalopods, prepared molluscs and cured fish.

Consumption is assumed to shift away from traditional patterns in favour of more convenient products (Anon., 2001f), reflected here in the increase of prepared preserved and fillets products, due to the reduced time Western European households spare for meal preparation.

Another major trend affecting future seafood consumption in Germany is the trend towards products perceived to be healthy and safe, which has grown in the already environmentally minded market since the BSE and foot and mouth crisis (OECD, 2003) (Anon., 2001f).

Germany is also identified as one of the "greener" markets in Europe and organic and sustainable fishing labels should experience positive development in this market (CFCE, 1999)

Table 158: Germany - Assumptions for projection

OECD group	94-98% %	Annual %	Prod % 99-30	T Imp % 99-30	T Exp % 99-30	T Cons 99-30	T Prod Annual	% Imp Annual	% Exp% Annual	Cons % Annual
Cephalopods	-15%	-3%		-10%	0%	-10%		-0.3%	0.0%	-0.3%
Crus., mol. & other aquatic inv., prepared	-55%	-11%		-20%	0%	-18%		-0.6%	0.0%	-0.5%
Crustaceans	-14%	-3%	0%	-10%	0%	-12%	0.0%	-0.3%	0.0%	-0.3%
Fish, cured	-26%	-5%	0%	-10%	0%	-10%	0.0%	-0.3%	0.0%	-0.3%
Fish, fillets	9%	2%	5%	32%	0%	30%	0.2%	0.9%	0.0%	0.8%
Fish, fresh/chilled	-29%	-6%	0%	-21%	0%	-20%	0.0%	-0.6%	0.0%	-0.6%
Fish, frozen	-24%	-5%	0%	-2%	0%	-20%	0.0%	-0.1%	0.0%	-0.6%
Molluscs	-224%	-45%		-7%	0%	-50%		-0.2%	0.0%	-1.3%
Prepared/preserved fish	24%	5%	0%	46%	0%	50%	0.0%	1.2%	0.0%	1.3%
Fish/marine mammal, fat, oil	-181%	-36%	0%	0%	0%		0.0%	0.0%	0.0%	0.0%
Flour, meal unfit for hum. Cons.	78%	16%	0%	0%	0%		0.0%	0.0%	0.0%	0.0%

Source: database

The main results illustrate the assumed constant tonnage exported and increasing demand met by a small increase in capture fisheries production, a larger increase in aquaculture production and a steady increase in imports. Commodities production is taken to remain constant, apart from a small increase in the fish fillet commodity group. The apparent consumption per capita will increase from 13 to 18 kg per capita per year.

Table 159: Germany - Main results for projection

Nature	Average 94-98	2005	2010	2015	2020	2025	2030
Exports FU (t live wt)	469709	508974	508974	508974	508974	508974	508974
Imports FU (t live wt)	1222634	1382762	1422901	1465856	1511762	1560766	1613020
Production FU (t live wt)	324543	380772	381661	382557	383460	384370	385287
Fish supply FU (t live wt)	1077468	1254561	1295588	1339439	1386249	1436162	1489333
Population (X1000)	81798	83675	84854	84762	84670	84578	84486
Per caput supply (kg/h)	13	15	15	16	16	17	18

Nature	Average 94-98	2005	2010	2015	2020	2025	2030
Production NFU (t live wt)	14704	16805	16805	16805	16805	16805	16805
Imports NFU (t live wt)	589282	568789	568789	568789	568789	568789	568789
Exports NFU (t live wt)	301513	263811	263811	263811	263811	263811	263811
Net supply NFU (t live wt)	302473	321783	321783	321783	321783	321783	321783
Aquaculture (t live wt)	60427	66507	67352	68915	71026	73570	76466
Capture (t live wt)	246458	246458	246458	246458	246458	246458	246458
Production total (t live wt)	306885	312964	313809	315372	317484	320027	322923

Source: database

Food use net supply and human consumption 2005-2030

The net supply for food use commodities is predicted to grow by 24 percent from 1.2 million in 1998 to 1.5 Mt by 2030, as a consequence of the trend away from meat products, initiated by the BSE crisis and the foot and mouth disease (OECD, 2003). This growth will be supported mostly by import growth, as domestic production will increase only slightly. This will tilt the German fish trade deficit further, as exports are assumed to remain constant. As net supply will mostly be fuelled by imports, their pattern will be very similar, with prepared/preserved products and fish fillets on the increase, while consumption of the rest of the commodities decrease. Regarding prepared/preserved commodities, tinned products and marinades (herring and tuna) were already reported to take a top position in 2001 (OECD, 2003), while delicatessen and convenience products sectors were identified as sectors with the most growth potential on the German market (Anon., 2001f).

Table 160: Germany - FU net supply by OECD group of commodities 2005-2030 (tonne live weight)

Gp of commodities	Ave. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	12913	11580	11397	11216	11038	10863	10691
Crus., mol. & other aquatic inv., prepared	12053	9309	9026	8751	8484	8224	7972
Crustaceans	38374	40091	39325	38570	37827	37094	36372
Fish, cured	61065	53112	52288	51477	50677	49890	49114
Fish, fillets	455122	550159	573187	597204	622252	648378	675629
Fish, fresh/chilled	197878	171380	165484	159761	154207	148818	143587
Fish, frozen	2843	8920	8623	8327	8032	7738	7445
Molluscs	13129	4013	3651	3293	2938	2588	2241
Prepared/preserved fish	284091	405997	432609	460841	490793	522570	556282
Total FU net supply	1077468	1254561	1295588	1339439	1386249	1436162	1489333

Source: database

Main species affected by the increase in imports will be herring for the small pelagic, tunas for the large pelagic, pollock, cod and redfish for demersal.

Table 161: Germany - FU net supply by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	20997	20740	20672	20632	20619	20634	20677
Diadromous fish	135127	146327	144522	142878	141397	140079	138926
Marine fish, pelagic, tunas	72539	83797	89514	95581	102020	108853	116103
Marine fish, pelagic, small	151095	169855	183546	198110	213599	230066	247569
Marine fish, demersal	291917	372447	390955	410446	430959	452539	475231
Marine fish, others	329325	396401	402980	409962	417368	425222	433550
Crustaceans	38374	40091	39325	38570	37827	37094	36372
Molluscs	23741	11801	11204	10616	10039	9472	8916
Cephalopods	12913	11580	11397	11216	11038	10863	10691
Aquatic animals	1440	1520	1473	1427	1383	1340	1298
FU net supply	1077468	1254561	1295588	1339439	1386249	1436162	1489333

Source: database

Growing imports will support a growth in apparent fish consumption, from 15 kg per capita per year to 17.6 kg per capita per year, as German population will increase more slowly (+3 percent) than the net supply (+24 percent) between 1998 and 2030.

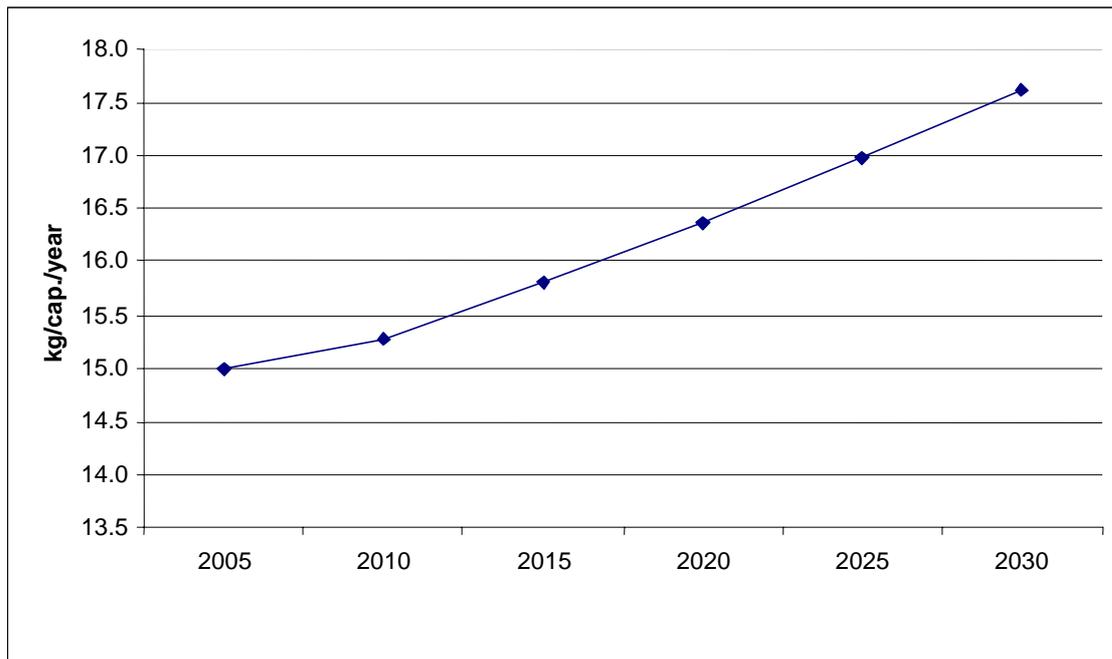


Figure 32: Fish consumption per capita per year in Germany 2005-2030

Changing diets and preferences in fish products will drive a change in commodities product type more than a drastic change between species groups. Herring, pollock, salmon and tunas are on the increase, while the share of shrimps is decreasing.

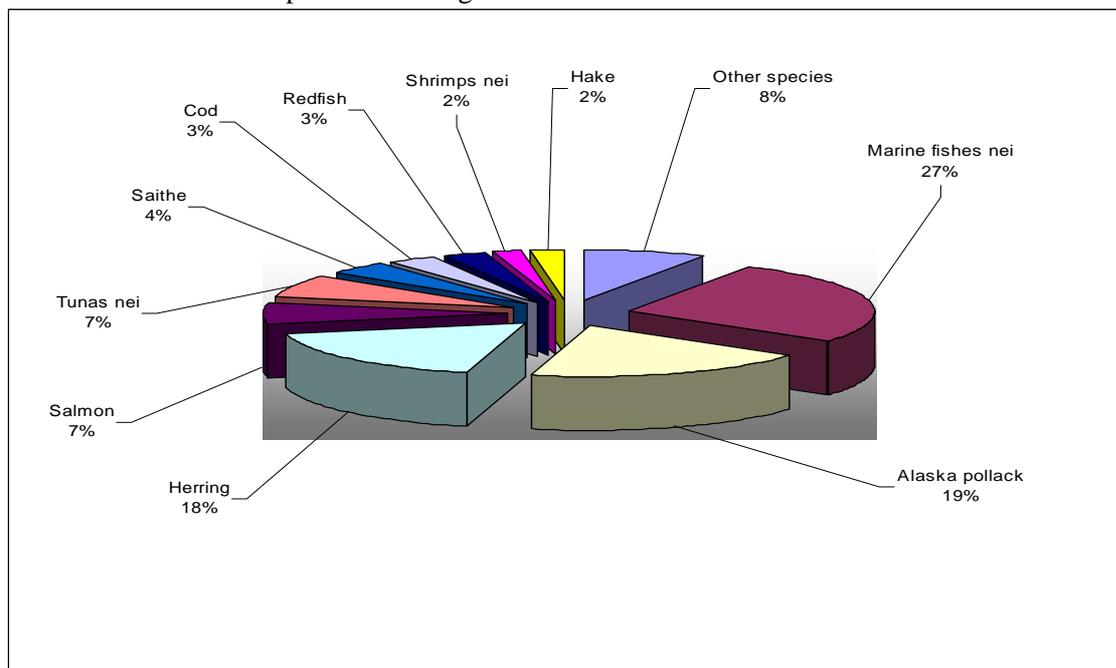


Figure 33: Germany - Main species consumed in 2030

Non-food use net supply 2005-2030

Non-food use is taken to remain stable at its 1998 level of 320 000 tonnes.

Production 2005-2030

The following tables give the predicted aquaculture, total productions by species group, and the commodities production by OECD group of products.

Capture and aquaculture

Aquaculture production will grow overall, with the decrease in carp (freshwater) production more than offset by the increase in mussels (molluscs) and rainbow trout (diadromous).

Table 162: Germany - Aquaculture by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	12200	6487	4538	3174	2220	1553	1086
Diadromous fish	25046	26486	27578	28715	29898	31130	32414
Molluscs	23181	33533	35236	37026	38908	40887	42966
Total gp of species	60427	66507	67352	68915	71026	73570	76466

Source: database

Increase in aquaculture production drive the increase in total production as marine production is assumed to have reached a plateau.

Table 163: Germany - Total production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	33219	27506	25557	24193	23239	22572	22105
Diadromous fish	26267	27707	28799	29936	31119	32351	33635
Marine fish, pelagic, tunas	235	235	235	235	235	235	235
Marine fish, pelagic, small	110744	110744	110744	110744	110744	110744	110744
Marine fish, demersal	95756	95756	95756	95756	95756	95756	95756
Marine fish, others	285	285	285	285	285	285	285
Crustaceans	15900	15900	15900	15900	15900	15900	15900
Molluscs	24470	34822	36525	38315	40197	42175	44255
Cephalopods	0	0	0	0	0	0	0
Others	8	8	8	8	8	8	8
Total gp of species	306885	312964	313809	315372	317484	320027	322923

Source: database

Commodities

By 2030, the commodities production is predicted to reach 385 000 tonnes for the year, an increase of just 1.5 percent over the 1998 production due to a rise in fish fillets production. The rest of the production is assumed to remain constant. The limited capacity of domestic production transfers the pressure of change in consumer demand on trade.

Table 164: Germany - FU Commodities Production by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Crustaceans	4128	3951	3951	3951	3951	3951	3951
Fish, cured	12830	12525	12525	12525	12525	12525	12525
Fish, fillets	96421	116201	117090	117986	118889	119799	120716
Fish, fresh/chilled	11897	8627	8627	8627	8627	8627	8627
Fish, frozen	98102	129816	129816	129816	129816	129816	129816
Prepared/preserved fish	101166	109651	109651	109651	109651	109651	109651
Total FU Production	324543	380772	381661	382557	383460	384370	385287

Source: database

Increase in fish fillets production mostly concerns herring and mackerel for small pelagic; cod, saithe, redfish and haddock for demersal.

Table 165: Germany - FU Commodities Production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	228	233	233	233	233	233	233
Diadromous fish	4078	4281	4281	4281	4281	4281	4281
Marine fish, pelagic, small	47711	53490	53492	53494	53496	53498	53500

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Marine fish, demersal	30627	35259	35269	35279	35288	35298	35308
Marine fish, others	237770	283557	284435	285319	286210	287108	288013
Crustaceans	4128	3951	3951	3951	3951	3951	3951
Total FU Production	324543	380772	381661	382557	383460	384370	385287

Source: database

Trade 2005-2030

Imports

Prepared/preserved products and fish fillets imports will rise, while the rest of the commodities will be on a downward trend. However, this decrease will not be sufficient to offset the impact of increasing commodities, and total imports are predicted to increase by 21 percent over the 1998-2030 period.

Table 166: Germany - FU Commodities Imports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Crus., mol. & other aquatic inv., prepared	14174	10015	9733	9458	9191	8931	8679
Crustaceans	49123	51677	50911	50156	49413	48680	47958
Fish, cured	57162	55560	54736	53925	53125	52338	51562
Fish, fillets	421560	499365	521504	544625	568771	593987	620321
Fish, fresh/chilled	241900	199762	193865	188142	182589	177199	171968
Fish, frozen	85137	83712	83414	83118	82823	82529	82236
Molluscs	30013	33442	33080	32722	32368	32017	31670
Prepared/preserved fish	309750	436870	463481	491714	521666	553442	587155
Total FU Imports	1222634	1382762	1422901	1465856	1511762	1560766	1613020

Source: database

Changes in the groups of commodities products consumed are reflected in changes of species imported, with a growth in small pelagic and other marine fish species, imported as fillets and prepared/preserved fish.

Table 167: Germany - FU Commodities Imports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	22866	23147	23079	23038	23025	23040	23083
Diadromous fish	165055	169065	167261	165617	164136	162818	161665
Marine fish, pelagic, tunas	82323	95975	101692	107759	114198	121031	128281
Marine fish, pelagic, small	259434	299809	313498	328061	343547	360013	377514
Marine fish, demersal	463798	546551	565049	584530	605034	626604	649286
Marine fish, others	122034	140720	146422	152519	159034	165990	173413
Crustaceans	49123	51677	50911	50156	49413	48680	47958
Molluscs	42592	41789	41191	40604	40027	39460	38903
Cephalopods	13815	12360	12176	11996	11818	11643	11470
Aquatic animals	1595	1669	1622	1576	1531	1488	1446
Total FU Import	1222634	1382762	1422901	1465856	1511762	1560766	1613020

Source: database

Exports

German exports are assumed to remain stable over the period, at their 1998 level of 510 000 tonnes.

GREECE

Greece, with 15 000 km of coastline, has a strong tradition of fish and seafood consumption. Fishing provides an important economic role for a large proportion of the population of nearly 10 million people. In recent years, an additional market supplying products to the 10 to 11 million tourists who visit Greece each year has accompanied this historic link with seafood. This new market draws on Greek production, but is also leading to increased imports of new species and products from abroad. Nationally, seafood is now regarded as a very important sector of the economy, and a significant value-added commodity. During the last decade, the main feature of domestic production has been the increase of sea bream and sea bass aquaculture, which accounts for nearly half of all European production.

Production: captures, aquaculture and commodities 1989-1998

There has been a considerable increase in both marine and inland production since the 1950s. By 1998, total Greek production was approximately 188 000 tonnes. Since 1989, production has experienced an increase of 7%, mainly due to the rise in aquaculture that has compensated for the fall in capture fisheries. The considerable inland fisheries production of 25 000 tonnes can also be attributed to increased aquaculture in recent years. Aquaculture represented 30 percent of the total production in 1998, a huge increase from 3 percent of the production in 1989. There have recently been large increases in mussel production, for example, with 16 000 tonnes produced in 1999.

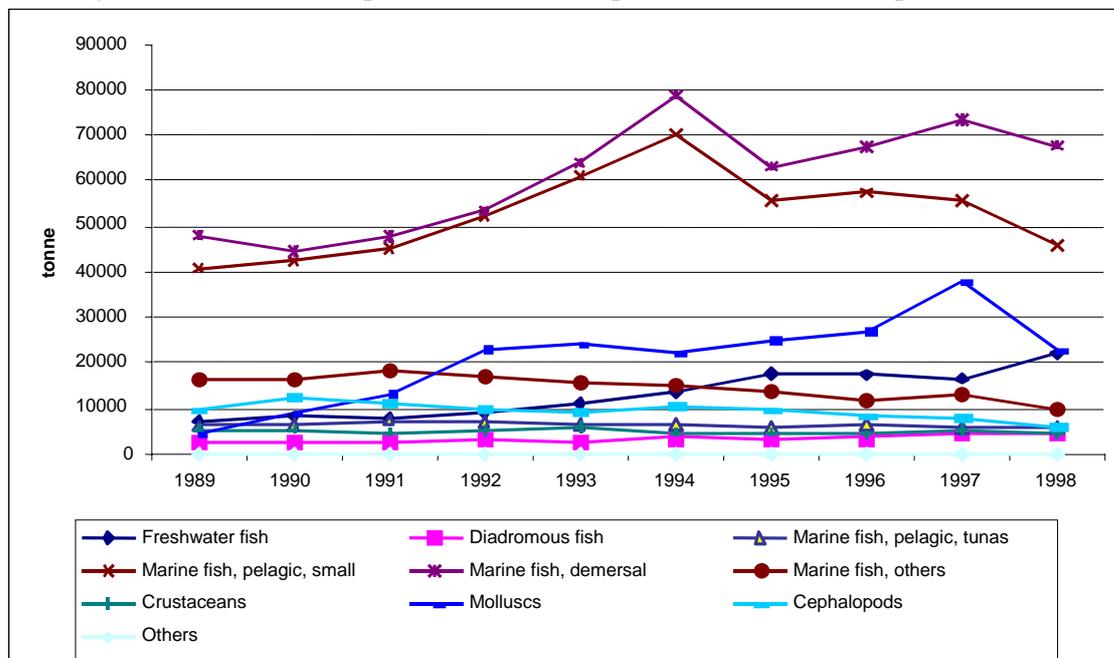


Figure 34: Greece - Capture and aquaculture production 1989-1998

Captures

The captures of the national fleet decreased from 135 000 tonnes in 1989, to 128 000 tonnes in 1998. This reduction is partly due to a reduction in the volume landed by vessels operating in the Mediterranean region as well as to the almost halving of Greek production in high seas fisheries (Papageorgiou, 1999).

Table 168: Greece - Captures by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	6950	7717	7480	8702	10776	13293	17585	16483	16000	21769	12676
Diadromous fish	477	519	508	653	426	729	887	1029	1300	1814	834
Marine fish, pelagic, tunas	6170	6435	7184	7021	6622	6514	5615	6362	5839	5734	6350
Marine fish, pelagic, small	40786	42166	44912	52213	61017	70166	55178	56633	55216	45350	52364

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, demersal	47210	40901	42996	44241	50476	65318	44182	41774	40138	27106	44434
Marine fish, others	16085	16162	18155	16828	15673	15097	13395	11086	12433	8390	14330
Crustaceans	5348	5394	4641	4849	5765	4462	4445	4347	4961	4057	4827
Molluscs	2819	5230	7108	14597	6992	5105	14295	16704	26724	8273	10785
Cephalopods	9530	12284	11219	10141	9130	10279	9741	7995	7872	5727	9392
Others	16	10	3	4	2	2	10	11	10	10	8
Total gp of species	135391	136818	144206	159249	166879	190965	165333	162424	170493	128230	155999

Source: database

During the same period, the reduction in value was of a much greater magnitude causing a drop of almost 40%. The vast majority of this production is derived from the Aegean Sea that provided European anchovy, pilchard, bogue and gilthead bream. The Ionian Sea provides a much smaller proportion of production, mainly anchovy, pilchard and picarels.

Aquaculture

Aquaculture started in Greece in the 1980s and expanded strongly from 1985 with the introduction of mariculture, EU support and very sympathetic national policy and legislation (Kyprianou, 2001). During the 1990s the volume produced by Greek aquaculture demonstrated an explosive increase with production volumes in 1998 almost 15 times greater than volumes in 1989. Production in 1989 was around 4 700 tonnes, while in 1998 it amounted to nearly 60 000 tonnes. This phenomenon is due to a rapid increase in the number of companies involved, to a high rate of investment and to a significant reduction in production cost over the last decade (Papageorgiou, 1999). Greek aquaculture now provides 30 percent of all seafood consumed domestically (Kyprianou, 2001).

Table 169: Greece - Aquaculture by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	378	330	294	281	233	212	223	716	376	207	325
Diadromous fish	2073	1993	1824	2465	2251	2615	2061	2520	3034	2846	2368
Marine fish, pelagic, small	0	0	0	0	0	48	505	502	480	524	206
Marine fish, demersal	790	3550	4599	9169	13394	13500	18927	25583	33230	40458	16320
Marine fish, others	0	0	0	0	0	0	39	305	595	1286	223
Molluscs	1500	3686	5898	8391	16700	16802	10889	10225	11118	14602	9981
Total gp of species	4741	9559	12615	20306	32578	33177	32644	39851	48833	59923	29423

Source : database

Farmed production is dominated by the marine fish farming industry with the largest production of sea bass and sea bream in the world (40 000 tonnes in 1998) and by shellfish culture (14 600 tonnes in 1998). Greece also produces rainbow trout, eels (Diadromous) and mullet (Marine, pelagic, small) to a lesser degree. Shellfish aquaculture (Molluscs, mostly mussels) is becoming more significant and has seen a tenfold increase between 1989 and 1998. The country's output of sea bass and sea bream represents 48 percent of the total Mediterranean production and about 44 percent of fry production (Federation of Greek Mariculturists, 2000). Almost two thirds of the production of sea bass and sea bream are exported, the rest is consumed on the domestic market.

After its very rapid expansion, the Greek marine fish farming sector seems to have reached a critical point and serious decisions are required in order to continue its course of development. Emphasis needs to be directed towards the diversification of product presentation and the development of new domestic and foreign markets (Federation of Greek Mariculturists, 2000). For example, new products based on sea bass and sea bream like fish fillets, smoked fillets, pre-cooked fish and ready to cook fish need to be developed. It must be noted that today only a very limited part of production is undergoing some sort of further processing. To meet the increased consumer awareness concerning product hygiene, actions are needed by those involved in the production and distribution, in order to ensure proper hygiene standards along the entire supply chain.

Commodities production

Food use commodities production

The two tables below present the evolution of commodities production from 1989 to 1998 by OECD group of commodities and by FAO group of species. Fish is mostly sold fresh in Greece with 50 000 tonnes on average per year over the period considered. Main species include small pelagic such as anchovies and pilchards. The second next most important product group is 'Fish, frozen' and concerns all species groups including crustaceans and cephalopods. The cured (salted or in brine) category includes dried and smoked fish, and several species from the small pelagic (anchovies, mackerel), demersal (cod-klipfisk) and aquatic animals (dried salted sea-cucumbers) and 'Marine fish, others'.

Table 170: Greece - FU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	23841	35237	30047	13520	15207	18888	12763	6884	9029	8950	17437
Crus., mol. & other aquatic inv., prep.	20066	14701	14705	14534	15312	16496	8546	16806	21261	20499	16293
Crustaceans	10146	9516	12533	9738	22030	12623	7899	8082	14111	13951	12063
Fish, cured	7166	7400	8280	9708	10212	10909	11828	11054	12329	10551	9944
Fish, fillets	4287	4281	5203	10922	5751	9578	13155	12035	16541	13379	9513
Fish, fresh/chilled	28710	29305	33840	51926	43456	57013	65912	70203	87996	72309	54067
Fish, frozen	42215	39741	44798	60600	62146	63567	51664.5	56125	41629	25006	48749
Molluscs	3456	4543	12343	18790	21345	12365	13456	14356	20123	18675	13945
Prepared/preserved fish	3434	3283	3847	4431	8773	16732	26093	25542	23565	27692	14339
Total FU Production	143321	148008	165595	194169	204232	218171	211316	221088	246584	211012	196350

Source: database

Overall, commodities production has increased markedly over the 1989-98 reference period, apart for the production of tunas that peaked in 1995-96 and then decreased.

Table 171: Greece - FU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Diadromous fish	1199	859	1246	2137	3445	5105	3704	1947	5173	5304	3012
Marine fish, pelagic, tunas	0	0	0	174	53	296	2864	2324	560	764	704
Marine fish, pelagic, small	31605	38533	44103	63194	48603	72850	65853	61666	71243	56766	55441
Marine fish, demersal	21674	19272	23779	35214	44169	48702	45659	51982	43153	31566	36517
Marine fish, others	31334	25347	26839	36868	34068	30846	50573	57041	61932	54537	40939
Crustaceans	10146	9516	12533	9738	22030	12623	7899	8082	14111	13951	12063
Molluscs	23420	18812	25814	32670	36423	28718	21807	30952	40942	38999	29856
Cephalopods	23841	35237	30047	13520	15207	18888	12763	6884	9029	8950	17437
Aquatic animals	102	432	1234	654	234	143	195	209	442	175	382
Total FU Production	143320	148008	165595	194169	204232	218171	211316	221087	246585	211013	196350

Source: database

Non-food use commodities production

Greece produces a small quantity - 4 000 tonnes per year between 1989 and 1998 on average - of fish meal from small pelagic species.

Table 172: Greece - NFU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Flour, meal unfit for human cons.	0	3383	4321	4563	5277	7155	4871	5051	5900	2083	4260
Total NFU Production	0	3383	4321	4563	5277	7155	4871	5051	5900	2083	4260

Source: database

Table 173: Greece - NFU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	0	3383	4321	4563	5277	7155	4871	5051	5900	2083	4260
Total NFU Production	0	3383	4321	4563	5277	7155	4871	5051	5900	2083	4260

Source: database

Non-food use: trade and net supply 1989-1998

Domestic aquaculture and capture fisheries production is used exclusively for human consumption, so non-food use products are mainly supplied by imports. This is particularly true of fish meal for the aquaculture sector, the bulk of which is supplied by Denmark. From 1989 to 1998, the average volume of imports was 38 000 tonnes, of which less than 10 percent was oil. Small quantities of aquatic animals (corals and sponges) made up more than half of the non-food use exports, which stood at 838 tonnes in 1998.

Non-food use imports

Non-food use commodities imports have been increasing steadily since their 1989 level of 29 000 tonnes to reach 55 000 tonnes by 1998.

Table 174: Greece - NFU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	215	1048	717	1098	1775	2620	1738	3959	3485	5025	2168
Flour, meal unfit for human cons.	28300	27348	28273	28052	32325	42306	38423	40816	45713	50137	36169
Total NFU Imports	28515	28396	28990	29150	34100	44926	40162	44775	49198	55161	38337

Source: database

Table 175: Greece - NFU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	28156	26652	27814	27198	27988	38029	36355	38650	42384	47508	34073
Marine fish, others	302	982	631	1182	5512	5764	2381	5034	5582	6609	3398
Aquatic animals	58	654	409	361	486	1121	1426	1088	1232	1044	788
Aquatic mammals	0	109	136	409	115	12	0	3	0	0	78
Total NFU Import	28515	28396	28990	29150	34100	44926	40162	44775	49198	55161	38337

Source: database

Non-food use exports

Exports have always been limited as domestic production is limited and re-exportations scarce. Non-food use exports were on average 1 500 tonnes between 1989 and 1998.

Table 176: Greece - NFU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	0	0	0	3	0	0	0	0	0	120	12
Flour, meal unfit for human cons.	50	493	331	225	7234	764	1251	2541	1970	718	1558
Total NFU Exports	50	493	331	228	7234	764	1251	2541	1970	838	1570

Source: database

Table 177: Greece - NFU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	4	0	2	61	6776	151	178	431	754	242	860
Marine fish, others	0	14	4	23	87	53	66	1402	270	162	208
Aquatic animals	47	479	325	145	371	560	1008	708	947	434	502
Total NFU Export	50	493	331	228	7234	764	1251	2541	1970	838	1570

Source: database

Non-food use net supply

Net supply was approximately 56 000 tonnes in 1998, and had to be nearly entirely imported, as domestic production is very limited.

Table 178: Greece - NFU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish/marine mammal, fat, oil	215	1048	717	1095	1775	2620	1738	3959	3485	4905	2156
Flour, meal unfit for human consumption	28249	30238	32262	32389	30368	48697	42043	43326	49643	51502	38872
Total NFU net supply	28464	31286	32979	33484	32143	51317	43782	47285	53128	56406	41028

Source: database

Table 179: Greece - NFU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, pelagic, small	28152	30035	32132	31700	26489	45033	41049	43270	47530	49349	37474
Marine fish, others	302	968	627	1159	5425	5711	2315	3632	5312	6447	3190
Aquatic animals	11	175	84	216	115	561	418	380	286	611	286
Aquatic mammals	0	109	136	409	115	12	0	3	0	0	78
NFU net supply	28464	31286	32979	33484	32143	51317	43782	47285	53128	56406	41028

Source: database

Market for human consumption**Trade**

Greece has a trade deficit in aquatic food use products. The value of imports exceeded the value of exports by about EUR 35 million in 1999 (Kyprianou, 2001). Nevertheless this deficit decreased during the 1990s, with exports more than trebling by 1998 (Papageorgiou, 1999).

Food use imports

In 1998, cephalopods were the largest food use commodity import at 41 000 tonnes, followed by fresh and frozen fish at 31 000 tonnes and 34 000 tonnes respectively. The remainder of the imports were dried, cured or smoked fish and prepared dishes. The majority of fish products supplied to Greece come from Italy and the Netherlands. Denmark is another big supplier, but largely of non-food use fish meal for the Greek aquaculture industry.

Table 180: Greece - FU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	24611	17791	16395	17336	20408	19761	23252	30192	35600	40720	24607
Crus., mol. & other aquatic inv., prepared	4931	6670	5519	4772	2650	6621	3223	4770	5298	1039	4549
Crustaceans	811	968	829	1755	1614	2415	3086	4782	4441	4135	2484
Fish, cured	11082	12163	10479	9207	9671	11687	11965	15264	15136	11924	11858
Fish, fillets	2845	3560	4834	3957	4668	7475	7477	9689	10781	18148	7343
Fish, fresh/chilled	4953	4754	6385	6447	6925	5734	9976	12720	18529	30647	10707
Fish, frozen	31583	34220	30911	29521	27721	25406	29273	28304	31366	33628	30193
Molluscs	104	69	160	191	172	304	375	501	790	869	354
Prepared/preserved fish	9645	10359	10650	10512	10892	10606	10378	9903	11021	11368	10533
Total FU Imports	90564	90554	86161	83698	84722	90010	99005	116127	132963	152477	102628

Source: database

The main species imported by Greece between 1989 and 1998 were large pelagic (tunas and swordfish), small pelagic (herring and mackerel), demersal (Atlantic cod and redfish, and Argentinian hake) and cephalopods (squid, octopus and cuttlefish).

Table 181: Greece - FU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	979	1500	1806	1390	2444	3611	3070	5725	6738	17041	4430
Diadromous fish	516	599	519	489	1041	1516	2960	3684	2603	2671	1660

Marine fish, pelagic, tunas	3074	3499	4054	5068	5846	5677	6987	6505	8714	8991	5842
Marine fish, pelagic, small	10446	11127	12079	11760	10596	11360	9665	7537	10361	7807	10274
Marine fish, demersal	28862	32982	29445	27857	28864	25108	30450	30098	38540	34401	30661
Marine fish, others	16232	15349	15356	13081	11087	13635	15937	22333	19876	34804	17769
Crustaceans	811	968	829	1755	1614	2415	3086	4782	4441	4135	2484
Molluscs	5035	6739	5651	4956	2756	6792	3389	5164	5966	1864	4831
Cephalopods	24611	17791	16395	17336	20408	19761	23252	30192	35600	40720	24607
Aquatic animals	0	0	28	6	66	133	209	107	122	44	72
Total FU Import	90564	90554	86161	83698	84722	90010	99005	116127	132963	152477	102628

Source: database

Food use exports

Exports, fuelled by the growth in aquaculture production, have been increasing faster than imports since 1996. Exports concern mostly frozen (33 000 tonnes in 1998) and fresh fish (21 000 tonnes in 1998) and molluscs (19 000 tonnes in 1998). The most significant export is that of farmed mussels (18 000 tonnes fresh and 2 500 tonnes canned in 1998) followed by sea bream (10 600 tonnes fresh/chilled some frozen) and sea bass. Italy is the principal buyer of Greek exports, and it is expected that demand for these species will increase faster in other southern European countries. France, Spain and the UK are importers of Greek fish and shellfish, but some markets, Germany for example, have declined slightly in recent years (Kyprianou, 2001).

Table 182: Greece - FU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	1071	997	773	2126	933	1257	2278	1768	2377	1601	1518
Crus., mol. & other aquatic inv., prepared	8976	5212	3702	3268	2878	2383	1841	3056	3083	2518	3692
Crustaceans	639	287	258	418	1130	615	554	1044	1089	1134	717
Fish, cured	14313	8675	5462	4999	6571	5332	4501	4757	4670	5012	6429
Fish, fillets	133	21	12	6	76	17	103	164	177	162	87
Fish, fresh/chilled	4451	3644	5754	6470	10286	6831	5554	22435	21827	21255	10851
Fish, frozen	792	1010	1154	11171	12993	14865	15254	14691	30142	33238	13531
Molluscs	3406	3387	5782	10623	9941	3916	11739	12921	20396	19276	10139
Prepared/preserved fish	1355	1137	961	1623	2333	3150	3137	4878	3198	3022	2479
Total FU Exports	35135	24371	23858	40705	47141	38366	44960	65716	86958	87218	49443

Source: database

Table 183: Greece - FU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	39	45	220	61	88	489	977	669	194	222	300
Diadromous fish	1390	1443	1192	1556	2331	2760	2276	1693	1710	2042	1839
Marine fish, pelagic, tunas	434	187	259	1547	1489	2593	1348	5067	1553	942	1542
Marine fish, pelagic, small	15452	8153	5295	4737	5749	6570	5571	7540	7105	9387	7556
Marine fish, demersal	583	1428	900	927	5273	6579	8186	10281	11607	12214	5798
Marine fish, others	3146	3230	5477	15442	17328	11203	10191	21676	37843	37883	16342
Crustaceans	639	287	258	418	1130	615	554	1044	1089	1134	717
Molluscs	12284	8598	9308	13881	12811	6265	13517	15936	23186	21750	13754
Cephalopods	1071	997	773	2126	933	1257	2278	1768	2377	1601	1518
Aquatic animals	99	2	176	10	9	34	63	41	292	45	77
Total FU Export	35135	24371	23858	40705	47141	38366	44960	65716	86958	87218	49443

Source: database

Distribution

In 1998, fishmongers accounted for 40 percent of the market, and dominated the distribution of aquatic products in Greece. Supermarkets are less developed in Greece than in other European countries, and therefore modern distribution is less pronounced and accounted for approximately 20 percent of the market in 1998 (Papageorgiou and Girard, 2000). However, there are signs that the

recent explosion in aquaculture production is having a modernising effect with the development of a more sophisticated distribution structure, including new processing facilities (freezing, canning and salting) and a growth in hyper- and supermarket retailers. In particular, the larger aquaculture producers are showing signs of a preference for dealing directly with larger retailers such as supermarket chains, in addition to hotels and caterers.

Of the imported products, 80 percent are channelled through small family-owned concerns operating as local sales agents and distributors (Kyprianou, 2001).

Food use net supply and consumption

Domestic demand for aquatic products has been slowly but steadily increasing over the last decade. The increase in demand can be attributed to the interest in healthier lifestyles and diets, to the facts that imports and aquaculture have increased and that seafood is now more readily available through supermarkets than it once was. Modern, working lifestyles for women have increased the demand for less traditional dishes and frozen products that are faster to prepare. It is expected that this demand will continue to rise (Papageorgiou, 1999). In total, the net supply has increased from 199 000 tonnes in 1989 to 276 000 tonnes in 1998. On average frozen fish dominate the net supply with 65 000 tonnes, followed by fresh fish (54 000 tonnes) and cephalopods (40 000 tonnes).

Table 184: Greece - FU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	47381	52031	45669	28730	34682	37392	33737	35308	42252	48069	40525
Crus., mol. & other aquatic inv., prep.	16020	16159	16522	16038	15084	20734	9928	18520	23477	19020	17150
Crustaceans	10318	10197	13104	11074	22514	14423	10431	11820	17464	16953	13830
Fish, cured	3935	10888	13297	13916	13312	17264	19292	21561	22795	17463	15372
Fish, fillets	6999	7820	10025	14873	10343	17036	20529	21560	27145	31365	16769
Fish, fresh/chilled	29212	30415	34471	51903	40095	55916	70334	60488	84698	81701	53923
Fish, frozen	73006	72951	74555	78950	76874	74108	67418	69738	42853	25396	65585
Molluscs	154	1225	6721	8358	11576	8754	2091	1936	517	268	4160
Prepared/preserved fish	11724	12504	13536	13319	17333	24189	33335	30567	31389	36038	22393
Total FU net supply	198749	214192	227899	237162	241813	269815	265361	271498	292590	276272	249535

Source: database

Main species consumed in Greece include anchovy, pilchard, mackerel for small pelagic; octopus, cuttlefish and squid for cephalopods; cod, seabream, seabass and hake for demersal.

Table 185: Greece - FU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	941	1454	1586	1329	2356	3122	2093	5056	6544	16819	4130
Diadromous fish	325	14	574	1071	2155	3861	4388	3937	6066	5934	2832
Marine fish, pelagic, tunas	2640	3312	3795	3695	4409	3381	8504	3762	7721	8813	5003
Marine fish, pelagic, small	26599	41506	50887	70216	53449	77640	69947	61663	74499	55185	58159
Marine fish, demersal	49952	50826	52323	62144	67760	67231	67923	71799	70086	53753	61380
Marine fish, others	44420	37467	36718	34507	27827	33278	56319	57698	43964	51458	42366
Crustaceans	10318	10197	13104	11074	22514	14423	10431	11820	17464	16953	13830
Molluscs	16170	16954	22157	23746	26369	29245	11679	20180	23722	19113	20934
Cephalopods	47381	52031	45669	28730	34682	37392	33737	35308	42252	48069	40525
Aquatic animals	3	430	1086	650	292	243	341	276	272	175	377
FU net supply	198749	214192	227899	237162	241813	269815	265361	271498	292590	276272	249535

Source: database

The annual consumption of fish per capita was 25 kg in 1998, rising from under 20 kg per capita per year since 1989. The share of fish in the total consumption of animal proteins per day was 12 percent in 1997 (FAO, 1999).

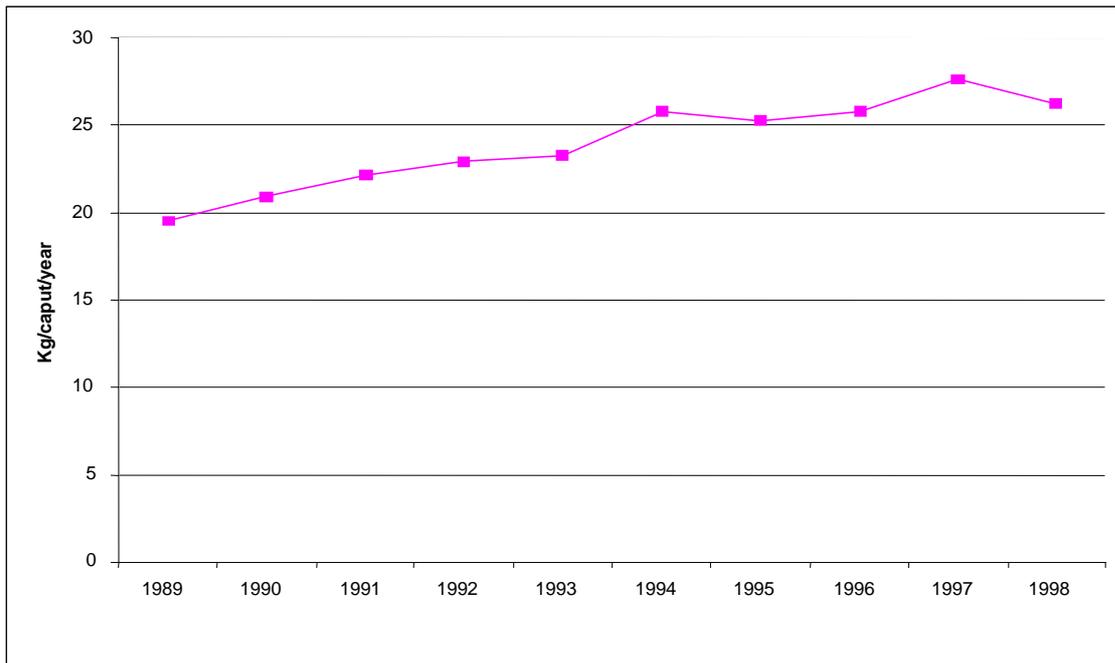


Figure 35: Fish consumption per capita per year in Greece 1989-1998

Fresh products (including fresh fish, crustaceans, and cephalopods, etc.) dominated the Greek market for aquatic products in 1998 (75 percent share), leading to a high number of different species regularly consumed. Products were otherwise bought either frozen or processed (marinated, salted or canned) (Papageorgiou and Girard 2000). Household expenditure for aquatic products accounted for 7 percent of the total food expenditure in 1998. Households also consumed more fish products at home (75 percent) than in restaurants.

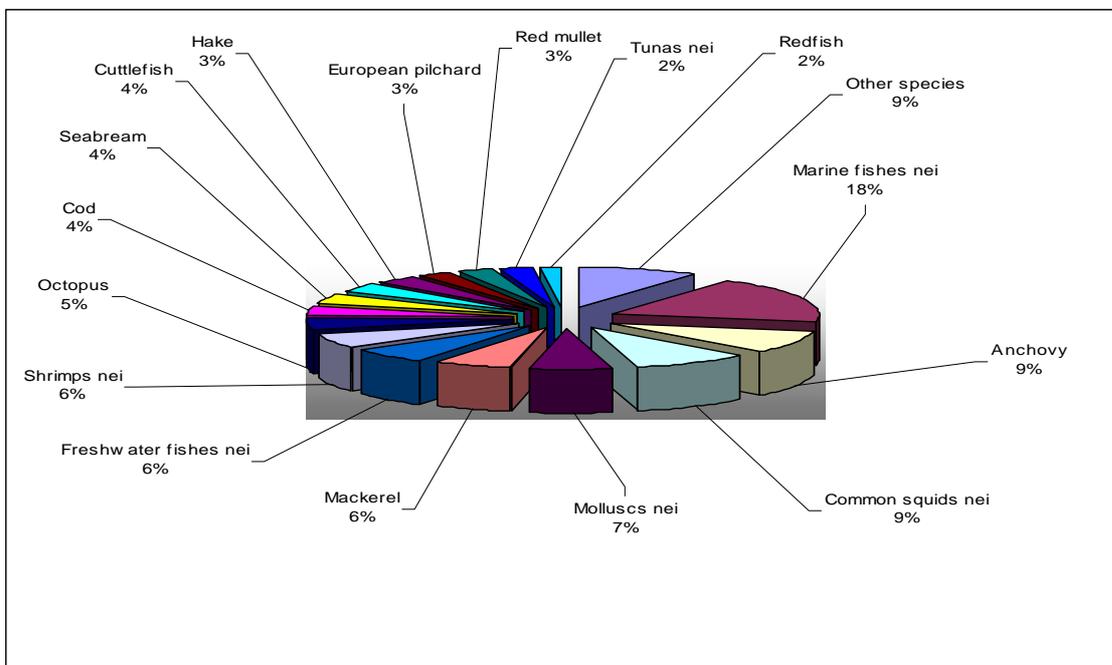


Figure 36: Greece - Main species consumed in 1998

Assumptions for projection 2005-2030 and main results

Consumption trends for OECD group of products form the basis of the model's assumptions (see methodology section in Part One of the study). Further assumptions regarding production, imports and exports and the need for fish in Greece between 2005 and 2030 take into account and extrapolate previous trends (1994-1998, first two columns in Table 187).

For Greece, main consumption trends for the period 2005-2030 ("Cons T 1999-2030" and last column "Annual Cons %" in next Table) assume:

An overall increase in the demand for fish fillets (25 percent) cephalopods (20 percent), preserved/prepared (20 percent) and to a lesser extent cured fish (10 percent), crustaceans (10 percent) and prepared crustaceans and molluscs (5 percent);

A stagnation of all other commodities.

Seafood consumption in Greece is positively affected by the growing interest in healthier lifestyles and diets, with a tendency to move away from traditional dishes. Also, most Greek women are now working outside of the home and prefer food that requires little preparation but nonetheless contains high nutritional value (Synodou, 2000). This last trend is reflected in these assumptions by the increase in consumption of fish fillets and prepared/preserved products.

Decreasing fish prices, the penetration of supermarkets – which has brought seafood closer to the general public - are other factors influencing positively Greek seafood consumption (Kyprianou, 2001). The development of the tourism industry is also likely to boost seafood consumption (Synodou, 2000).

Table 186: Greece - Assumptions for projection

OECD group	94-98%	annual %	Prod % 99-30	T Imp % 99-30	T Exp % 99-30	T Cons 99-30	T Prod % Annual	% Imp Annual	% Exp Annual	Cons % Annual
Cephalopods	29%	6%	0%	24%	0%	20%	0.0%	0.7%	0.0%	0.0%
Crus., mol. & other aquatic inv., prepared	-8%	-2%	5%	0%	0%	5%	0.2%	0.0%	0.0%	0.2%
Crustaceans	18%	4%	0%	42%	0%	10%	0.0%	1.1%	0.0%	0.3%
Fish, cured	1%	0%	10%	9%	0%	10%	0.3%	1.8%	0.0%	0.6%
Fish, fillets	84%	17%	0%	46%	0%	25%	0.0%	0.0%	0.0%	0.0%
Fish, fresh/chilled	46%	9%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Fish, frozen	-66%	-13%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Molluscs	-97%	-19%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Prepared/preserved fish	49%	10%	0%	64%	0%	20%	0.0%	1.6%	0.0%	0.6%
Fish/marine mammal, fat, oil	64%	13%		0%	0%	0%		0.0%	0.0%	0.0%
Flour, meal unfit for hum. Cons.	17%	3%	0%	0%	0%		0.0%	0.0%	0.0%	0.0%

Source: database

The main results of the projection assume a small increase in the production of cured fish (10 percent) and prepared crustaceans and molluscs (5 percent); together with an increase in imports to answer rising domestic demand for prepared/preserved products, fish fillets, crustaceans and cured fish (79 percent). Exports will not increase while capture fisheries remain stable and aquaculture output grows. The apparent consumption per capita will increase from 26 to 27 kg per capita per year.

Table 187: Greece - Main results for projection

Nature	Average 94-98	2005	2010	2015	2020	2025	2030
Exports FU (t live wt)		64643	87218	87218	87218	87218	87218
Imports FU (t live wt)		118116	157688	161706	165993	170569	175457
Production FU (t live wt)		221634	213001	214444	215909	217394	218900
Fish supply FU (t live wt)		275107	283470	288932	294683	300744	307139
Population (X1000)		10509	10838	11079	11174	11269	11365

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Others	9	9	9	9	9	9	9
Total gp of species	206375	228941	233271	237941	242975	248401	254253

Source: database

Commodities

Greek food use commodities production will increase by a mere 10 000 tonnes between 2005 and 2030. Cured fish (smoked, dried and salted products) and prepared molluscs will be the only two commodities to increase, the others being assumed to remain constant. Cured fish will experience the biggest rise of the two, increasing by 10 percent over the period. This increase in commodity production reflects the need for the aquaculture industry to increase the share of its production undergoing processing, in order to diversify the product range, add value and increase shelf life (Charalambakis, 2000).

Table 190: Greece - FU Commodities Production by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	11303	8950	8950	8950	8950	8950	8950
Crus., mol. & other aquatic inv., prepared	16722	20719	20878	21037	21198	21361	21524
Crustaceans	11333	13951	13951	13951	13951	13951	13951
Fish, cured	11334	10154	10308	10463	10621	10781	10944
Fish, fillets	12938	13379	13379	13379	13379	13379	13379
Fish, fresh/chilled	70687	72309	72309	72309	72309	72309	72309
Fish, frozen	47945	25006	25006	25006	25006	25006	25006
Molluscs	15795	18675	18675	18675	18675	18675	18675
Prepared/preserved fish	23925	27692	27692	27692	27692	27692	27692
Total FU Production	221634	213001	214444	215909	217394	218900	220428

Source: database

The main species influenced by the rise in production will be trouts for diadromous fish, European anchovies and mackerels for small pelagic and cod for demersal.

Table 191: Greece - FU Commodities Production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Diadromous fish	4247	5368	5414	5461	5509	5557	5606
Marine fish, pelagic, tunas	1362	764	764	764	764	764	764
Marine fish, pelagic, small	65675	57374	57817	58267	58723	59186	59656
Marine fish, demersal	44212	31581	31592	31604	31615	31627	31638
Marine fish, others	50986	55617	56402	57199	58008	58829	59662
Crustaceans	11333	13951	13951	13951	13951	13951	13951
Molluscs	32284	39217	39374	39533	39692	39853	40015
Cephalopods	11303	8950	8950	8950	8950	8950	8950
Aquatic animals	233	177	179	180	181	183	184
Total FU Production	221634	213001	214444	215909	217394	218900	220428

Source: database

Trade 2005-2030

Imports

Food use commodities imports will increase by 15 percent between 1998 and 2030. Imports will be stimulated by a general increase in demand for fish fillets, prepared/preserved products, crustaceans and cephalopods more specifically.

Table 192: Greece - FU Commodities Imports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	29905	42682	44141	45650	47211	48824	50493
Crus., mol. & other aquatic inv., prepared	4190	1039	1039	1039	1039	1039	1039
Crustaceans	3772	4464	4716	4981	5262	5558	5871
Fish, cured	13195	12109	12292	12477	12666	12857	13051
Fish, fillets	10714	19583	20689	21917	23274	24779	26441
Fish, fresh/chilled	15521	30647	30647	30647	30647	30647	30647
Fish, frozen	29595	33628	33628	33628	33628	33628	33628
Molluscs	568	869	869	869	869	869	869
Prepared/preserved fish	10655	12667	13685	14785	15973	17256	18643
Total FU Imports	118116	157688	161706	165993	170569	175457	180682

Source: database

The rise in fish fillets imports will mostly affect salmon for diadromous fish, mackerel for small pelagic and cod, hake, pollock, redfish for demersal. The increase in prepared/preserved commodities will mostly influence tunas for large pelagic, mackerel and sardines for small pelagic and salmon for diadromous fish. Crustaceans on the increase are various shrimps, prawns and lobsters, while squid and octopus form the bulk of cephalopods imports.

Table 193: Greece - FU Commodities Imports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	7237	17041	17041	17041	17041	17041	17041
Diadromous fish	2687	2782	2870	2966	3069	3183	3306
Marine fish, pelagic, tunas	7375	9680	10219	10802	11431	12112	12847
Marine fish, pelagic, small	9346	8277	8648	9051	9490	9967	10487
Marine fish, demersal	31719	35732	36792	37952	39223	40614	42138
Marine fish, others	21317	35122	35372	35642	35934	36250	36592
Crustaceans	3772	4464	4716	4981	5262	5558	5871
Molluscs	4635	1864	1864	1864	1864	1864	1864
Cephalopods	29905	42682	44141	45650	47211	48824	50493
Aquatic animals	123	44	44	44	44	44	44
Total FU Import	118116	157688	161706	165993	170569	175457	180682

Source: database

Exports

Exports will remain stable at their 1989/1998 level of around 90 000 tonnes.

IRELAND

The main feature of the Irish fishery sector is a strong production increase in recent decades and the consolidation of aquaculture, particularly of salmon and mussels. Ireland is a net exporter of aquatic products and the sector is competitive, recording increased volumes in recent years. The latter half of the 1990s saw a huge national and EU-funded investment in the structure of the industry, benefiting the sector through increased efficiency, modernisation and development of the supply chain. The population is approximately 3.6 million inhabitants. The fishing industry provides important employment opportunities through supportive industries in peripheral, rural areas.

Production: captures, aquaculture and commodities 1989-1998

The fishing industry has developed considerably since its accession to the European Union and its participation in the Common Fisheries Policy. In fact, of all the maritime states of the European Economic Community, Ireland was perhaps the most disadvantaged country in fisheries terms at the time of its entry to Europe in 1972. Since then, and largely with EU aid, the sector has strengthened considerably (DG fisheries, 1992).

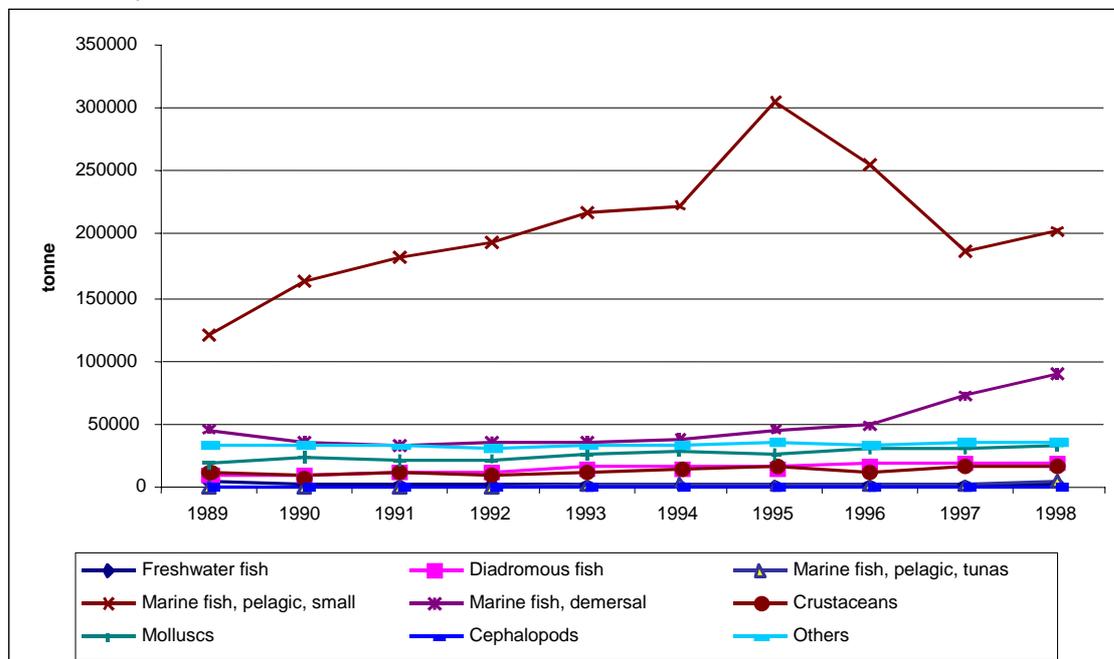


Figure 37: Ireland - Capture and aquaculture production 1989-1998

Irish production was 360 000 tonnes for the year 1998. This volume has experienced a strong increase since 1989 when the production was 220 000 tonnes. The share of aquaculture production was nearly 10 percent of this total in 1998. Ireland's inland water system provides important national revenue through excellent sport fishing for salmon and sea trout and also supports a significant commercial European eel fishery.

Captures

The general trend over the last 20 years has been a gradual decline in the Irish demersal fishery (reflecting the more restrictive Total Allowable Catches) together with an expansion of the pelagic sub-sector and continued growth in the landings of shellfish and particularly Dublin Bay prawn (FAO, 2000). Recently, the pelagic sub-sector has also started to suffer from poorer landings and poorer prices, while the aquaculture industry has continued to thrive (Anon., 1999f).

The volume of captures increased from 220 000 tonnes in 1989 to 360 000 tonnes in 1997. The main species were Atlantic horse mackerel, Atlantic herring and mackerel, which accounted for almost the half of the total landings. Other species comprised whitefish (blue whiting, cod, pollock), blue mussels, salmon and shellfish (FAO, 2000). The peak in production experienced in 1995 is due to extraordinary catches of small pelagic (mackerel and herring) during that period (Anon., 1999f).

Table 194: Ireland - Captures by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	3703	1700	1700	1700	1693	2000	2000	2000	2000	2200	2070
Diadromous fish	3780	1803	1642	1922	1777	2408	2551	2643	2524	2650	2370
Marine fish, pelagic, tunas	0	40	60	451	1946	2534	918	889	1942	3903	1268
Marine fish, pelagic, small	119909	163917	181395	193210	217359	223321	304353	254049	187369	201414	204630
Marine fish, demersal	45460	35517	32740	35744	35508	37784	46289	48776	71952	89520	47929
Crustaceans	10700	8623	11183	9593	10478	13443	16889	12359	15936	16082	12529
Molluscs	3262	3837	4298	6216	9407	12158	12098	11792	10495	8316	8188
Cephalopods	432	184	149	261	368	283	323	494	449	613	356
Others	33062	32752	32342	30790	31767	33451	35467	33857	35396	36132	33502
Total gp of species	220308	248373	265509	279887	310303	327382	420888	366859	328063	360830	312840

Source: database

Aquaculture

In 1989 aquaculture production was 21 000 tonnes but by 1998 this volume increased to 40 000 tonnes. The main cultures are mussels and oysters. Bivalve aquaculture has increased rapidly in recent years as the national climate for investment has become more attractive and as prices have remained good over several years (FAO, 2000). In the year 1997, for instance, production was estimated at 22 000 tonnes, an increase of almost 25 percent in one year (OECD, 2000). The remainder of production is dominated by salmon and, to a lesser degree, rainbow trout.

Table 195: Ireland - Aquaculture by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Diadromous fish	6450	7352	10705	11093	13949	13083	13284	15875	16542	17130	12546
Marine fish, demersal	0	0	0	3	4	3	15	30	0	5	6
Molluscs	14340	19221	16994	15985	16205	15529	14067	19020	20312	23200	17487
Total gp of species	20790	26573	27699	27081	30158	28615	27366	34925	36854	40335	30040

Source: database

The aquaculture sector in Ireland has diversified in recent years with the establishment of the country's first land-based European eel farm, the first commercial-scale harvest of Arctic char and the small-scale production of turbot and halibut. Other new practices are showing initial good results, including the re-seeding scallop beds and the hatching and on-growing of shellfish such as the Japanese abalone (FAO, 2000). There appears to be room for expansion and diversification within the industry and the consolidation of an organically-reared salmon and trout market is now under way (Anon., 1999f). Investment in aquaculture is actively encouraged by supportive policy and legislation.

Commodities production

Food use commodities production

Food use commodities production has increased from 230 000 tonnes in 1989, to 410 000 tonnes in 1998. On average, frozen commodities represented nearly 50 percent of total production over the period considered. Fresh/chilled products accounted for 20 percent (85 000 tonnes), and fish fillets a further 15 percent (52 000 tonnes).

Table 196: Ireland - FU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	0	0	678	1234	1440	1190	1321	2768	1345	1456	1143
Crus., mol. & other aquatic inv., prepared	0	0	0	189	4325	3285	4874	4458	6863	9836	3383
Crustaceans	14670	15113	11611	11719	7247	6566	10692	8364	7849	9763	10359
Fish, cured	10906	16179	16692	13650	16080	7811	10580	9903	10951	14898	12765
Fish, fillets	49187	62736	68669	63796	62977	35923	40034	46551	42662	46424	51896
Fish, fresh/chilled	45643	35675	78654	98700	108799	90654	102346	87659	104654	98766	85155
Fish, frozen	114537	84012	109586	124639	212010	170242	250488	227353	205204	190784	168885
Molluscs	11528	15467	18443	14082	5641	5840	9514	9803	10504	12140	11296
Prepared/preserved fish	10471	7329	10912	18338	16263	16559	27252	36767	28836	28772	20150
Total FU Production	256941	236511	315245	346347	434782	338069	457100	433627	418867	412839	365033

Source: database

Small pelagics are the main species processed in Ireland, with 117 000 tonnes of Atlantic mackerel and 64 000 tonnes of horse mackerel processed in 1998. Other small pelagics processed in Ireland are herring and sprat. Whiting, cod, anglerfish and sole make up the bulk of the demersal species processed, whilst mussels largely account for molluscs.

Table 197: Ireland - FU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	54	123	543	432	2445	2266	2492	2537	4754	6742	2239
Diadromous fish	523	760	330	419	78	144	92	103	90	78	262
Marine fish, pelagic, small	168658	160140	190973	199501	284148	211949	300880	285451	258261	250155	231012
Marine fish, demersal	12278	6464	7206	12384	8238	12695	13431	9549	11267	7314	10083
Marine fish, others	49231	38444	85461	106387	121219	94133	113804	110592	117935	115354	95256
Crustaceans	14670	15113	11611	11719	7247	6566	10692	8364	7849	9763	10359
Molluscs	11528	15467	18443	14271	9966	9125	14387	14261	17366	21976	14679
Cephalopods	0	0	678	1234	1440	1190	1321	2768	1345	1456	1143
Total FU Production	256941	236511	315245	346347	434782	338069	457100	433627	418867	412839	365033

Source: database

Non-food use commodities production

Non-food use commodities production has increased since its 1989 level of 27 000 tonnes to reach 67 000 in 1998. Fish meal forms the bulk of the production with 40 000 tonnes on average.

Table 198: Ireland - NFU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	10987	10647	13443	16331	17011	15334	20612	17401	11453	14332	14755
Flour, meal unfit for human cons.	16413	29963	44811	51327	45363	35268	44972	47458	39921	52911	40841
Total NFU Production	27400	40610	58255	67658	62374	50602	65584	64859	51375	67243	55596

Source: database

Table 199: Ireland - NFU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	16413	29963	44811	51327	45363	35268	44972	47458	39921	52911	40841
Marine fish, others	10987	10647	13443	16331	17011	15334	20612	17401	11453	14332	14755
Total NFU Production	27400	40610	58255	67658	62374	50602	65584	64859	51375	67243	55596

Source: database

Non-food use: trade and net supply 1989-1998

Approximately 15 percent of the total national production is used for non-human consumption while other sources of non-food products are imported. An important share of the non-food use products is

exported. From 1994 to 1998, the average volume of imports was 35 000 tonnes and the volume of exports was 22 000 tonnes.

Non-food use imports

Non-food use imports have declined from 42 000 tonnes to 22 000 tonnes in the past few years mostly due to an increase in domestic production and a fall in re-exportation.

Table 200: Ireland - NFU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	2211	2567	3939	4072	7364	5068	8357	12821	5878	575	5285
Flour, meal unfit for human cons.	16927	25258	26952	20277	24980	31231	30483	30082	30209	21592	25799
Total NFU Imports	19138	27825	30891	24349	32344	36299	38840	42903	36087	22167	31084

Source: database

Table 201: Ireland - NFU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	16913	22526	22696	17776	23476	30378	28817	28190	28081	19543	23840
Marine fish, others	2211	5266	8187	6513	8854	5622	9628	14251	7542	2246	7032
Aquatic animals	14	32	8	60	15	299	395	461	464	377	213
Total NFU Import	19138	27825	30891	24349	32344	36299	38840	42903	36087	22167	31084

Source: database

Non-food use exports

Exports have declined in the last two years to 18 000 tonnes as increased domestic consumption swallowed the national production surplus and re-exportations diminished.

Table 202: Ireland - NFU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	11424	9872	10865	12441	3100	1383	349	403	627	671	5114
Flour, meal unfit for human cons.	9498	7322	14687	18548	19621	19531	27386	25934	17524	17619	17767
Total NFU Exports	20922	17195	25552	30988	22721	20914	27735	26337	18151	18290	22881

Source: database

Table 203: Ireland - NFU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	9498	6116	13364	18418	19621	17152	26054	24972	16939	17263	16940
Marine fish, others	11424	11055	12188	12571	3100	3762	1590	1282	1212	1027	5921
Aquatic animals	0	23	1	0	0	0	91	83	0	0	20
Total NFU Export	20922	17195	25552	30988	22721	20914	27735	26337	18151	18290	22881

Source: database

Non-food use net supply

Non-food use net supply has nearly tripled since the early nineties to reach 71 000 tonnes in 1998. However, consumption has been fairly stable in the past few years at around 75 000 tonnes.

Table 204: Ireland - NFU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish/marine mammal, fat, oil	1774	3342	6517	7962	21275	19018	28619	29819	16705	14236	14927
Flour, meal unfit for human consumption	23842	47898	57077	53056	50722	46968	48069	51605	52606	56884	48873
Total NFU net supply	25616	51240	63594	61019	71997	65987	76688	81424	69311	71119	63800

Source: database

Table 205: Ireland - NFU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, pelagic, small	23828	46373	54143	50685	49217	48494	47734	50676	51063	55191	47740
Marine fish, others	1774	4858	9442	10274	22765	17193	28650	30370	17784	15551	15866
Aquatic animals	14	9	9	60	15	299	304	378	464	377	193
NFU net supply	25616	51240	63594	61019	71997	65987	76688	81424	69311	71119	63800

Source: database

Market for human consumption

Trade

Most of the trading activity is geared to the export of herring and mackerel where products are sold to Europe, Southeast Asia and Africa (FAO, 2000). Between 1989 and 1998 exports reached 330 000 tonnes whereas imports were 40 000 tonnes. In terms of value, Ireland exported IEP 220 millions worth of food use products in 1997, while imports amounted to IEP 56 millions.

The most significant market for Irish exports is France, which accounts for 23 percent of the share in value. Spain (15 percent), the United Kingdom (13 percent) and Germany (10 percent) were also significant importers of Irish products. The most important exports, in terms of value are mackerel and horse mackerel.

Food use imports

Food use imports have been growing since 1993, to reach 44 000 tonnes in 1998. Prepared/preserved products (mostly canned) top the table of commodities imported to Ireland (with an average of 13 000 tonnes per annum), overtaking fresh fish by 1 000 tonnes. Frozen fish come in third with an average of 6 000 tonnes.

Table 206: Ireland - FU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	13	58	22	3	33	33	1	9	11	32	21
Crus., mol. & other aquatic inv., prepared	65	53	101	102	13	17	2	7	42	99	50
Crustaceans	2135	2927	3292	2597	3195	2680	2546	3407	5158	6115	3405
Fish, cured	231	295	1468	951	1473	1133	1306	2030	1914	1647	1245
Fish, fillets	2072	3789	3914	3025	3254	1614	1668	2378	2313	2600	2663
Fish, fresh/chilled	10666	22401	14014	15930	10451	3074	3160	11457	12577	14611	11834
Fish, frozen	8823	12121	9261	7688	722	6047	9814	998	2908	3812	6220
Molluscs	830	1514	1160	222	112	821	836	1903	347	190	793
Prepared/preserved fish	10582	10447	13441	15516	15208	9843	11541	15134	13960	15087	13076
Total FU Imports	35416	53604	46673	46034	34460	25262	30874	37324	39231	44194	39307

Source: database

Main species imported in Ireland are tuna for large pelagic; salmon for diadromous fish; mackerel and herring for small pelagic; whiting, hake and haddock for demersal.

Table 207: Ireland - FU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	0	0	97	148	112	65	139	188	377	153	128
Diadromous fish	2162	2690	3625	4616	3462	3249	3329	5622	6365	4345	3947
Marine fish, pelagic, tunas	2008	1797	1987	1615	3974	1709	2535	3361	3533	8367	3089
Marine fish, pelagic, small	18266	33917	22458	21806	7288	6497	10675	3676	4893	3356	13283
Marine fish, demersal	7287	7244	8139	5700	9071	5819	6390	13356	12916	15140	9106
Marine fish, others	2651	3404	5792	9226	7201	4372	4420	5796	5588	6397	5485
Crustaceans	2135	2927	3292	2597	3195	2680	2546	3407	5158	6115	3405
Molluscs	895	1566	1181	258	122	824	839	1910	382	286	826
Cephalopods	13	58	22	3	33	33	1	9	11	32	21
Aquatic animals	0	0	80	66	3	14	0	0	7	3	17
Total FU Import	35416	53604	46673	46034	34460	25262	30874	37324	39231	44194	39307

Source: database

Food use exports

Exports have grown from 215 000 tonnes in 1989 to 380 000 tonnes in 1998. Frozen fish account for 50 percent of the average production of 330 000 tonnes over the period 1989/1998. Fresh fish come second with around 30 percent (90 000 tonnes), followed by fish fillets with 45 000 tonnes. The peak in exports reached in 1995 is linked with very important catches of small pelagic (herring and mackerel) around that year that created an important surplus for the export market.

Table 208: Ireland - FU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	0	0	500	835	1034	839	414	2619	435	220	690
Crus., mol. & other aquatic inv., prepared	29	11	28	59	1823	2379	2848	3113	3978	5197	1947
Crustaceans	8281	8944	9922	9275	7236	8273	11293	10880	10795	11794	9669
Fish, cured	6427	9655	9056	7069	7748	6252	6630	7402	6822	8274	7534
Fish, fillets	45706	58494	62965	61510	45233	35859	33135	41895	35211	35168	45518
Fish, fresh/chilled	51494	54340	83733	109233	102004	82546	97424	85815	105458	102324	87437
Fish, frozen	88802	70170	105897	119410	208025	143793	234313	220112	193777	189046	157334
Molluscs	10304	13829	18151	11987	5181	6489	8694	8468	10762	10061	10393
Prepared/preserved fish	4134	4129	6919	8488	7291	7785	12003	22777	14033	16966	10452
Total FU Exports	215176	219571	297172	327866	385576	294215	406753	403081	381272	379050	330973

Source: database

Main species exported from Ireland are mackerel, jack mackerel, horse mackerel and herring for small pelagic; cod, anglerfish, megrim and haddock for demersal; lobsters and crabs for crustaceans; mussels for molluscs and salmon for diadromous fish.

Table 209: Ireland - FU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	42	58	428	463	1133	1816	1469	1868	4865	4469	1661
Diadromous fish	2586	3287	3112	4021	3435	2692	2148	4816	6205	3558	3586
Marine fish, pelagic, tunas	12	2	277	981	1853	1131	712	833	1445	2478	972
Marine fish, pelagic, small	128317	147460	167118	174315	245825	162701	254039	234967	216592	207717	193905
Marine fish, demersal	18719	10099	13757	12103	14567	17613	19207	19897	21274	19745	16698
Marine fish, others	46886	35882	83877	113828	103487	90281	105930	115620	104920	113810	91452
Crustaceans	8281	8944	9922	9275	7236	8273	11293	10880	10795	11794	9669
Molluscs	10332	13840	18178	11988	7004	8864	11541	11582	14753	15291	12337
Cephalopods	0	0	500	835	1034	839	414	2619	435	220	690
Aquatic animals	0	0	1	58	1	4	0	0	13	33	2
Total FU Export	215176	219571	297172	327866	385576	294215	406753	403081	381272	379050	330973

Source: database

Food use net supply and consumption

Irish food use net supply amounted to 73 000 tonnes on average between 1989 and 1998. With 22 000 tonnes and a share of 30%, prepared/preserved commodities represent the major commodity of the net supply but seem to have reached a plateau. Frozen products come second with 18 000 tonnes but have presented quite an erratic pattern over the period considered. Prepared crustaceans and molluscs increased from 40 tonnes in 1989 to 4 000 tonnes in 1998, but now seem to have reached an optimum level.

Table 210: Ireland - FU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	13	58	200	401	439	383	908	157	921	1268	475
Crus., mol. & other aquatic inv., prepared	36	42	73	232	2515	922	2029	1352	2927	4737	1486
Crustaceans	8524	9097	4981	5041	3206	973	1945	891	2212	4084	4095
Fish, cured	4709	6819	9104	7532	9805	2691	5255	4531	6043	8271	6476
Fish, fillets	5552	8031	9618	5311	20998	1677	8567	7035	9764	13856	9041
Fish, fresh/chilled	4815	3735	8935	5398	17246	11183	8082	13301	11773	11054	9552
Fish, frozen	34558	25963	12950	12918	4706	32497	25989	8239	14336	5550	17771
Molluscs	2054	3151	1452	2318	572	173	1656	3238	88	2269	1697
Prepared/preserved fish	16919	13647	17433	25365	24179	18617	26790	29125	28764	26893	22773
Total FU net supply	77181	70544	64746	64515	83666	69116	81222	67870	76827	77983	73367

Source: database

Small pelagic represented the biggest share of the net supply with 50 000 tonnes out of an average of 70 000 tonnes for the period 1989/1998.

Table 211: Ireland - FU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	12	65	212	117	1423	515	1162	857	266	2426	705
Diadromous fish	98	164	843	1014	105	701	1274	910	250	865	622
Marine fish, pelagic, tunas	1996	1795	1710	634	2121	578	1824	2528	2089	5889	2116
Marine fish, pelagic, small	58606	46597	46313	46992	45611	55745	57516	54161	46563	45794	50390
Marine fish, demersal	846	3609	1587	5981	2741	901	614	3008	2909	2710	2491
Marine fish, others	4995	5966	7376	1786	24933	8224	12294	768	18603	7941	9289
Crustaceans	8524	9097	4981	5041	3206	973	1945	891	2212	4084	4095
Molluscs	2090	3193	1446	2541	3084	1085	3685	4590	2995	6970	3168
Cephalopods	13	58	200	401	439	383	908	157	921	1268	475
Aquatic animals	0	0	79	9	2	10	0	0	20	36	15
FU net supply	77181	70544	64746	64515	83666	69116	81222	67870	76827	77983	73367

Source: database

Consumption per capita was 19 kg per year. Fish represented approximately 6 percent of the total animal protein consumed in 1997 (FAO, 1999). Added value and convenience products are set to take a growing share of future seafood sales as the demand for ready made meals and convenience foods increases (Anon., 2001n).

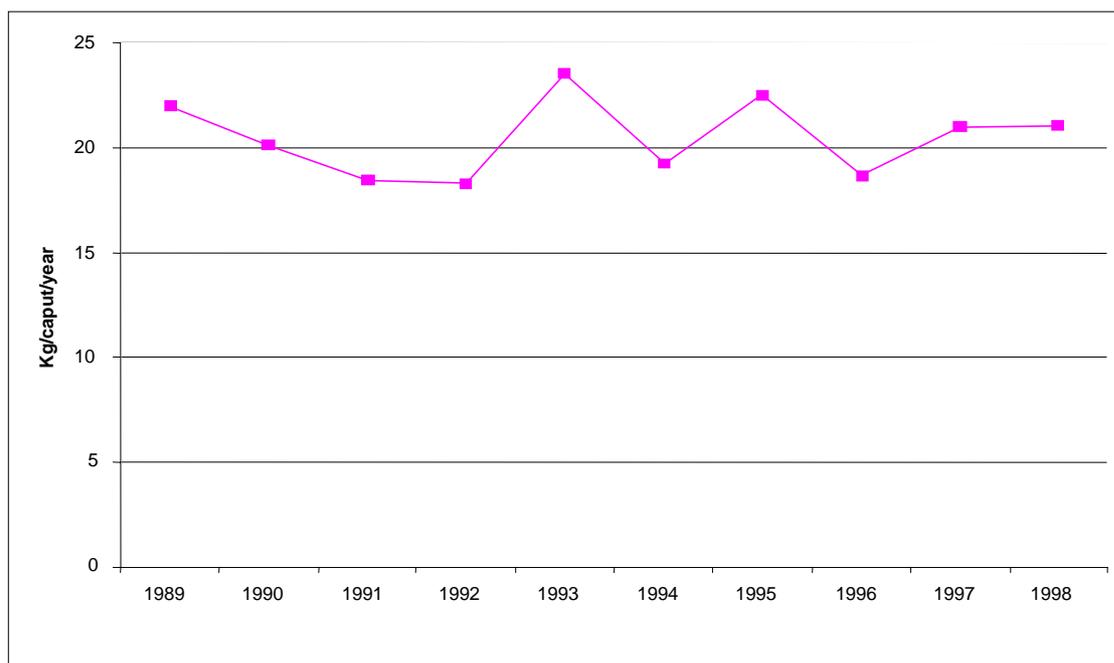


Figure 38: Fish consumption per capita per year in Ireland 1989-1998

Mackerel (15 percent), jack and horse mackerel (31 percent) are the major species consumed in Ireland. Mussels follow with an 11 percent share of the market.

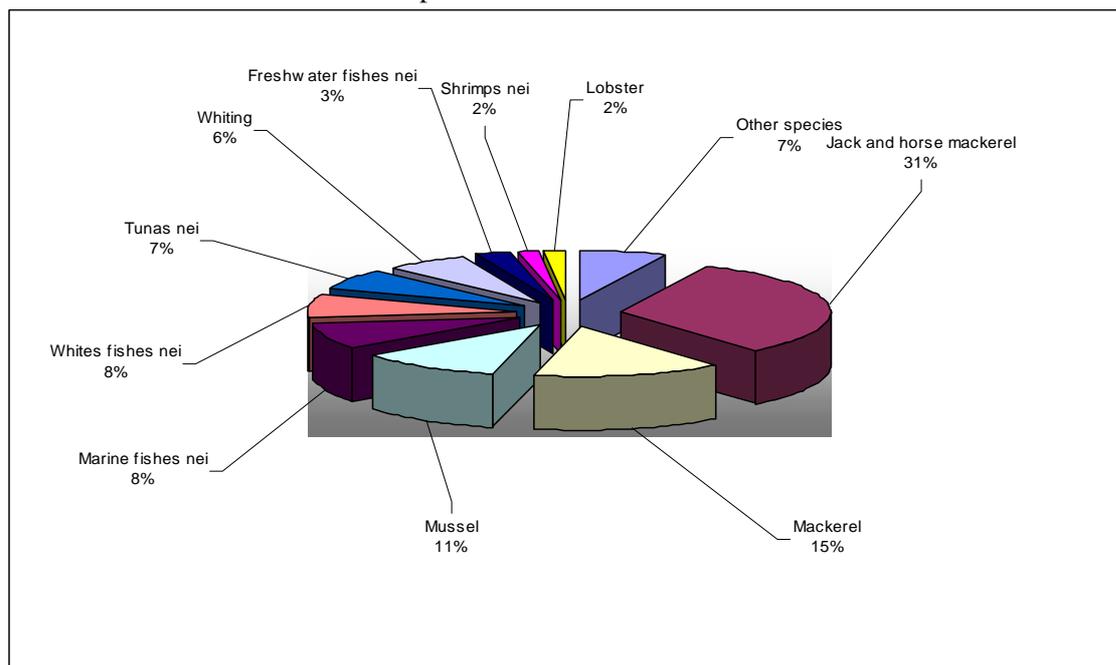


Figure 39: Ireland - Main species consumed in 1998

Assumptions for projection 2005-2030 and main results

As specified in the methodology section (see Part One of the study), assumptions have been made on the consumption trend of the OECD group of products. Further assumptions are made regarding production, imports and exports and Ireland's need for fish in 2005 up to 2030 by taking into account and extrapolating previous trends.

For Ireland, the main consumption trends for the period 2005-2030 assume:

An increase in the demand for fresh fish by 50 percent over the period 1998-2030, while cured products will increase by 25%. Consumption of molluscs (10 percent), crustaceans and molluscs prepared (5 percent) and cephalopods (5 percent) will also increase but to a lesser extent.

A stagnation in the demand for prepared/preserved products, frozen fish, crustaceans and fish fillets. A large increase in the production of cured fish (60 percent), mostly for the export markets, while fresh fish production and molluscs increase more slowly.

Increases in exports fuelled by the increase in production

A large increase in imports for crustaceans (200 percent) and cephalopods (180 percent), but volumes remain low.

Demand for fresh fish will be boosted by restaurant, and other out of home sales. Indeed, dining out continues to be popular, and the food served is usually prepared using fresh produce sourced from Ireland or other EU countries (Hanley, 2001). With increasingly demanding Irish consumers, it is this, together with the trend towards high quality products, that will affect the sale of fresh fish.

Additionally, with the economy at an unprecedented high, consumers are prepared to pay for quality, and food products that are new to the market. This has been evident in recent years with the increase in sales of consumer ready chilled and frozen food products (prepared dishes) and is likely to continue in the future (Hanley, 2001). However, this is not clearly reflected in our assumptions, as the prepared/preserved group of commodities appear to stagnate. This is due to the fact that the increasing trend in convenience products (prepared products) is offset by the downward trend affecting canned products (preserved products).

Overall, the shift in consumption towards quality and convenient seafood product will result in a decrease in per capita consumption of seafood, as the growth of the net supply will be lower than the demographic growth. The Irish consumer will eat less fish but of better quality.

Table 212: Ireland - Assumption for projection

OECD group	94-98%	annual %	Prod % 99-30	T Imp % 99-30	T Exp % 99-30	T Cons 99-30	T Prod Annual	% Imp Annual	% Exp Annual	Cons Annual %
Cephalopods	92%	18%	0%	180%	0%	5%	0.0%	3.3%	0.0%	0.1%
Crus., mol. & other aquatic inv., prepared	210%	42%	0%	200%	0%	5%	0.0%	3.5%	0.0%	0.1%
Crustaceans	-220%	-44%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Fish, cured	23%	5%	60%	0%	80%	25%	1.4%	0.0%	1.9%	0.7%
Fish, fillets	-15%	-3%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Fish, fresh/chilled	-91%	-18%	20%	10%	18%	50%	0.6%	0.3%	0.5%	1.3%
Fish, frozen	-298%	-60%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Molluscs	5%	1%	10%	0%	10%	10%	0.3%	0.0%	0.3%	0.3%
Prepared/preserved fish	-10%	-2%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Fish/marine mammal, fat, oil	-45%	-9%	0%	0%	0%		0.0%	0.0%	0.0%	0.0%
Flour, meal unfit for hum. Cons.	-15%	-3%	0%	0%	0%		0.0%	0.0%	0.0%	0.0%

Source: database

Aquaculture production will rise, while capture production will remain stable. Imports will increase mostly to cope with an increased demand for fresh fish, cephalopods and prepared crustaceans and molluscs. Thanks to an increased domestic production due to aquaculture, exports will rise, mostly in cured and fresh fish.

Table 213: Ireland - Main results for projection

Nature	Average 94-98	2005	2010	2015	2020	2025	2030
Exports FU (t live wt)	372874	384160	387991	391984	396150	400499	405043
Imports FU (t live wt)	35377	44525	44771	45025	45290	45565	45853
Production FU (t live wt)	412100	418663	423024	427563	432289	437210	442338

Nature	Average 94-98	2005	2010	2015	2020	2025	2030
Fish supply FU (t live wt)	74604	79028	79804	80604	81428	82276	83148
Population (X1000)	3636	3732	3760	3834	3909	3986	4064
Per caput supply (kg/h)	21	21	21	21	21	21	20
Production NFU (t live wt)	59932	67243	67243	67243	67243	67243	67243
Imports NFU (t live wt)	35259	22167	22167	22167	22167	22167	22167
Exports NFU (t live wt)	22285	18290	18290	18290	18290	18290	18290
Net supply NFU (t live wt)	72906	71119	71119	71119	71119	71119	71119
Aquaculture (t live wt)	33619	44673	48098	51825	55881	60298	65108
Capture (t live wt)	360804	360804	360804	360804	360804	360804	360804
Production total (t live wt)	394423	405477	408903	412630	416686	421102	425912

Source: database

Food use net supply and human consumption 2005-2030

Irish food use net supply will rise by 7 percent between 1998 and 2030 to reach 83 000 tonnes in 2030. Most of this rise can be attributed to an increase in the consumption of fresh and cured fish. Cephalopods and molluscs also increase but to a lesser extent.

Table 214: Ireland - FU net supply by OECD group of commodities 2005-2030 (tonne live weight)

Gp of commodities	Ave. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	728	1276	1283	1291	1301	1312	1326
Crus., mol. & other aquatic inv., prepared	2393	4764	4788	4816	4849	4889	4936
Crustaceans	2021	4084	4084	4084	4084	4084	4084
Fish, cured	5358	8692	8998	9305	9612	9918	10218
Fish, fillets	8180	13856	13856	13856	13856	13856	13856
Fish, fresh/chilled	11079	11596	12001	12423	12861	13317	13791
Fish, frozen	17322	5550	5550	5550	5550	5550	5550
Molluscs	1485	2316	2350	2385	2420	2456	2493
Prepared/preserved fish	26038	26893	26893	26893	26893	26893	26893
Total FU net supply	74604	79028	79804	80604	81428	82276	83148

Source: database

The main species of the net supply remain small pelagic, even if their share is decreasing. Demersal fish also decrease, whilst cephalopods and molluscs increase.

Table 215: Ireland - FU net supply by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	1045	2409	2397	2383	2370	2356	2342
Diadromous fish	800	724	617	504	385	259	126
Marine fish, pelagic, tunas	2581	5921	5943	5966	5988	6011	6034
Marine fish, pelagic, small	51956	43454	41728	39953	38127	36247	34309
Marine fish, demersal	2028	2224	1864	1492	1110	715	308
Marine fish, others	9566	11857	14751	17729	20793	23946	27190
Crustaceans	2021	4084	4084	4084	4084	4084	4084
Molluscs	3865	7044	7101	7163	7231	7305	7387
Cephalopods	728	1276	1283	1291	1301	1312	1326
Aquatic animals	13	37	37	38	39	40	41
FU net supply	74604	79028	79804	80604	81428	82276	83148

Source: database

As the net supply growth rate (7 percent over the period considered) is lower than that of the population (10 percent), Irish consumption per capita will decrease slightly from 21 kg per capita per year in 2005 to 20 kg per capita per year in 2030.

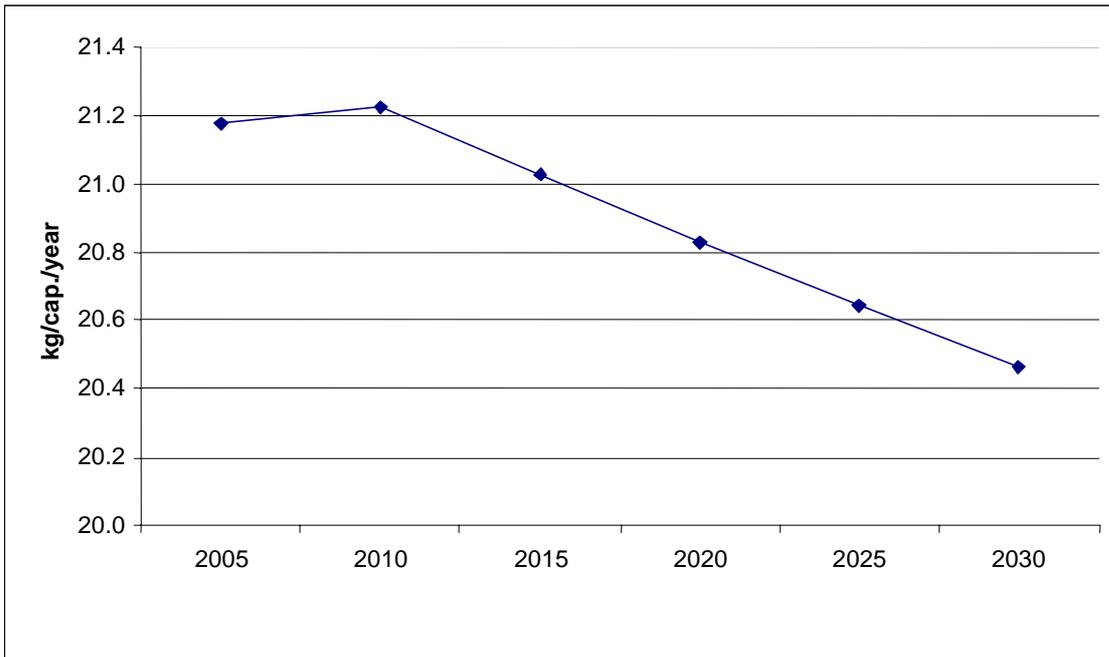


Figure 40: Fish consumption per capita per year in Ireland 2005-2030

The combined share of the two most important small pelagic (horse mackerel and mackerel) diminish from 46 percent in 1998 to 33 percent in 2030, and the share of freshwater fish also diminishes (-1 percent). However, the variety of marine species increases, as the biggest increase is experienced in the group of various marine species (+19 percent).

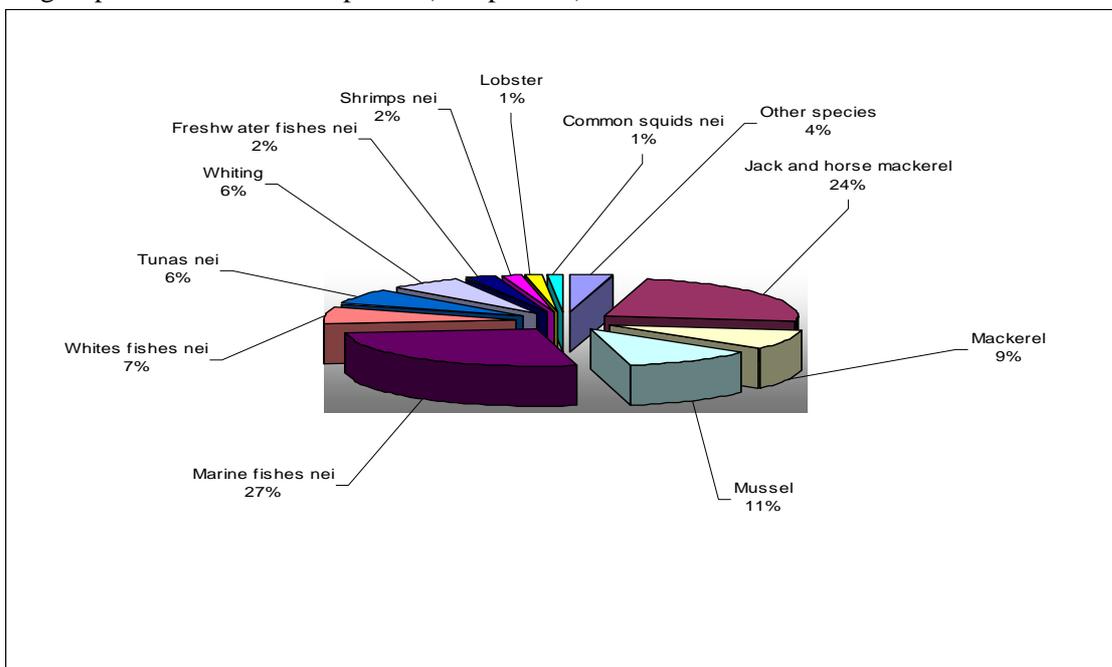


Figure 41: Ireland - Main species consumed in 2030

Non-food use net supply 2005-2030

There will be no significant changes in the non-food use net supply in Ireland for the period 1998/2030. It will remain around its 1998 level of 70 000 tonnes.

Production 2005-2030

Capture and aquaculture

Between 1994 and 1999, in excess of IEP 30 million was invested in the aquaculture sector as part of the Irish government's National Development Plan 2000-2006; a further investment of almost IEP 60 million is envisaged (OECD, 2003). The strategic objectives being pursued in this sector are:

Increased employment, output value and exports on a sustainable basis.

The creation of a sustainable structure (critical mass) for further expansion of the sector.

Secured improved competitiveness, technology, quality, added value and diversification in the sector (OECD, 2003).

Every sector of the Irish aquaculture industry will benefit, but more specifically diadromous fish and molluscs production. According to the OECD (2000), the market outlook for rope mussel is especially good with an increased demand from processors. Surveys have also located substantial seed mussel beds for bottom mussel cultivation at various locations around the coast (OECD, 2000). Total production will reach 65 000 tonnes by 2030 representing an increase of around 50 percent since 1998.

Table 216: Ireland - Aquaculture by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Diadromous fish	15183	19507	21411	23507	25814	28354	31151
Marine fish, demersal	11	6	6	7	8	9	9
Molluscs	18426	25160	26681	28312	30060	31935	33948
Total gp of species	33619	44673	48098	51825	55881	60298	65108

Source: database

The main species produced in 2030 will be salmon and rainbow trout for diadromous fish; blue mussels, Pacific cupped oysters and European oysters for molluscs. The main species captured will be horse mackerel, mackerel and sprat for pelagic; blue whiting, whiting, cod and haddock for demersal.

Table 217: Ireland - Total production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	2040	2040	2040	2040	2040	2040	2040
Diadromous fish	17738	22062	23966	26062	28369	30909	33706
Marine fish, pelagic, tunas	2037	2037	2037	2037	2037	2037	2037
Marine fish, pelagic, small	234101	234101	234101	234101	234101	234101	234101
Marine fish, demersal	58875	58870	58871	58871	58872	58873	58874
Crustaceans	14942	14942	14942	14942	14942	14942	14942
Molluscs	29397	36132	37653	39283	41032	42907	44919
Cephalopods	432	432	432	432	432	432	432
Others	34861	34861	34861	34861	34861	34861	34861
Total gp of species	394423	405477	408903	412630	416686	421102	425912

Source: database

Commodities

Production of cured fish, fresh fish and molluscs increase slightly, while the other commodities remain stable. Total production increases to reach 442 000 tonnes at the end of the period representing around 10 percent more than in 1998. Processing facilities have benefited during the late nineties from large investments thanks to the Operational Fisheries Programme agreed between the European Commission and The Irish Government (OECD, 2000). The sector remains a government priority and a provision of IEP 171 million has been allocated for its development in the National Development Plan 2001-2006 (OECD, 2003)

Table 218: Ireland - FU Commodities Production by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2000	2005	2010	2015	2020	2025	2030
Cephalopods	1616	1456	1456	1456	1456	1456	1456	1456
Crus., mol. & other aquatic inv., prepared	5863	9836	9836	9836	9836	9836	9836	9836
Crustaceans	8647	9763	9763	9763	9763	9763	9763	9763
Fish, cured	10828	15327	16454	17665	18964	20359	21856	23464
Fish, fillets	42319	46424	46424	46424	46424	46424	46424	46424
Fish, fresh/chilled	96816	99898	102785	105755	108811	111955	115190	118519
Fish, frozen	208814	190784	190784	190784	190784	190784	190784	190784
Molluscs	9560	12211	12389	12570	12754	12940	13129	13320
Prepared/preserved fish	27637	28772	28772	28772	28772	28772	28772	28772
Total FU Production	412100	414470	418663	423024	427563	432289	437210	442338

Source: database

Small pelagic still make the bulk of the species used in the Irish processing industry, with species such as Atlantic mackerel, horse and jack mackerel and herring.

Table 219: Ireland - FU Commodities Production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2000	2005	2010	2015	2020	2025	2030
Freshwater fish	3759	6742	6742	6742	6742	6742	6742	6742
Diadromous fish	102	78	78	78	78	78	78	78
Marine fish, pelagic, small	261339	250584	251712	252922	254221	255616	257114	258722
Marine fish, demersal	10851	7314	7314	7314	7314	7314	7314	7314
Marine fish, others	110364	116486	119373	122343	125399	128543	131778	135107
Crustaceans	8647	9763	9763	9763	9763	9763	9763	9763
Molluscs	15423	22046	22225	22406	22589	22775	22964	23156
Cephalopods	1616	1456	1456	1456	1456	1456	1456	1456
Total FU Production	412100	414470	418663	423024	427563	432289	437210	442338

Source: database

Trade 2005-2030

Imports

Irish food use product imports will increase over the period considered to reach 46 000 tonnes by 2030. The increase will come from a rise in imports of fresh fish, cephalopods and prepared molluscs and crustaceans. All other commodities will remain stable.

Table 220: Ireland - FU Commodities Imports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	17	40	47	55	65	76	90
Crus., mol. & other aquatic inv., prepared	33	126	150	178	211	250	297
Crustaceans	3981	6115	6115	6115	6115	6115	6115
Fish, cured	1606	1647	1647	1647	1647	1647	1647
Fish, fillets	2115	2600	2600	2600	2600	2600	2600
Fish, fresh/chilled	8976	14907	15122	15340	15562	15786	16014
Fish, frozen	4716	3812	3812	3812	3812	3812	3812
Molluscs	819	190	190	190	190	190	190
Prepared/preserved fish	13113	15087	15087	15087	15087	15087	15087
Total FU Imports	35377	44525	44771	45025	45290	45565	45853

Source: database

Main fish species imported to Ireland are salmon for diadromous fish; whiting and hake for demersal; tuna for pelagic.

Table 221: Ireland - FU Commodities Imports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	184	156	158	160	161	163	165
Diadromous fish	4582	4364	4377	4391	4405	4419	4433
Marine fish, pelagic, tunas	3901	8434	8482	8532	8582	8632	8684
Marine fish, pelagic, small	5820	3365	3372	3378	3385	3391	3398
Marine fish, demersal	10724	15338	15482	15628	15776	15927	16079
Marine fish, others	5315	6398	6399	6399	6400	6401	6401
Crustaceans	3981	6115	6115	6115	6115	6115	6115
Molluscs	848	312	335	362	395	433	478
Cephalopods	17	40	47	55	65	76	90
Aquatic animals	5	4	4	5	6	7	8
Total FU Import	35377	44525	44771	45025	45290	45565	45853

Source: database

Exports

Irish food use commodities exports will increase by around 10 percent between 1998 and 2030 to reach 405 000 tonnes at the end of the period. Frozen fish remain the main Irish seafood export, but its share is decreasing in favour of fresh and cured fish products. Molluscs are also on the increase. Increased fish consumption in several European countries will have a positive influence on Irish exports. France, for example, the main Irish export market (OECD, 2000), will increase its demand for fresh fish over the period 1998-2030.

Expansion of the EU will also have a positive influence on the Irish exports, as Poland, Slovenia and Romania are significant markets for Irish exporters, especially for small pelagic species. Irish exports are, for example, currently subject to a 10 percent duty, which will be phased out when Poland joins the Union (Anon., 2002d).

Table 222: Ireland - FU Commodities Exports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	906	220	220	220	220	220	220
Crus., mol. & other aquatic inv., prepared	3503	5197	5197	5197	5197	5197	5197
Crustaceans	10607	11794	11794	11794	11794	11794	11794
Fish, cured	7076	9409	10314	11306	12394	13586	14893
Fish, fillets	36253	35168	35168	35168	35168	35168	35168
Fish, fresh/chilled	94713	106096	108876	111728	114655	117659	120742
Fish, frozen	196208	189046	189046	189046	189046	189046	189046
Molluscs	8895	10263	10410	10558	10709	10862	11017
Prepared/preserved fish	14713	16966	16966	16966	16966	16966	16966
Total FU Exports	372874	384160	387991	391984	396150	400499	405043

Source: database

Main species affected by a rise in exports will be salmon for diadromous fish; herring, jack and horse mackerel for pelagic; cod, anglerfish, megrim and haddock for demersal and mussels for molluscs.

Table 223: Ireland - FU Commodities Exports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	2898	4489	4504	4518	4534	4549	4565
Diadromous fish	3884	3718	3838	3965	4098	4238	4385
Marine fish, pelagic, tunas	1320	2513	2539	2566	2593	2621	2650
Marine fish, pelagic, small	215203	211623	214566	217646	220874	224258	227811
Marine fish, demersal	19547	20429	20933	21450	21981	22526	23085
Marine fish, others	106112	113914	113990	114069	114150	114233	114318
Crustaceans	10607	11794	11794	11794	11794	11794	11794
Molluscs	12406	15493	15640	15788	15939	16092	16247
Cephalopods	906	220	220	220	220	220	220
Aquatic animals	8	33	33	33	33	33	33
Total FU Export	372874	384160	387991	391984	396150	400499	405043

Source: database

ITALY

With 58 million inhabitants and a strong historical relationship with the sea and seafood, Italy is a major market for fishery product and this market has been growing consistently since 1991 (Annual Country report 1997). With increasing awareness of health issues and concern with good diet, there has been strong growth in consumption during the 1990s and as a consequence, Italy is now the world's fifth largest seafood importer. The industry comprises a fleet of small vessels and provides an important economic function in many rural areas while, nationally, a growth in the volume and diversity of imported products and a growing percentage of shellfish in the market have confirmed the sector as a key part of the economy. With demographic changes and the modernisation of distribution channels demand is increasing. New convenience products, requiring imported species, are starting to compete with more traditional seafood dishes.

Production: captures, aquaculture and commodities 1989-1998

Total Italian aquatic production in 1998 was 570 000 tonnes. Volume stood at 550 000 tonnes in 1989 and reached a maximum in 1995 with 632 000 tonnes. Aquaculture's share has increased since 1988, rising from 25 percent to 40 percent of total production.

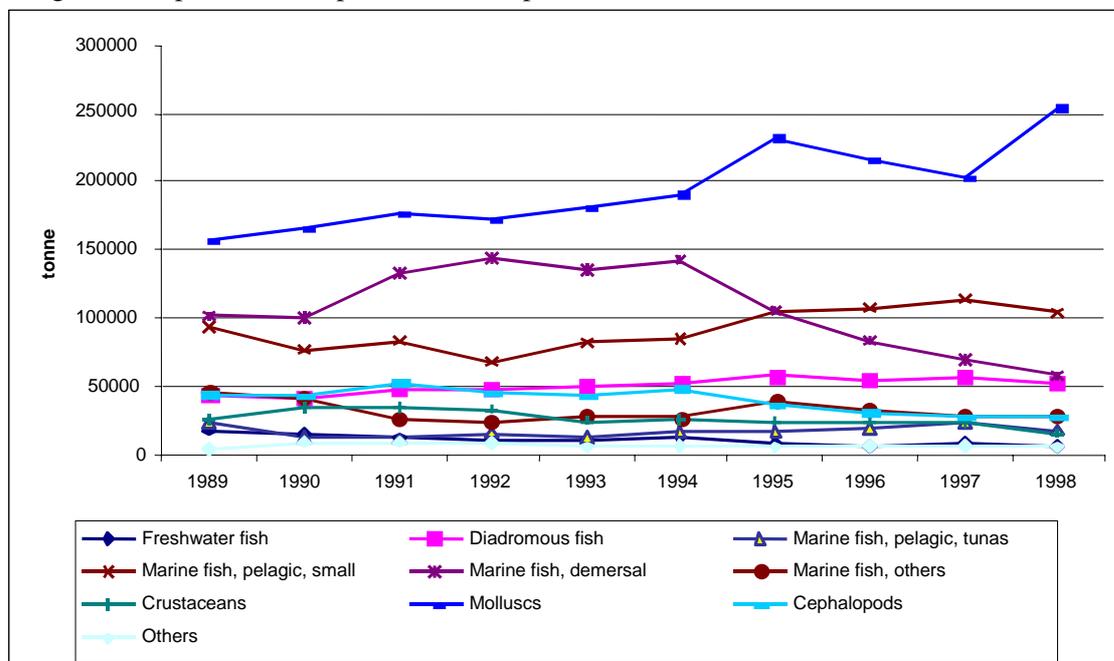


Figure 42: Italy - Capture and aquaculture production 1989-1998

Captures

In 1998, captures represented a volume of 320 000 tonnes. However, this volume represents a decrease of around 100 000 tonnes from the 1989 level. This drop can be explained by a dwindling of stocks due, in particular, to the use of destructive fishing techniques over several years, inefficient management, over-exploitation of marine resources and increasing pollution of the marine environment (Dheilly, 1999). And even though aquaculture has expanded considerably (see below), these gains have been insufficient to offset the dwindling catches from the wild fishery.

Table 224: Italy - Captures by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	14459	11450	5290	5455	5700	6146	6440	4793	5273	3501	6851
Diadromous fish	6351	2199	5017	4362	4307	4211	4211	2508	2101	1579	3685
Marine fish, pelagic, tunas	22898	12563	11282	15657	13276	17006	16939	19523	22835	17749	16973
Marine fish, pelagic, small	89862	73980	80362	64777	78729	81436	102665	104642	111645	101069	88917
Marine fish, demersal	99749	97536	130565	140059	130639	138160	98329	76135	60501	45983	101766
Marine fish, others	44476	41227	25634	24848	28595	27503	39476	33212	28258	27773	32100
Crustaceans	25531	34866	35197	32957	24869	26133	24389	24163	23113	15768	26699
Molluscs	68895	63963	58876	60900	66543	49221	67360	70119	59784	75638	64130
Cephalopods	43672	41716	51954	45242	42577	47207	36078	30804	27309	26533	39309
Others	3861	3848	3708	2209	608	1209	506	1856	1957	2007	2177
Total gp of species	419754	383348	407885	396466	395843	398232	396393	367755	342776	317600	382605

Source: database

Catches are mainly composed of finfish of varied quality, followed by small pelagic fish such as anchovy, mackerel and sardine. The remainder of the catch is composed of molluscs and crustaceans and, to a lesser degree, by tuna.

Italy has about 20000 km² of inland waters, including rivers, lakes, reservoirs and brackish water lagoons. Both commercial and sport fishing take place on these waters. Freshwater fishing produced nearly 9 500 tonnes in 1993 (FAO, 1996).

Aquaculture

Aquaculture production has been growing steadily over the last decade, reaching approximately 250 000 tonnes in 1998. Due to the varied geography of the country, offering different site conditions for aquaculture development, Italy's aquaculture industry is characterised by a variety of production techniques. Some of the growth in this sector can be attributed to the increased demand for seafood occasioned by the thriving tourism industry.

The major part of output is represented by mussels, trout and carpet shells and to a lesser degree by sea bass, sea bream, eel and mullet (FAO, 1996). The most interesting development within Italian aquaculture was the introduction of the Manila clam in the 1980s. Now raised by around 4 000 operators in the Northern Adriatic, approximately 30 000 tonnes of this species is produced annually (Anon., 1999a). Production of mussels is also significant and has been fairly stable during the last decade, whereas the production of sea bass and sea bream has been rising quickly in the 1990s. Production of trout has been steadily increasing despite tough competition from imported fresh salmon.

Table 225: Italy - Aquaculture by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	3175	3350	5775	4650	5100	5462	2400	2000	2500	2400	3681
Diadromous fish	36700	39350	41885	43615	45310	48333	53500	51500	54600	51550	46634
Marine fish, pelagic, small	3200	3000	2880	2942	2892	2900	3000	3100	2900	3000	2981
Marine fish, demersal	1950	1900	2503	2896	3993	4700	6800	7450	8700	11650	5254
Crustaceans	29	32	32	33	24	25	25	22	19	25	27
Molluscs	87116	100910	117116	111240	114000	140000	165000	145300	143000	178000	130168
Others	0	5000	5000	5000	5000	5000	5000	5000	5000	3000	4300
Total gp of species	132170	153542	175191	170376	176319	206420	235725	214372	216719	249625	193046

Source: database

The lower prices available for salmon have led to a switch in production away from large sized trout towards small portion-sized trout and trout farmers have been able to create a niche in the smaller sizes because imported salmon are generally only available between 3-4 kg and upwards. This strategy has been quite successful and trout consumption continues to be roughly double that of salmon (Lem, 1998).

It is expected that there is room for expansion within the Italian aquaculture sub-sector because the country is still very reliant on imports of bivalves like mussels from Spain and North Africa. Recent technical successes with the cultivation of the traditional, Italian variety of clam have also been a cause of optimism.

Finally, in parallel with the development of the aquaculture industry, there has been a considerable growth of a supporting hatchery industry, representing about 30 sites and producing the fry of sea bass, sea bream and eels and the spat for bivalve production (FAO, 1996).

Commodities production

Food use commodities production

Prepared/preserved products dominate Italy's food use commodities, having increased to represent 30 percent of average production between 1989 and 1998. The main products are large and small pelagic species. Frozen fish are the second largest group, representing 25 percent of total production. However, this group's volume has been on the decline, going from 170 000 tonnes in 1989 to 35 000 tonnes in 1998. On average, fresh fish represents 20 percent of total production over the period in question, but this group rose to second place in 1998 with an output of 140 000 tonnes, a growth largely at the expense of frozen products.

Table 226: Italy - FU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	28947	19029	39367	26215	23294	24717	9132	7178	11313	9683	19888
Crus., mol. & other aquatic inv., prepared	10399	7786	6636	5098	5976	6604	9806	10470	10150	9987	8291
Crustaceans	9367	8897	7718	7701	7733	8406	6205	5649	5244	3460	7038
Fish, cured	17599	18168	19908	22195	34168	37284	55503	59258	59844	54529	37846
Fish, fillets	0	0	0	4916	5197	5503	7845	9770	8458	7990	4968
Fish, fresh/chilled	95193	103239	102588	104425	88394	98392	128847	135822	137165	142850	113692
Fish, frozen	172037	161962	187854	190971	185818	208186	128234	72274	37754	35095	138019
Molluscs	54875	68736	70736	61232	96448	77216	104159	89302	94839	101179	81872
Prepared/preserved fish	152308	137653	136784	139234	117859	131190	171796	181096	182886	190467	154127
Total FU Production	540725	525470	571591	561987	564887	597498	621527	570819	547653	555240	565740

Source: database

Main species utilised in the transformation process are tunas for large pelagic; anchovy, European sardines and mackerel for small pelagic; sea bass, sea bream for demersal; clams for molluscs and cuttlefish and octopus for cephalopods.

Table 227: Italy - FU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Anadromous fish	6666	6488	6381	6070	6496	6879	9806	10470	10573	9987	7982
Marine fish, pelagic, tunas	126923	125139	124349	126576	117859	119264	156178	164633	166260	173152	140033
Marine fish, pelagic, small	84860	89842	91646	82796	84803	103359	126226	125099	122250	114276	102516
Marine fish, demersal	92897	88534	148479	158024	145030	152527	91810	94284	99088	102027	117270
Marine fish, others	112671	112717	80398	81698	87173	88187	147290	84439	53500	60522	90860
Crustaceans	9367	8897	7718	7701	7733	8406	6205	5649	5244	3460	7038
Molluscs	78394	74825	73253	72907	92499	94160	74880	79067	79425	82134	80154
Cephalopods	28947	19029	39367	26215	23294	24717	9132	7178	11313	9683	19888
Total FU Production	540725	525470	571591	561987	564887	597498	621527	570819	547653	555240	565740

Source: database

Non-food use commodities production

Italian non-food use commodities production consists only in fish meal and in 1998 production went back to its level of 1989 after a decrease in the middle of the decade. Average production was 10 000 tonnes between 1989 and 1998. Production is limited due to the absence of raw material, as the majority of Italian fish is being directed towards human consumption.

Table 228: Italy - NFU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Flour, meal unfit for human cons.	11199	11420	11485	4856	7275	7154	10591	11307	11842	11984	9911
Total NFU Production	11199	11420	11485	4856	7275	7154	10591	11307	11842	11984	9911

Source: database

Table 229: Italy - NFU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	11199	11420	11485	4856	7275	7154	10591	11307	11842	11984	9911
Total NFU Production	11199	11420	11485	4856	7275	7154	10591	11307	11842	11984	9911

Source: database

Non-food use: trade and net supply 1989-1998*Non-food use imports*

Italian non-food use imports amounted to 180 000 tonnes per year on average between 1989 and 1998. This high level of imports compensate for low domestic production, as Italian captures are mostly used for human consumption.

Table 230: Italy - NFU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	42606	44253	35705	40935	46367	66224	84041	65752	63584	57818	54728
Flour, meal unfit for human cons.	117962	144817	142272	141786	130631	140010	122270	117768	125742	91824	127508
Total NFU Imports	160568	189070	177976	182721	176997	206233	206311	183520	189326	149642	182236

Source: database

Table 231: Italy - NFU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	117930	140158	137676	129358	127703	135544	116767	103561	104069	79228	119199
Marine fish, others	42014	43494	36577	40996	46671	66368	84341	66575	65824	58854	55171
Aquatic animals	32	4395	3705	12340	2525	4250	5203	13322	19425	11461	7666
Aquatic mammals	592	1023	19	28	99	71	0	62	9	99	200
Total NFU Import	160568	189070	177976	182721	176997	206233	206311	183520	189326	149642	182236

Source: database

Non-food use exports

Italian non-food use exports mostly consist of re-exportations, as domestic production is limited. Average exports over the period 1989 to 1998 were around 25 000 tonnes a year.

Table 232: Italy - NFU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	1689	1112	1856	956	839	183	43	103	309	48	714
Flour, meal unfit for human cons.	18276	40052	28419	30147	27758	21538	26758	20012	15905	16166	24503
Total NFU Exports	19965	41164	30275	31103	28598	21721	26801	20115	16214	16214	25217

Source: database

Table 233: Italy - NFU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	15275	25496	21414	23941	23952	17095	23593	16892	12991	13339	19399
Marine fish, others	4577	11374	6449	5806	2924	1673	1282	934	1258	745	3702
Aquatic animals	10	4253	2398	1339	1721	2952	1926	2286	1965	2129	2096
Aquatic mammals	124	40	13	17	0	0	0	3	0	0	20
Total NFU Export	19965	41164	30275	31103	28598	21721	26801	20115	16214	16214	25217

Source: database

Non-food use net supply

Non-food use net supply is quite important with on average 170 000 tonnes consumed yearly over the period 1989 to 1998. Nearly all this is fuelled by imports, as non-food use domestic production is limited.

Table 234: Italy - NFU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish/marine mammal, fat, oil	40917	43141	33849	39979	45527	66040	83997	65649	63275	57770	54014
Flour, meal unfit for human consumption	110885	116184	125338	116495	110148	125626	106103	109063	121679	87643	112916
Total NFU net supply	151802	159326	159187	156474	155675	191666	190100	174712	184954	145412	166931

Source: database

Table 235: Italy - NFU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, pelagic, small	113854	126081	127747	110272	111026	125602	103765	97976	102919	77873	109712
Marine fish, others	37437	32120	30128	35190	43747	64695	83058	65642	64566	58109	51469
Aquatic animals	42	142	1306	11001	803	1298	3277	11036	17459	9331	5570
Aquatic mammals	468	983	6	11	99	71	0	59	9	99	181
NFU net supply	151802	159326	159187	156474	155675	191666	190100	174712	184954	145412	166931

Source: database

Market for human consumption

Trade

Recent improvements in local aquaculture production have not been large enough to balance the stagnating wild catch in the Mediterranean Sea. Italy has been forced to cover the rise in demand with increased supplies from abroad, making it the world's largest importer of seafood in 1996. Imports have also been helped by the fact that local catches comprise a large share of small pelagic whereas the increase in demand has been concentrated on more delicately flavoured white-meat fish species (Dheilly, 1999). Between 1989 and 1998 imports amounted on average to 850 000 tonnes a year whereas exports amounted to 150 000 tonnes. The general trend appears to be a widening gap as imports continue to grow and exports to decline (FAO, 1996). In terms of value imports represented ITL 4 200 billion while exports amounted to ITL 570 billion in 1997 (OECD, 2000).

The main products imported relative to value are crustaceans and molluscs followed by canned products and fresh or chilled fish. The rest is composed of frozen, salted, dried and smoked fish (Dheilly, 1999). The frozen and canned products are mainly tuna, while fresh fish is sole, salmon, sea bass and sea bream. Crustaceans are mainly frozen shrimps, and molluscs are composed of squid and cuttlefish. Italy is the third largest salt fish market in Europe after Portugal and Spain and the main species are cod, salmon and anchovy. With regard to tuna species, the Italian tuna processing industry is the third largest in the world after USA and Thailand and the majority of raw material comes from imports (Anon., 1999g).

Food use imports

Italy's food use imports have been increasing steadily since 1989, to reach 955 000 tonnes in 1998. Frozen fish remain Italy's largest import commodity over the last decade, averaging 225 000 tonnes a year, but its share of total imports has decreased from 30 percent in 1989 to 18 percent in 1998. On average, cephalopods have been Italy's second largest import commodity over the last decade, but this category increased its share to 23 percent of total imports in 1998, overtaking frozen fish to go to the top of the table. Fresh fish remains constant over the decade with a 12 percent share. Prepared/preserved products saw the biggest increase over the decade, growing by 200 percent between 1989 and 1998.

Table 236: Italy - FU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	172836	164979	193962	165923	165976	178966	184232	193406	201813	214597	183669
Crus., mol. & other aquatic inv., prepared	3504	4323	5483	4785	9242	9399	10126	10264	9881	8459	7547
Crustaceans	53926	59606	64608	70354	60996	66694	63714	75743	70630	89927	67620
Fish, cured	63863	58688	63889	52645	52651	60504	47598	55363	52830	50496	55853
Fish, fillets	53208	60447	67395	57073	61549	65068	60104	70865	66628	76382	63872
Fish, fresh/chilled	100869	102499	104168	105046	98603	99353	87372	113338	112532	121206	104499
Fish, frozen	259960	288001	274398	248787	229290	215861	205202	192642	171894	173495	225953
Molluscs	42166	36912	33556	38615	42428	41558	39568	53629	64782	60616	45383
Prepared/preserved fish	52424	57293	74439	93021	101926	104636	104722	127091	145862	159657	102107
Total FU Imports	802757	832747	881899	836249	822661	842038	802638	892342	896853	954835	856502

Source: database

Main species imported in Italy are salmon for diadromous fish; tunas (90 000 tonnes in 1998), yellowfin tunas (60 000 tonnes) and swordfish for large pelagic; mackerels, anchovies, sardines for small pelagic; sea bass, sea bream, hake, plaice and cod for demersal; shrimp and Norwegian lobster for crustaceans; mussel, oyster, scallop and clams for molluscs; squid, cuttlefish and octopus for cephalopods.

Table 237: Italy - FU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	4145	4324	4577	4860	5729	10052	7012	11910	10281	10117	7301
Diadromous fish	18252	22503	26841	27090	27135	29015	22998	31751	31959	36878	27442
Marine fish, pelagic, tunas	185350	192373	195248	187956	175504	164964	167200	163449	162244	183296	177758
Marine fish, pelagic, small	43887	31894	29618	23312	37703	42109	35650	37220	39958	38832	36018
Marine fish, demersal	172999	179966	208270	185908	206467	213348	193692	219830	206445	210742	199767
Marine fish, others	105691	135869	119735	127445	91481	85933	78446	95138	98858	101371	103997
Crustaceans	53926	59606	64608	70354	60996	66694	63714	75743	70630	89927	67620
Molluscs	45304	40719	38352	43205	51306	50400	49473	63685	74255	68722	52542
Cephalopods	172836	164979	193962	165923	165976	178966	184232	193406	201813	214597	183669
Aquatic animals	366	515	688	195	364	557	221	208	409	353	387
Total FU Import	802757	832747	881899	836249	822661	842038	802638	892342	896853	954835	856502

Source: database

Food use exports

Exports have increased from their 1989 level of 130 000 tonnes to reach 170 000 tonnes in 1998. Over the period 1989 to 1998, the largest single export commodity was fresh fish with an average of 50 000 tonnes per annum, followed by molluscs at around 40 000 tonnes, and frozen fish at 25 000 tonnes.

Table 238: Italy - FU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	8381	9064	9550	9591	10544	14423	10069	11804	10609	9654	10369
Crus., mol. & other aquatic inv., prepared	565	609	604	604	1077	1194	1044	704	1033	800	823
Crustaceans	2694	3374	4882	4851	3682	3903	2580	3069	2934	3174	3514
Fish, cured	2260	1588	1794	2628	1965	3258	1469	2232	2824	2417	2244
Fish, fillets	1005	996	1441	1680	1320	1920	1288	1674	1470	1802	1460
Fish, fresh/chilled	30176	25756	32131	37395	44159	53802	54030	54791	68000	61189	46143
Fish, frozen	29064	25138	21960	24058	21578	30239	23334	27551	23000	22845	24877
Molluscs	32087	28116	28081	36643	40098	41494	37070	52895	40790	44522	38180
Prepared/preserved fish	26315	23517	18987	16378	18741	15710	15687	15794	17675	19821	18862
Total FU Exports	132547	118158	119431	133829	143165	165943	146570	170513	168334	166223	146471

Source: database

Main species exported are trout for diadromous fish; tuna for large pelagic; sardines and anchovies for small pelagic; cod and hake for demersal; shrimps for crustaceans; mussels for molluscs and octopus, squid and cuttlefish for cephalopods.

Table 239: Italy - FU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	199	238	1552	4185	1229	1392	826	1189	1340	1145	1330
Diadromous fish	7961	9269	6222	6179	7738	11612	9917	11122	12210	13023	9525
Marine fish, pelagic, tunas	11814	9561	9125	8383	11780	12014	14113	14825	16479	17838	12593
Marine fish, pelagic, small	39322	35271	39413	35525	35603	43474	36263	41148	51202	41489	39871
Marine fish, demersal	5037	5627	7101	9562	15155	14765	13245	12699	11765	9547	10450
Marine fish, others	24487	17029	12902	18306	16258	21673	21444	21059	19973	25033	19816
Crustaceans	2694	3374	4882	4851	3682	3903	2580	3069	2934	3174	3514
Molluscs	32629	28691	28431	37076	40910	42216	37954	53459	41519	45137	38802
Cephalopods	8381	9064	9550	9591	10544	14423	10069	11804	10609	9654	10369
Aquatic animals	23	34	254	171	265	471	160	139	303	184	200
Total FU Export	132547	118158	119431	133829	143165	165943	146570	170513	168334	166223	146471

Source: database

Distribution

The distribution of aquatic products in Italy remains dominated by wholesalers and traditional fishmongers. Supermarkets appear to play a much smaller role than in most other European markets, and it is interesting to note that the market share of supermarkets is more important in the north of the country than in the south. The majority of fresh seafood, in particular, is sold through traditional fishmongers, whereas supermarkets have a stronger role in distribution and sales of frozen seafood products (Lem, 1998). Finally, catering provides a very important sink and destination for seafood products in urban areas in Italy because most companies have contracts with large, professional caterers to run cafeterias and restaurants for use by their employees.

Food use net supply and consumption

Consumption has experienced a strong increase during the last decades due, in part, to improvements in distribution and a better general economic climate in the country. Net supply between 1989 and 1998 was on average 1.3 Mt. Frozen fish is on average the main commodity consumed in Italy with 340 000 tonnes a year over the period 1989 to 1998 but it has seen its share decline from 30 percent of the net supply in 1989 to 15 percent in 1998. In contrast, prepared/preserved products are on the increase with levels of 180 000 tonnes at the beginning compared with 330 000 tonnes in 1998. These products, such as canned tuna or coated fillets, have experienced a rise of 50 percent since 1989, to become the leading commodities consumed in Italy in 1996.

Table 240: Italy - FU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	193402	174944	223779	182548	178726	189260	183295	188780	202518	214627	193188
Crus., mol. & other aquatic inv., prepared	13338	11500	11516	9280	14141	14809	18888	20030	18998	17646	15015
Crustaceans	60600	65128	67444	73203	65047	71196	67339	78324	72941	90213	71144
Fish, cured	79201	75268	82003	72212	84854	94529	101632	112389	109850	102608	91455
Fish, fillets	52203	59451	65953	60309	65426	68651	66660	78961	73617	82570	67380
Fish, fresh/chilled	165886	179982	174625	172076	142838	143943	162189	194369	181697	202867	172048
Fish, frozen	402933	424825	440292	415700	393530	393808	310102	237365	186648	185745	339095
Molluscs	64954	77532	76211	63204	98778	77280	106657	90036	118831	117273	89075
Prepared/preserved fish	178417	171429	192236	215877	201044	220116	260831	292393	311073	330303	237372
Total FU net supply	1210936	1240060	1334058	1264406	1244384	1273592	1277594	1292648	1276171	1343852	1275770

Source: database

The Italian net supply is dominated by demersal and large pelagic each with around 300 000 tonnes on average over the period 1989 to 1998. Cod, hake, seabass and sea bream are the main species among demersal, while tuna and anchovies dominate the pelagic group of species.

Table 241: Italy - FU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	3946	4086	3025	675	4500	8660	6186	10721	8942	8972	5971
Anadromous fish	16958	19723	27000	26981	25893	24282	22887	31099	30322	33842	25899
Marine fish, pelagic, tunas	300459	307951	310472	306149	281583	272214	309265	313257	312025	338610	305198
Marine fish, pelagic, small	89425	86465	81851	70583	86903	101994	125613	121171	111006	111619	98663
Marine fish, demersal	260859	262873	349648	334370	336342	351110	272257	301415	293768	303222	306587
Marine fish, others	193875	231557	187231	190837	162396	152447	204292	158518	132385	136860	175041
Crustaceans	60599	65129	67444	73204	65047	71197	67339	78323	72940	90213	71144
Molluscs	91069	86853	83174	79036	102895	102344	86399	89293	112161	105719	93894
Cephalopods	193402	174944	223779	182547	178726	189260	183295	188780	202517	214626	193188
Aquatic animals	343	481	434	24	99	86	61	69	105	169	187
FU net supply	1210936	1240060	1334058	1264406	1244384	1273592	1277594	1292648	1276171	1343852	1275770

Source: database

In 1997, the per capita supply was 23 kg, which represents a considerable increase from the 15 kg per capita of 1988. In the same year, aquatic products account for 7 percent of total food expenditure, and almost 11 percent of the total animal proteins consumed per day (FAO, 1999). 50 percent of Italian families consume fish at least once a week, and the majority prefer fresh to frozen or canned fish.

Most of the fish sold in Italy is of maritime origin. Demand for freshwater fish is limited and concentrated in areas close to lakes and rivers where local traditions and recipes reflect the historic presence of freshwater species. Of marine fish, a large variety of pelagic and groundfish species are consumed in all product forms. Italy is also an important market for shrimp and cephalopods (Lem, 1998), the third largest consumer of mussels in the EU and the principal consumer of bivalves such as clams (Monfort, 1999).

Consumption of value added products is growing but Italian preference is still for fresh natural products. Consumer research shows that fresh fish has a prestigious image that consumers associate with light food, pleasant flavours and high nutritional values. Cured products are also traditionally popular in Italy and the country has the third largest market for saltfish in the EU. However, demographic changes coupled with less disposable time for the preparation of meals, have led to a surge in demand for value-added products. Therefore, the industry has launched new products to meet the demand, particularly in the north of the country. Retailers are also constantly looking for new products that will sell well and create excitement in the market (Anon., 1999a) and the consumption of value-added products is now starting to strengthen the market (Anon., 1999g).

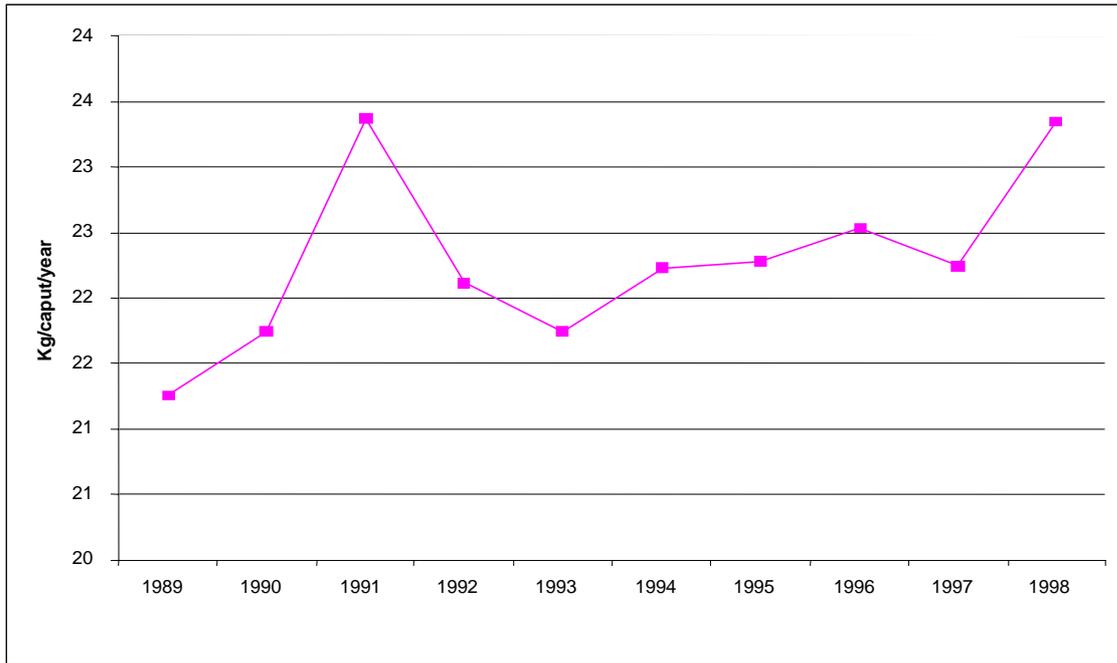


Figure 43: Fish consumption per capita per year in Italy 1989-1998

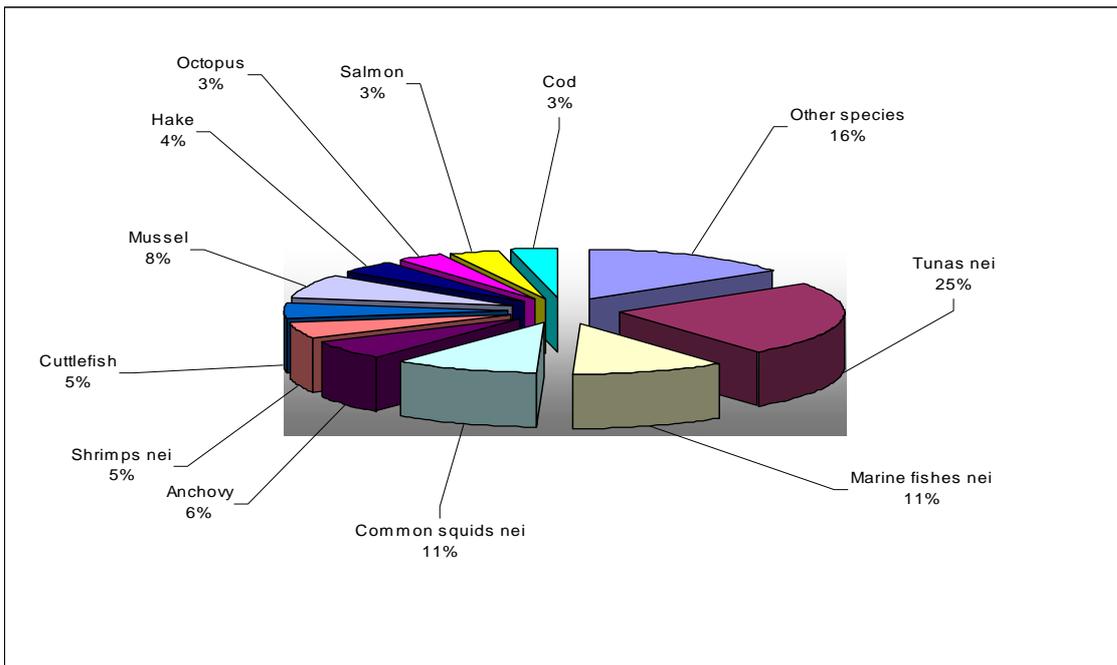


Figure 44: Italy - Main species consumed in 1998

Assumptions for projection 2005-2030 and main results

As specified in the methodology section (see Part One of the study), assumptions have been made on the consumption trend of the OECD group of products. Further assumptions are made regarding production, imports and exports and Italy’s need for fish in 2005 up to 2030 by taking into account and extrapolating previous trends.

For Italy, main consumption trends for the period 2005-2030 assume:

A 100 percent increase in the demand for crustaceans over the period 1998-2030, while cephalopods will increase by 30 percent as will prepared/preserved products. Fresh fish consumption will also increase but to a lesser extent. The increase in consumption of fish fillets and prepared molluscs will almost be imperceptible.

A moderate increase in the production of fish fillets (20 percent) and of fresh fish mostly to answer the increase in domestic demand. A smaller rise in prepared molluscs will account for the rise in exports, while the rise in prepared/preserved products will fuel the domestic market.

Increases in exports of prepared molluscs fuelled by the increase in production of these commodities.

A large increase in imports of crustaceans (100 percent) and a smaller one of prepared/preserved products (44 percent) destined for the domestic market.

There are several factors that will affect the consumption of seafood in Italy. Firstly, fresh fish will remain the preferred commodity amongst Italian consumers amongst whom it enjoys a prestigious image associated with light food, pleasant flavours and good nutritional value. Additionally, seafood is mostly consumed outside the home, with restaurants and other catering facilities accounting for 64 percent of Italian consumption in 2001 (Besozzi, 2002), which is also likely to affect fresh fish consumption. Therefore, it is assumed that over time, the demand for frozen fish will decrease, whilst the consumption of fresh fish will increase.

Second, demographic changes coupled with less disposable time for the preparation of meals, have already led to a surge in the demand for value-added products (Anon., 1999g), and this trend is likely to continue and is reflected here in the increase in prepared/preserved products.

Another factor having a positive affect on these products is the trend towards increasing food safety in the aftermath of various food crises of the nineties such as BSE and foot and mouth. There is increasing demand for products offering more transparency and assurances of quality, something pre-packed products are more likely to offer (OECD, 2003).

Affecting seafood consumption in general is the ever-growing share of supermarkets in the retail sector. Indeed, they contribute to increased seafood consumption by increasing fish availability (especially in inland regions), reducing prices through economies of scale and bargaining power, and ensuring quality through strict hygiene and health and safety norms (Lem, 2002). Additionally, supermarkets increase geographical availability whilst also decreasing seasonal disparities (Dheilly, 1999), which is another factor positively influencing consumption.

Table 242: Italy - Assumptions for projection

OECD group	94-98% annual %	Prod % 99-30	T Imp % 99-30	T Exp % 99-30	T Cons % 99-30	T Prod % Annual	% Imp Annual	% Exp Annual	Cons % Annual	
Cephalopods	-155%	-31%	0%	30%	0%	30%	0.0%	0.8%	0.0%	0.8%
Crus., mol. & other aquatic inv., prepared	34%	7%	10%	0%	70%	2%	0.3%	0.0%	1.7%	0.0%
Crustaceans	-143%	-29%	0%	100%	0%	100%	0.0%	2.2%	0.0%	2.2%
Fish, cured	32%	6%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Fish, fillets	31%	6%	20%	0%	0%	2%	0.6%	0.0%	0.0%	0.1%
Fish, fresh/chilled	31%	6%	17%	0%	0%	12%	0.5%	0.0%	0.0%	0.3%
Fish, frozen	-493%	-99%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Molluscs	24%	5%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Prepared/preserved fish	31%	6%	10%	44%	0%	30%	0.3%	1.1%	0.0%	0.6%
Fish/marine mammal, fat, oil	-15%	-3%		0%	0%			0.0%	0.0%	0.0%
Flour, meal unfit for hum. Cons.	-45%	-9%	0%	0%	0%		0.0%	0.0%	0.0%	0.0%

Source: database

Aquaculture production will continue to increase but not for all species. Imports will rise to cope with the increased demand for crustaceans, cephalopods and prepared/preserved fish. Exports of prepared

crustaceans will increase due to a rise in production of these commodities in Italy, but will have a limited impact on the net supply that will rise steadily between 1998 and 2030.

Table 243: Italy - Main results for projection

Nature	Average 94-98	2005	2010	2015	2020	2025	2030
Exports FU (t live wt)	163517	166321	166399	166483	166575	166674	166782
Imports FU (t live wt)	877741	995492	1027111	1061091	1097642	1136991	1179390
Production FU (t live wt)	578547	564930	571979	579138	586408	593790	601287
Fish supply FU (t live wt)	1292772	1394100	1432691	1473746	1517475	1564107	1613894
Population (X1000)	57387	57604	57633	57085	56543	56005	55473
Per caput supply (kg/h)	23	24	25	26	27	28	29
Production NFU (t live wt)	10576	11984	11984	11984	11984	11984	11984
Imports NFU (t live wt)	187006	149642	149642	149642	149642	149642	149642
Exports NFU (t live wt)	20213	16214	16214	16214	16214	16214	16214
Net supply NFU (t live wt)	177369	145412	145412	145412	145412	145412	145412
Aquaculture (t live wt)	224572	257964	264564	271694	279363	287593	296414
Capture (t live wt)	364551	364551	364551	364551	364551	364551	364551
Production total (t live wt)	589123	622515	629115	636245	643914	652144	660965

Source: database

Food use net supply and human consumption 2005-2030

Food use net supply will continue to increase between 1998 and 2030, reaching 1.6 Mt at the end of the period. Prepared/preserved products will become the largest single seafood commodity to be consumed in Italy, with 25 percent of the market. Crustaceans will enjoy the largest increase over the period, with a 100 percent rise in consumption. At the expense of the static frozen fish market, fresh fish will rise to be the country's second largest seafood commodity. Cephalopods and fish fillets will also increase, but to a lesser extent.

This trend was reflected in 2000, as the reported growth was pulled partly by fresh and defrosted fish and partly by deep-frozen packaged and ready-to-use products (prepared/preserved products) such as crustaceans and cephalopods (OECD, 2003). The OECD (2003) also remarks that events such as BSE crisis have made Italian consumers more sensitive to the issue of food safety and are more inclined to turn their attention to packaged goods whose labels or trademark ensures market transparency and fulfils consumers' ever growing concern with food safety.

Table 244: Italy - FU Net Supply by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	195696	227303	236814	246722	257045	267801	279006
Crus., mol. & other aquatic inv., prepared	18074	17758	17833	17904	17970	18031	18085
Crustaceans	76003	104936	116907	130247	145112	161679	180140
Fish, cured	104202	102608	102608	102608	102608	102608	102608
Fish, fillets	74092	82895	83135	83382	83637	83899	84168
Fish, fresh/chilled	177013	207943	211678	215507	219434	223459	227586
Fish, frozen	262734	185745	185745	185745	185745	185745	185745
Molluscs	102016	117273	117273	117273	117273	117273	117273
Prepared/preserved fish	282944	347640	360698	374357	388650	403613	419283
Total FU net supply	1292772	1394100	1432691	1473746	1517475	1564107	1613894

Source: database

Net supply will continue to be dominated by pelagic and demersal species like tuna, anchovies, cod and hake up to 2030, but apparent consumption of crustaceans such as shrimps and lobsters is increasing the fastest.

Table 245: Italy - FU net supply by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	8696	8972	8972	8972	8972	8972	8972
Diadromous fish	28486	33960	34050	34145	34245	34352	34465
Marine fish, pelagic, tunas	462497	524058	535291	546953	559066	571653	584737
Marine fish, pelagic, small	114281	113900	115611	117395	119256	121198	123225
Marine fish, demersal	223461	207232	208965	210799	212741	214797	216973
Marine fish, others	156901	139887	142154	144514	146971	149530	152197
Crustaceans	76003	104936	116907	130247	145112	161679	180140
Molluscs	26653	33706	33799	33890	33977	34060	34139
Cephalopods	195696	227303	236814	246722	257045	267801	279006
Aquatic animals	98	146	128	109	88	65	40
FU net supply	1292772	1394100	1432691	1473746	1517475	1564107	1613894

Source: database

A combination of Italy's declining population (-4 percent) over the period and a growth in net supply of 20%, will see per capita consumption increase from 24 kg per capita per year to 29 kg per capita per year in 2030.

Large national and international chains (PAM, Esselunga, GS, Coop, SMA-Auchan, Carrefour, Metro, etc.) are present in all regions with devastating consequences for the small retailers and fish shops. The concentration of bargaining power has in turn squeezed the margins of the suppliers, including the seafood wholesalers. On the other hand, sales through super- and hypermarkets are more cost-efficient than through small shops and the reduced costs have in large part been passed on to consumers as lower prices. However, there are large differences in domestic consumption with the coastal regions consuming up to double the national average, whereas the landlocked areas, especially in the north, consume much less. Still, improved transportation and the expansion of fresh fish counters in supermarkets have improved availability tremendously in the last decade, including in landlocked areas where fresh seafood previously was sold perhaps only once a week in the small town market. Combined with the greater availability of seafood through longer opening hours in the supermarkets, these factors should, over time, increase seafood consumption in Italy (Lem, 2002).

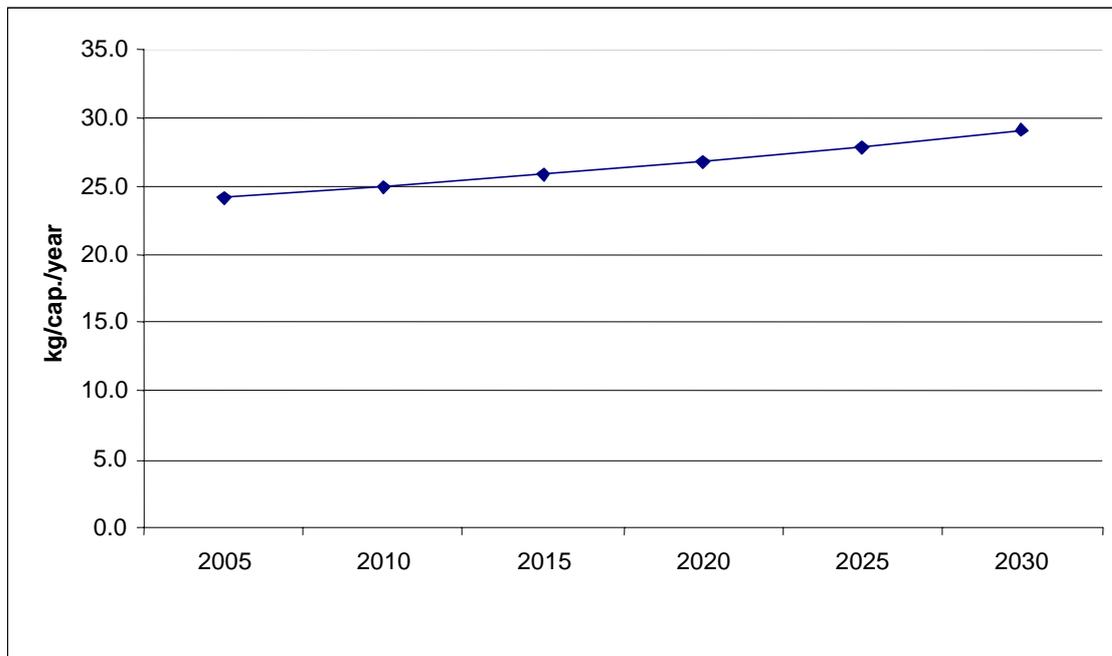


Figure 45: Fish consumption per capita per year in Italy 2005-2030

Main species consumed in Italy in 2030 will be tuna whose share declined slightly from 25 percent in 1998 to 21 percent in 2030. Shrimps and lobsters are increasing, while the rest of the species remain more or less stable.

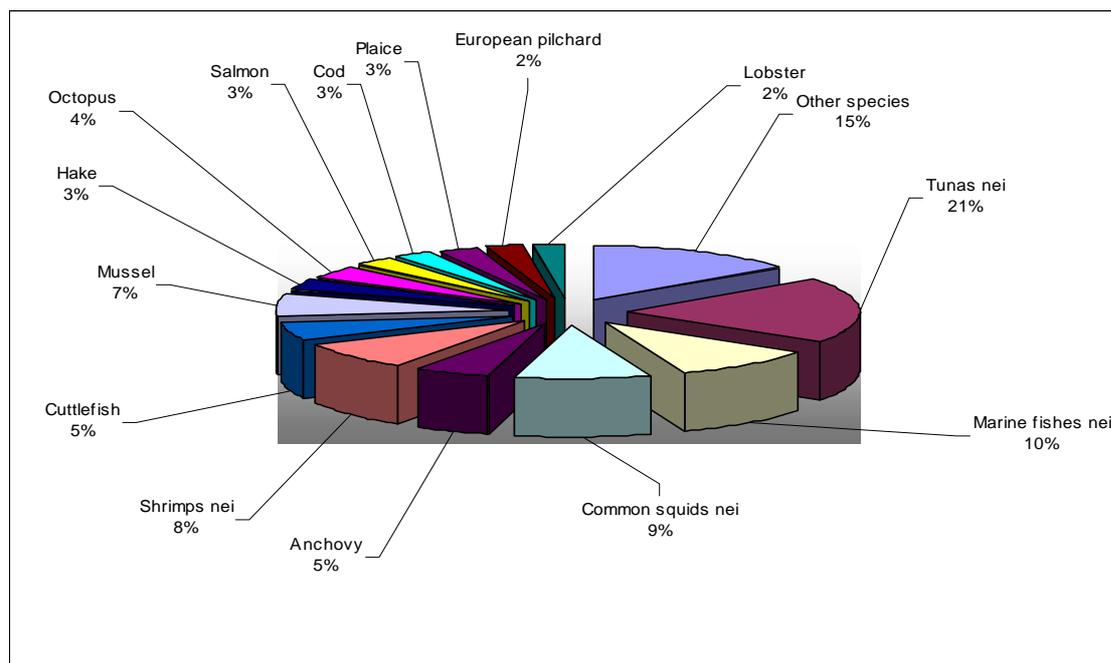


Figure 46: Italy - Main species consumed in 2030

Non-food use net supply 2005-2030

No significant change in the non-food use net supply will be experienced over the period 1998 to 2030, as imports, exports and production will remain stable.

Production 2005-2030

Capture and aquaculture

Aquaculture production will increase from 250 000 tonnes in 1998 to nearly 300 000 tonnes in 2030. It will benefit from positive attention from the Italian government as it has identified aquaculture in its triannual plan of 2000 as a key instrument for reducing and rationalising fishing activities (OECD, 2000).

Main species concerned by this increase are: rainbow trout for diadromous fish, seabass and seabream for demersal and carpet shells for molluscs. The increase in Italian aquaculture production might even have been underestimated as levels of production were already reported to have reached 264 000 tonnes in 2001 (OECD, 2003), which is well ahead of the projection.

Table 246: Italy - Aquaculture by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	2952	2050	1913	1830	1779	1748	1729
Diadromous fish	51897	54734	57188	59797	62569	65509	68625
Marine fish, pelagic, small	2980	2867	2776	2687	2602	2519	2439
Marine fish, demersal	7860	13382	14775	16313	18011	19885	21955
Crustaceans	23	23	21	19	18	17	15
Molluscs	154260	181462	184088	186847	189746	192794	195997
Others	4600	3446	3805	4201	4638	5121	5654
Total gp of species	224572	257964	264564	271694	279363	287593	296414

Source: database

The rise in total production is only due to the increased output of the aquaculture sector as capture fisheries remain stable.

Table 247: Italy - Total production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	8183	7280	7143	7060	7010	6979	6960
Diadromous fish	54819	57656	60110	62719	65491	68431	71547
Marine fish, pelagic, tunas	18810	18810	18810	18810	18810	18810	18810
Marine fish, pelagic, small	103271	103158	103067	102979	102893	102810	102730
Marine fish, demersal	91682	97204	98597	100134	101832	103707	105776
Marine fish, others	31244	31244	31244	31244	31244	31244	31244
Crustaceans	22736	22736	22734	22733	22731	22730	22729
Molluscs	218684	245887	248512	251271	254171	257218	260422
Cephalopods	33586	33586	33586	33586	33586	33586	33586
Others	6107	4953	5311	5707	6145	6627	7160
Total gp of species	589123	622515	629115	636245	643914	652144	660965

Source: database

Commodities

Total production will increase from its 1998 level of 555 000 tonnes to 600 000 tonnes in 2030. Fresh fish and fish fillets production will increase by 20 percent between 1998 and 2030, while production of prepared products (crustaceans and molluscs, fish meat and canned fish) will rise more slowly with a 10 percent increase over the period considered.

Table 248: Italy - FU Commodities Production by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	12405	9683	9683	9683	9683	9683	9683
Crus., mol. & other aquatic inv., prepared	9403	10197	10350	10506	10663	10823	10986
Crustaceans	5793	3460	3460	3460	3460	3460	3460
Fish, cured	53284	54529	54529	54529	54529	54529	54529
Fish, fillets	7913	8315	8555	8802	9057	9318	9588
Fish, fresh/chilled	128615	147926	151661	155490	159417	163442	167569
Fish, frozen	96309	35095	35095	35095	35095	35095	35095
Molluscs	93339	101179	101179	101179	101179	101179	101179
Prepared/preserved fish	171487	194547	197467	200394	203325	206261	209198
Total FU Production	578547	564930	571979	579138	586408	593790	601287

Source: database

Main species concerned by the rise in production will be anchovy and sardines for small pelagic and tuna for large pelagic.

Table 249: Italy - FU Commodities Production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Anadromous fish	9543	9987	9987	9987	9987	9987	9987
Marine fish, pelagic, tunas	155897	176821	179489	173152	173152	187738	190571
Marine fish, pelagic, small	118242	115140	115768	116406	117053	117710	118377
Marine fish, demersal	107947	105652	108320	111055	113859	116734	119682
Marine fish, others	86788	62054	63139	73262	77081	66344	67394
Crustaceans	5793	3460	3460	3460	3460	3460	3460
Molluscs	81933	82134	82134	82134	82134	82134	82134
Cephalopods	12405	9683	9683	9683	9683	9683	9683
Total FU Production	578547	564930	571979	579138	586408	593790	601287

Source: database

Trade 2005-2030

Imports

Imports of food use commodities will increase from 950 000 tonnes in 1998 to reach 1.2 million in 2030 as captures in the Mediterranean Sea stagnate and the increase in aquaculture production not large enough to cover the domestic needs. Imports are also boosted by the fact that local catches

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Total FU Exports	163517	166321	166399	166483	166575	166674	166782

Source: database

The only species affected by the rise in exports are mussels, which confirms molluscs as the primary Italian export, followed by small pelagic species such as sardine and anchovy.

Table 253: Italy - FU Commodities Exports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	1178	1145	1145	1145	1145	1145	1145
Diadromous fish	11577	13023	13023	13023	13023	13023	13023
Marine fish, pelagic, tunas	15054	17838	17838	17838	17838	17838	17838
Marine fish, pelagic, small	42715	41489	41489	41489	41489	41489	41489
Marine fish, demersal	12404	9547	9547	9547	9547	9547	9547
Marine fish, others	21836	25033	25033	25033	25033	25033	25033
Crustaceans	3132	3174	3174	3174	3174	3174	3174
Molluscs	44057	45213	45273	45338	45408	45485	45568
Cephalopods	11312	9654	9654	9654	9654	9654	9654
Aquatic animals	251	207	224	244	265	288	313
Total FU Export	163517	166321	166399	166483	166575	166674	166782

Source: database

NETHERLANDS

With a population of approximately 15.5 million people, The Netherlands is one of Europe's major fish producers, and having been a predominant fishing nation for centuries, it is now a leading distributor of fish. The country's favourable geographic position, modern fleet, processing facilities and trading network make it the second largest exporter of fish in the EU after Denmark. The sector is characterised by the high proportion of commodities produced for export, and a large variety of high value species such as sole, plaice, North Sea shrimp, mussels and clams, in addition to speciality value-added products such as smoked mackerel, maatje herring and eel. It is true to say that the seafood industry in The Netherlands has now reached the stage where processing and value-added products are more significant to the national economy than the capture and production of raw product.

Production: captures, aquaculture and commodities 1989-1998

Dutch production was 660 000 tonnes in 1998. The total volume experienced strong growth after 1989 (530 000 tonnes), mainly due to the rise in the capture sector. Aquaculture accounted for approximately 18 percent of the volume in 1998.

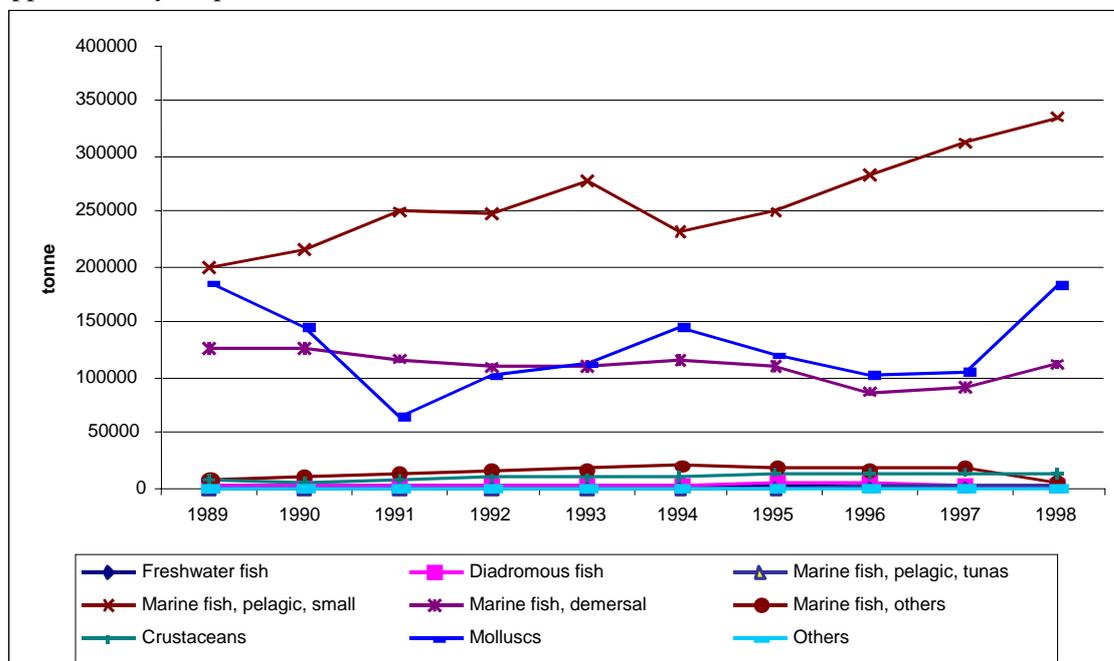


Figure 47: Netherlands - Capture and aquaculture production 1989-1998

Captures

In 1997, marine fisheries were the most significant sector in the fishing industry. Captures by the Dutch fleet were approximately 540 000 tonnes in 1998, an increase of about 100 000 tonnes over the ten-year period since 1989. Captures are composed of shellfish (mussels, oysters, cockles and hulls), sole, plaice, cod, whiting, herring and shrimp (FAO, 1999). Fishing grounds are located mainly in the central and the southern parts of the North Sea.

Table 254: Netherlands - Captures by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	1449	1031	960	746	645	599	762	1001	975	898	907
Diadromous fish	2314	1690	2664	1605	998	1896	3384	1192	1348	672	1776
Marine fish, pelagic, tunas	0	0	0	0	0	0	0	1694	1625	2171	549
Marine fish, pelagic, small	199059	214359	249818	247451	278602	232818	249600	283673	312210	334762	260235
Marine fish, demersal	126052	126920	117326	108558	111263	115784	111125	87303	91442	112872	110865

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, others	7522	11192	14342	16156	16687	20267	19457	16914	19406	4127	14607
Crustaceans	7572	5509	8156	10125	9802	10338	14165	12490	13681	12565	10440
Molluscs	77319	45488	13898	48326	43758	38350	39594	6528	11111	68541	39291
Others	0	0	0	95	16	118	10	48	44	30	36
Total gp of species	421287	406189	407164	433062	461771	420170	438097	410843	451842	536638	438706

Source: database

Inland fisheries are mainly composed of eel, perch, pike, bream and trout (FAO, 1999) and most of the activity occurs in the IJsselmeer (Anon., 1999k). In 1997, the total volume of inland captures was approximately 7 000 tonnes.

Aquaculture

In 1998, farmed production was 120 000 tonnes, an increase of 11 000 tonnes since 1989. Aquaculture is dominated by the mussel (11 000 tonnes), which is produced largely in the Wadden Sea and Zeeland. Following a slump in 1980, production and sales recovered well, allowing exports to extend beyond the traditional market (Belgium and France) and into other countries. The production and sales of processed mussels (marinated and frozen) also increased (Anon., 1999k). In contrast, the oyster culture has not recovered from a disease that was imported in the early 1990s, and only produced 1 400 tonnes in 1997 (FAO, 1999).

Table 255: Netherlands - Aquaculture by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	475	500	500	500	900	710	1019	1200	1206	1799	881
Diadromous fish	600	750	800	770	1450	1687	1735	3050	2501	2561	1590
Marine fish, demersal	0	0	0	0	0	0	12	25	25	25	9
Molluscs	107800	99745	50348	52835	68775	106982	81172	95596	94478	115639	87337
Total gp of species	108875	100995	51648	54105	71125	109379	83938	99871	98210	120024	89817

Source : database

In 1997, fish farming was composed of eel, African catfish, trout, and to a lesser extent, turbot, sea bass and sea bream. Since 1994, eel and catfish cultures have seen a great deal of activity both by way of the establishment of new businesses, and the expansion of existing operations. An increase in production is expected, as large-scale fish farming has not yet reached its full potential (FAO, 1999). However, there appear to be institutional constraints on the development of this sector, in particular, poor linkage and communication between research institutes and the industry. A supportive policy environment and the market for expansion are required for the future growth of Dutch aquaculture (FAO, 1999).

Commodities production

Food use commodities production

Dutch commodities production was 525 000 tonnes a year between 1989 and 1998, and is dominated by frozen fish products that account for 60 percent on average. Molluscs is the second largest commodity at 55 000 tonnes, followed by fish fillets at 40 000 tonnes. Value-added activities for freshwater products (and diadromous species) mainly concern the smoking process, but although there are numerous smokehouses in the Netherlands they tend to remain small-scale (Rudiger, 1998).

Table 256: Netherlands - FU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Crus., mol. & other aquatic inv., prepared	22183	20048	15428	16789	14567	21345	19870	19067	20439	18790	18853
Crustaceans	15647	17654	12345	21345	21345	12535	9037	11210	13456	7747	14232
Fish, cured	47113	47783	50218	34236	33595	40474	31512	32547	28945	34175	38060
Fish, fillets	56116	53951	52933	37653	36900	47474	39759	36599	33778	30967	42613
Fish, fresh/chilled	10560	10607	10501	7863	6228	6996	6064	6524	5219	4865	7543
Fish, frozen	282057	267389	254852	310205	336950	294461	269961	290933	391220	402412	310044

Molluscs	60321	64322	41234	45654	51234	56432	48765	65432	73256	45632	55228
Prepared/preserved fish	39520	36995	38425	34743	34872	52094	50320	34990	30318	39348	39162
Total FU Production	533517	518749	475936	508488	535691	531812	475288	497302	596631	583937	525735

Source: database

The main species involved in the Dutch production process are the small pelagic jack mackerel, horse mackerel, and herring (mainly sold in frozen form). The second largest group are the demersal species, of which blue whiting, plaice, sole and cod are the most important. Finally, there are the mussels that account for the bulk of Dutch molluscs production.

Table 257: Netherlands - FU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Diadromous fish	4135	4331	4671	4112	3794	4880	4516	4357	3842	4448	4309
Marine fish, pelagic, small	298618	279275	255502	313890	324677	286106	260162	296020	378552	395082	308788
Marine fish, demersal	89189	90914	103616	73860	84147	111743	93947	74983	68811	78644	86985
Marine fish, others	43423	42205	43140	32837	35926	38770	38991	26234	38275	33594	37340
Crustaceans	15647	17654	12345	21345	21345	12535	9037	11210	13456	7747	14232
Molluscs	82504	84370	56662	62443	65801	77777	68635	84499	93695	64422	74081
Total FU Production	533517	518749	475936	508488	535691	531812	475288	497302	596631	583937	525735

Source: database

Non-food use commodities production

The Netherlands do not produce any non-food use commodities.

Non-food use: trade and net supply 1989-1998

Domestic production is used exclusively for human consumption. Therefore, raw materials for the non-food use industry come mainly from imports. After being processed, an important share of non-food use products is exported. The Netherlands is a major non-food use trader, with Rotterdam playing the role of access gate of non-food use commodities to the European market.

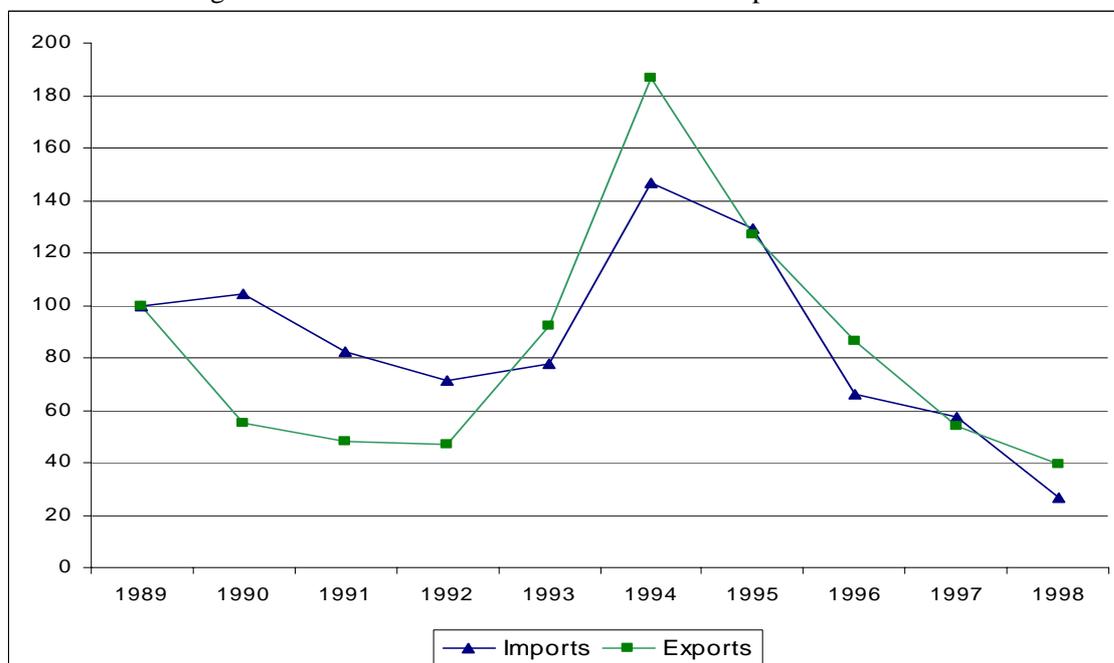


Figure 48: Netherlands - Non-food use imports and exports indexes

Non-food use imports

On average, non-food use imports were 600 000 tonnes between 1989 and 1998, but the volume fell from the 690 000 tonnes imported at the beginning of the decade, to only 180 000 tonnes in 1998. This

fall has to be linked with a decrease in national consumption and re-exportations caused by perturbations within the European pig farming industry at that time. This industry, a major consumer of non-food use fish products, experienced environmental problems, and others associated with diseases during the 1990s which led to a sharp decrease in demand for non-food use products.

Table 258: Netherlands - NFU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	515039	536936	443175	350553	328257	545103	644412	312866	285266	112018	407362
Flour, meal unfit for human cons.	174622	184476	125566	139450	206074	466040	248445	141824	109111	71299	186691
Total NFU Imports	689660	721412	568741	490003	534331	1011143	892857	454690	394377	183316	594053

Source: database

Table 259: Netherlands - NFU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	174616	184476	125566	139450	206074	464348	244799	136350	104598	69926	185020
Marine fish, others	515039	536936	443175	350553	328257	545103	644412	312866	285080	111779	407320
Aquatic animals	6	0	0	0	0	1692	3542	5310	4285	1337	1617
Aquatic mammals	0	0	0	0	0	0	104	164	415	274	96
Total NFU Import	689660	721412	568741	490003	534331	1011143	892857	454690	394377	183316	594053

Source: database

Non-food use exports

Exports have been declining in line with imports as they only consist of re-exportations, domestic production being non-existent. Exports therefore dropped from 220 000 tonnes in 1989 to 90 000 tonnes in 1998.

Table 260: Netherlands - NFU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	55876	48030	40087	38141	72593	87573	79743	69068	64981	42611	59870
Flour, meal unfit for human cons.	168248	75405	68069	66692	134006	330450	204936	124808	55874	45936	127442
Total NFU Exports	224124	123435	108156	104833	206599	418023	284679	193876	120855	88547	187313

Source: database

Table 261: Netherlands - NFU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	67170	74983	67626	65922	133307	188267	77514	52972	31718	23416	78289
Marine fish, others	156949	48452	40530	38911	73292	229621	203695	140550	88775	64916	108569
Aquatic animals	5	0	0	0	0	135	3458	342	321	215	448
Aquatic mammals	0	0	0	0	0	0	12	13	40	0	7
Total NFU Export	224124	123435	108156	104833	206599	418023	284679	193876	120855	88547	187313

Source: database

Non-food use net supply

The net supply of non-food use commodities has decreased sharply from its 1995 level of 600 000 tonnes to 95 000 tonnes in 1998, as demand from the pig industry fell due to environmental problems and others associated with diseases.

Table 262: Netherlands - NFU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish/marine mammal, fat, oil	459163	488906	403088	312412	255664	457530	564669	243798	220285	69406	347492
Flour, meal unfit for human consumption	6373	109071	57497	72758	72068	135590	43509	17016	53237	25363	59248
Total NFU net supply	465536	597978	460585	385170	327732	593120	608178	260814	273523	94769	406740

Source: database

Table 263: Netherlands - NFU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, pelagic, small	107446	109493	57940	73528	72767	276082	167285	83378	72880	46511	106731
Marine fish, others	358090	488485	402646	311642	254965	315482	440718	172316	196305	46863	298751
Aquatic animals	1	0	0	0	0	1557	83	4968	3964	1122	1169
Aquatic mammals	0	0	0	0	0	0	92	151	375	274	89
NFU net supply	465536	597978	460585	385170	327732	593120	608178	260814	273523	94769	406740

Source: database

Market for human consumption

Trade

The Netherlands is one of the biggest fish exporters in Europe and about 80 percent of the fish caught by Dutch vessels are exported. Situated on the edge of the productive fishing grounds of the North Sea and with fast distribution channels to the great fish-eating nations of southern Europe and beyond, it enjoys an ideal location. The country exports seafood mostly to Germany, Belgium and Italy (Trachet, 2000). The processing and marketing industry obtains 60 percent of its products from the national fleet, the remainder being imported. Germany, the UK and Denmark are the leading suppliers of the Dutch industry. In terms of volume, the principal segment of the export market is made up of pelagic species and adequate supplies are assured by supplementing national production with imported supplies of fish, primarily from Denmark. The main pelagic product is frozen herring for which Germany is again the largest importer. The supply of herring roe to Japan also represents a significant share of the export market of pelagic species (Anon., 1999k), while southern Europe is becoming a more significant importer of Dutch products such as clams and less traditionally consumed species as tastes and national demands change in countries such as Italy (Anon., 2000f).

Finally, there is also a small but significant market for eel in the Netherlands, the country being the largest importer in the EU and together with Germany the greatest consumer (Rudiger, 1998). The Netherlands is also the major importer, exporter and consumer of Nile perch in the EU with about 14 000 tonnes of fillets imported in 1996 and about half this amount consumed nationally.

Food use imports

Dutch imports had been increasing up to the mid nineties but seem to have stabilised in the past few years at a level around 600 000 tonnes with a value averaging NLG 1.7 billion in 1997 (OECD, 2000). Frozen fish remain the primary import at 180 000 tonnes per annum on average, but its share has been decreasing recently. Fresh fish come next, but are also on a declining trend. Products on the increase are prepared/preserved commodities and fish fillets.

Table 264: Netherlands - FU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	7227	7742	5628	5493	28280	22639	31889	26679	28563	26842	19098
Crus., mol. & other aquatic inv., prepared	4403	7659	8558	8647	6915	8844	8134	9962	7552	7017	7769
Crustaceans	17350	16545	23854	20704	20262	43029	49471	48248	52325	65105	35689
Fish, cured	12534	15588	15381	14978	8703	13061	25104	29025	42756	45542	22267
Fish, fillets	13374	21621	24133	22317	31269	32602	60541	60883	61926	67033	39570
Fish, fresh/chilled	108813	139538	148963	144782	129816	131438	121180	117028	122545	102975	126708
Fish, frozen	137798	161962	183241	187662	168229	235145	206251	167780	189878	171211	180916
Molluscs	15018	25121	60023	85231	39879	11776	20168	42809	27128	23867	35102
Prepared/preserved fish	31881	41643	43759	43762	45325	39781	45341	65818	68327	76436	50207
Total FU Imports	348397	437419	513539	533575	478677	538316	568080	568231	601000	586029	517326

Source: database

The main species imported by the Netherlands are salmon for diadromous fish; tuna for large pelagic; Atlantic herring, jack and horse mackerel, Atlantic mackerel and pilchards for small pelagic; plaice,

cod, Argentinian hake and Alaska pollock for demersal; shrimps and crab for crustaceans; mussels for molluscs; squid and cuttlefish for cephalopods.

Table 265: Netherlands - FU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	4152	4838	5761	5936	7422	12698	17161	21074	17103	18703	11485
Diadromous fish	18437	22823	23270	23832	20026	22667	22306	27526	31396	29762	24205
Marine fish, pelagic, tunas	8576	9661	9185	11788	19682	12706	16853	23641	25708	28539	16634
Marine fish, pelagic, small	165506	205629	229122	232091	209123	237278	195970	158831	178550	157123	196922
Marine fish, demersal	90920	115315	122249	116745	109698	146680	179975	169066	189854	176123	141662
Marine fish, others	16808	22086	25889	23109	17391	19999	26152	40395	42821	52948	28760
Crustaceans	17350	16545	23854	20704	20262	43029	49471	48248	52325	65105	35689
Molluscs	18893	32189	67128	92028	46437	19912	27425	49327	32248	29107	41470
Cephalopods	7227	7742	5628	5493	28280	22639	31889	26679	28563	26842	19098
Aquatic animals	528	590	1453	1849	357	708	877	3445	2432	1777	1402
Total FU Import	348397	437419	513539	533575	478677	538316	568080	568231	601000	586029	517326

Source: database

Food use exports

Food use exports have been steadily increasing from their level of 680 000 tonnes in 1989, reaching 930 000 tonnes in 1998. The main commodity exported is frozen fish, which on average represents nearly 60 percent of exports over the period considered. Fresh fish comes second with 70 000 tonnes, followed by fish fillets and molluscs both with 60 000 tonnes. In terms of value, Dutch food use exports amounted to NLG 2.5 billion in 1997 (OECD, 2000).

Table 266: Netherlands - FU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	5765	6995	5152	3170	10513	20549	10138	10324	22397	16219	11122
Crus., mol. & other aquatic inv., prepared	18526	23740	19451	21052	18379	24995	23479	25470	23409	22221	22072
Crustaceans	31730	32574	30949	39947	40432	48719	45762	53900	65330	63705	45305
Fish, cured	26553	33379	37505	30056	24397	26591	19040	21928	37327	44463	30124
Fish, fillets	52011	55627	56825	51343	67422	66892	62107	59752	62846	57253	59208
Fish, fresh/chilled	86765	78508	83124	72949	58826	64655	56201	71668	61621	54099	68842
Fish, frozen	350005	425565	437240	496351	480435	461984	458749	448119	545446	572369	467626
Molluscs	63523	67856	45827	53686	57517	62893	50736	70798	78703	43322	59486
Prepared/preserved fish	41373	50420	55260	46575	48114	48823	56712	44911	45764	59332	49728
Total FU Exports	676251	774664	771333	815128	806036	826102	782924	806869	942844	932983	813513

Source: database

Small pelagic species, such as herring, jack and horse mackerel, mackerel and pilchards, account for the majority of Dutch exports. They are mostly exported frozen. Demersal species such as blue whiting, plaice, cod and sole are also export commodities, whilst mussels make up the bulk of mollusc exports. Shrimps account for the main part of crustacean exports, whilst squids are the main cephalopod export.

Table 267: Netherlands - FU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	4012	4697	5530	5333	6472	12657	8570	11708	10478	9264	7872
Diadromous fish	8989	7088	10841	8345	6048	7059	8511	11969	11787	10645	9128
Marine fish, pelagic, tunas	5137	6330	5304	4533	7248	4757	10469	9749	14923	25831	9428
Marine fish, pelagic, small	374055	444645	452581	506031	466600	440892	437313	430595	502513	537832	459306
Marine fish, demersal	128553	145902	159895	136935	151084	168393	151787	140025	163184	164327	151009
Marine fish, others	35961	34837	35801	36095	41743	35188	36159	42331	50120	39616	38785
Crustaceans	31730	32574	30949	39947	40432	48719	45762	53900	65330	63705	45305
Molluscs	82006	91224	64455	73504	75550	87261	73746	93540	100165	63846	80530

Cephalopods	5765	6995	5152	3170	10513	20549	10138	10324	22397	16219	11122
Aquatic animals	43	372	823	1234	345	628	469	2728	1947	1697	1029
Total FU Export	676251	774664	771333	815128	806036	826102	782924	806869	942844	932983	813513

Source: database

Distribution

Specialised fish retailers dominate the domestic market with a 90 percent market segment. Of the specialised retailers, some 57 percent are street traders but they account for only 23 percent of the market. Preserved and frozen fish are often channelled through supermarkets, which represent a market share of 11 percent (FAO, 1999). Facilities and standards within the production and distribution chain are described as state-of-the-art (Trachet, 2000).

Food use net supply and consumption

The market share of seafood has risen but remains relatively small. The largest growth is in the "fresh" range of products such as raw fish, fried fish, smoked products and shrimps. Ready meals are becoming more popular and will gain a bigger market share in the future while mussels are becoming more popular with the development of leak-proof packaging for sales in supermarkets (Trachet, 2000). The Dutch average net supply between 1989 and 1998 was around 230 000 tonnes. Fresh fish is the main commodity consumed in the Netherlands representing 30% of the average net supply. Prepared/preserved commodities (canned fish, fillets coated in batter, fishmeal) come second with 40 000 tonnes and have been increasing during the past decade.

Table 268: Netherlands - FU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	1462	747	476	2323	17767	2090	21751	16354	6166	10623	7976
Crus., mol. & other aquatic inv., prepared	8059	3966	4535	4383	3103	5194	4525	3559	4583	3586	4549
Crustaceans	1267	1625	5250	2102	1174	6845	12746	5558	451	9147	4616
Fish, cured	33094	29992	28094	19157	17901	26945	37576	39644	34373	35255	30203
Fish, fillets	17480	19945	20240	8627	746	13184	38193	37730	32858	40747	22975
Fish, fresh/chilled	32608	71637	76340	79697	77218	73779	71043	51884	66143	53742	65409
Fish, frozen	69850	3787	853	1517	24744	67622	17463	10594	35652	1254	23334
Molluscs	11816	21587	55430	77198	33596	5315	18197	37443	21681	26177	30844
Prepared/preserved fish	30027	28219	26924	31930	32083	43052	38949	55897	52881	56452	39641
Total FU net supply	205663	181504	218142	226936	208332	244026	260444	258664	254786	236982	229548

Source: database

Demersal species, such as plaice, cod and sole form the bulk of the Dutch net supply. The share of small pelagic species (herring, mackerel) has been decreasing.

Table 269: Netherlands - FU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	140	142	231	603	950	41	8591	9366	6625	9439	3613
Diadromous fish	13584	20067	17099	19599	17773	20489	18310	19914	23451	23565	19385
Marine fish, pelagic, tunas	3439	3331	3881	7255	12433	7949	6384	13893	10785	2707	7206
Marine fish, pelagic, small	90070	40260	32043	39950	67199	82492	18820	24255	54588	14373	46405
Marine fish, demersal	51556	60327	65970	53670	42761	90030	122135	104023	95481	90440	77639
Marine fish, others	24270	29453	33228	19851	11574	23581	28984	24298	30977	46925	27314
Crustaceans	1267	1625	5250	2102	1174	6845	12746	5558	451	9147	4616
Molluscs	19390	25335	59335	80967	36688	10428	22315	40286	25778	29683	35020
Cephalopods	1462	747	476	2323	17767	2090	21751	16354	6166	10623	7976
Aquatic animals	485	218	630	615	12	81	408	716	486	80	373
FU net supply	205663	181504	218142	226936	208332	244026	260444	258664	254786	236982	229548

Source: database

The per capita supply is 16 kg on average between 1994 and 1998. However, fish represented only 7 percent of the total animal protein consumed per day in 1997 (FAO, 1999) and the market share of seafood products remains relatively small (Holmyard, 1999).

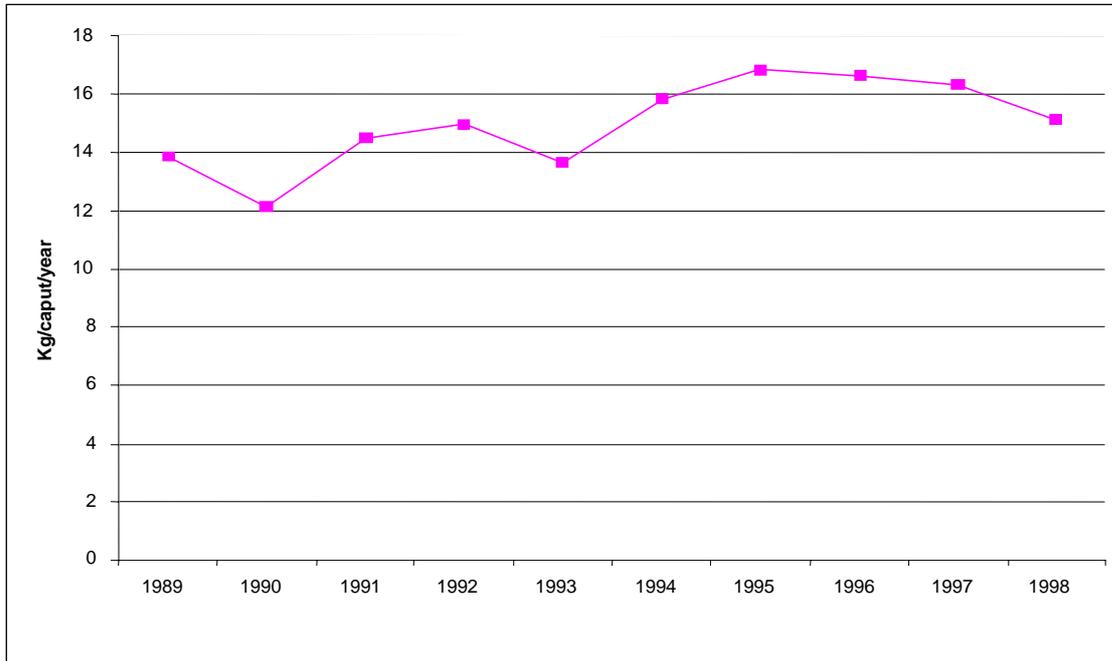


Figure 49: Fish consumption per capita per year in the Netherlands 1989-1998

Traditionally, fish consumption can be split into three: one third of the market is made up of herring products, one third goes to fried fish and the remaining products and species account for 33 percent (Trachet, 2000). Because lunch in the Netherlands is eaten cold with or on bread and dinner is a hot meal, fish is prepared and served in very different ways on these occasions. Fish is also eaten as a snack meal and hot fish snacks are widely available from fish stalls (Holmyard, 1998).

Assumptions for projection 2005-2030

As specified in the methodology section (see Part One of the study), assumptions have been made on the consumption trend of the OECD group of products. Further assumptions are made regarding production, imports and exports and The Netherlands' need for fish in 2005 up to 2030 by taking into account and extrapolating previous trends.

For the Netherlands, main consumption trends for the period 2005-2030 assume:

A large increase of the demand for cephalopods by 100 percent over the period 1998-2030, while fish fillets will increase by 50%. Prepared molluscs consumption will also increase but to a lesser extent (30 percent), whereas fresh molluscs and prepared/preserved commodities consumption will rise by 20%.

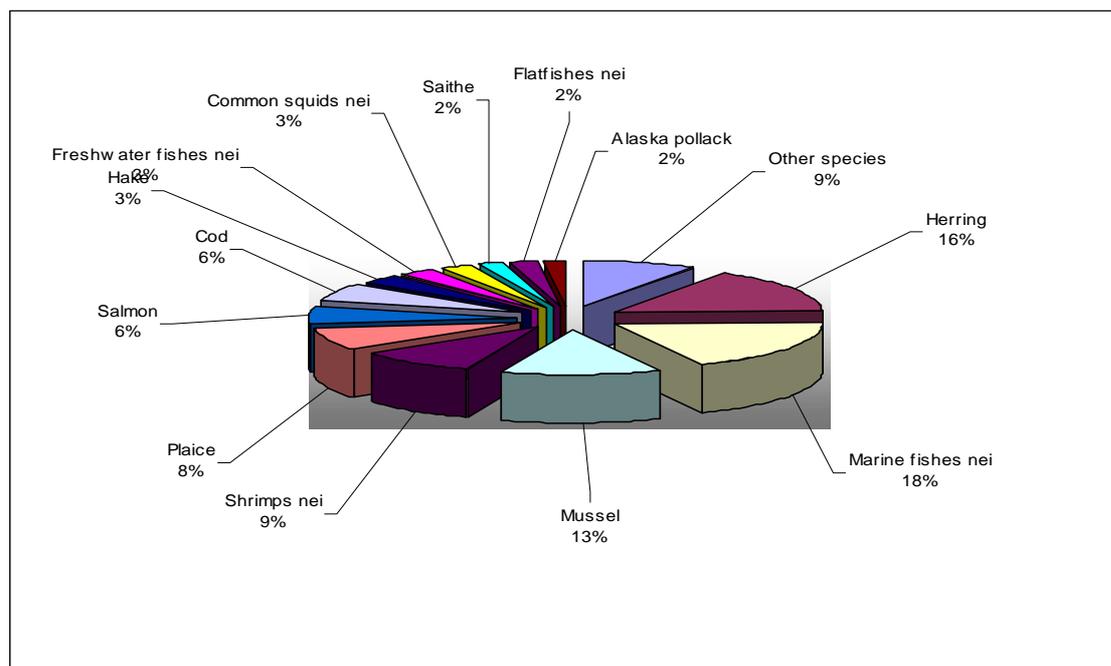


Figure 50: Netherlands - Main species consumed in 1998

The consumption of crustaceans is set to decrease by 50%, while other commodities remain constant.

An increase of 20 percent in the output of prepared/preserved commodities, whilst molluscs and fish fillets will both rise by 10%, mostly to supply the domestic market.

A rise in exports limited to molluscs thanks to the increase in production of this commodity.

A moderate increase in imports of cephalopods (40 percent), and a smaller one of fish fillets (25 percent) and prepared/preserved commodities, as domestic production cannot cope with the increase in demand for these products. The import of crustaceans will decrease due to lower national consumption.

Fish is expected to become even more accepted during the next few years at the expense of meat, and convenience/value added products will gain a bigger market share (Holmyard, 1998).

This increasing popularity of ready meals and convenience products is the main feature of Dutch seafood consumption (Trachet, 2000). These products will gain a bigger market share in order to fit with the increasingly busy lifestyle and the reduction in time spared for meal preparation. This is reflected here by the increased demand for prepared/preserved products and prepared molluscs and crustaceans. Fresh molluscs sales are boosted thanks to the development of leak proof packaging that facilitate sales in supermarkets (Holmyard, 1999).

This trend towards ready meals and food on the move might also be boosted through the Dutch tradition of buying fried fish to eat on the spot as a snack, a tradition that has been reported to be vital and growing (Trachet, 2000).

Table 270: Netherlands - Assumptions for projection

OECD group	94-98% annual %	Prod % 99-30	T Imp % 99-30	T Exp % 99-30	T Cons % 99-30	T Prod % Annual	% Imp Annual	% Exp Annual	Cons % Annual
Cephalopods	118%	24%	40%	0%	100%		1.0%	0.0%	2.2%
Crus., mol. & other aquatic inv., prepared	125%	25%	0%	17%	0%	32%	0.0%	0.5%	0.9%

Gp of commodities	Ave. 94-98	2005	2010	2015	2020	2025	2030
Molluscs	21763	27209	27983	28789	29627	30498	31405
Prepared/preserved fish	49446	58814	60530	62271	64038	65830	67648
Total FU net supply	250981	245747	252299	259105	266173	273515	281140

Source: database

The main species affected by the evolution of the Dutch net supply are shrimps for crustaceans, squid and cuttlefish for cephalopods, and herring and mackerel for small pelagic.

Table 273: Netherlands - FU net supply by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	6812	9883	10215	10559	10915	11284	11667
Diadromous fish	21146	23954	24241	24534	24836	25145	25462
Marine fish, pelagic, tunas	8344	3256	3655	4061	4472	4890	5314
Marine fish, pelagic, small	38906	15260	15907	16564	17233	17912	18603
Marine fish, demersal	100422	93517	95798	98150	100577	103079	105661
Marine fish, others	30953	48068	48907	49765	50644	51543	52464
Crustaceans	6949	8122	7401	6687	5982	5284	4594
Molluscs	25698	30893	31798	32738	33713	34725	35775
Cephalopods	11397	12651	14192	15816	17526	19328	21226
Aquatic animals	354	140	185	230	277	325	373
FU net supply	250981	245747	252299	259105	266173	273515	281140

Source: database

As the Dutch population will grow less (13%) than the net supply (19%) over the period considered, consumption per capita will increase from 15 kg per capita per year in 2005 to 16 kg per capita per year by 2030.

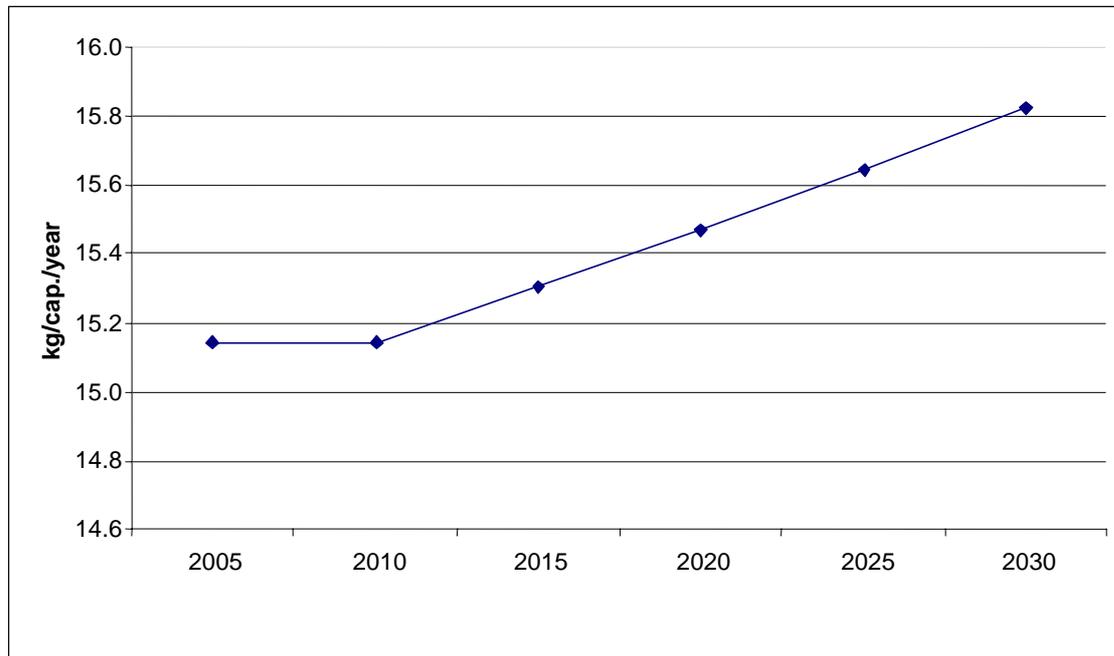


Figure 51: Fish consumption per capita per year in the Netherlands 2005-2030

The main species consumed in 2030 will be the same as in 1998 except that cephalopods (squids) are on the increase, whilst shrimps are decreasing. The share of species (herring, plaice and hake) that have seen their volume remain stable between 1998 and 2030 will diminish slightly.

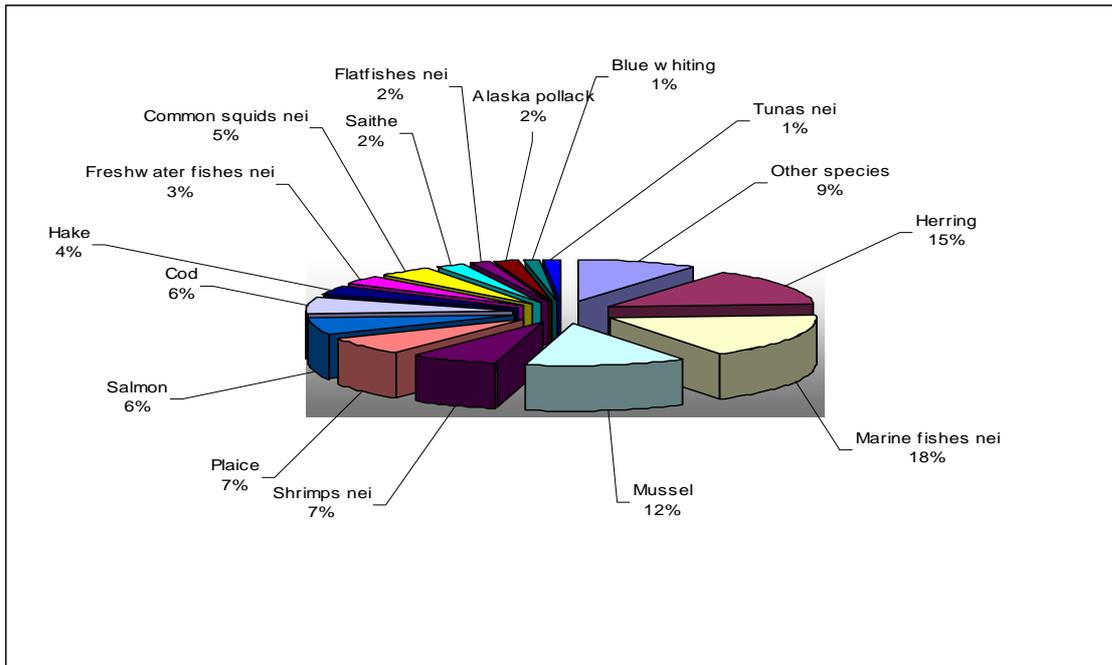


Figure 52: Netherlands - Main species consumed in 2030

Non-Food use net supply and human consumption 2005-2030

No major change in the non-food use net supply is expected. It will remain at its 1998 level of around 100 000 tonnes.

Production 2005-2030

Capture and aquaculture

Aquaculture production will increase to reach 150 000 tonnes by 2030. Mussels will account for 90 percent of the Dutch aquaculture output. Catfish will account for the increase in freshwater species, while eel and rainbow trout will be the diadromous fish produced.

Table 274: Netherlands - Aquaculture by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	1187	2066	2282	2519	2781	3071	3390
Diadromous fish	2307	2908	3198	3523	3885	4287	4732
Marine fish, demersal	17	29	32	35	39	43	47
Molluscs	98773	120532	124170	127934	131829	135862	140040
Total gp of species	102284	125535	129681	134011	138534	143263	148209

Source: database

Total production will reach 600 000 tonnes by 2030, with the increase due to the development of the aquaculture sector. Small pelagic species (horse mackerel, herring and sardine) still account for the majority of Dutch production. Molluscs (mussels and cockles) come second with 170 000 tonnes.

Table 275: Netherlands - Total production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	2034	2913	3129	3366	3628	3918	4237
Diadromous fish	4005	4606	4896	5222	5584	5986	6430
Marine fish, pelagic, tunas	1098	1098	1098	1098	1098	1098	1098
Marine fish, pelagic, small	282613	282613	282613	282613	282613	282613	282613
Marine fish, demersal	103723	103734	103737	103740	103744	103748	103752
Marine fish, others	16034	16034	16034	16034	16034	16034	16034
Crustaceans	12648	12648	12648	12648	12648	12648	12648
Molluscs	131598	153357	156995	160759	164654	168687	172864
Others	50	50	50	50	50	50	50

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Total gp of species	553802	577053	581199	585529	590052	594781	599727

Source: database

Commodities

Dutch commodities production will increase slightly between 1998 and 2030 to reach an output of 600 000 tonnes by the end of the period. Frozen fish remain the main commodity produced with a stable output of 400 000 tonnes. Fish fillets, molluscs and prepare/preserved commodities will all slightly increase their share in the Dutch production, whilst fresh and cured fish outputs remain stable.

Table 276: Netherlands - FU Commodities Production by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Crus., mol. & other aquatic inv., prepared	19902	18790	18790	18790	18790	18790	18790
Crustaceans	10797	7747	7747	7747	7747	7747	7747
Fish, cured	33531	34175	34175	34175	34175	34175	34175
Fish, fillets	37716	31620	32094	32576	33064	33560	34064
Fish, fresh/chilled	5934	4865	4865	4865	4865	4865	4865
Fish, frozen	329797	402412	402412	402412	402412	402412	402412
Molluscs	57903	47489	48861	50273	51726	53220	54758
Prepared/preserved fish	41414	40177	40780	41392	42013	42643	43283
Total FU Production	536994	587275	589724	592230	594792	597413	600095

Source: database

Frozen products are mainly made of small pelagic species, such as jack and horse mackerel, herring and sardines. Utilisation of molluscs, such as mussels, and of some demersal species such as plaice, cod and flounder will increase.

Table 277: Netherlands - FU Commodities Production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Diadromous fish	4409	4448	4448	4448	4448	4448	4448
Marine fish, pelagic, small	323184	395668	396095	396528	396968	397414	397867
Marine fish, demersal	85625	79283	79748	80220	80699	81185	81679
Marine fish, others	35173	33849	34035	34223	34414	34608	34805
Crustaceans	10797	7747	7747	7747	7747	7747	7747
Molluscs	77806	66279	67651	69063	70516	72010	73548
Total FU Production	536994	587275	589724	592230	594792	597413	600095

Source: database

Trade 2005-2030

With regard to trade in The Netherlands over the period 1998 to 2030, this model only examines the influence of consumption on imports and exports. As has been already mentioned (see above), re-exportation is not included. Therefore, changes in imports and exports are only triggered by an increase or a decrease in consumption, or by variations in the level of production. In a country like The Netherlands, that imports two thirds of the raw material it uses in its processing industry, and exports 80% of its production (Anon., 2002a), the trade pattern is more likely to be affected by changes in the international environment than by changes in domestic consumption, but this cannot be reflected in this model.

Imports

Dutch imports will increase slightly to reach 620 000 tonnes by 2030. This increase will mostly be due to a rise in fish fillets, prepared molluscs and prepared/preserved commodities (canned products, fish meat and battered fillets) in response to growing domestic demand for these products. This will be offset by a fall in imports of crustaceans (mostly shrimp).

Table 278: Netherlands - FU Commodities Imports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	27322	28870	30411	32035	33745	35547	37445
Crus., mol. & other aquatic inv., prepared	8302	7255	7431	7610	7794	7982	8175
Crustaceans	51636	64081	63359	62646	61940	61243	60553
Fish, cured	31098	45542	45542	45542	45542	45542	45542
Fish, fillets	56597	70509	73101	75789	78576	81465	84461
Fish, fresh/chilled	119033	102975	102975	102975	102975	102975	102975
Fish, frozen	194053	171211	171211	171211	171211	171211	171211
Molluscs	25150	23867	23867	23867	23867	23867	23867
Prepared/preserved fish	59141	77969	79082	80212	81357	82519	83698
Total FU Imports	572331	592280	596981	601888	607009	612352	617927

Source: database

Species affected by a rise in imports will be salmon for diadromous fish; tuna for large pelagic; sardines and herring for small pelagic; squid and octopus for cephalopods and mussels for molluscs. The only species affected negatively by the evolution of imports are shrimps.

Table 279: Netherlands - FU Commodities Imports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	17348	19148	19479	19823	20179	20548	20931
Diadromous fish	26731	30151	30438	30731	31033	31342	31659
Marine fish, pelagic, tunas	21490	29087	29487	29892	30303	30721	31146
Marine fish, pelagic, small	185550	157424	157644	157868	158097	158330	158568
Marine fish, demersal	172339	178561	180377	182258	184205	186221	188309
Marine fish, others	36463	53835	54488	55158	55846	56551	57275
Crustaceans	51636	64081	63359	62646	61940	61243	60553
Molluscs	31604	29285	29416	29550	29687	29827	29971
Cephalopods	27322	28870	30411	32035	33745	35547	37445
Aquatic animals	1848	1838	1882	1927	1974	2022	2070
Total FU Import	572331	592280	596981	601888	607009	612352	617927

Source: database

Exports

Dutch exports will reach 940 000 tonnes by 2030, due to the limitations of the model (as discussed above), this only reflects the production increase of the Dutch aquaculture industry, and not the influence of international demand. Therefore, only the export of molluscs - namely fresh mussels - is assumed to increase (by around 10 percent to reach 47 000 tonnes by 2030), as this is the only commodity in which there will be a sufficient production surplus to be directed to the export markets. However, Dutch re-exports are likely to increase. Firstly due to the enlargement of the EU which will open new markets, and secondly due to the overall increase in fish consumption throughout the countries of Europe which will benefit the major fish trading nations, of which the Netherlands is one.

Table 280: Netherlands - FU Commodities Exports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	15925	16219	16219	16219	16219	16219	16219
Crus., mol. & other aquatic inv., prepared	23915	22221	22221	22221	22221	22221	22221
Crustaceans	55483	63705	63705	63705	63705	63705	63705
Fish, cured	29870	44463	44463	44463	44463	44463	44463
Fish, fillets	61770	57253	57253	57253	57253	57253	57253
Fish, fresh/chilled	61649	54099	54099	54099	54099	54099	54099
Fish, frozen	497334	572369	572369	572369	572369	572369	572369
Molluscs	61290	44146	44745	45351	45966	46589	47221
Prepared/preserved fish	51108	59332	59332	59332	59332	59332	59332
Total FU Exports	858345	933808	934406	935013	935628	936251	936882

Source: database

Only mussels are affected by the rise in exports, all other species remain at their 1998 level, with small pelagic such as jack and horse mackerel, Atlantic herring and mackerel dominating Dutch exports.

Table 281: Netherlands - FU Commodities Exports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	10535	9264	9264	9264	9264	9264	9264
Diadromous fish	9994	10645	10645	10645	10645	10645	10645
Marine fish, pelagic, tunas	13146	25831	25831	25831	25831	25831	25831
Marine fish, pelagic, small	469829	537832	537832	537832	537832	537832	537832
Marine fish, demersal	157543	164327	164327	164327	164327	164327	164327
Marine fish, others	40683	39616	39616	39616	39616	39616	39616
Crustaceans	55483	63705	63705	63705	63705	63705	63705
Molluscs	83711	64670	65268	65875	66490	67113	67745
Cephalopods	15925	16219	16219	16219	16219	16219	16219
Aquatic animals	1494	1697	1697	1697	1697	1697	1697
Total FU Export	858345	933808	934406	935013	935628	936251	936882

Source: database

PORTUGAL

With a population of approximately 10 million inhabitants and a strong maritime heritage and traditional association with seafood, Portugal is the most important consumer of fishery products in Europe. The national industry has had to adapt to changes in the fishery over the last decade as Portuguese landings of cod and whiting have fallen and the emphasis on imports has increased. The fishing industry still remains important to isolated and rural areas, however, where it performs an important socio-economic function.

Production: captures, aquaculture and commodities 1989-1998

Between 1989 and 1998, total Portuguese production fell from 340 000 tonnes to 240 000 tonnes, a decrease largely due to the diminution of catches from international waters. Portugal has the second smallest market for freshwater species in the EU (the smallest is Luxembourg's), and only 2 000 tonnes were landed in 1995 (Rudiger, 1998). Aquaculture is negligible, and accounts for only 3 percent of the total in 1998.

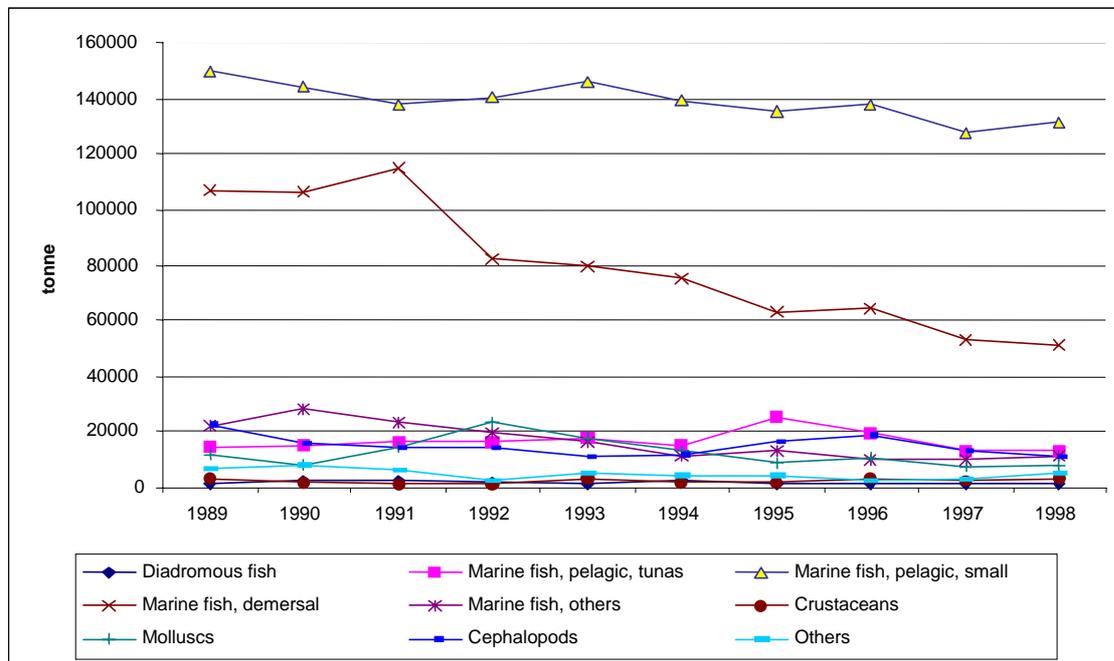


Figure 53: Portugal - Capture and aquaculture production 1989-1998

Captures

Between 1989 and 1998, total catches fell from 330 000 tonnes to 230 000 tonnes, a decrease largely due to a reduction in the catches of the distant water fleet as a consequence of access problems to fishing grounds such as the NAFO zones, amongst others (Anon., 1997a).

Table 282: Portugal - Captures by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Diadromous fish	58	46	40	48	109	139	104	65	58	54	72
Marine fish, pelagic, tunas	14315	15014	16385	16326	17592	15271	25069	19430	12973	13492	16587
Marine fish, pelagic, small	149694	144492	137808	140199	145832	138971	135097	137557	128020	131664	138933
Marine fish, demersal	107093	105977	114873	81830	79609	74454	62424	63330	51879	49254	79072
Marine fish, others	22024	28331	23368	19387	16499	11115	13154	10086	9895	11181	16504
Crustaceans	3293	2080	1364	1298	2905	1808	2180	2871	2453	3264	2352
Molluscs	4734	6010	11230	18934	13848	9245	5786	7787	3387	3608	8457
Cephalopods	22949	15995	14455	14825	11395	12174	16747	19281	13252	11413	15249
Others	6876	8015	6060	2420	4760	4520	4720	2835	2904	4840	4795

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Total gp of species	331036	325960	325583	295267	292549	267697	265281	263242	224821	228770	282021

Source: database

The most important species caught by the Portuguese fleet in 1998 were sardine and horse mackerel, respectively accounting for 40 percent and 8 percent of the total catch. Black scabbard, silver scabbard and chub mackerel all represented around 8 000 tonnes of catches. Inshore vessels, operating a wide range of gears land small amounts of very diverse catches (FAO, 2000)

Aquaculture

Aquaculture production was 8 500 tonnes in 1989, experienced a fall in 1990 due to problems with parasites, and reached 7 500 tonnes in 1998. Although Portugal is not generally associated with aquaculture, and there have been marked fluctuations in production over the past decade, there has been a trend towards increased output, in part as a result of greater sea bass and sea bream production in cages in the south of the country (Lopes, 2000). In fact, Portuguese aquaculture has shown marked evolution since the mid-1980s, when production consisted entirely of extensive bivalve culture in tidal estuaries and the rearing of freshwater trout.

Table 283: Portugal - Aquaculture by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Diadromous fish	1079	2387	2370	1803	1438	2143	958	1338	1250	1264	1603
Marine fish, demersal	24	107	298	377	372	579	764	990	1473	1922	691
Molluscs	7425	2469	3566	4191	4144	3824	3247	3018	4439	4327	4065
Total gp of species	8528	4963	6234	6371	5954	6546	4969	5346	7162	7513	6359

Source : database

Today the production of bivalves has been expanded to other mollusc species such as carpet shells, oysters and cockles and other fish species, the majority of which are comprised of sea bass and sea bream reared in marine cages in the south of the country (FAO, 2000). Whilst carpet shells remain the most significant aquaculture species by far (DG Fish, 1996), there is some inland aquaculture where trout is farmed in the mountainous north of the country (Goulding, 1998). There is also some production of salmon and eels.

Commodities production

Food use commodities production

On average, the main commodities produced in Portugal are prepared/preserved products. They account for 60 percent of total production between 1989 and 1998 and are mostly canned products. The canning sector is the main processing industry in Portugal (Lopes, 2000). Frozen commodities come next with 80 000 tonnes and 30 percent of total production.

Table 284: Portugal - FU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	23376	11536	5899	4864	14059	9966	12316	6301	2376	7611	9830
Crustaceans	1373	1634	746	202	376	164	195	92	242	63	509
Fish, cured	6912	3234	2905	3194	3481	1997	4379	2382	160	127	2877
Fish, frozen	130965	132050	121420	75963	79186	77386	57250	53258	52903	57397	83778
Molluscs	2567	4532	7890	16543	8765	6543	4321	4327	5436	3245	6417
Prepared/preserved fish	145594	134220	120445	176361	165551	156575	167379	164910	158128	150340	153950
Total FU Production	310787	287205	259306	277128	271417	252631	245841	231271	219246	218783	257361

Source: database

The main species involved in the production process are: small pelagic such as European sardine and Atlantic mackerel; large pelagic, namely tuna, and demersal such as Atlantic redfish and cod.

Table 285: Portugal - FU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, tunas	39712	43875	48749	67524	62315	63278	69121	68044	59865	59866	58235
Marine fish, pelagic, small	116055	104813	93603	128806	121618	105739	103792	103116	107438	97873	108286
Marine fish, demersal	113001	98418	76754	46357	33200	40158	40765	37440	31489	30796	54838
Marine fish, others	14703	22397	25664	12832	31084	26783	15330	11950	12399	19329	19247
Crustaceans	1373	1634	746	202	376	164	195	92	242	63	509
Molluscs	2567	4532	7890	16543	8765	6543	4321	4327	5436	3245	6417
Cephalopods	23376	11536	5899	4864	14059	9966	12316	6301	2376	7611	9830
Total FU Production	310787	287205	259306	277128	271417	252631	245841	231271	219246	218783	257361

Source: database

Non-food use commodities production

Non-food use production is limited in Portugal and averaged 28 000 tonnes over the period 1989 to 1998.

Table 286: Portugal - NFU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	10671	7845	13195	15603	10259	7107	8001	6907	6027	4258	8987
Flour, meal unfit for human cons.	20629	20405	17206	25451	25592	21048	20730	19269	16710	9732	19677
Total NFU Production	31300	28250	30401	41053	35851	28155	28730	26176	22737	13990	28664

Source: database

Table 287: Portugal - NFU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	20629	20405	17206	25451	25592	21048	20730	19269	16710	9732	19677
Marine fish, others	10671	7845	13195	15603	10259	7107	8001	6907	6027	4258	8987
Total NFU Production	31300	28250	30401	41053	35851	28155	28730	26176	22737	13990	28664

Source: database

Non-food use: trade and net supply 1989-1998

Only 10 percent of the domestic catches are used for non-human consumption products. Therefore, raw materials for the non-food use industry come mainly from imports.

Non-food use imports

Non-food use imports averaged 13 000 tonnes during the last decade but they have been increasing from their 1989 level of 4 000 tonnes to reach 20 000 tonnes in 1998.

Table 288: Portugal - NFU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	1093	1728	256	859	1165	1568	2900	1458	886	1242	1316
Flour, meal unfit for human cons.	3266	3138	4434	5802	5920	11735	9362	22759	29100	19105	11462
Total NFU Imports	4359	4867	4690	6660	7085	13303	12261	24217	29987	20347	12778

Source: database

Table 289: Portugal - NFU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	2694	3055	4265	5758	5723	9547	7547	7943	15071	12965	7457
Marine fish, others	1665	1812	425	903	1344	2125	3178	14441	13205	5319	4442
Aquatic animals	0	0	0	0	0	1556	1537	1759	1563	2063	848
Aquatic mammals	0	0	0	0	19	74	0	74	149	0	32
Total NFU Import	4359	4867	4690	6660	7085	13303	12261	24217	29987	20347	12778

Source: database

Non-food use exports

As domestic production is quite limited, Portuguese non-food use exports do not represent a significant volume. They amounted to 6 000 tonnes on average between 1989 and 1998.

Table 290: Portugal - NFU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	4882	3685	9018	8196	5991	4085	6648	6080	5847	4863	5930
Flour, meal unfit for human cons.	0	7	55	78	74	166	517	505	2400	717	452
Total NFU Exports	4882	3692	9073	8274	6064	4251	7165	6584	8247	5580	6381

Source: database

Table 291: Portugal - NFU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	0	7	55	78	53	158	510	496	499	647	250
Marine fish, others	4882	3685	9018	8196	5995	4093	6654	6082	7747	4874	6123
Aquatic animals	0	0	0	0	0	0	1	4	0	60	7
Aquatic mammals	0	0	0	0	16	0	0	3	0	0	2
Total NFU Export	4882	3692	9073	8274	6064	4251	7165	6584	8247	5580	6381

Source: database

Non-food use net supply

Non-food use net supply amounted to 35 000 tonnes on average between 1989 and 1998.

Table 292: Portugal - NFU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish/marine mammal, fat, oil	6882	5889	4433	8265	5433	4589	4252	2285	1067	636	4373
Flour, meal unfit for human consumption	23895	23536	21585	31174	31439	32617	29575	41524	43411	28120	30688
Total NFU net supply	30777	29425	26018	39439	36872	37207	33827	43809	44477	28756	35061

Source: database

Table 293: Portugal - NFU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, pelagic, small	23323	23453	21416	31130	31262	30437	27766	26717	31282	22050	26884
Marine fish, others	7454	5972	4602	8309	5607	5139	4525	15266	11484	4703	7306
Aquatic animals	0	0	0	0	0	1556	1535	1755	1563	2003	841
Aquatic mammals	0	0	0	0	3	74	0	71	149	0	30
NFU net supply	30777	29425	26018	39439	36872	37207	33827	43809	44477	28756	35061

Source: database

Market for human consumption**Trade**

Due to the relative weakness of domestic production, 60% of the market is supplied by imports. On average, between 1994 and 1998, exports of aquatic products were 120 000 tonnes whilst imports were 486 000 tonnes. In terms of value, imports and exports amounted to PTE 136 billion and PTE 48 billion respectively (OECD, 2000).

Countries importing Portuguese products are primarily EU member states, in particular the United Kingdom, Spain and Italy. Frozen and canned products (sardines in particular) are the main export.

Portugal's principle suppliers include Norway, from whence significant quantities of cod are imported. After cod, the main import commodities are shrimps, frozen hake and fresh/chilled horse mackerel (Anon., 1997a). Imports of cod, particularly from Norway, increased in the 1990s to compensate for lower local landings, but this trend had the effect of exposing the Portuguese salting and drying processors to oscillations in supply (FAO, 2000). The growth of cod imports is partly a result of the increased demand for dried and canned products by other EU countries, and has helped to offset the fluctuations in the supply of the raw product (DG Fish, 1996).

Finally, although molluscs and crustaceans account for only 7 percent and 10 percent of total catches respectively, Portugal is the second largest importer of bivalves such as groove carpet shells and other clams (Monfort, 1999).

Food use imports

From 1989 to 1998, the main commodity imported by Portugal was frozen fish at a rate of 180 000 tonnes per annum on average. Frozen fish account for 40 percent of the total volume of imports, and provide raw material for the important Portuguese canning industry. Cured fish are the second largest commodity imported by the country, at an average rate of 140 000 tonnes per year, and representing 30 percent of total imports. Cured fish products are largely composed of salted or dried cod, a product traditionally consumed in Portugal.

Table 294: Portugal - FU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	26452	25356	36631	30971	32423	28468	32905	31607	36298	43296	32441
Crus., mol. & other aquatic inv., prepared	1580	2853	3262	2718	2056	1967	2171	2248	2278	2935	2407
Crustaceans	12587	19126	23942	26379	24840	24471	23554	25549	26388	28457	23529
Fish, cured	158425	162887	148073	135922	130613	127194	136661	150026	142077	138710	143059
Fish, fillets	4030	5578	5319	5894	4764	6034	6308	10123	10290	13357	7170
Fish, fresh/chilled	36627	33631	39953	37777	52232	63804	65555	54408	69575	71391	52495
Fish, frozen	115519	160646	186214	174749	173496	176876	184052	210608	185051	192818	176003
Molluscs	1009	1304	1864	2051	3083	3499	3969	5055	6959	6170	3496
Prepared/preserved fish	2589	3297	9464	8621	11317	17528	15633	13669	15319	16208	11365
Total FU Imports	358815	414679	454721	425083	434825	449841	470810	503292	494235	513342	451964

Source: database

In 1998, more than 50 percent of all imports are demersal fish, amongst which, the greatest is Atlantic cod at 170 000 tonnes. The remainder include species such as hake, Atlantic redfish and Pacific cod. Imports of small pelagic fish include jack and horse mackerel, mackerel and sardine, whilst the most common large pelagic species is the Yellowfin tuna. Imported cephalopods include squid, octopus and cuttlefish, whilst the main mollusc species are clams and mussels. Imports of crustaceans are mostly composed of shrimps, and of diadromous fish, salmon is the most common.

Table 295: Portugal - FU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	133	42	150	224	223	276	2262	1555	2149	2998	1001
Diadromous fish	355	547	1485	1419	1260	1346	2159	3075	4110	7624	2338
Marine fish, pelagic, tunas	9603	14718	13484	8078	16809	24239	23050	26916	16276	26090	17926
Marine fish, pelagic, small	66975	77537	65888	48538	54231	57668	62021	49391	78434	73647	63433
Marine fish, demersal	222133	253129	249182	251925	265983	270562	283131	314090	285675	277655	267346
Marine fish, others	17990	20066	58834	52779	33917	37345	35586	43806	35669	44471	38046
Crustaceans	12587	19126	23942	26379	24840	24471	23554	25549	26388	28457	23529
Molluscs	1544	2075	2802	3138	3844	4351	4905	6043	8007	7075	4378
Cephalopods	26452	25356	36631	30971	32423	28468	32905	31607	36298	43296	32441

Aquatic animals	1045	2082	2324	1631	1295	1115	1236	1261	1230	2030	1525
Total FU Import	358815	414679	454721	425083	434825	449841	470810	503292	494235	513342	451964

Source: database

Food use exports

Portuguese food use exports amounted to 110 000 tonnes on average between 1989 and 1998. On average, the main export commodity is frozen products at 40 000 tonnes, but since 1994 prepared products have been the primary Portuguese fish export. This reflects the good health of the Portuguese canning industry.

Table 296: Portugal - FU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	5413	3132	3721	3580	4022	1999	8138	8589	10244	8102	5694
Crus., mol. & other aquatic inv., prepared	57	50	78	72	364	401	282	183	363	185	203
Crustaceans	3105	3193	2688	2585	2093	1887	2652	4314	4881	5197	3259
Fish, cured	4119	3096	1855	1643	1763	2007	2625	3647	6561	2756	3007
Fish, fillets	3985	3103	1513	3435	2980	4618	6295	4468	5975	3018	3939
Fish, fresh/chilled	11321	12732	18540	13585	10785	13186	20399	23387	22490	30230	17665
Fish, frozen	45391	51441	51162	38522	38982	39085	38283	30517	32578	29848	39581
Molluscs	3441	4655	9152	17719	8535	4104	2238	4024	1707	1671	5725
Prepared/preserved fish	12800	13606	16420	14246	37389	40035	48183	36991	37389	42069	29913
Total FU Exports	89631	95007	105128	95388	106913	107323	129095	116119	122187	123076	108987

Source: database

The main species involved in Portuguese exports are: small pelagic such as European sardine and pilchard; Atlantic cod and plaice for demersal; tuna for large pelagic and some cephalopods such as squid.

Table 297: Portugal - FU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	24	35	41	34	25	86	1015	330	511	211	231
Diadromous fish	74	141	82	95	456	363	628	625	555	738	376
Marine fish, pelagic, tunas	5835	6537	12113	9909	16265	12114	19822	19344	12975	12772	12769
Marine fish, pelagic, small	15947	21210	25438	24025	37470	44102	56366	47099	52048	59955	38366
Marine fish, demersal	43293	44696	42324	30171	24844	30687	27082	21065	27949	22686	31480
Marine fish, others	12442	11357	9492	7197	12839	11580	10873	10547	10954	11560	10884
Crustaceans	3105	3193	2688	2585	2093	1887	2652	4314	4881	5197	3259
Molluscs	3494	4699	9192	17756	8583	4152	2346	4089	1727	1736	5778
Cephalopods	5413	3132	3721	3580	4022	1999	8138	8589	10244	8102	5694
Aquatic animals	4	6	37	36	316	353	173	117	343	120	150
Total FU Export	89631	95007	105128	95388	106913	107323	129095	116119	122187	123076	108987

Source: database

Distribution

The distribution of seafood products within Portugal is complex and may flow through auctions at fishing ports or through direct sales to a variety of industry, supermarket and retail clients. Wholesalers represent the major buyers of products, however. Little or no aquaculture products are sold at auction. These are mostly sold directly to retailers, supermarkets or processors under contract. In recent years, with the proliferation of large supermarkets, a new form of distribution has evolved based on direct contracts between Producers Organisations or wholesalers and the supermarket chains themselves (Lopes, 2000).

Food use net supply and consumption

Portugal is the most important consumer of aquatic products in Europe. The net supply in live weight was approximately 600 000 tonnes between 1989 and 1998. Frozen fish is the main commodity of the

net supply but it is mainly directed towards the canning industry for further processing. At 25 percent of the net supply, the second largest commodity is cured fish, represented by traditional products such as dried and salted cod (klipfish), dried cod (stockfish), cod in brine or other species, such as mackerel, smoked. Prepared/preserved products are third with 135 000 tonnes on average.

Table 298: Portugal - FU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	44415	33760	38809	32255	42461	36436	37084	29319	28430	42805	36577
Crus., mol. & other aquatic inv., prepared	1523	2803	3184	2646	1692	1566	1890	2066	1914	2751	2203
Crustaceans	10855	17567	22001	23996	23123	22748	21098	21327	21749	23324	20779
Fish, cured	161218	163025	149123	137473	132331	127184	138415	148760	135676	136081	142929
Fish, fillets	44	2475	3806	2459	1783	1415	13	5654	4315	10339	3230
Fish, fresh/chilled	25306	20899	21412	24192	41447	50617	45156	31022	47086	41161	34830
Fish, frozen	201093	241255	256471	212190	213700	215177	203019	233349	205376	220367	220200
Molluscs	134	1181	603	874	3313	5938	6052	5359	10689	7743	4189
Prepared/preserved fish	135383	123911	113490	170737	139479	134068	134829	141588	136058	124479	135402
Total FU net supply	579971	606877	608899	606822	599330	595149	587556	618444	591294	609050	600339

Source: database

Demersal species (mostly cod, for stock- and klipfish) dominate the net supply, followed by large and small pelagic species (tuna in the first instance, herring and sardine for the canning industry in the second).

Table 299: Portugal - FU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	109	7	109	190	197	190	1247	1225	1638	2786	770
Diadromous fish	281	407	1403	1324	804	983	1531	2450	3554	6886	1962
Marine fish, pelagic, tunas	43481	52056	50120	65693	62859	75402	72350	75615	63165	73185	63393
Marine fish, pelagic, small	167083	161140	134054	153319	138380	119305	109447	105409	133825	111565	133353
Marine fish, demersal	291840	306850	283612	268111	274339	280033	296814	330465	289215	285765	290704
Marine fish, others	20251	31106	75006	58414	52162	52548	40044	45210	37114	52240	46409
Crustaceans	10855	17567	22001	23996	23123	22748	21098	21327	21749	23324	20779
Molluscs	617	1907	1499	1925	4027	6742	6880	6281	11716	8584	5018
Cephalopods	44415	33760	38809	32255	42461	36436	37084	29319	28430	42805	36577
Aquatic animals	1040	2077	2287	1595	979	762	1063	1144	887	1910	1374
FU net supply	579971	606877	608899	606822	599330	595149	587556	618444	591294	609050	600339

Source: database

In 1998, consumption per capita was around 61 kg and fishery products represented about 14 percent of consumer's expenditure on foodstuffs whilst they providing 23 percent of the population's supply of animal protein (FAO, 2000).

Salted products represent by far the most significant share of consumed products (46 percent of total consumption), followed by fresh and refrigerated products and frozen products. The structure of consumption of fishery products shows unequivocally the preference of the Portuguese for dry and salted cod. Consumption levels of fresh and refrigerated products appear stable (DG Fish, 1996).

With regards to freshwater species, Portugal has one of the lowest rates of domestic consumption in the EU. In 1995 the per capita consumption of freshwater species was only 280 grams per capita per year (Rudiger, 1998).

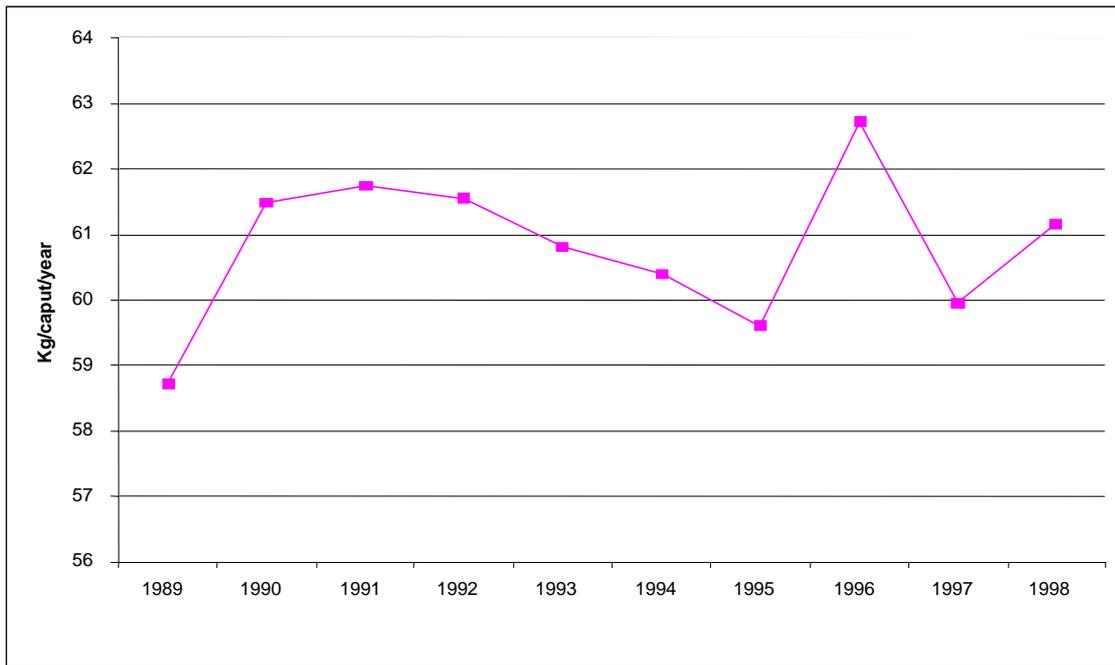


Figure 54: Fish consumption per capita per year in Portugal 1989-1998

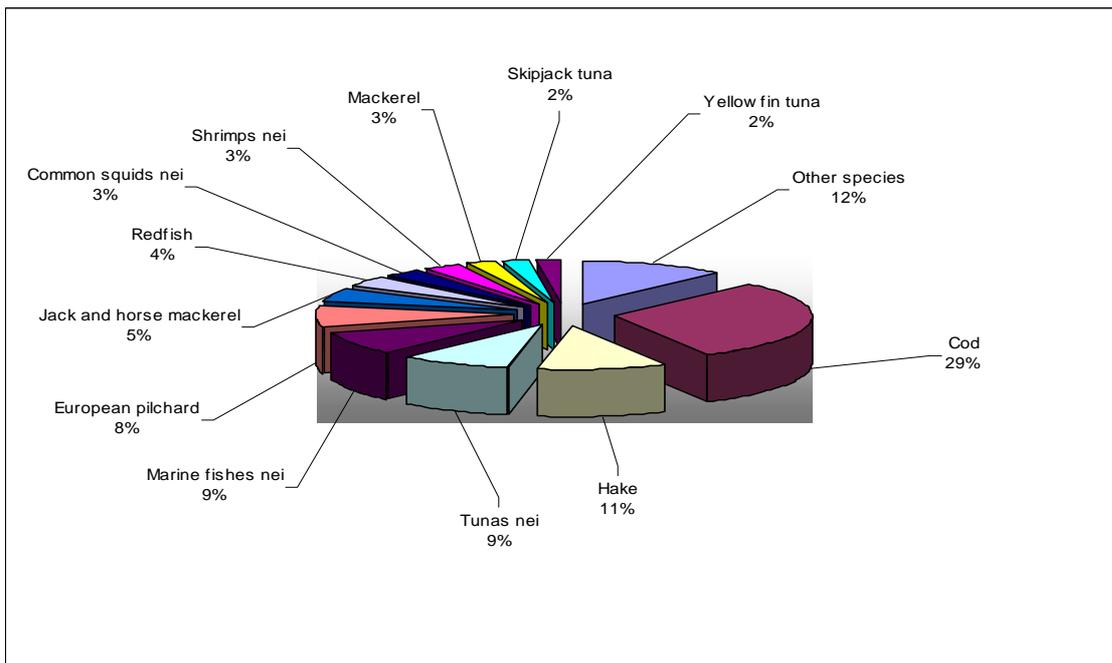


Figure 55: Portugal - Main species consumed in 1998

Assumptions for projection 2005-2030 and main results

As specified in the methodology section (see Part One of the study), assumptions have been made on the consumption trend of the OECD group of products. Further assumptions are made regarding production, imports and exports and Portugal's need for fish between 2005 and 2030 by taking into account and extrapolating previous trends.

For Portugal, main consumption trends for the period 2005-2030 assume:

Nature	Average 94-98	2005	2010	2015	2020	2025	2030
Production total (t live wt)	256269	256689	256589	256762	257151	257719	258451

Source: database

Food use net supply and human consumption 2005-2030

Portuguese food use net supply will slowly increase from its 1998 level of around 610 000 tonnes to reach a mere 616 000 tonnes by 2030. As commodities production is not expected to grow, the increased domestic demand will be fuelled by imports only, and the pattern of the net supply will therefore be very similar to the one of imports. Molluscs will experience the biggest rise whilst fish fillets, cephalopods and prepared molluscs and aquatic invertebrates (such as sea cucumber) will also increase, but more slowly.

Table 302: Portugal - FU net supply by OECD group of commodities 2005-2030 (tonne live weight)

Gp of commodities	Ave. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	34815	43717	44380	45054	45737	46431	47135
Crus., mol. & other aquatic inv., prepared	2037	2806	2847	2888	2930	2972	3015
Crustaceans	22049	23324	23324	23324	23324	23324	23324
Fish, cured	137223	136081	136081	136081	136081	136081	136081
Fish, fillets	4347	11337	12095	12893	13733	14617	15548
Fish, fresh/chilled	43008	38739	37059	35421	33822	32262	30741
Fish, frozen	215458	220367	220367	220367	220367	220367	220367
Molluscs	7156	8941	9936	11066	12348	13803	15456
Prepared/preserved fish	134204	124479	124479	124479	124479	124479	124479
Total FU net supply	600298	609791	610568	611572	612820	614336	616144

Source: database

Demersal fish (cod) still represent the bulk of the species consumed in Portugal, followed by small pelagic such as herring, sardine and mackerel, while the share of molluscs (mussels) is increasing.

Table 303: Portugal - FU net supply by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	1417	2813	2835	2859	2886	2915	2948
Diadromous fish	3081	6691	6558	6428	6302	6180	6061
Marine fish, pelagic, tunas	71943	73189	73193	73198	73203	73208	73214
Marine fish, pelagic, small	115910	110106	109094	108108	107146	106208	105294
Marine fish, demersal	296458	286256	286652	287087	287564	288082	288646
Marine fish, others	45431	51947	51749	51561	51382	51213	51053
Crustaceans	22049	23324	23324	23324	23324	23324	23324
Molluscs	8040	9799	10806	11949	13244	14712	16377
Cephalopods	34815	43717	44380	45054	45737	46431	47135
Aquatic animals	1153	1949	1977	2005	2034	2063	2093
FU net supply	600298	609791	610568	611572	612820	614336	616144

Source: database

As the net supply will grow less (1 percent) during the period considered than the population (8 percent), the apparent consumption per capita will decrease from 61 kg per capita per year in 1998 to 57 kg per capita per year in 2030. Changing consumption habits and the high prices commanded by seafood products will be the two main factors affecting Portuguese consumption. Portuguese people will increasingly turn towards easy to cook food and less expensive products such as poultry (Ramos, 2002).

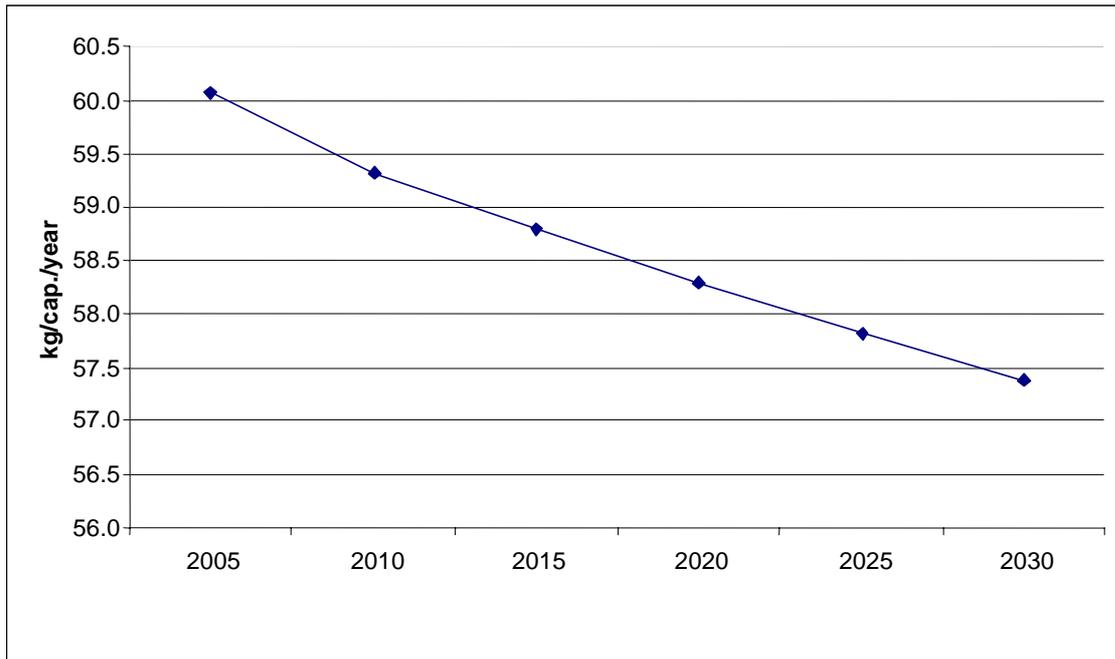


Figure 56: Fish consumption per capita per year in Portugal 2005-2030

Cod still dominates consumption in Portugal and increases its share by a point, while the share of small pelagic species such as pilchards and jack and horse mackerel decrease slightly.

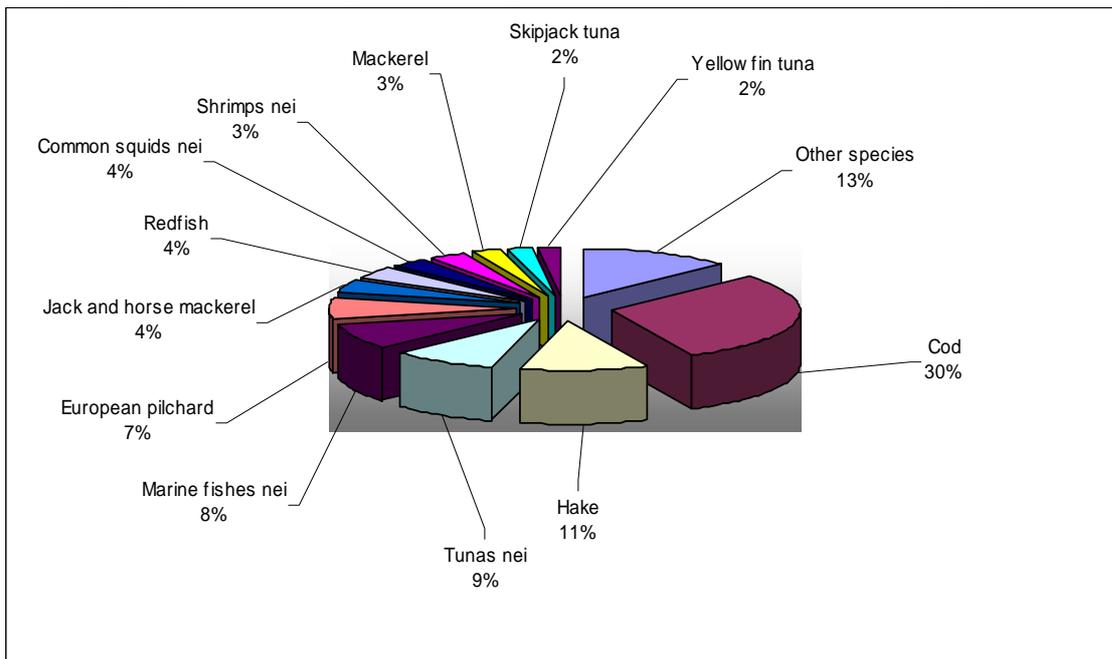


Figure 57: Portugal - Main species consumed in 2030

Non-Food use net supply 2005-2030

No significant changes are expected in the non-food use sector until 2030. Net supply will stay at its 1998 level of about 30 000 tonnes.

Production 2005-2030

Capture and aquaculture

The new legal framework for agriculture set up in 2000 simplifies and expedites the application and decision making procedures for setting up, exploiting and transferring marine aquaculture and similar facilities and to ensure environmental compatibility with sectoral legislation. Additionally, in 2001 other innovative development measures to promote sea fish farming were introduced by the Portuguese government (OECD, 2003). All this creates a favourable environment for the future development of the aquaculture sector in Portugal that will see its production increase to 8 500 tonnes by 2030. The increase in output in diadromous fish and demersal species will be offset by a decrease in the production of molluscs. This will be due to a reduction in output of grooved carpet shell and common edible cockle due to eutrophication and problems with diseases. The industry was already experiencing these problems in the late 1990's (OECD, 2003).

Table 304: Portugal - Aquaculture by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Diadromous fish	1391	1510	1717	1954	2227	2542	2909
Marine fish, demersal	1146	2208	2438	2691	2971	3281	3622
Molluscs	3771	3009	2472	2155	1990	1934	1957
Total gp of species	6307	6727	6627	6800	7188	7757	8488

Source: database

Total production will increase due to the increase of aquaculture production. Species on the increase are rainbow trout and eel for diadromous species, sea bass and sea bream for demersal. As for molluscs, Pacific cupped oyster and blue mussel are on the rise while grooved carpet shell and common edible cockle are decreasing.

Table 305: Portugal - Total production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Diadromous fish	1475	1594	1801	2038	2311	2626	2993
Marine fish, pelagic, tunas	17247	17247	17247	17247	17247	17247	17247
Marine fish, pelagic, small	134262	134262	134262	134262	134262	134262	134262
Marine fish, demersal	61414	62476	62706	62959	63240	63549	63890
Marine fish, others	11086	11086	11086	11086	11086	11086	11086
Crustaceans	2515	2515	2515	2515	2515	2515	2515
Molluscs	9734	8972	8435	8118	7953	7897	7920
Cephalopods	14573	14573	14573	14573	14573	14573	14573
Others	3964	3964	3964	3964	3964	3964	3964
Total gp of species	256269	256689	256589	256762	257151	257719	258451

Source: database

Commodities

The Portuguese canning industry, a major player of the processing sector, was reported to be suffering due to competition problems, sourcing of raw material and structural issues by the beginning of the century (OECD, 2003). Also, the salting and drying industry, another important Portuguese industry, rely completely on cod for its production, a species whose availability has been declining during the past decade and whose supply is subject to political and legal measures managing fishing-grounds. These are often located in waters under the jurisdiction of a third party country or international organisation such as NAFO, which leaves Portuguese producers with little control over their raw material supply. In addition, substituting other species is practically impossible because it would require the re-educating of a consumer taste deeply rooted in centuries of Portuguese gastronomic culture (Guillotreau and Le Grel, 2001), which leaves the salting and drying industry with an uncertain future.

Assumptions are that the Portuguese food use commodities production will stagnate between 2005 and 2030, as the industry will not be able to overcome these problems. Production will remain at its 1998 level of 220 000 tonnes.

Trade 2005-2030

Imports

Food use commodities imports will rise slightly to reach 520 000 tonnes by 2030. The rise in imports of molluscs will be the most significant with a more than 100 percent increase from their level of 1998. Imports of fillets and prepared crustaceans (mostly prepared shrimps) will also increase but at a much slower pace. Still these increases will not be significant enough to change the overall pattern of Portuguese imports, with frozen and cured fish remaining the two main imported commodities. Among cured fish, dried salted cod was reported to account for 62 percent of total imports in value terms in 2001 (OECD, 2003).

Cod (fresh, chilled or salted), the main Portuguese import, is now subject to a reduced rate of 3 percent import levy under the new provision of the common organisation of the market for fishery and aquaculture products (OECD, 2003), but that will not be enough to significantly increase imports of this species that sees its biomass reducing everywhere.

Table 306: Portugal - FU Commodities Imports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	34515	44208	44872	45545	46228	46922	47626
Crus., mol. & other aquatic inv., prepared	2320	2991	3032	3073	3114	3157	3199
Crustaceans	25684	28457	28457	28457	28457	28457	28457
Fish, cured	138933	138710	138710	138710	138710	138710	138710
Fish, fillets	9222	14355	15112	15910	16751	17635	18566
Fish, fresh/chilled	64947	68969	67290	65651	64052	62493	60971
Fish, frozen	189881	192818	192818	192818	192818	192818	192818
Molluscs	5130	7367	8362	9492	10774	12230	13882
Prepared/preserved fish	15672	16208	16208	16208	16208	16208	16208
Total FU Imports	486304	514084	514861	515864	517113	518629	520437

Source: database

Main species affected by the rise in imports will be mussels for molluscs; herring for small pelagic; cod, Greenland halibut, redfish for demersal and shrimps for crustaceans.

Table 307: Portugal - FU Commodities Imports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	1848	3024	3046	3070	3097	3126	3159
Diadromous fish	3663	7430	7296	7166	7040	6918	6799
Marine fish, pelagic, tunas	23314	26095	26099	26103	26108	26113	26119
Marine fish, pelagic, small	64232	72188	71176	70190	69229	68291	67376
Marine fish, demersal	286223	278146	278542	278977	279454	279972	280536
Marine fish, others	39376	44178	43980	43791	43613	43443	43284
Crustaceans	25684	28457	28457	28457	28457	28457	28457
Molluscs	6076	8290	9297	10440	11735	13203	14869
Cephalopods	34515	44208	44872	45545	46228	46922	47626
Aquatic animals	1374	2068	2096	2125	2154	2183	2213
Total FU Import	486304	514084	514861	515864	517113	518629	520437

Source: database

Exports

Food use commodities exports will not increase on the period 1998 and 2030, and will remain at around 120 000 tonnes a year.

SPAIN

Spain is 85 percent surrounded by the sea and the country is historically associated with fishing and the preparation of seafood. This heritage has led to the development of a huge and very important fisheries sector, both in terms of its fishing fleet, which is one of the largest in Europe, and as one of the largest markets for fish and seafood in the world. The Spanish fishing fleet has traditionally operated in distant waters and harvested a wide range of species. Recently imposed constraints on these vessels have resulted in the rise of a modern and productive aquaculture sub-sector, providing huge volumes of product for the global markets and helping to improve the country's balance of trade in seafood. The fishing port and auction at Vigo handles more food fish than any other port in the world and together with large national levels of imports and recent modernisation of processing and distribution chains, this production has ensured an extended period of increased domestic consumption since the 1970s.

Production: captures, aquaculture and commodities 1989-1998

The Spanish production of fishery products was 1.4 Mt in 1998 and has fallen since 1989 when the recorded volume was 1.5 millions. Despite greater controls, a decline in the size of the fishing fleet, as operators have relocated their activities, and reduced access to some third country fishing grounds, production has remained quite stable over the last twenty years at about 1 Mt. Aquaculture has increased significantly and accounted for about 20 percent of the total production in 1998. During the last decade the share of production from aquaculture has increased and in part compensated for the reduction in captures.

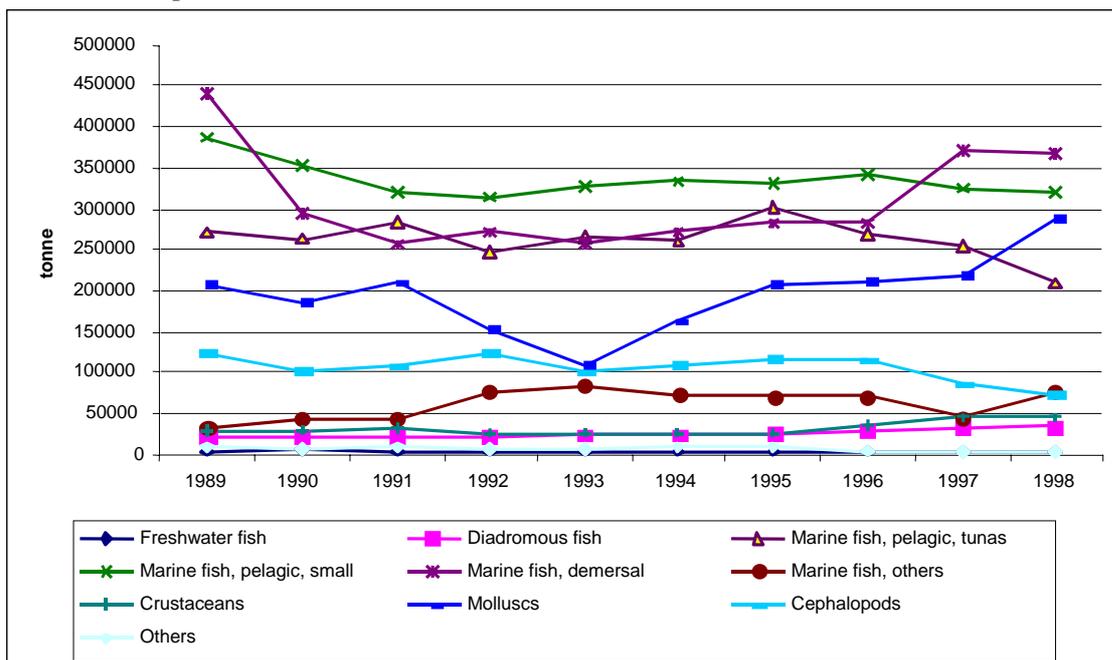


Figure 58: Spain - Capture and aquaculture production 1989-1998

Captures

The Spanish fleet has traditionally operated in distant waters. Access arrangements to EU and non-EU waters have slowly been consolidated since the CFP was initiated. The total captures were 1.1 Mt in 1998 but this volume represents a reduction since the 1.3 Mt in 1989, mainly due to the restructuring of the fleet. Small pelagic fish, such as sardine, mackerel and anchovy, represent 30 percent on average of total Spanish captures, but lost their lead position in recent years to demersal species (blue

whiting, hake, cod), which on average account for 25 percent of fisheries production. Large pelagic fish come next with a 20 percent share. They are mostly made of different species of tuna (skipjack, yellowfin, bigeye, albacore, Northern bluefin) and swordfish.

Table 308: Spain - Captures by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	4074	5389	4827	4856	4439	3981	3944	4000	4000	4000	4351
Diadromous fish	2993	3032	2516	2479	2474	2109	2240	2296	2306	2301	2475
Marine fish, pelagic, tunas	272123	262689	284114	248538	263966	260303	300995	268367	253677	210146	262492
Marine fish, pelagic, small	386644	352663	321492	314856	326916	333563	332129	341927	324126	320383	335470
Marine fish, demersal	439556	294616	254778	267033	254888	267340	276946	275489	365782	360153	305658
Marine fish, others	32255	42745	43631	74276	83978	73048	69819	69646	45471	75794	61066
Crustaceans	28041	29596	31556	24905	25522	24643	26419	35654	45409	45102	31685
Molluscs	7173	4855	7345	8575	7656	10687	11059	13683	16806	15441	10328
Cephalopods	124557	103540	107013	124592	100530	108866	117654	115128	84931	72660	105947
Others	8893	7119	7705	7304	7305	7737	7709	3412	2621	3063	6287
Total gp of species	1306309	1106244	1064977	1077414	1077674	1092277	1148914	1129602	1145129	1109043	1125758

Source: database

Aquaculture

The volume of aquaculture increased from 220 000 tonnes in 1989 to 310 000 tonnes in 1998. Spanish production is dominated in quantity by the traditional shellfish farming (mussels and other shellfish) whose production reached more than 200 000 tonnes in 1997. Mussel cultivation developed significantly in Spain where the use of floating rafts in the river mouths of Galicia has expanded spectacularly. These initiatives have been so significant that they nowadays form a central component to the social and economic development plans in many areas (FAO, 1997). Spanish blue mussels production accounted for over half of global production in 1990.

Table 309: Spain - Aquaculture by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	463	350	396	403	400	400	163	160	215	168	312
Diadromous fish	18216	18485	18651	19370	20426	21092	22909	25975	30186	31245	22656
Marine fish, pelagic, small	59	118	56	108	110	144	114	125	170	142	115
Marine fish, demersal	651	1243	1999	3453	3935	4267	5366	6723	6298	7850	4179
Crustaceans	102	201	92	153	185	159	168	227	295	185	177
Molluscs	200334	180434	201509	145223	101047	151867	195224	198325	201941	273895	184980
Total gp of species	219825	200831	222703	168710	126103	177929	223944	231535	239105	313485	212417

Source: database

In recent years, however, technical constraints and outbreaks of disease have encouraged diversification within the industry (Robinson and Pascoe, 1998). Production of sea bream and turbot has been rising and taking a more significant share of total markets over the last decade. It is believed that aquaculture still has a strong potential for development and it is hoped that mussel and trout production, for instance, could reach nearly 400 000 tonnes and 40 000 tonnes, respectively (CFCE, 1999). The aquaculture industry in Spain has absorbed some of the employment losses resulting from fleet restructuring and it is expected that it will help to satisfy an important share of total demand in the future, particularly of prime-quality products (FAO, 1997).

With respect to freshwater fish aquaculture, the industry is dominated by trout farming, which produced nearly 25 000 tonnes in 1997 (CFCE, 1999).

Commodities production

Food use commodities production

Spain produced on average 1.2 Mt of food use commodities during the period 1989/1998. With around 40 percent of the output, frozen fish was on average the main commodity of the Spanish processing industry. However, frozen fish production has been declining from around 600 000 tonnes in 1989 to 350 000 tonnes in 1998. In second place, with around 300 000 tonnes on average, come

prepared/preserved commodities, followed by cephalopods with nearly 200 000 tonnes a year between 1989 and 1998.

Table 310: Spain - FU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	200591	143285	133510	159954	198669	179244	234433	217015	220502	253192	194039
Crus., mol. & other aquatic inv., prepared	30245	26412	45293	22305	26014	34690	42093	58438	44858	46221	37657
Crustaceans	39942	32737	31620	41508	52527	28015	28485	34231	39169	36756	36499
Fish, cured	67139	52460	70051	52426	29231	31015	36787	41124	46872	45636	47274
Fish, fillets	65723	36137	28532	21333	25451	24133	15311	24794	26501	31990	29991
Fish, fresh/chilled	47394	43147	30955	28197	26217	2784	3553	5045	4441	6694	19843
Fish, frozen	582102	500741	496550	521781	501042	485520	484645	433976	419849	348853	477506
Molluscs	27182	26054	27389	61735	43161	44380	46150	49644	51541	53439	43067
Prepared/preserved fish	215168	210773	205035	170998	222616	357601	381930	374992	373740	443855	295671
Total FU Production	1275485	1071744	1068934	1080237	1124928	1187383	1273386	1239259	1227474	1266636	1181546

Source: database

Large pelagic fish dominate the Spanish processing industry, representing 30 percent of the output. They include species such as tunas (skipjack, yellowfin, bigeye, albacore, Northern bluefin) and swordfish. In second place with 20 percent come small pelagic fish, mainly European sardines, mackerel and anchovies. Cephalopods are next at around 15 percent and are mostly composed of squid, cuttlefish and octopus. Demersal species represent only 13 percent of commodities production and are mostly made of cod, skates, sharks and hake.

Table 311: Spain - FU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Diadromous fish	70	32	101	108	1365	3985	4454	6418	7081	8269	3188
Marine fish, pelagic, tunas	395342	372424	345119	312357	337221	332624	376464	346525	377421	376295	357179
Marine fish, pelagic, small	180733	186793	231773	225645	197420	248335	244891	228834	226421	225180	219603
Marine fish, demersal	317285	207434	172065	134401	129547	127903	110750	114302	120037	115944	154967
Marine fish, others	84094	76574	82065	122224	139005	188207	185667	183853	140443	151340	135347
Crustaceans	39942	32737	31620	41508	52527	28015	28485	34231	39169	36756	36499
Molluscs	56759	52416	72589	83886	69026	78931	87875	107573	95877	98478	80341
Cephalopods	200591	143285	133510	159954	198669	179244	234433	217015	220502	253192	194039
Aquatic animals	667	50	93	154	150	139	368	509	523	1182	383
Total FU Production	1275485	1071744	1068934	1080237	1124928	1187383	1273386	1239259	1227474	1266636	1181546

Source: database

Non-food use commodities production

Spanish non-food use commodities production dropped in the middle of the nineties but has recovered in recent years, to return to its average level of output of around 160 000 tonnes.

Table 312: Spain - NFU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	7424	11633	6950	12891	28052	22191	14018	27088	24575	28117	18294
Flour, meal unfit for human cons.	243225	223698	211796	154227	50796	60633	85427	94791	132186	127775	138455
Total NFU Production	250649	235331	218746	167118	78848	82824	99444	121878	156761	155892	156749

Source: database

Table 313: Spain - NFU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	243225	223698	211796	154227	50796	53175	32361	52367	58042	64299	114399
Marine fish, others	7424	11633	6950	12891	28052	29649	67083	69511	98719	91593	42351
Total NFU Production	250649	235331	218746	167118	78848	82824	99444	121878	156761	155892	156749

Source: database

Non-food use: trade and net supply 1989-1998

Around 10 percent of domestic catches are used for non-human consumption products. The remainder of raw material has to be imported. Between 1989 and 1998, the average volume of imports was 100 000 tonnes, while exports amounted to 45 000 tonnes.

Non-food use imports

Exports have increased from their 1989 level of 60 000 tonnes to reach 130 000 tonnes in 1998, but have stabilized around this level in recent years.

Table 314: Spain - NFU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	32593	27919	22068	12929	19347	36354	50631	43210	47217	53742	34601
Flour, meal unfit for human cons.	26603	23742	34564	35839	63860	100508	78396	81072	117706	76167	63846
Total NFU Imports	59196	51661	56632	48767	83207	136861	129027	124282	164922	129909	98446

Source: database

Table 315: Spain - NFU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	22333	23675	33685	34996	62444	93559	72683	74593	111697	73254	60292
Marine fish, others	36863	27986	22947	13772	20763	38243	52872	46229	50643	55255	36557
Aquatic animals	0	0	0	0	0	5059	3472	3460	2582	1400	1597
Total NFU Import	59196	51661	56632	48767	83207	136861	129027	124282	164922	129909	98446

Source: database

Non-food use exports

Spanish non-food use commodities exports have been fairly constant on the period considered, remaining around their average level of 45 000 tonnes.

Table 316: Spain - NFU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	11361	20157	9658	17081	19396	14461	10086	20513	15734	10087	14853
Flour, meal unfit for human cons.	33829	28260	38960	34977	22618	30304	19266	36310	30170	34308	30900
Total NFU Exports	45190	48417	48617	52058	42013	44765	29352	56823	45904	44395	45753

Source: database

Table 317: Spain - NFU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	26502	28133	38712	34847	22462	24614	12145	24605	12778	18008	24281
Marine fish, others	18688	20284	9905	17212	19552	20120	17131	32059	32560	26382	21389
Aquatic animals	0	0	0	0	0	30	75	160	566	4	83
Aquatic mammals	0	0	0	0	0	0	0	0	0	0	0
Total NFU Export	45190	48417	48617	52058	42013	44765	29352	56823	45904	44395	45753

Source: database

Non-food use net supply

With around 200 000 tonnes consumed on average between 1989 and 1998, Spain is one of the major consumers of non-food use products in Europe. Its domestic production covers around 75 percent of its needs, the rest being supplemented through imports, a share of which are re-exported.

Table 318: Spain - NFU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish/marine mammal, fat, oil	28656	19395	19360	8738	28004	44084	54562	49785	56059	71773	38042
Flour, meal unfit for human consumption	236000	219180	207401	155089	92039	130836	144557	139552	219721	169634	171401
Total NFU net supply	264656	238575	226761	163827	120042	174920	199119	189337	275779	241407	209442

Source: database

Table 319: Spain - NFU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, pelagic, small	239056	219240	206769	154376	90779	122120	92899	102355	156961	119544	150410
Marine fish, others	25599	19335	19992	9451	29264	47772	102824	83682	116802	120465	57519
Aquatic animals	0	0	0	0	0	5029	3396	3300	2016	1397	1514
Aquatic mammals	0	0	0	0	0	0	0	0	0	0	0
NFU net supply	264656	238575	226761	163827	120042	174920	199119	189337	275779	241407	209442

Source: database

Market for human consumption

Trade

The commercial potential of the Spanish fishing industry has not yet been fully realised and the future economic performance of the sector is expected to remain strong or to increase (Molina, 1997). Imports were around 1 Mt on average between 1989 and 1998. The main suppliers of Spain are Argentina, Morocco and France. Exports amounted to 540 000 tonnes between 1989 and 1998. Portugal, Italy and France were the principal destinations of these exports. In terms of value, imports amounted to ESP 460 billion while exports were worth ESP 220 billion in 1997 (OECD, 2000).

Food use imports

Frozen fish represent on average a third of Spanish food use commodities imports and are mostly used as raw material for the Spanish processing industry. Second come fresh fish with 180 000 tonnes and a share of nearly 20 percent of imports, mostly to compensate for the deficient domestic production of these commodities. Cephalopods and crustaceans come next with respectively 160 000 tonnes and 110 000 tonnes average between 1989 and 1998.

Table 320: Spain - FU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	134864	130529	152912	128891	140967	150067	162787	179054	225456	219835	162536
Crus., mol. & other aquatic inv., prepared	23560	27237	23545	25687	16242	18112	22419	28044	30831	23170	23885
Crustaceans	72650	98923	112182	117342	106943	135352	100274	121667	117927	129797	111306
Fish, cured	38095	48424	48410	48199	41006	44109	42463	54199	53695	47136	46574
Fish, fillets	29961	42873	53926	60479	57334	69713	70468	100631	92492	103996	68187
Fish, fresh/chilled	123713	163798	163817	181373	160512	195514	172330	217744	214791	205368	179896
Fish, frozen	211150	316879	325369	214651	259509	240356	237387	278924	318750	361654	276463
Molluscs	28568	32430	41260	50992	94626	35282	37354	44678	38118	38148	44145
Prepared/preserved fish	11234	20257	25930	34678	30875	34911	41986	50172	52001	47556	34960
Total FU Imports	673796	881349	947350	862292	908014	923416	887468	1075112	1144060	1176660	947952

Source: database

The main species imported into Spain are: salmon for diadromous fish; tunas (yellowfin, albacore, skipjack and others) and swordfish for large pelagic species; anchovies and sardines for small pelagic species; Cape and Argentinian hake, cod and redfish for demersal species; shrimps and prawns for crustaceans; mussels and scallops for molluscs; squid, cuttlefish and octopus for cephalopods.

Table 321: Spain - FU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	545	1919	3586	3837	2971	4348	4310	10735	3009	3725	3899
Diadromous fish	12825	18703	23433	24990	22804	21361	21855	27488	28980	26915	22935
Marine fish, pelagic, tunas	61394	130341	119322	74617	83539	79904	86052	112163	120719	150932	101898
Marine fish, pelagic, small	116371	146499	135772	100254	80767	100900	94234	119246	133056	153028	118013
Marine fish, demersal	161879	211793	247870	238082	266382	293591	282642	340526	351140	328258	272216
Marine fish, others	61139	82976	87468	97600	92774	84499	75541	91512	94825	102853	87119
Crustaceans	72650	98923	112182	117342	106943	135352	100274	121667	117927	129797	111306
Molluscs	48568	55370	61769	72978	106766	48844	51208	57944	49655	50012	60311

Cephalopods	134864	130529	152912	128891	140967	150067	162787	179054	225456	219835	162536
Aquatic animals	3560	4297	3036	3700	4102	4550	8564	14778	19293	11305	7718
Total FU Import	673796	881349	947350	862292	908014	923416	887468	1075112	1144060	1176660	947952

Source: database

Food use exports

Frozen fish exports come first among Spanish exported commodities with 240 000 tonnes on average between 1989 and 1998. In second place are cephalopods with 100 000 tonnes. Fresh fish and prepared/preserved are next with 65 000 and 50 000 tonnes respectively.

Table 322: Spain - FU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	63090	67158	90755	94296	103877	105673	108497	138015	114931	129318	101561
Crus., mol. & other aquatic inv., prepared	16229	13926	14591	17147	17446	16757	20044	24111	22077	23312	18564
Crustaceans	3097	3532	3813	6050	13482	9317	10194	16208	13830	15718	9524
Fish, cured	13571	19761	19064	8146	11119	10077	10847	13215	13730	12256	13179
Fish, fillets	12688	9438	7743	7752	15544	14210	17357	30911	29463	30039	17514
Fish, fresh/chilled	48009	54596	55669	44155	55025	62214	73113	94672	87093	83280	65783
Fish, frozen	205991	187029	188864	121997	181096	239733	255754	269001	382848	396862	242917
Molluscs	33587	22327	24752	25429	23320	20045	27022	31491	32094	32892	27296
Prepared/preserved fish	27822	19435	24009	21661	32596	39804	56551	75242	83356	100121	48060
Total FU Exports	424085	397202	429262	346632	453506	517828	579379	692867	779422	823799	544398

Source: database

Regarding species, large pelagic fish dominate exports with 130 000 tonnes average but small pelagic species are second with only 10 000 tonnes less. The main pelagic species are tunas (yellowfin, bluefin, skipjack), swordfish, pilchards and jack and horse mackerel. Next come cephalopods with 100 000 tonnes and represented by squid, cuttlefish and octopus. The main exported demersal species are sharks and hake.

Table 323: Spain - FU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	58	443	168	403	892	463	462	354	692	561	450
Diadromous fish	1016	1828	1783	1357	2510	3794	4605	10633	9491	9285	4630
Marine fish, pelagic, tunas	77840	88605	128619	71782	94335	139722	158089	160446	203799	166715	128995
Marine fish, pelagic, small	125307	94168	69480	39133	91844	101714	100878	121186	184443	269235	119739
Marine fish, demersal	61340	63660	55606	47109	77732	88375	102518	126797	115981	121188	86031
Marine fish, others	42520	41556	39695	43925	28066	31969	47071	63626	82084	55574	47609
Crustaceans	3097	3532	3813	6050	13482	9317	10194	16208	13830	15718	9524
Molluscs	48977	35601	38689	41912	37054	32502	40340	48424	47553	48071	41912
Cephalopods	63090	67158	90755	94296	103877	105673	108497	138015	114931	129318	101561
Aquatic animals	839	652	655	664	3712	4299	6725	7178	6618	8133	3947
Total FU Export	424085	397202	429262	346632	453506	517828	579379	692867	779422	823799	544398

Source: database

Distribution

Changes in distribution have accelerated during recent years and have contributed to a decline in the number of traditional fishmongers through increased competition and profitability. However, in 1997 the traditional fish retailers still accounted for the majority of fish sales (CFCE, 1999), despite the increase in the number of supermarkets and hypermarkets, as these small outlets have managed to maintain a foothold in the market by providing a specialist service.

There are essentially three quite distinct chains of distribution representing, in turn, the flow of raw material to processors, the distribution of raw fish and the distribution of frozen products (Foreign Trade and Seafood Prices: Implications for the CFP, 1997). The distribution chain is well organised in Spain with most fresh product flowing from first sale auction or through a huge wholesaling

organisation called Mercasa (Robinson & Pascoe, 1999). The wholesale mercasas are new, large markets that have quickly become established and now dictate 50 percent of the flow of fresh fish within Spain, as the supply of local product and first hand sales has declined and small-scale auctions have become less significant. Increased imports and total volumes of handled product have been possible through general modernisation including improved quality and adherence to hygiene directives and standardisation measures.

Food use net supply and consumption

Spain has a strong tradition of consumption of fishery products and is the second largest consumer per capita in the EU. Between 1989 and 1998 net supply was approximately 1.6 Mt. The major commodity consumed in Spain is frozen fish with 500 000 tonnes on average annually. But Spain's share has been decreasing over the last decade and is mainly directed for further processing. Prepared/preserved products come second and have been increasing from 200 000 tonnes in 1989 to nearly 400 000 tonnes in 1998, where they appear to have stabilised. Cephalopods remain among the favourite species in Spain with 250 000 tonnes consumed yearly between 1989 and 1998. Crustaceans and fresh fish come next with 140 000 and 130 000 tonnes respectively.

Table 324: Spain - NFU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	272365	206656	195666	194549	235759	223638	288723	258054	331027	343708	255015
Crus., mol. & other aquatic inv., prepared	37576	39723	54247	30844	24810	36046	44468	62371	53612	46078	42978
Crustaceans	109495	128127	139989	152800	145989	154051	118564	139690	143266	150835	138281
Fish, cured	91663	81123	99397	92479	59117	65047	68403	82108	86837	80516	80669
Fish, fillets	82995	69572	74714	74061	67241	79636	68422	94514	89531	105948	80663
Fish, fresh/chilled	123098	152349	139103	165415	131705	136084	102770	128117	132138	128783	133956
Fish, frozen	587261	630591	633055	614434	579455	486143	466278	443899	355751	313646	511051
Molluscs	22163	36157	43896	87298	114467	59617	56482	62831	57565	58695	59917
Prepared/preserved fish	198580	211594	206955	184016	220895	352709	367366	349922	342384	391289	282571
Total FU net supply	1525196	1555891	1587023	1595897	1579437	1592971	1581475	1621504	1592111	1619497	1585100

Source: database

Demersal fish and large pelagic species dominate with each representing around 20 percent of the net supply. Cephalopods come next with 255 000 tonnes, followed by crustaceans with 140 000 tonnes. The most important species are: yellowfin, bigeye and skipjack tuna for large pelagic fish; anchovy and sardine for small pelagic fish, hake and cod for demersal; cuttlefish and squid for cephalopods; and mussels for molluscs.

Table 325: Spain - NFU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	487	1476	3418	3434	2079	3885	3849	10381	2317	3165	3449
Diadromous fish	11880	16907	21751	23740	21659	21551	21704	23272	26570	25898	21493
Marine fish, pelagic, tunas	378896	414161	335822	315192	326424	272805	304428	298242	294341	360513	330082
Marine fish, pelagic, small	171798	239124	298065	286766	186342	247521	238246	226893	175034	108973	217876
Marine fish, demersal	417824	355567	364330	325374	318197	333118	290874	328030	355195	323014	341152
Marine fish, others	102713	117994	129838	175899	203712	240737	214138	211739	153184	198618	174857
Crustaceans	109495	128127	139989	152800	145989	154051	118564	139690	143266	150835	138281
Molluscs	56350	72185	95669	114951	138738	95274	98743	117093	97979	100419	98740
Cephalopods	272365	206656	195666	194549	235759	223638	288723	258054	331027	343708	255015
Aquatic animals	3389	3695	2474	3191	539	390	2207	8109	13198	4354	4154
FU net supply	1525196	1555891	1587023	1595897	1579437	1592971	1581475	1621504	1592111	1619497	1585100

Source: database

Consumption per capita was on average 41 kg between 1994 and 1998. Fishery products represented a significant share of the household expense with nearly 12 percent of the total food expenditure in 1997 (Papageorgiou and Girard, 2000). Fish also represented approximately 18 percent of the daily consumption of animal proteins in 1997 (FAO, 1999).

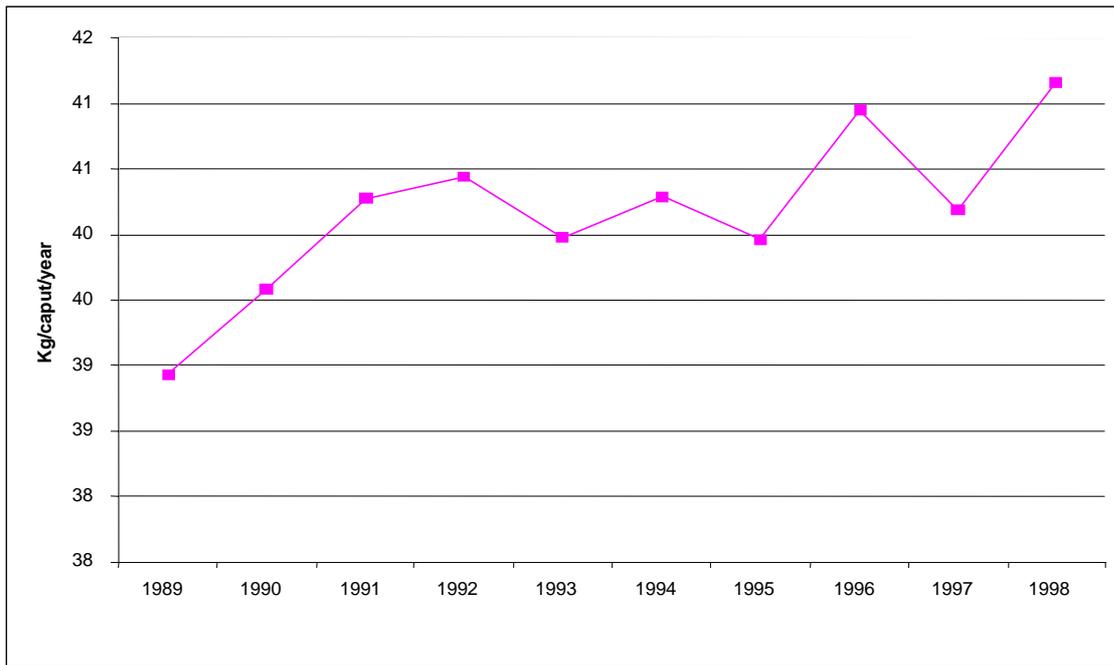


Figure 59: Fish consumption per capita per year in Spain 1989-1998

The market for fresh fish is dominated by certain species such as hake, megrim, monkfish, sea bream and blue fish. Other very important species are langoustine, shrimp, lobster, octopus, squid, cuttlefish and mussels. In 1997, one observed a relative stability of the market of fresh fish whereas the market of frozen fish had lost 20 percent during the previous four years. In contrast, the canned products industry presented an increase in activity, due in particular to the strong growth of tuna exports. The market for surimi was in full boom and in 1998 was the primary European market with 21 000 tonnes. The market for processed products remained modest but was increasing (CFCE, 1999).

In 1997, most consumption of aquatic products occurred mainly at home. However consumption outside the home was developing more and more, in particular for frozen products (Papageorgiou, Girard 2000). Although the traditional specialist suppliers of fresh products still remained popular, there was some increased demand for more modern convenience products (Robinson & Pascoe, 1998). This was reflected in the fact that although the share of the domestic market represented by frozen products was decreasing, the overall sales of pre-cooked and convenience products was increasing by between 5-10 percent per year (Urch, 1998). Projections based on anticipated social, economic and demographic changes within Spain suggested that the demand for these types of products would continue to expand in the future (Manrique & Jensen, 1998) and the processing industry was already attempting to produce and supply new forms of products to new customers like the catering trade (Larrieu, 1998).

In addition, it is interesting to note that differences in consumption patterns exist between the regions (CFCE, 1999). Although the continuous demand for high quality fish, together with limits to its supply, have maintained the high cost of seafood to Spanish consumers, there is little sign that the market for fish products is shrinking. In fact, the modernisation of the import sector and related processing and distribution chains has evolved to meet this continued domestic demand.

Finally, the popularity of freshwater species in Spain is generally low, with only 700 grams per capita consumed in 1995 (Rudiger, 1998).

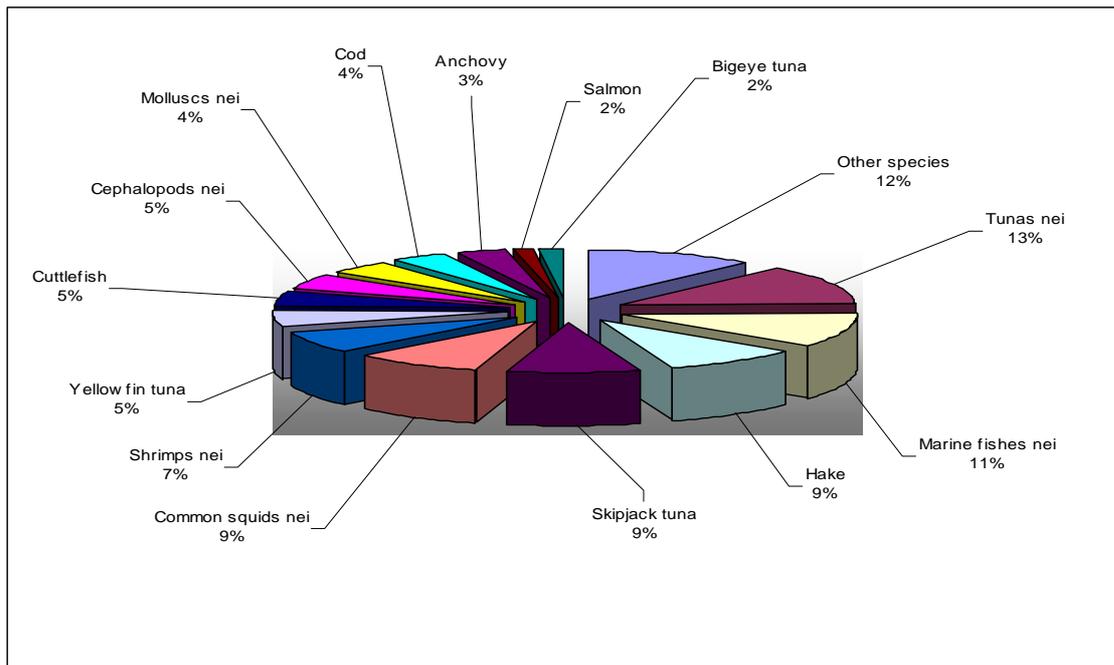


Figure 60: Spain - Main species consumed in 1998

Assumptions for projection 2005-2030 and main results

As specified in the methodology section (see Part1 of the study), assumptions were made regarding the consumption trends of the OECD group of products. Further assumptions were made regarding production, imports and exports and Spain's need for fish in 2005 up to 2030 by taking into account and extrapolating previous trends.

For Spain, the main consumption trends for the period 2005-2030 assume:

An increase of the demand for molluscs by 25 percent during the period 1998-2030, while cephalopods, prepared molluscs, cured fish, fish fillets and prepared preserved products all increase by 10%.

An important decrease in frozen fish consumption by 50%.

The other commodities remain constant.

The increase in prepared commodities at the expense of unelaborated products such as fresh fish or frozen fish reflect the trend at the end of the nineties where time spared for meal preparation decreased due to several sociological reasons: increase in the number of women working outside the home and weakening of the "fish culture" and fish consumption among young people (in households where the wife is 60 years old or older consumption of fish is twice the level of households where the wife is less than 30 years old) (CFCE, 1999). The overall sales of pre-cooked and convenience products were reported to be increasing by 5-10 percent annually in the middle of the last decade (Urch, 1998).

Still, this trend towards convenience products is not sufficient to offset the declining trend of more traditional products (fresh and frozen fish) affected by rising prices due mostly to supply problems (Pazos, 2002) and Spanish consumption per capita will be decreasing over the projection period.

Table 326: Spain - Assumptions for projection

OECD group	94-98% annual %	Prod % 99-30	T Imp % 99-30	T Exp % 99-30	T Cons % 99-30	T Prod Annual	% Imp Annual	% Exp Annual	Cons % Annual	
Cephalopods	41%	8%	0%	15%	0%	10%	0.0%	0.4%	0.0%	0.3%
Crus., mol. & other aquatic inv., prepared	23%	5%	0%	20%	0%	10%	0.0%	0.6%	0.0%	0.3%
Crustaceans	-2%	0%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Fish, cured	20%	4%	0%	17%	0%	10%	0.0%	0.5%	0.0%	0.3%
Fish, fillets	28%	6%	0%	10%	0%	10%	0.0%	0.3%	0.0%	0.3%
Fish, fresh/chilled	-4%	-1%	5%	0%	0%	0%	0.2%	0.0%	0.0%	0.0%
Fish, frozen	-53%	-11%	0%	-74%	0%	-50%	0.0%	-1.7%	0.0%	-1.3%
Molluscs	-6%	-1%	20%	10%	0%	25%	0.6%	0.3%	0.0%	0.7%
Prepared/preserved fish	3%	1%	5%	37%	0%	10%	0.2%	1.0%	0.0%	0.3%
Fish/marine mammal, fat, oil	39%	8%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%
Flour, meal unfit for hum. Cons.	21%	4%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%

Food use commodities imports will decrease slightly under the influence of the decline of the major Spanish fish imports, namely frozen fish. Still, imports of some commodities will increase, but not sufficiently to offset the declining trend. Food use production will go up slightly thanks to an increase in molluscs production. Aquaculture production will rise, while exports will remain stable. The Spanish net supply will have a downward trend. The non-food use sector will not experience any major change from the period 1998/1998.

Table 327: Spain - Main results for projection

Nature	Average 94-98	2005	2010	2015	2020	2025	2030
Exports FU (t live wt)	678659	823799	823799	823799	823799	823799	823799
Imports FU (t live wt)	1041343	1150508	1135216	1122518	1112234	1104200	1098268
Production FU (t live wt)	1238827	1273644	1278736	1283901	1289141	1294457	1299851
Fish supply FU (t live wt)	1601512	1600354	1590153	1582621	1577577	1574859	1574320
Population (X1000)	39533	39941	40372	40339	40307	40275	40242
Per caput supply (kg/h)	41	40	39	39	39	39	39
Production NFU (t live wt)	123360	155892	155892	155892	155892	155892	155892
Imports NFU (t live wt)	137000	129909	129909	129909	129909	129909	129909
Exports NFU (t live wt)	44248	44395	44395	44395	44395	44395	44395
Net supply NFU (t live wt)	216112	241407	241407	241407	241407	241407	241407
Aquaculture (t live wt)	237200	327221	337830	349086	361017	373693	387222
Capture (t live wt)	1124993	1124993	1124993	1124993	1124993	1124993	1124993
Production total (t live wt)	1362193	1452214	1462823	1474079	1486011	1498687	1512215

Source: database

Food use net supply 2005-2030

Net supply of food use commodities will decrease in Spain on the period 1998/2030 for various structural reasons. First, supply is getting increasingly limited in a context of overall dwindling resources, which drives seafood prices up and causes demand to contract (Pazos, 2002). Second, domestic demand diminishes due to the loss of traditional culinary practices, where fish held an important role, and to the reduced amount of time available for preparing meals, as Spanish women increasingly pursue professional careers (CFCE, 1999).

This decrease in consumption will mostly be felt within frozen fish commodities, which cannot be offset by the increase in consumption of nearly all other commodities, such as cured fish, prepared and preserved products, molluscs, cephalopods and crustaceans. The seafood sector experiences an evolution similar to the meat market, with a decrease in demand for less elaborated commodities, such as fresh or frozen products, while interest for transformed products increases (CFCE, 1999). This trend also reflects a change towards higher quality products while quantity consumed diminishes. Whereas volume of the net supply decreases, its value is increasing.

Table 328: Spain - NFU net supply by OECD group of commodities 2005-2030 (tonne live weight)

Gp of commodities	Ave. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	289030	350533	355537	360652	365880	371223	376684
Crus., mol. & other aquatic inv., prepared	48515	47021	47718	48435	49172	49931	50712
Crustaceans	141281	150835	150835	150835	150835	150835	150835
Fish, cured	76582	82163	83375	84616	85889	87193	88529
Fish, fillets	87610	108139	109732	111349	112990	114656	116347
Fish, fresh/chilled	125578	128855	128906	128959	129011	129064	129118
Fish, frozen	413143	271694	244743	220063	197464	176770	157821
Molluscs	59038	61673	63864	66111	68414	70776	73197
Prepared/preserved fish	360734	399442	405444	411602	417922	424411	431078
Total FU net supply	1601512	1600354	1590153	1582621	1577577	1574859	1574320

Source: database

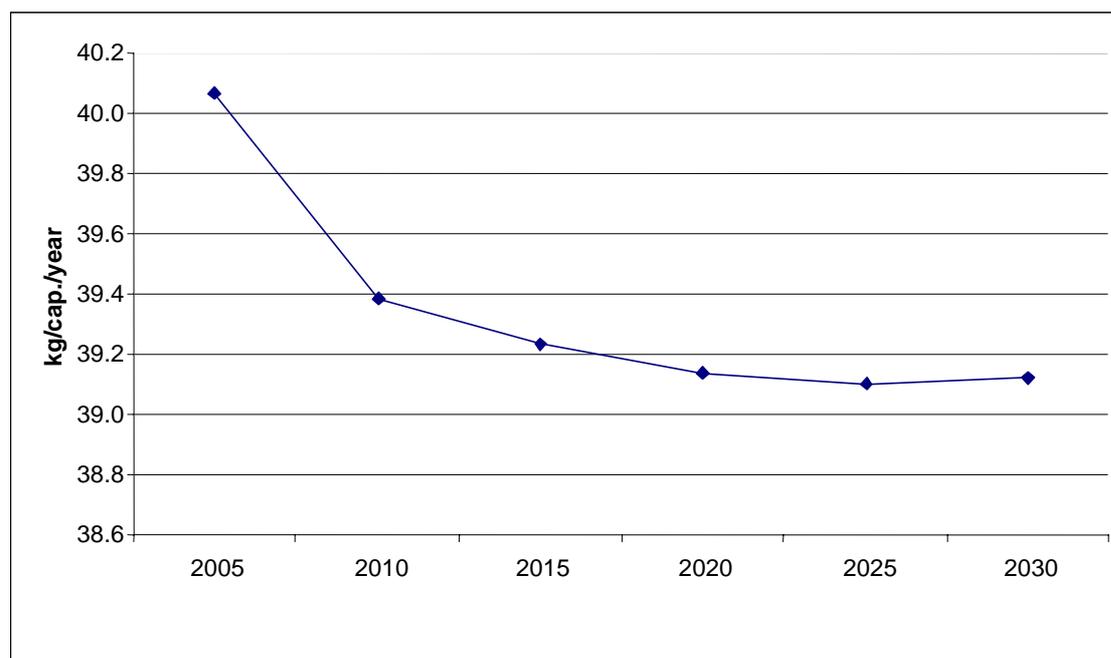
As frozen products are to be found under all groups of fish species (pelagic large and small, demersal, diadromous) they are all decreasing over the period 1998/2030.

Table 329: Spain - NFU net supply by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	4719	3179	3192	3205	3219	3235	3251
Diadromous fish	23799	25613	25436	25281	25145	25026	24925
Marine fish, pelagic, tunas	306066	350033	343655	338122	333367	329334	325967
Marine fish, pelagic, small	199334	99985	94341	89285	84769	80751	77192
Marine fish, demersal	326046	312756	306429	300860	295991	291767	288137
Marine fish, others	203683	198727	199146	199836	200785	201982	203420
Crustaceans	141281	150835	150835	150835	150835	150835	150835
Molluscs	101902	103880	106428	109042	111723	114473	117294
Cephalopods	289030	350533	355537	360652	365880	371223	376684
Aquatic animals	5651	4814	5154	5504	5864	6234	6615
FU net supply	1601512	1600354	1590153	1582621	1577577	1574859	1574320

Source: database

As the net supply is decreasing (-3 percent) and population will be rising by 2 percent over the period considered, Spanish consumption per capita will decrease from 40 kg to 39 kg per capita per year by 2030.

**Figure 61: Annual fish consumption per capita in Spain 2005-2030**

As the diminution in frozen fish consumption affects pelagic species as well as demersal ones, the relative shares of the different species remain more or less as they were in 1998. Molluscs increase slightly, while tuna (yellowfin and skipjack) seem are a bit more affected by the diminution of imports than other species.

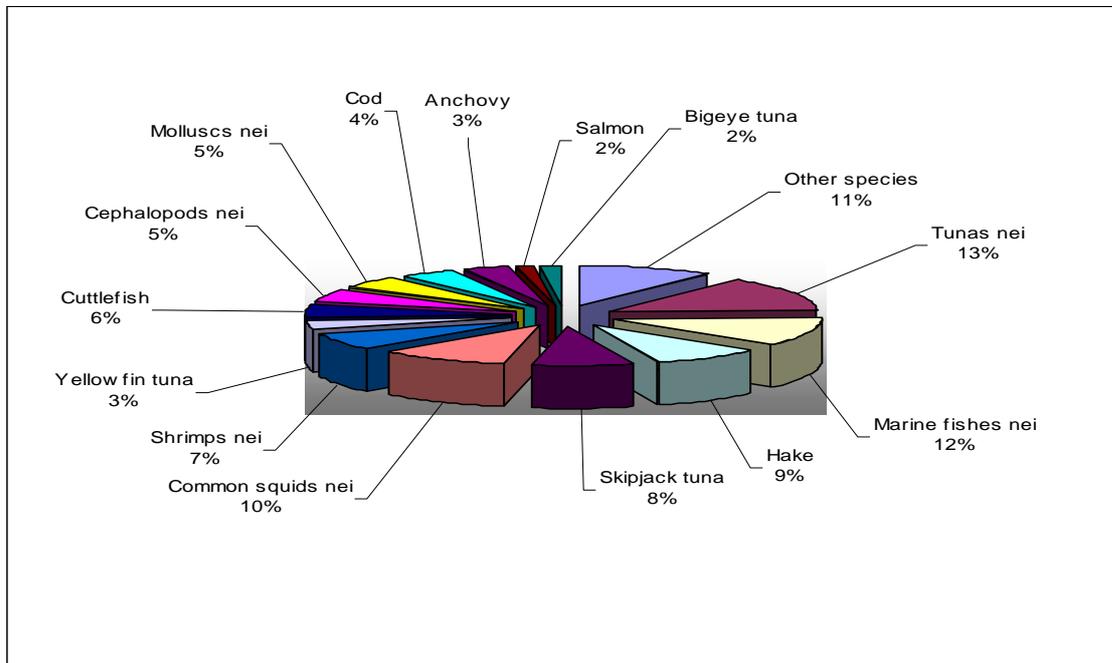


Figure 62: Spain - Main species consumed in 2030

Non-Food use net supply and human consumption 2005-2030

Non-food use net supply will remain constant at its 1998 level of around 240 000 tonnes.

Production 2005-2030

Capture and aquaculture

The Spanish coast offers excellent opportunities for aquaculture and its development is being pushed ahead by the Government, while the establishment of new, modern processing plants is encouraged (Anon., 2001). MAPA (Spanish Food, Fisheries and Agriculture Ministry) estimates that total aquaculture production can progress up to 800 000 tonnes with mussel culture accounting for 400 000 tonnes (CFCE, 1999).

In our assumptions however, aquaculture production will rise from 310 000 tonnes in 1998 to reach 390 000 tonnes by 2030. Freshwater fish production (mostly tench) will be the only sector to decrease. Demersal (sea bass, sea bream, turbot) and diadromous production (rainbow trout) will both have experienced a 50 percent rise by 2030. Molluscs production (blue mussel, common edible cockle) will rise more slowly with a 20 percent increase.

Table 330: Spain - Aquaculture production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	221	117	91	70	54	42	33
Diadromous fish	26281	33594	35384	37272	39266	41371	43594
Marine fish, pelagic, small	139	256	390	594	905	1379	2100
Marine fish, demersal	6101	9019	9960	10999	12146	13414	14814
Crustaceans	207	198	213	232	254	280	308
Molluscs	204250	284037	291793	299918	308392	317208	326373
Total gp of species	237200	327221	337830	349086	361017	373693	387222

Source: database

Capture production will remain stable, so the only species affected by the increase in production are the cultivated species mentioned above.

Table 331: Spain - Total production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	4206	4102	4076	4055	4039	4027	4018
Diadromous fish	28532	35845	37634	39523	41517	43622	45845
Marine fish, pelagic, tunas	258698	258698	258698	258698	258698	258698	258698
Marine fish, pelagic, small	330565	330682	330816	331020	331331	331804	332526
Marine fish, demersal	315243	318161	319102	320141	321288	322556	323956
Marine fish, others	66756	66756	66756	66756	66756	66756	66756
Crustaceans	35652	35643	35658	35677	35700	35725	35753
Molluscs	217786	297572	305328	313453	321927	330743	339908
Cephalopods	99848	99848	99848	99848	99848	99848	99848
Others	4909	4909	4909	4909	4909	4909	4909
Total gp of species	1362193	1452214	1462823	1474079	1486011	1498687	1512215

Source: database

Commodities

Food use commodities production will increase slightly to reach 1.3 Mt by 2030. The major part of this increase will be due to an increased production of molluscs commodities. Fresh fish and prepared/preserved products also increase but more slowly, the latter continuing its position as the top-ranked commodity produced in Spain, with around 470 000 tonnes in 2030. In order to become less dependent on market fluctuations and to ensure stable raw material supply, larger enterprises are aiming to expand their basic business, and integration between contracted fishing vessels, aquaculture facilities and processing facilities is more and more common (Anon., 2001).

Table 332: Spain - FU Commodities Production by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	220877	253192	253192	253192	253192	253192	253192
Crus., mol. & other aquatic inv., prepared	45260	46221	46221	46221	46221	46221	46221
Crustaceans	33331	36756	36756	36756	36756	36756	36756
Fish, cured	40287	45636	45636	45636	45636	45636	45636
Fish, fillets	24546	31990	31990	31990	31990	31990	31990
Fish, fresh/chilled	4503	6766	6818	6870	6922	6975	7029
Fish, frozen	434569	348853	348853	348853	348853	348853	348853
Molluscs	49031	55614	57221	58874	60576	62326	64127
Prepared/preserved fish	386424	448617	452050	455510	458996	462508	466047
Total FU Production	1238827	1273644	1278736	1283901	1289141	1294457	1299851

Source: database

Species affected by an increase in production are: tunas for large pelagic species; sardine and anchovies for small pelagic species; and mussels for molluscs.

Table 333: Spain - FU Commodities Production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Diadromous fish	6041	8270	8271	8272	8273	8274	8275
Marine fish, pelagic, tunas	361866	379307	381477	383665	385869	388090	390328
Marine fish, pelagic, small	234732	225912	226440	226972	227507	228047	228591
Marine fish, demersal	117787	115944	115944	115944	115944	115944	115944
Marine fish, others	169902	152430	153215	154007	154804	155608	156418
Crustaceans	33331	36756	36756	36756	36756	36756	36756
Molluscs	93747	100652	102259	103913	105614	107365	109166
Cephalopods	220877	253192	253192	253192	253192	253192	253192
Aquatic animals	544	1182	1182	1182	1182	1182	1182
Total FU Production	1238827	1273644	1278736	1283901	1289141	1294457	1299851

Source: database

Trade 2005-2030

Imports

Food use commodities imports will decrease between 1998 and 2030 to reach 1.1 million at the end of the period. Imports of frozen fish will decrease by 75 percent on the period, and are considered to reach 205 000 tonnes by 2030. At the same time, imports of prepared/preserved fish, fish fillets and molluscs will increase, reflecting the trend in demand towards higher value products. After 2030, fresh fish will overtake frozen fish to become the top-ranked commodity imported in Spain.

Table 334: Spain - FU Commodities Imports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	187440	226660	231664	236779	242006	247349	252810
Crus., mol. & other aquatic inv., prepared	24515	24112	24809	25526	26264	27023	27803
Crustaceans	121003	129797	129797	129797	129797	129797	129797
Fish, cured	48320	48783	49995	51236	52509	53813	55149
Fish, fillets	87460	106187	107780	109398	111039	112705	114396
Fish, fresh/chilled	201149	205368	205368	205368	205368	205368	205368
Fish, frozen	287414	319703	292751	268072	245473	224779	205829
Molluscs	38716	38951	39536	40129	40731	41342	41962
Prepared/preserved fish	45325	50946	53515	56213	59048	62025	65152
Total FU Imports	1041343	1150508	1135216	1122518	1112234	1104200	1098268

Source: database

The main species affected by the fall in imports will be large and small pelagic species such as tunas (albacore, skipjack, yellowfin) or sardine and mackerel, which make up the bulk of the frozen fish imports. Frozen demersal fish, with species like hake and cod, will also suffer, whereas molluscs imports (mussels) will increase.

Table 335: Spain - FU Commodities Imports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	5226	3740	3752	3766	3780	3796	3812
Diadromous fish	25320	26628	26451	26294	26157	26038	25936
Marine fish, pelagic, tunas	109954	137441	128893	121172	114213	107958	102354
Marine fish, pelagic, small	120093	143308	137136	131548	126496	121939	117836
Marine fish, demersal	319231	318000	311673	306104	301235	297011	293381
Marine fish, others	89846	101871	101506	101404	101555	101949	102577
Crustaceans	121003	129797	129797	129797	129797	129797	129797
Molluscs	51533	51299	52240	53200	54180	55180	56200
Cephalopods	187440	226660	231664	236779	242006	247349	252810
Aquatic animals	11698	11765	12105	12455	12815	13185	13566
Total FU Import	1041343	1150508	1135216	1122518	1112234	1104200	1098268

Source: database

Exports

There will be no significant change in food use commodities exports during the period of the projection.

SWEDEN

Sweden has a strong tradition of fish consumption and now operates a very significant pelagic fishery, providing the vast majority of all landings by weight. As the availability of whitefish declined, the pelagic fleet led to the development of a very strong catching and processing industry for fish reduction to meal and other non-food uses. The population of Sweden is approximately 9 million inhabitants.

Production: captures, aquaculture and commodities 1989-1998

Swedish production was 416 000 tonnes in live weight for the year 1998. The share of aquaculture in this total was negligible and represented, approximately 2%.

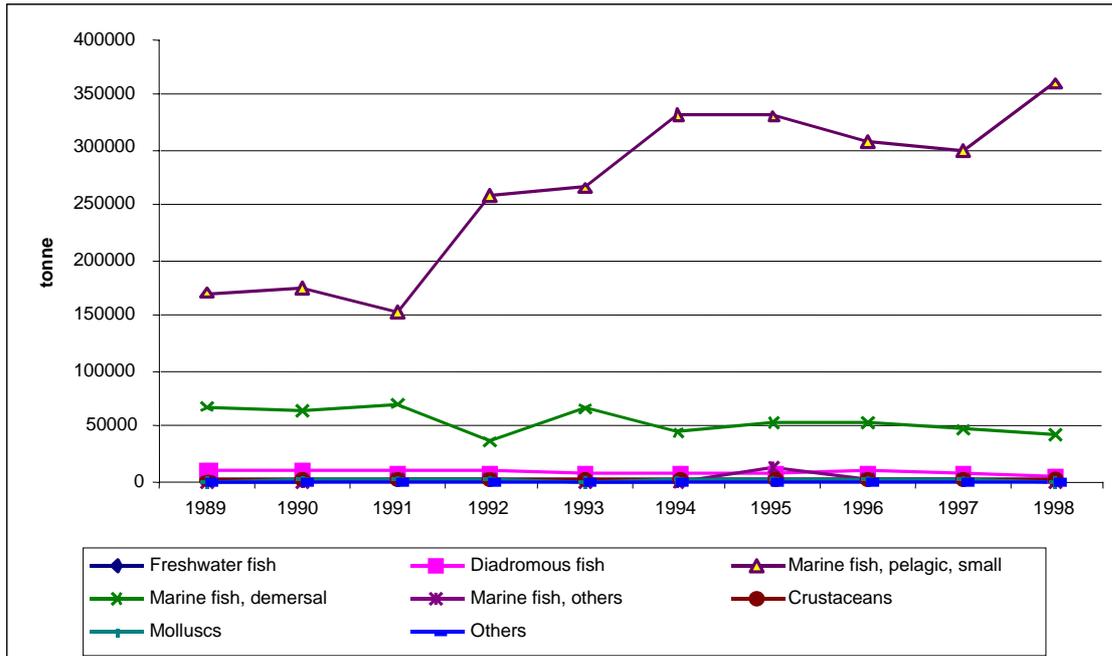


Figure 63: Sweden - Capture and aquaculture production 1989-1998

Captures

Landings strongly increased from 250 000 tonnes in 1990 to 400 000 tonnes in 1998. Pelagic fisheries represented 90 percent of this total and were mostly landed abroad. In 1997 the 250 000 tonnes that went for fish reduction was a historically high level of catch. The rest of the catch was made up of herring (45 000 tonnes) and cod (30 000 tonnes), the most economically important species. A dramatic price increase for this last species had a positive effect on the total income of the Baltic fisheries, where most of the catch was taken (FAO, 1999).

Table 336: Sweden - Captures by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	3737	3813	3876	3433	3371	3142	2530	2491	2612	1907	3091
Diadromous fish	3170	3057	2854	3055	3018	3131	2613	2542	2438	1965	2784
Marine fish, pelagic, small	171401	175961	153856	259713	265737	331766	329855	306302	298835	360008	265343
Marine fish, demersal	68355	64572	70693	35615	65675	44287	53126	53075	46663	42903	54496
Marine fish, others	744	760	2415	2573	755	741	12650	3065	3003	338	2704
Crustaceans	2367	2795	3273	3107	3281	3684	3731	3400	3843	3725	3321
Molluscs	5	20	41	28	34	53	54	3	6	38	28
Others	61	110	55	0	0	25	53	124	8	14	45
Total gp of species	249840	251088	237063	307524	341871	386829	404612	371002	357408	410898	331814

Source: database

Sweden, with its many lakes of more than 1 hectare, has a significant potential for the development of freshwater fishing in its interior. Recreational fishing accounted for catches from Sweden's lakes of approximately 63 000 tonnes in 1995, half of which was consumed within the households of the fishermen and 30 percent were sold or given away (FAO, 1998). Although Sweden's major lakes (the Vänern and Vättern) support an established inland fishery, the potential for thousands of smaller lakes to provide pike and pike-perch deserves greater attention (Wheatley, 2001).

Aquaculture

Aquaculture production is rather small in Sweden and in 1998 only accounted for approximately 5 500 tonnes. The majority of production was made up by trout and mussel cultivation (FAO, 1998). Most of this production was exported. Although mussel production has remained stable in recent years, the number of trout farms and the volume of their production has declined since 1997 (Rudiger, 1998). Strict environmental regulations constrain the expansion of aquaculture in Sweden and it is anticipated that the sub-sector will not expand significantly in the near future.

Table 337: Sweden - Aquaculture by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Diadromous fish	7693	7971	6349	5780	5175	5323	6034	6435	5273	5036	6107
Crustaceans	4	8	8	8	11	10	12	10	8	9	9
Molluscs	241	1163	1643	1353	737	2095	1521	1821	1425	455	1245
Total gp of species	7938	9142	8000	7141	5923	7428	7567	8266	6706	5500	7361

Source: database

Commodities production

Although the Swedish fish processing industry consists of small-scale, and often foreign-owned plants, a wide variety of value-added products are produced for domestic and foreign markets including fresh fillets, cured and smoked fish, lumpfish caviar, caviar substitutes, crustaceans and molluscs (FAO, 1999).

Food use commodities production

Sweden produced 300 000 tonnes of food use commodities on average between 1989 and 1998, With 50 percent of the production made of fresh and chilled fish, while prepared/preserved products accounted for 25%.

Table 338: Sweden - FU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Crus., mol. & other aquatic inv., prepared	4790	6788	7658	11072	7686	8465	9461	2830	3227	7190	6917
Crustaceans	4657	4137	3829	4734	2437	0	0	4972	832	791	2639
Fish, cured	1757	50	5757	113	6275	160	3242	11674	9398	14808	5323
Fish, fillets	19092	14754	7232	3580	6817	7639	22766	11180	7436	9913	11041
Fish, fresh/chilled	102374	123211	98760	154322	157897	178654	154321	165432	178654	187690	150132
Fish, frozen	2124	4493	9044	19712	30799	65592	87955	33786	65877	91580	41096
Prepared/preserved fish	82662	79868	75957	111259	104458	79689	45665	89855	74976	49315	79370
Total FU Production	217456	233300	208238	304792	316369	340200	323410	319729	340401	361288	296518

Source: database

The main species involved in the Swedish transformation industry is Atlantic herring, while cod (fresh or salted) is the main demersal species. The absence of classification does not enable more definition for the rest of the species (marine fish others), but most of this unclassified fish production is filleted or sold fresh.

Table 339: Sweden - FU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Diadromous fish	14901	11267	10898	13995	9527	9817	1115	1029	4494	6129	8317
Marine fish, pelagic, small	43314	43643	55433	68777	98542	76593	91146	105482	88391	79490	75081
Marine fish, demersal	17296	12364	8813	6043	3703	7033	8308	8214	11230	20012	10302
Marine fish, others	132499	155101	121606	200171	194473	238292	213379	197202	232227	247675	193262
Crustaceans	9447	10925	11487	15806	10124	8465	9461	7802	4059	7981	9556
Total FU Production	217456	233300	208238	304792	316369	340200	323410	319729	340401	361288	296518

Source: database

Non-food use commodities production

Non-food use commodities production amounted to 90 000 tonnes on average between 1989 and 1998. Main species used in the reduction process were sprat and herring.

Table 340: Sweden - NFU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	13309	15481	20603	23666	24043	36485	44714	29651	22265	34118	26433
Flour, meal unfit for human cons.	42011	38163	32348	55162	61843	79969	105829	82139	60333	88999	64679
Total NFU Production	55320	53643	52951	78828	85887	116453	150543	111790	82598	123117	91113

Source: database

Table 341: Sweden - NFU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	42011	38163	32348	55162	61843	79969	105829	82139	60333	88999	64679
Marine fish, others	13309	15481	20603	23666	24043	36485	44714	29651	22265	34118	26433
Total NFU Production	55320	53643	52951	78828	85887	116453	150543	111790	82598	123117	91113

Source: database

Non-food use: trade and net supply 1989-1998

On average approximately 25 percent of the domestic production goes to the non-food use sector and a small amount is imported. In this respect, fish oil and fish meal production represents a significant share of total use but a rather minor proportion of total value (FAO, 1999).

Non-food use imports

Swedish non-food use imports amounted to 70 000 tonnes on average but declined from their 150 000 tonnes level of 1989 to 25 000 tonnes in 1998, due to the gradual replacement of animal proteins by vegetable-based meal in the farming sector.

Table 342: Sweden - NFU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	26923	24186	12493	4534	9672	5194	18664	8158	5169	1322	11632
Flour, meal unfit for human cons.	121417	126256	98761	88184	36938	39260	27053	23918	30812	23325	61592
Total NFU Imports	148340	150442	111254	92719	46610	44454	45717	32076	35981	24647	73224

Source: database

Table 343: Sweden - NFU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Aquatic animals	0	0	0	0	0	5424	10807	9486	7948	6094	3976
Total NFU Import	148340	150442	111254	92719	46610	44454	45717	32076	35981	24647	73224

Source: database

Non-food use exports

Most of non-food use Swedish commodities are landed directly abroad in Denmark or Norway (FAO, 1999) but do not always appear on the exports data. Swedish non-food use exports accounted for 40 000 tonnes on the period 1989/1998.

Table 344: Sweden - NFU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	11573	14929	17650	16526	21962	34650	22053	17133	12714	18346	18754
Flour, meal unfit for human cons.	2122	7850	4193	4132	5857	21856	52361	39499	36922	45772	22056
Total NFU Exports	13695	22779	21843	20658	27820	56506	74414	56631	49636	64118	40810

Source: database

Table 345: Sweden - NFU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	2122	7850	4193	4132	5857	4826	8568	5340	1681	12534	5710
Marine fish, others	11573	14929	17650	16526	21962	51679	65846	51291	47955	51584	35100
Aquatic mammals	0	0	0	0	0	0	0	0	0	0	0
Total NFU Export	13695	22779	21843	20658	27820	56506	74414	56631	49636	64118	40810
Marine fish, others	148340	150442	111254	92719	46610	39030	34910	22590	28033	18552	69248

Source: database

Non-food use net supply

Average non-food use net supply was around 120 000 tonnes in Sweden between 1989 and 1998. Still, non-food use commodities consumption seems to be declining since the beginning of the decade.

Table 346: Sweden - NFU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98	
Fish/marine mammal, fat, oil		28658	24738	15446	11674	11753	7029	41326	20677	14720	17094	19311
Flour, meal unfit for human consumption		161307	156568	126916	139214	92924	97373	80521	66558	54223	66551	104215
Total NFU net supply		189965	181306	142362	150888	104677	104402	121846	87235	68943	83645	123527

Source: database

Table 347: Sweden - NFU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, pelagic, small	39889	30312	28155	51030	55986	75142	97261	76799	58652	76465	58969
Marine fish, others	150076	150994	114207	99858	48691	23836	13778	950	2343	1086	60582
Aquatic animals	0	0	0	0	0	5424	10807	9486	7948	6094	3976
Aquatic mammals	0	0	0	0	0	0	0	0	0	0	0
NFU net supply	189965	181306	142362	150888	104677	104402	121846	87235	68943	83645	123527

Source: database

Market for human consumption**Trade**

Between 1989 and 1998 imports for human consumption amounted to 150 000 tonnes, while exports were 220 000 tonnes. In terms of value, imports were worth SEK 4.5 billion, whereas exports amounted to SEK 2.5 billion in 1997.

Exported products included a broad variety of commodities such as fresh fish and smoked products, shellfish and molluscs, as well as caviar and its substitutes. Since Sweden's accession to the EU, new

foreign markets have been created and exports of herring, processed herring products, in particular, have increased markedly. In 1997, Norway provided 57 percent of Swedish imports, with fresh salmon representing a significant proportion of the volume imported. It is also in that year that France became the most important market for exports when it outstripped the traditionally largest purchaser, Denmark.

Food use imports

Swedish food use imports have been increasing during the past decade from their 1989 level of 110 000 tonnes to reach 220 000 tonnes in 1998. The number one commodity imported into Sweden was fresh and chilled fish representing 30 percent of imports on average but on an increasing trend. The dynamism of these imports is due more to the activity of the re-export sector than to local consumption. Atlantic salmon accounted for 60 000 out of the 100 000 tonnes of fresh fish imported in Sweden in 1998. Second in ranking were the prepared/preserved products with 28 000 tonnes on average, followed by fish fillets.

Table 348: Sweden - FU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	284	249	253	324	285	232	314	622	381	413	336
Crus., mol. & other aquatic inv., prepared	9658	11692	11368	12514	11927	15215	13143	14212	17091	16168	13299
Crustaceans	8829	12073	12237	13335	13747	13308	8564	10951	12005	13357	11841
Fish, cured	12659	8843	9924	7421	6374	7299	9788	16625	18445	24021	12140
Fish, fillets	15380	16656	15590	17782	18606	21356	20441	23469	25481	25035	19980
Fish, fresh/chilled	21920	21976	22024	24671	26059	44323	72931	82318	98775	104182	51918
Fish, frozen	10019	10759	10622	14721	11350	15134	12047	14512	14346	12132	12564
Molluscs	1279	1443	1826	1398	1550	1768	1487	1389	1515	1387	1504
Prepared/preserved fish	29132	32877	33007	31972	28490	28205	20531	30065	24131	19984	27839
Total FU Imports	109161	116566	116851	124137	118389	146840	159245	194162	212170	216680	151420

Source: database

The main species imported into Sweden were: Atlantic salmon for diadromous species; herring and mackerel for small pelagic species; Atlantic cod, Alaska pollock, redfish and saithe for demersal species; shrimps and prawns for crustaceans; mussels for molluscs.

Table 349: Sweden - FU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	52	33	11	367	620	277	720	533	768	1265	465
Diadromous fish	18911	17911	18307	25225	22554	25558	53792	62162	74506	83465	40239
Marine fish, pelagic, tunas	5506	5451	5892	5597	4060	5680	1944	3846	2394	1929	4230
Marine fish, pelagic, small	22018	18833	18730	16833	16291	26695	17280	26466	24985	22122	21025
Marine fish, demersal	28357	31437	30669	33068	31976	41695	45151	48690	53727	52914	39768
Marine fish, others	14266	17444	17557	15478	15379	16411	16849	25290	24798	23659	18713
Crustaceans	16831	21231	21641	23831	23483	26020	20456	23435	27484	28032	23244
Molluscs	2935	3977	3790	3415	3741	4271	2738	3117	3128	2881	3399
Cephalopods	284	249	253	324	285	232	314	622	381	413	336
Total FU Import	109161	116566	116851	124137	118389	146840	159245	194162	212170	216680	151420

Source: database

Food use exports

Denmark has traditionally been the largest buyer of Swedish fish and fish products, however, in 1997, as mentioned above, France became the most important destination for Swedish exports (OECD, 2000). On average, Sweden exported 220 000 tonnes of food use commodities between 1989 and 1998. Fresh and chilled fish accounted for the bulk of Swedish exports with 190 000 tonnes, the rest being made of various fish preparations such as fish roes, fish meat, prepared fillets and also canned small pelagic fish.

Table 350: Sweden - FU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Crus., mol. & other aquatic inv., prepared	383	358	315	300	226	216	580	529	1784	1504	619
Crustaceans	1052	1188	1087	808	851	1017	1400	967	1100	1508	1098
Fish, cured	393	257	495	774	732	774	1104	2392	4501	7874	1930
Fish, fillets	3336	3274	3524	2595	2691	2319	5359	5328	6333	5681	4044
Fish, fresh/chilled	121866	124689	114453	172842	181150	220129	214829	236306	257027	267937	191123
Fish, frozen	4048	4869	5817	4878	5825	9364	6566	10818	11467	19447	8310
Molluscs	8	1205	1431	751	497	1035	558	1010	417	187	710
Prepared/preserved fish	8627	9236	8808	9780	9902	12848	14151	22823	21714	21537	13943
Total FU Exports	139713	145075	135930	192727	201873	247702	244547	280173	304342	325676	221776

Source: database

Atlantic salmon (diadromous, mostly fresh), herring, mackerel and sprat (small pelagic, fresh and canned), cod, blue whiting, saithe and haddock (demersal, mostly fresh) are the main species exported by Sweden.

Table 351: Sweden - FU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	27	27	4	14	15	21	675	119	767	981	265
Diadromous fish	4775	5915	4125	4166	3636	5999	15807	12111	24600	31296	11243
Marine fish, pelagic, tunas	76	219	220	176	108	72	1141	3311	145	26	549
Marine fish, pelagic, small	62594	61383	74049	64989	43607	50188	57592	123820	113353	99818	75139
Marine fish, demersal	33881	33809	29267	15374	12786	26552	25840	28260	32215	30637	26862
Marine fish, others	36916	40972	25432	106149	140148	162602	140955	110047	129962	159718	105290
Crustaceans	1353	1416	1264	989	978	1152	1936	1418	2784	2913	1620
Molluscs	90	1334	1568	869	595	1116	602	1088	516	286	807
Total FU Export	139713	145075	135930	192727	201873	247702	244547	280173	304342	325676	221776

Source: database

Food use net supply and consumption

Sweden is an important consumer of fish in Europe. Between 1989 and 1998, the net supply in live weight amounts to 230 000 tonnes and has been steadily increasing since its 1989 level of 190 000 tonnes. On average, the main commodities of the Swedish food use net supply are prepared/preserved products, accounting for nearly 50 percent of average consumption, which reflects the higher demand since 1995 for single-serving meals (OECD, 2001). Second in rank come frozen fish with 45 000 tonnes followed by fish fillets with 30 000 tonnes.

Table 352: Sweden - FU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	284	249	253	324	285	232	314	622	381	413	336
Crus., mol. & other aquatic inv., prepared	14065	18121	18711	23285	19388	23464	22024	16514	18534	21854	19596
Crustaceans	12434	15022	14980	17261	15334	12290	7165	14956	11737	12640	13382
Fish, cured	14022	8636	15186	6760	11917	6685	11925	25907	23341	30955	15533
Fish, fillets	31137	28135	19297	18768	22732	26676	37848	29320	26584	29267	26976
Fish, fresh/chilled	2427	20498	6331	6151	2806	2848	12423	11444	20403	23935	10927
Fish, frozen	8095	10383	13849	29555	36324	71363	93436	37480	68757	84266	45351
Molluscs	1272	238	395	647	1053	734	929	379	1099	1200	795
Prepared/preserved fish	103168	103509	100156	133451	123046	95046	52045	97097	77394	47761	93267
Total FU net supply	186904	204791	189158	236202	232885	239338	238108	233718	248229	252292	226163

Source: database

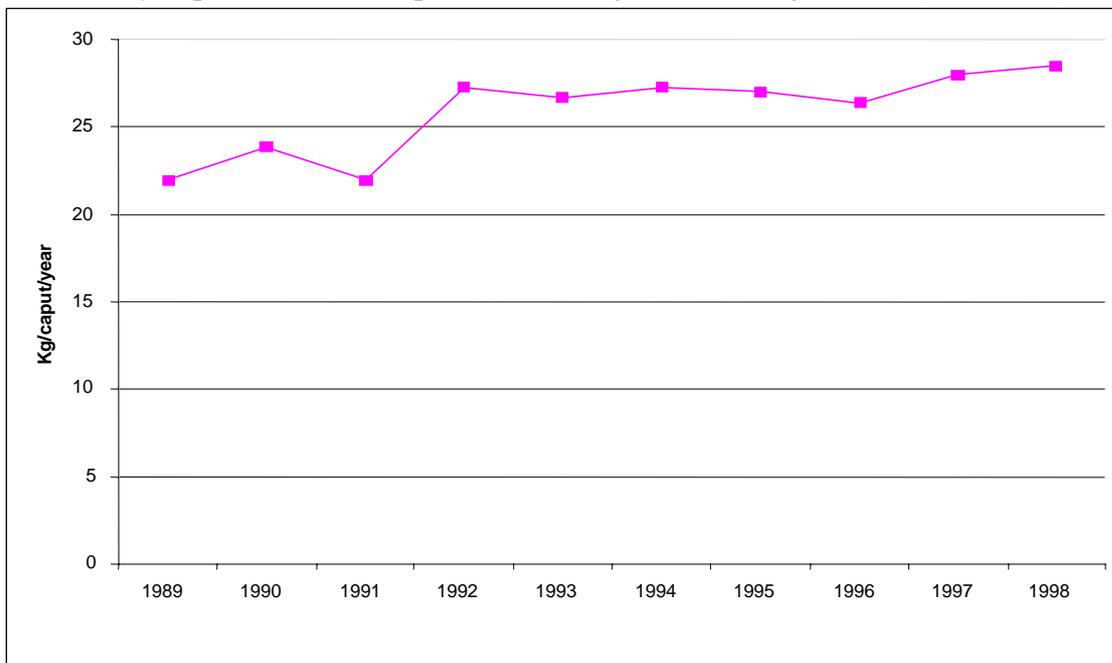
The main species of the net supply are Atlantic salmon for diadromous fish, herring and mackerel for small pelagic fish, cod and pollock for demersal fish.

Table 353: Sweden - FU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	25	7	7	353	605	255	45	415	2	284	200
Diadromous fish	29036	23264	25080	35054	28445	29377	39100	51081	54400	58298	37313
Marine fish, pelagic, tunas	5430	5233	5672	5422	3952	5608	804	535	2249	1902	3681
Marine fish, pelagic, small	2737	1093	113	20621	71226	53101	50835	8128	23	1794	20967
Marine fish, demersal	11772	9992	10215	23737	22893	22176	27620	28644	32741	42289	23208
Marine fish, others	109849	131573	113731	109499	69703	92101	89274	112445	127063	111616	106685
Crustaceans	24925	30739	31864	38648	32628	33333	27981	29819	28759	33100	31180
Molluscs	2845	2642	2222	2546	3146	3155	2136	2030	2611	2594	2593
Cephalopods	284	249	253	324	285	232	314	622	381	413	336
FU net supply	186904	204791	189158	236202	232885	239338	238108	233718	248229	252292	226163

Source: database

In 1997, consumption per capita was around 26 kg per annum and fish represented approximately 12 percent of the consumption of animal proteins per day in 1997 (FAO, 1999). Still, statistics for domestic consumption may not adequately represent Sweden's demand for fish and seafood products because many personal and recreational catches are unreported. Finally, the "green" lobby is powerful in Sweden and it is possible that marketing in the future will emphasise the ecological sustainability of products and their production through eco-labelling schemes (FAO, 1999).

**Figure 64: Fish consumption per capita per year in Sweden 1989-1998**

The main species consumed in Sweden are Atlantic salmon for diadromous fish (17 percent), herring (16 percent) and mackerel for small pelagic species, cod (10 percent) and pollock for demersal species, and shrimps (9 percent) for crustaceans.

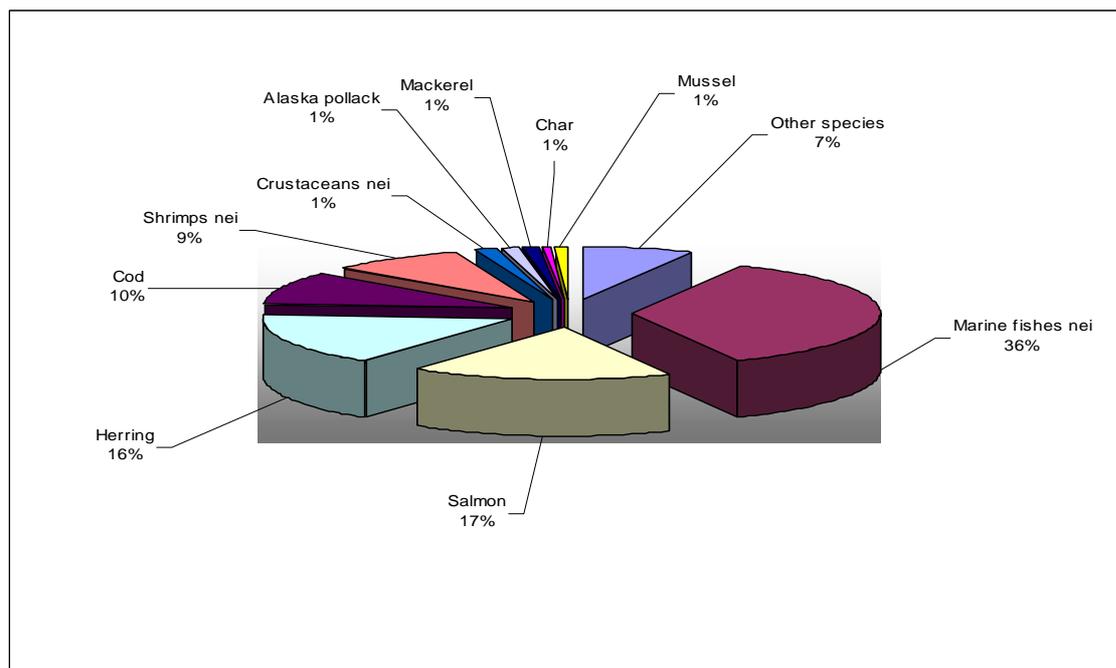


Figure 65: Sweden - Main species consumed in 1998

Assumptions for projection 2005-2030 and main results

As specified in the methodology section (see Part1 of the study), assumptions were made on the consumption trend of the OECD group of products. Further assumptions were made regarding production, imports and exports and Sweden's need for fish in 2005 up to 2030 by taking into account and extrapolating previous trends.

For Sweden, the main consumption trends for the period 2005-2030 assume:

A large increase of the demand for cured fish, by nearly 100 percent on the period 1998-2030, with cephalopods increasing by 20%.

A decrease in fresh fish consumption by 20%, as well as a lesser decrease in consumption of frozen fish, prepared/preserved products and molluscs.

The other commodities remain constant.

Apparent consumption will increase until 2030 due to the fact that Swedish people are becoming increasingly conscious of environment and health concerns in their choice of food, and the general perception among Swedes is that fish is a healthy alternative to other forms of meat (Lexmon, 2003).

Still, Swedish seafood consumption per capita is expected to decline slowly until 2030, mostly because demographic expansion will be faster than the increase in overall consumption. This reflects a tendency of younger generations to eat less fish, especially products that require much preparation, such as fresh fish, which has been on a declining trend for years (OECD, 2003). This trend towards higher demand for single-serving meals and convenience products (OECD, 2001) is reflected here by the increase in cured fish (mostly smoked products) while fresh fish and frozen products decrease. The prepared/preserved group of products, however, does not reflect clearly this evolution, as it is negatively affected by the decrease in canned products (preserved products) that is offsetting the increase in prepared commodities. These include products such as gratins, rolls, sushi, prepared crayfish tails, shrimp, crab sticks and lobster (Lexmon, 2003).

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	392	430	442	455	468	482	496
FU net supply	242337	252070	252963	254716	257338	260859	265327

Source: database

The main species affected in the net supply are the same ones affected by changes in imports, i.e. cod and haddock for demersal species (increase in stockfish, klipfish and smoked products), salmon for diadromous fish (increase in smoked products, while fresh salmon decreases), Atlantic herring for small pelagic species (increase in salted products, while canned commodities decrease) and tunas (decrease in canned products) for large pelagic species.

Table 357: Sweden - FU net supply by OECD group of commodities 2005-2030 (tonne live weight)

Gp of commodities	Ave. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	392	430	442	455	468	482	496
Crus., mol. & other aquatic inv., prepared	20478	21854	21854	21854	21854	21854	21854
Crustaceans	11758	12364	12170	11979	11791	11605	11422
Fish, cured	19763	35562	39384	43716	48626	54192	60501
Fish, fillets	29939	29267	29267	29267	29267	29267	29267
Fish, fresh/chilled	14210	23596	23354	23114	22873	22634	22394
Fish, frozen	71060	81255	79574	78203	77084	76172	75427
Molluscs	868	1200	1200	1200	1200	1200	1200
Prepared/preserved fish	73869	46542	45717	44929	44175	43454	42764
Total FU net supply	242337	252070	252963	254716	257338	260859	265327

Source: database

As the Swedish population will grow more during the period considered than the net supply (10 percent versus 5 percent), consumption per capita will decrease from 28 to 27 kg per capita per year.

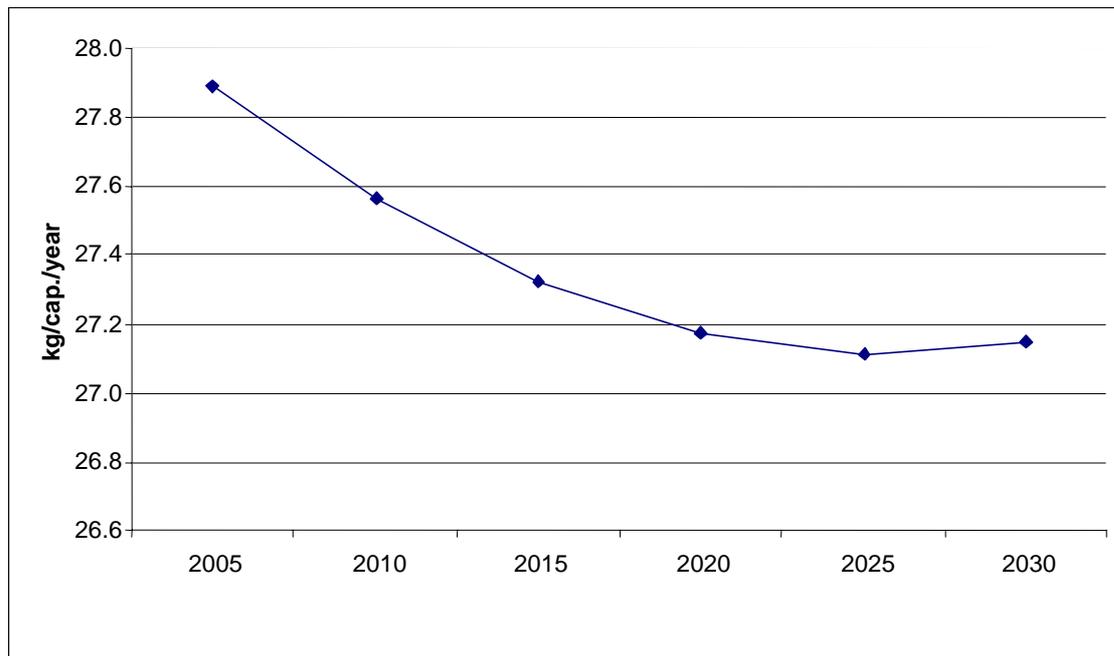


Figure 66: Fish consumption per capita per year in Sweden 2005-2030

Salmon and herring consumption both decrease and now represent the same share of total Swedish consumption, with 15 percent each. Shrimp consumption increases to 8%, while cod consumption reaches 10 percent of the total consumption.

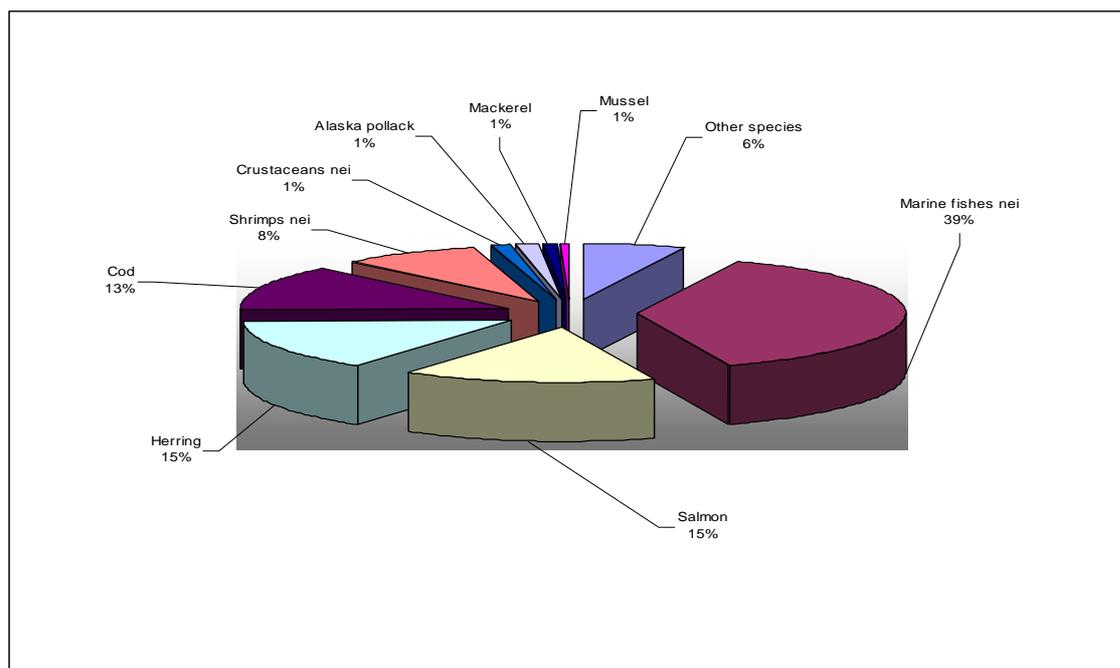


Figure 67: Sweden - Main species consumed in 2030

Non-food use net supply 2005-2030

No significant changes will be experienced in the Swedish non-food use net supply. It is expected to remain around its 1998 level of 80 000 tonnes.

Production 2005-2030

Capture and aquaculture

Swedish aquaculture production will decrease from 5 500 tonnes in 1998 to around 3 500 tonnes by 2030, mostly because of the growing environmental concerns affecting the industry. The OECD reported a decrease in the number of Swedish farms by 40 units out of 300 between 1999 and 2000 (OECD, 2003). The only sector to increase is mussel production, usually considered as a more environmentally friendly activity than other forms of fish-farming, but quantities produced remain limited.

Table 358: Sweden - Aquaculture by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Diadromous fish	5620	4534	4232	3972	3753	3571	3426
Crustaceans	10	11	13	15	17	20	23
Molluscs	1463	523	577	637	703	777	857
Total gp of species	7093	5068	4822	4624	4473	4368	4306

Source: database

Total production decreases with capture fisheries remaining constant and total aquaculture production decreasing.

Table 359: Sweden - Total production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	2536	2536	2536	2536	2536	2536	2536
Diadromous fish	8158	7072	6769	6510	6290	6109	5964
Marine fish, pelagic, small	325353	325353	325353	325353	325353	325353	325353
Marine fish, demersal	48011	48011	48011	48011	48011	48011	48011
Marine fish, others	3959	3959	3959	3959	3959	3959	3959
Crustaceans	3686	3688	3689	3691	3694	3697	3700
Molluscs	1494	553	608	668	734	807	888

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Others	45	45	45	45	45	45	45
Total gp of species	393243	391218	390971	390774	390623	390518	390456

Source: database

Commodities

There will be no significant changes in Swedish commodities production during 1998 and 2030. Commodity production will remain stable around its 1998 level of 360 000 tonnes.

Trade 2005-2030

Imports

Swedish food use commodities imports will increase to 230 000 tonnes by 2030, to compensate for the stagnating domestic production and the increasing national demand. Cured fish products will experience the biggest increase coming from 24 000 tonnes in 1998 to reach 54 000 tonnes by 2030. Main cured products include dried fish (stockfish), dried and salted fish (klipfish), fish in brine and smoked fish. Cephalopods also increase but at a much slower pace. Still, these increases will be compensated by a fall imports of products such as frozen fish, prepared/preserved fish and crustaceans. Frozen fish will decrease by 5 000 tonnes between 2005 and 2030.

Table 360: Sweden - FU Commodities Imports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	392	430	442	455	468	482	496
Crus., mol. & other aquatic inv., prepared	15166	16168	16168	16168	16168	16168	16168
Crustaceans	11637	13081	12887	12696	12508	12322	12140
Fish, cured	15235	28628	32449	36781	41692	47258	53567
Fish, fillets	23156	25035	25035	25035	25035	25035	25035
Fish, fresh/chilled	80506	103843	103602	103361	103121	102881	102642
Fish, frozen	13634	9122	7440	6069	4950	4038	3294
Molluscs	1509	1387	1387	1387	1387	1387	1387
Prepared/preserved fish	24583	18765	17940	17151	16397	15676	14987
Total FU Imports	185820	216458	217351	219104	221727	225248	229715

Source: database

The main species affected by changes in the import pattern will be cod and haddock for demersal species (consumed in the form of klipfish and stockfish, or smoked), salmon for diadromous fish (increase of the smoked form, while fresh salmon imports decrease), Atlantic herring for small pelagic and tunas for large pelagic.

Table 361: Sweden - FU Commodities Imports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	713	1237	1221	1207	1196	1186	1178
Diadromous fish	59897	81378	80207	79253	78481	77863	77376
Marine fish, pelagic, tunas	3159	1815	1737	1663	1593	1525	1461
Marine fish, pelagic, small	23510	21587	21283	21039	20854	20728	20659
Marine fish, demersal	48436	53932	55011	56393	58092	60129	62531
Marine fish, others	21402	25444	27007	28841	30979	33458	36320
Crustaceans	25085	27756	27562	27371	27182	26997	26814
Molluscs	3227	2881	2881	2881	2881	2881	2881
Cephalopods	392	430	442	455	468	482	496
Total FU Import	185820	216458	217351	219104	221727	225248	229715

Source: database

Exports

Exports of food use commodities will remain around their 1998 level of 330 000 tonnes.

UNITED KINGDOM

The United Kingdom is a major fish producer and trader in Europe with a strong historical fishing tradition and maritime heritage. UK waters provide a wide range of high-value species targeted by vessels from the UK and other member states, supplying both domestic and very significant export markets. Although handling and distribution has become concentrated at a few, modernised centres, the sector provides an important socio-economic function in many rural and isolated areas, and changing markets, restrictive policies and pressures on stocks have required extensive and ongoing restructuring. However, the industry remains diverse with respect to target species, fleets, processing activities and products and associated sub-sectors have changed their role to remain competitive, both nationally and internationally. With a population of 59 million inhabitants, the United Kingdom is also an important fish consumption market.

Production: captures, aquaculture and commodities 1989-1998

Domestic production was approximately 1 Mt in 1998 and the annual volume has expanded steadily since 1989 (900 000 t). Most of this increase can be attributed to salmon and trout farming, which represented nearly 13 percent of this total, together with increased landings of non-quota species and shellfish (Sheal *et al.*, 1998). In 1998, 552 000 tonnes of sea fish were landed in UK ports with a further 370 000 tonnes landed abroad by UK vessels (Agriculture Committee, 1999). However, the latter half of the 1990s saw a decline in UK landings by 31%, which was only partly compensated for by an increase in imports of 15 percent (Sea Fish Industry Authority, 1999a).

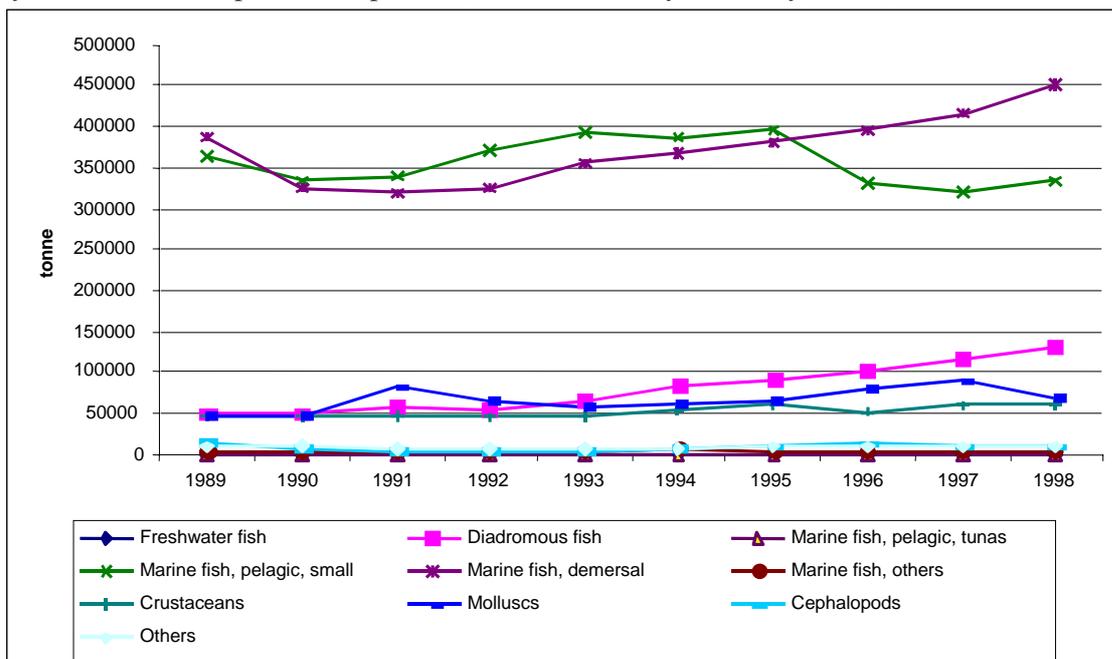


Figure 68: United Kingdom - Capture and aquaculture production 1989-1998

Captures

Capture recorded a strong increase during the last decade. In 1998, the total landings, carried out by the British fleet were about 928 000 tonnes versus 866 000 tonnes in 1989. Haddock was the most important species in volume and cod, in spite of a light fall, was the most significant species in value. The landings of molluscs and shellfish were 133 000 tonnes in 1997 with Norwegian lobster the most significant species in value (FAO, 1997b).

Table 362: United Kingdom - Captures by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	15	9	8	8	6	8	6	6	10	12	9
Diadromous fish	2882	2709	2110	2066	1941	2276	2198	2116	1517	2600	2242
Marine fish, pelagic, tunas	0	0	110	60	501	579	197	54	52	119	167
Marine fish, pelagic, small	362298	332364	339140	372005	392996	386194	394457	330409	320624	332592	356308
Marine fish, demersal	385819	324924	317945	324520	355194	367758	380284	394839	417459	451459	372020
Marine fish, others	1934	1549	3698	4744	4893	5427	5115	4179	4313	3781	3963
Crustaceans	45158	46522	47353	45156	47913	53988	60137	51337	58922	61467	51795
Molluscs	42997	44879	75682	60861	52238	55882	58708	70034	75610	58352	59524
Cephalopods	15913	7454	4492	3606	4545	5850	8818	12156	7714	9490	8004
Others	8619	11280	6683	5641	5553	6531	8501	9154	8900	8039	7890
Total gp of species	865635	771690	797221	818667	865780	884493	918421	874284	895121	927911	861922

Source: database

It is acknowledged that some areas of the UK do suffer from illegal landings of out-of-quota “black fish” and that there is a large amount of under-reporting of catches.

Aquaculture

The British aquaculture industry is dominated by Atlantic salmon, which represents about 90 percent of outputs and to a lesser degree by rainbow trout, mussels and oysters (Sea Fish Industry Authority, 1999b). The cultivation of additional species such as turbot, cod and halibut has given some encouraging results in recent years but, to date, most of these projects have been largely experimental.

Table 363: United Kingdom - Aquaculture by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	200	50	50	50	16	15	133	133	0	0	65
Diadromous fish	46135	47153	55191	51745	63326	80616	86801	100017	115372	127480	77384
Molluscs	2969	2823	5633	5016	5420	5062	6892	9736	14323	9931	6781
Total gp of species	49304	50026	60874	56811	68762	85693	93826	109886	129695	137411	84229

Source: database

The majority of the aquaculture farms are located in Scotland and there has been a period of consolidation within the UK industry over the last decades whereby the number of companies has decreased but the number of sites and the volume of production has increased from 49 000 tonnes in 1989 to 137 000 tonnes in 1998. This rise is mainly due to technological advancements and improvements in productivity of salmon culture (Fishery Research Service, 2001). As with several other UK sub-sectors, aquaculture provides considerable employment opportunities in remote and rural areas. However, the UK aquaculture industry is very sensitive to price fluctuations and Norwegian overproduction in the late 1990s reduced prices significantly. This had a very negative impact on UK competitiveness in the market (FAO, 1997b).

Commodities production

Food use commodities production

Total food use commodities production was 1.1 million tonnes on average during the period 1989/1998, but it steadily increased from its 1994 level of 1 million tonnes to reach 1.3 million tonnes in 1998. Fresh fillets are the main commodities produced in the UK with 425 000 tonnes a year on average. Next come fresh fish with 260 000 tonnes followed by frozen fish with 225 000 tonnes.

Table 364: United Kingdom - FU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Crustaceans	49327	49983	58834	43962	43161	54452	50363	22452	26194	32861	43159
Fish, cured	98812	76615	83413	69105	74293	72926	69346	90229	95343	114891	84497
Fish, fillets	388833	374279	442112	370218	412419	395245	391119	450158	478169	552150	425470
Fish, fresh/chilled	189099	168799	267890	250989	303520	246545	269137	268506	298427	302688	256560
Fish, frozen	206455	164046	212494	325364	273390	239055	245621	184952	190314	209346	225104
Molluscs	75698	69625	46682	36305	33356	28324	27659	35624	43281	48111	44466
Prepared/preserved fish	31729	21526	25354	21751	30326	29884	28363	35180	41144	49646	31490
Total FU Production	1039952	924872	1136779	1117695	1170465	1066431	1081607	1087102	1172872	1309692	1110747

Source: database

The main species involved in the transformation sector are: salmon for diadromous fish, Atlantic mackerel and Atlantic herring for small pelagic fish; cod, haddock and plaice for demersal fish; Norway lobster and crab for crustaceans; and scallops for molluscs (Anon., 1999b and 1999d).

Table 365: United Kingdom - FU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	0	0	0	0	544	915	1247	967	518	554	475
Diadromous fish	35096	34137	36023	29387	27390	29105	27688	34605	35189	39978	32860
Marine fish, pelagic, small	157774	140998	196774	312376	269405	227743	236130	178850	190880	210121	212105
Marine fish, demersal	329016	296615	302831	252780	293442	291641	284943	328537	338090	419541	313744
Marine fish, others	393041	333514	495635	442885	503167	434252	453577	486066	538720	558525	463938
Crustaceans	49327	49983	58834	43962	43161	54452	50363	22452	26194	32861	43159
Molluscs	75698	69625	46682	36305	33356	28324	27659	35624	43281	48111	44466
Total FU Production	1039952	924872	1136779	1117695	1170465	1066431	1081607	1087102	1172872	1309692	1110747

Source: database

Non-food use commodities production

Fish meal and fish oil are produced from spoilt fish, fish offal from processors or fish withdrawn from auctions under price stabilisation arrangements (FAO, 1997b). Average production was 230 000 tonnes per year between 1989 and 1998.

Table 366: United Kingdom - NFU Commodities Production by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	2018	1682	1150	2274	3550	7452	9853	6935	8229	7790	5093
Flour, meal unfit for human cons.	281841	266503	229385	224095	237057	249360	232923	187120	189194	151868	224934
Total NFU Production	283859	268185	230535	226370	240607	256813	242775	194055	197423	159657	230028

Source: database

Table 367: United Kingdom - NFU Commodities Production by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	107249	108150	93114	104484	105107	112402	105091	112956	119466	100852	106887
Marine fish, demersal	174591	158353	136271	119611	131949	136959	127832	74164	69728	51016	118047
Marine fish, others	2018	1682	1150	2274	3550	7452	9853	6935	8229	7790	5093
Total NFU Production	283859	268185	230535	226370	240607	256813	242775	194055	197423	159657	230028

Source: database

Non-food use: trade and net supply 1989-1998

Twenty percent of total catches are turned into non-food use commodities, the rest of the production being supplied by imports. From 1994 to 1998, the average volume of imports was 595 000 tonnes and the volume of exports 77 000 tonnes.

Non-food use imports

Non-food use imports declined from their 1989 level of 850 000 tonnes to reach 450 000 tonnes in 1998. This decrease was mainly due to a reduction of fish fat and oil imports, while fish meal remained fairly constant.

Table 368: United Kingdom - NFU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	531980	483893	418692	361320	392271	413780	384348	235889	212548	146977	358170
Flour, meal unfit for human cons.	315929	313618	266282	295422	308788	319090	295096	301656	357556	308654	308209
Total NFU Imports	847909	797512	684974	656743	701059	732870	679444	537545	570104	455631	666379

Source: database

Table 369: United Kingdom - NFU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	299330	309973	260364	290488	302184	298044	284124	289538	341594	285962	296160
Marine fish, others	547835	486971	423937	365712	398456	433258	392716	246208	225194	167737	368803
Aquatic animals	0	0	0	0	0	1568	1850	1204	1976	1932	853
Aquatic mammals	744	567	673	543	419	0	753	595	1339	0	563
Total NFU Import	847909	797512	684974	656743	701059	732870	679444	537545	570104	455631	666379

Source: database

Non-food use exports

UK non-food use commodities exports have been limited during the past decade, with 50 000 tonnes average between 1989 and 1998.

Table 370: United Kingdom - NFU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Fish/marine mammal, fat, oil	2862	18987	5618	24599	32902	36682	44210	17666	16155	11593	21127
Flour, meal unfit for human cons.	16554	7043	6631	22366	20763	48819	56087	52087	37128	45417	31289
Total NFU Exports	19416	26030	12249	46965	53664	85501	100297	69753	53284	57010	52417

Source: database

Table 371: United Kingdom - NFU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Marine fish, pelagic, small	6055	5046	3451	6823	10651	22357	29558	20804	24686	23369	15280
Marine fish, others	13981	21457	9358	40593	43362	61909	69803	48300	28470	32098	36933
Aquatic animals	0	0	0	0	0	1234	1564	1145	1243	1543	673
Aquatic mammals	620	473	561	452	349	0	628	496	1116	0	469
Total NFU Export	19416	26030	12249	46965	53664	85501	100297	69753	53284	57010	52417

Source: database

Non-food use net supply

The UK is a major non-food use consumer with average consumption of 850 000 tonnes per year between 1989 and 1998. Still, the trend is decreasing with levels of consumption at the beginning of the decade (1.1 Mt) being twice the 1998 level (560 000 tonnes).

Table 372: United Kingdom - NFU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Fish/marine mammal, fat, oil	531136	466588	414225	338996	362919	384551	349990	225158	204622	143174	342136
Flour, meal unfit for human consumption	581216	573078	489035	497152	525082	519631	471932	436689	509622	415104	501854
Total NFU net supply	1112352	1039666	903260	836147	888002	904182	821922	661847	714243	558278	843990

Source: database

Table 373: United Kingdom - NFU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Marine fish, pelagic, small	400524	413077	350026	388149	396640	388088	359656	381690	436374	363446	387767
Marine fish, demersal	174591	158353	136271	119611	131949	136959	127832	74164	69728	51016	118047
Marine fish, others	535872	467196	415729	327393	358645	378801	332767	204843	204953	143428	336963
Aquatic animals	0	0	0	0	0	334	286	59	733	389	180
Aquatic mammals	1364	1040	1233	995	767	0	1381	1091	2455	0	1033
NFU net supply	1112352	1039666	903260	836147	888002	904182	821922	661847	714243	558278	843990

Source: database

Market for human consumption

Trade

The United Kingdom is a major fish trader in Europe. From 1989 to 1998, UK imports averaged 700 000 tonnes annually while exports averaged 500 000 tonnes annually (Anon., 1999c). In terms of value imports amounted to GBP 1.2 billion while exports represented GBP 600 million in 1997. The worsening trade balance in terms of value reflects the predominance of high value species (demersal) in British imports, while a major share of UK exports to the rest of the EU is made up of relatively low-value pelagic species such as mackerel and herring (Agriculture Committee, 1999).

Only 21 percent of English imports come from the European Union and the most significant suppliers are Iceland and Norway (CFCE, 1998). In recent years, there has been an increase in total imports to meet rising demand and consumption (see below). Although trends in imports may be demand led, fluctuations in the volume of UK exports sometimes seem to reflect landings achieved, particularly landings of pelagic species that represent the majority volume (Anon., 2000g). Despite this, there has been a marked and rapid increase in direct landings to foreign ports, in particular of plaice (CLREA & CEMARE, 1999).

Food use imports

With 700 000 tonnes on average during the period 1989/1998, the UK is a major food use commodities importer. Food use commodities imports steadily increased during the decade from their 1989 level of 570 000 tonnes to reach 780 000 tonnes by 1998. Fish fillets were on average the main food use imports into the UK with 175 000 tonnes, representing 30 percent of total imports. They were followed by prepared/preserved commodities that have been increasing during the past decade from 130 000 tonnes in 1989 to reach 190 000 tonnes in 1998. Fresh fish and frozen fish come next with 140 000 tonnes and 100 000 tonnes annual averages respectively. Around 55 percent of the volume of fresh, chilled and frozen imports were cod and haddock, since UK landings are insufficient to meet the demand for white fish in the processing industry (Sheal *et al.*, 1998).

Table 374: United Kingdom - FU Commodities Imports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	3504	2924	2950	2949	3908	4789	4600	10429	7587	9595	5323
Crus., mol. & other aquatic inv., prepared	4033	4543	3757	3735	2591	3206	2552	3163	3419	4248	3525
Crustaceans	55017	96542	95397	103013	99521	103642	102518	109574	109834	132500	100756
Fish, cured	4758	6755	6431	5915	3193	3658	4368	4232	4452	4275	4804
Fish, fillets	97778	134910	118937	189390	192890	193817	195464	214851	211797	209511	175934

Fish, fresh/chilled	188280	193569	146252	133872	115244	147774	114747	134447	142142	126150	144248
Fish, frozen	81097	95273	105955	104862	92242	95769	88556	113509	95282	103066	97561
Molluscs	4947	6838	9126	6809	6454	7093	6822	6931	8500	8913	7243
Prepared/preserved fish	131508	135847	149033	159971	160341	160807	158721	170095	181617	185695	159364
Total FU Imports	570922	677201	637838	710515	676383	720555	678349	767230	764630	783954	698758

Source: database

Demersal species form the bulk of UK imports, with nearly 50 percent of all imports on average. The most important species among demersal is cod with more than 160 000 tonnes imported in 1998 (Myrland & Vassdal, 1998). Alaska pollock, hake and saithe are also imported in significant amounts. Other major species imported into the UK are: salmon for diadromous fish; tunas, with more than 100 000 tonnes imported in 1998, for large pelagic species; sardines, mackerels, jack and horse mackerels for small pelagic species; various shrimps and prawns for crustaceans; mussels for molluscs; and squid for cephalopods.

Table 375: United Kingdom - FU Commodities Imports by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	4581	7310	5946	8334	8516	9440	10422	12269	11549	14617	9298
Diadromous fish	39587	51076	52779	58891	54522	68311	49028	61713	61455	53339	55070
Marine fish, pelagic, tunas	69804	62477	78494	80236	81170	82563	94514	99458	112922	120433	88207
Marine fish, pelagic, small	60241	72379	68950	67444	53853	59568	57482	38491	37941	43231	55958
Marine fish, demersal	280729	318146	270979	333322	325495	335831	314459	387491	376177	360305	330293
Marine fish, others	48479	54967	49461	45783	40354	46113	35952	37711	35245	36773	43084
Crustaceans	55017	96542	95397	103013	99521	103642	102518	109574	109834	132500	100756
Molluscs	8628	10622	12647	10208	8673	9252	8293	9204	11203	12320	10105
Cephalopods	3504	2924	2950	2949	3908	4789	4600	10429	7587	9595	5323
Aquatic animals	353	759	237	336	372	1047	1081	889	716	841	663
Total FU Import	570922	677201	637838	710515	676383	720555	678349	767230	764630	783954	698758

Source: database

Food use exports

The UK exported around 530 000 tonnes annually of food use commodities on average between 1989 and 1998. Exports were increasing fast at the beginning of the decade but slowed down since 1993. Fresh fish is the main commodity exported representing nearly 60 percent of total exports on average. It has been steadily increasing since its 1995 level of 310 000 tonnes to reach 380 000 tonnes in 1998. Second with nearly 70 000 tonnes and 13 percent of total exports come frozen fish, followed by crustaceans with 55 000 tonnes.

Table 376: United Kingdom - FU Commodities Exports by OECD group of products 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Cephalopods	2038	2187	1837	1329	3020	3170	4125	10264	6634	7440	4204
Crus., mol. & other aquatic inv., prepared	346	668	469	695	1348	2636	1015	950	688	452	927
Crustaceans	38998	45936	49965	46836	45813	61403	59396	62838	59458	76288	54693
Fish, cured	8881	7877	9638	9176	11489	16540	16807	14663	12356	12277	11970
Fish, fillets	10958	12281	15240	18557	25651	32314	30554	23271	22506	32057	22339
Fish, fresh/chilled	211738	204308	314569	340489	344542	323728	315723	310065	356613	376502	309828
Fish, frozen	45022	52046	24491	132320	79364	85073	94392	49287	52967	64626	67959
Molluscs	19651	19799	31017	26458	18152	19363	19576	24974	28024	29302	23632
Prepared/preserved fish	19098	18137	20911	19102	37389	47698	43219	49191	45671	68793	36921
Total FU Exports	356731	363238	468138	594962	566768	591924	584809	545502	584917	667737	532473

Source: database

The main species exported from the UK are made of small pelagic fish which represented 250 000 tonnes per year and nearly 50 percent of all exports on average between 1989 and 1998. The most

common species in this group are Atlantic herring, Atlantic mackerel, jack and horse mackerel. Demersal species represent 20 percent on average of exports and the main species are blue whiting, sandlance, plaice and anglerfish. Next in rank come crustaceans with species such as shrimps and crabs, followed by diadromous fish, with salmon in first place.

Table 377: United Kingdom - FU Commodities Exports by FAO group of species 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Av. 89-98
Freshwater fish	460	688	2367	4046	724	860	1052	666	473	995	1233
Diadromous fish	17553	18525	23728	20780	28247	38147	35034	39618	42728	50586	31495
Marine fish, pelagic, tunas	1480	1475	1955	1541	3250	3241	2984	3730	5189	26005	5085
Marine fish, pelagic, small	156173	161567	236464	345399	318147	286414	275786	194549	223176	250403	244808
Marine fish, demersal	70177	64661	69101	93106	109632	127476	134332	144750	160242	168780	114226
Marine fish, others	49854	47734	51235	54772	38434	49214	51509	63163	58305	57485	52171
Crustaceans	38998	45936	49965	46836	45813	61403	59396	62838	59458	76288	54693
Molluscs	19948	20101	31331	26993	19314	20955	20292	25672	28278	29534	24242
Cephalopods	2038	2187	1837	1329	3020	3170	4125	10264	6634	7440	4204
Aquatic animals	50	365	156	160	187	1043	300	252	433	220	317
Total FU Export	356731	363238	468138	594962	566768	591924	584809	545502	584917	667737	532473

Source: database

Distribution

In 1997, distribution of fish products was dominated by supermarkets, which accounted for nearly 60 percent of the market (Papageorgiou and Girard, 2000). The increasing dominance of the supermarket chains is particularly pronounced in the sales of fresh and frozen products where their share has almost quadrupled since the 1980s (Young & Smith, 1999). The largest swing of the market share for fresh fish has, in fact, been from fishmongers to the major retailers and supermarkets and there is little to suggest that the major retailers will not increase their dominance in the future (Sheal et al, 1998). Despite the rising number of wet fish counters in supermarkets, the overall sale of wet fish in loose form is declining as sales of pre-packed forms continue to increase (Anon., 1999i).

Overall, 55 percent of seafood is obtained from retail outlets and eaten at home, the remaining 45 percent is eaten out of home and is obtained from restaurants or take-away outlets. The UK catering sector represents a significant outlet for UK fisheries products and is made up by an excess of 200 000 individual outlets (Failler *et al.*, 1999) and by the traditionally popular fish fryers, which provide approximately 30 percent of UK fish consumption away from the home (CFCE, 1998). Take-away meals have grown in popularity rising from 600 million meals in 1992 to 820 million meals in 1997. In addition, home delivered meals have increased dramatically in popularity over this period from 50 million meals to 155 million meals. Clearly, working families and the perceived shortage of time to prepare more traditional meals has increased the demand for convenience foods in the UK (Young & Muir, 1999).

In terms of the supply chain, primary processors (those concentrating on trimming and filleting) continue to buy the majority of their fresh product through the auction system, while secondary processors rely increasingly on direct imports to supplement supplies from primary processors (Sheal *et al.*, 1999). However, the system of direct contracting operated by the larger retailers has expanded recently from established pelagic fish, shellfish and frozen whitefish sectors to now include the direct sale of fresh fish (Young & Smith, 1999). Other new forms of contract are emerging, and in 1999 one of the largest retailers forged direct contracts with vessel skippers for the first time (Anon., 1999i).

In recent years, primary processors have recognised the need to diversify and enter into the value-added market and so have attempted to expand their activities into some secondary processing. The result has been a growth in the secondary processing sector as demand from the processors' customers, such as supermarkets and ultimately consumers, increased (Sheal *et al.*, 1999). Recent projections by the Sea Fish Industry Authority suggest that this trend will continue in the near future, with increasing

activity in the secondary processing sub-sector but decline in the primary processing industry (Anon., 1999i).

In summary, the processing and distribution network within the UK has had to adapt to increasing pressure from foreign competition and limited supplies of raw products over the last 10-15 years. Consolidation has resulted in the disappearance of smaller and less efficient companies as fewer and larger concerns have managed to create an efficient and cost-effective sector. The processing and distribution network has generally adapted successfully and now provides a wide range of popular and innovative products to the domestic and foreign market (Anon., 1998d). As with the sector in all other major processing and trading countries in the EU, the main concern for the industry is the continued and reliable sourcing of good quality raw product (Sea Fish Industry Authority, 1999b).

Food use net supply and consumption

The UK could theoretically be self-sufficient with respect to seafood but the consumer's preference is for a very narrow range of species and products, some of which must be obtained through imports or foreign waters (Agriculture Committee, 1999). The demand for cod, for instance, which represents one quarter of global supply, outstrips UK production by five times and as much as 70 percent of supermarket sales comprise just five species (cod, haddock, plaice, salmon and trout). Between 1989 and 1998, net supply was approximately 1.3 Mt. Fish fillets are the main commodities consumed in the UK with 580 000 tonnes on average, representing nearly 50 percent of total commodities consumption. Consumption of these commodities has been increasing over the last decade from its 1989 level of 475 000 tonnes to reach 730 000 tonnes in 1998. Second in importance come frozen fish with 250 000 tonnes and 20 percent of food use net supply, followed by prepared/preserved commodities with 150 000 tonnes a year on average on the period 1989/1998.

Table 378: United Kingdom - FU net supply by OECD group of commodities 1989-1998 (tonne live weight)

Gp of commodities	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Cephalopods	1466	738	1112	1621	887	1619	475	165	953	2155	1119
Crus., mol. & other aquatic inv., prepared	3687	3875	3288	3040	1243	570	1537	2213	2731	3796	2598
Crustaceans	65346	100589	104266	100140	96869	96691	93485	69188	76570	89073	89222
Fish, cured	94688	75494	80207	65843	65997	60044	56906	79797	87439	106889	77331
Fish, fillets	475652	496908	545809	541051	579657	556749	556028	641738	667460	729604	579066
Fish, fresh/chilled	165641	158059	99573	44371	74223	70591	68161	92888	83956	52335	90980
Fish, frozen	242530	207273	293957	297907	286269	249751	239785	249174	232630	247786	254706
Molluscs	60994	56664	24791	16656	21657	16054	14904	17580	23757	27722	28078
Prepared/preserved fish	144138	139235	153475	162621	153277	142993	143864	156084	177090	166548	153933
Total FU net supply	1254143	1238835	1306479	1233248	1280080	1195062	1175147	1308829	1352586	1425908	1277032

Source: database

Demersal fish account for around 50 percent of the net supply with 530 000 tonnes on average, cod and haddock being the two major species. Small pelagic fish should come second, but available data do not reflect it clearly as unidentified fish under the grouping marine fish others account for a very large share of the total.

Table 379: United Kingdom - FU net supply by FAO group of species 1989-1998 (tonne live weight)

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Freshwater fish	4121	6623	3579	4288	8335	9494	10617	12570	11595	14175	8540
Diadromous fish	57129	66688	65074	67498	53665	59269	41682	56700	53917	42731	56435
Marine fish, pelagic, tunas	68324	61002	76539	78694	77920	79322	91530	95728	107734	94428	83122
Marine fish, pelagic, small	61842	51810	29260	34421	5110	896	17826	22793	5645	2949	23255
Marine fish, demersal	539568	550100	504709	492995	509306	499995	465070	571278	554025	611067	529811
Marine fish, others	391666	340748	493861	433896	505086	431151	438020	460615	515660	537813	454851
Crustaceans	65346	100589	104266	100140	96869	96691	93485	69188	76570	89073	89222
Molluscs	64378	60146	27998	19520	22715	16621	15660	19156	26206	30897	30330
Cephalopods	1466	738	1112	1621	887	1619	475	165	953	2155	1119

Gp Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Ave. 89-98
Aquatic animals	303	393	81	176	185	3	782	638	282	621	346
FU net supply	1254143	1238835	1306479	1233248	1280080	1195062	1175147	1308829	1352586	1425908	1277032

Source: database

Consumption per capita per year was around 24 kg in 1998 and household expenditure for fishery products accounted for approximately 5 percent of the total allocated for food consumption.

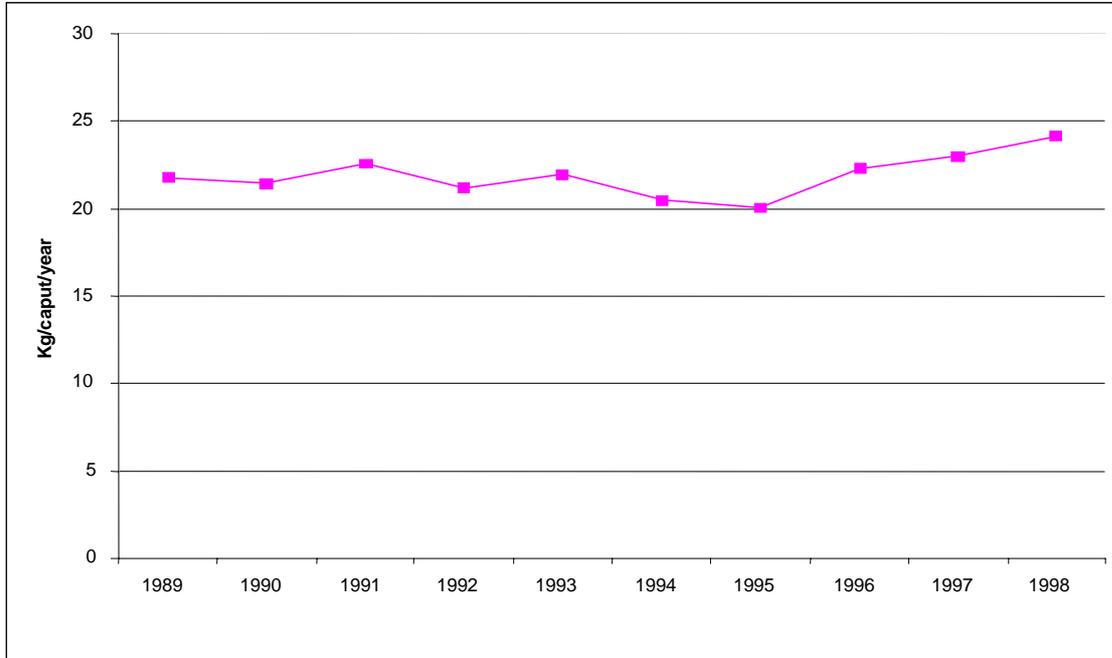


Figure 69: Fish consumption per capita per year in the United Kingdom 1989-1998

Total UK fish sales increased during 1989-1998 and although the British consumer has generally been regarded as conservative with respect to seafood, hygiene and health incidents such as the BSE crisis (bovine spongiform encephalitis) attracted consumers to alternative products and new species. This crisis also increased the number of vegetarian consumers and now 3 million people (4.5 percent of the population but 12 percent of those less 18 years old) are vegetarian and 4 million have stopped consuming red mea (Fofana, 2000). In addition, the popularity of fish appears to be age-specific and people between 55-74 years old consume approximately twice the amount of fish as those under 34 years old (CFCE, 1998). Although this seems to reflect an aversion to the preparation of fish meals by the young, consumption in the UK has remained strong and steady over the last decade as the public health concerns have increased demand despite increasing prices of whitefish. To some extent, this increased demand can be attributed to aggressive publicity and marketing by the national seafood industry but, as in most EU countries, this had been accompanied by an increasing concern for health and diet issues such as BSE in recent years. Several of the large supermarket stores are hoping to consolidate sales of salmon and trout in the future by creating a niche market for organically-reared products (Anon., 1998i and 1999j).

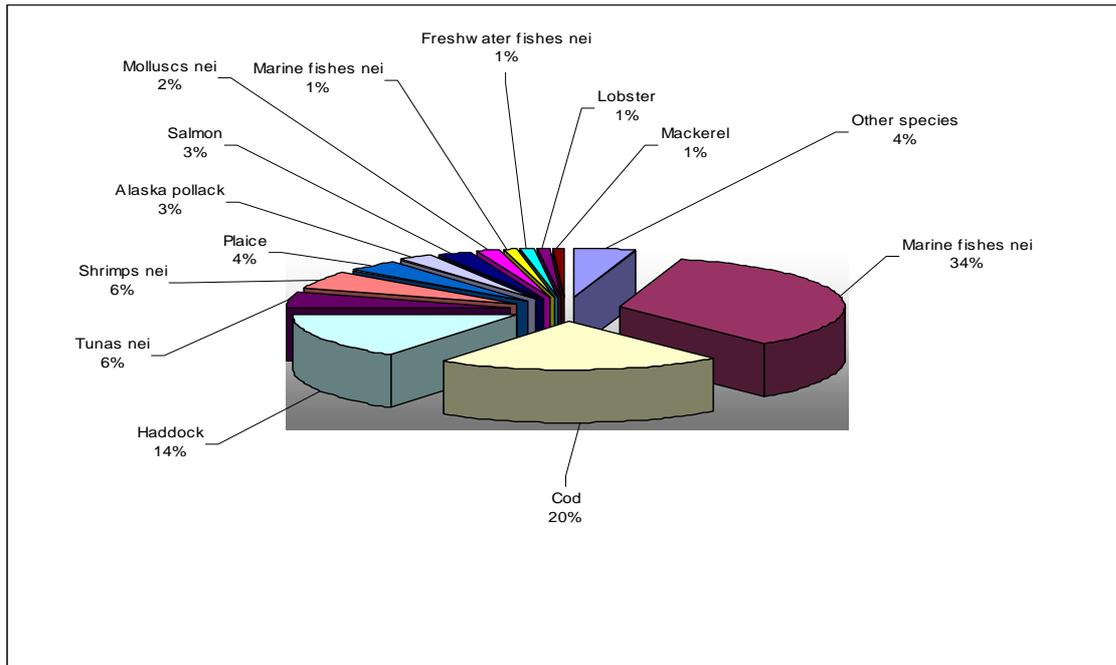


Figure 70: The United Kingdom - Main species consumed in 1998

Assumptions for projection 2005-2030 and main results

As specified in the methodology section (see Part1 of the study), assumptions were made on the consumption trends of the OECD group of products. Further assumptions were made regarding production, imports and exports and the UK's need for fish in 2005 up to 2030 by taking into account and extrapolating previous trends.

Consumption assumptions for the period 2005/2030 in the UK involve:

An increase in demand for cephalopods and prepared crustaceans (+100 percent), as well as an increase in consumption of molluscs (20 percent) and prepared/preserved products (25 percent), reflecting the trend towards convenience meals.

A lesser increase in cured fish and fish fillets consumption (10 percent and 5 percent respectively).

Stagnation of the consumption of crustaceans and cephalopods commodities, while both fresh and frozen products see their demand decrease by 10 percent and 5 percent respectively.

The main feature affecting seafood consumption in the UK is the trend toward convenience foods with consumers seeking more easy-to-eat products to fit with their increasingly busy lives (Broomfield, 2003). This is reflected here in the increase in demand for preserved/prepared products, prepared crustaceans and molluscs, cured fish and fish fillets. Also, this trend towards food on the move is expected to affect negatively home consumption to the benefit of restaurants and catering outlet, an already important seafood retail channel with 45 percent of seafood sales over the last decade Failler *et al.*, 1999).

Seafood consumption is also positively influenced in the UK by the tendency of the British consumer to look for healthy and safe products, mostly as a reaction to food scares such as BSE and foot and mouth crises (CFCE, 1998).

Furthermore, the increasing share of supermarkets in the seafood retail sector (75 percent of fresh fish sales in 2002 and 93 percent of frozen fish (CFCE, 2002)) is likely to influence seafood consumption

positively by increasing the availability and diversity of products and ensuring low prices and health and hygienic standards.

In addition, restaurants and pubs are reported to be including more and more seafood products in their menu, which will positively impact seafood consumption, as restaurants and catering represented 38 percent of UK seafood sales in 1999 (CFCE, 2002).

Table 380: United Kingdom - Assumption for projection

OECD group	94-98%	annual %	Prod T % 99-30	Imp T % 99-30	Exp T % 99-30	Cons T % 99-30	T Prod Annual	% Imp Annual	% Exp Annual	Cons Annual	% Annual
Cephalopods	42%	8%	0%	0%	0%	0%		0.0%	0.0%	0.0%	
Crus., mol. & other aquatic inv., prepared	334%	67%	0%	89%	0%	100%		2.0%	0.0%	2.2%	
Crustaceans	-6%	-1%	0%	0%	0%	0%	0.0%	0.0%	0.0%	0.0%	
Fish, cured	43%	9%	0%	130%	0%	5%	0.0%	2.6%	0.0%	0.2%	
Fish, fillets	13%	3%	0%	36%	0%	10%	0.0%	1.0%	0.0%	0.3%	
Fish, fresh/chilled	-127%	-25%	5%	0%	4%	-10%	0.2%	0.0%	0.1%	-0.3%	
Fish, frozen	-36%	-7%	5%	0%	23%	-5%	0.2%	0.0%	0.6%	-0.2%	
Molluscs	192%	38%	10%	9%	0%	20%	0.3%	0.3%	0.0%	0.6%	
Prepared/preserved fish	5%	1%	0%	22%	0%	25%	0.0%	0.6%	0.0%	0.7%	
Fish/marine mammal, fat, oil	-94%	-19%	0%	0%	0%		0.0%	0.0%	0.0%	0.0%	
Flour, meal unfit for hum. Cons.	-11%	-2%	0%	0%	0%		0.0%	0.0%	0.0%	0.0%	

Source: database

Total fish production will increase thanks to a rise in aquaculture production, as capture fisheries stagnate. As a whole, net supply will rise and domestic production will not be able to cope with this increased demand, which will drive imports up. The decrease in consumption of some products (fresh and frozen) will enable some surplus to be spared for the export market, as domestic production of these two commodities continues to rise, which will drive UK exports up during the period considered. The UK non-food use market will not experience significant changes according to the results of the projection

Table 381: United Kingdom - Main results for projection

Nature	Average 94-98	2005	2010	2015	2020	2025	2030
Exports FU (t live wt)		594978	673975	678532	683177	687912	692739
Imports FU (t live wt)		742943	808445	826942	846328	866657	887985
Production FU (t live wt)		1143541	1316200	1320897	1325636	1330417	1335239
Fish supply FU (t live wt)		1291507	1450670	1469306	1488787	1509162	1530485
Population (X1000)		58689	59703	60146	60590	61038	61489
Per caput supply (kg/h)		22	24	24	25	25	25
Production NFU (t live wt)		210145	159657	159657	159657	159657	159657
Imports NFU (t live wt)		595119	455631	455631	455631	455631	455631
Exports NFU (t live wt)		73169	57010	57010	57010	57010	57010
Net supply NFU (t live wt)		732094	558278	558278	558278	558278	558278
Aquaculture (t live wt)		111302	146301	153155	160459	168241	176535
Capture (t live wt)		900046	900046	900046	900046	900046	900046
Production total (t live wt)		1011348	1046347	1053201	1060505	1068287	1076581

Source: database

Food use net supply and human consumption 2005-2030

British food use net supply will increase only slowly, as the increase triggered by the rise in imports and production of food use commodities is compensated by an increase in exports. The UK food use net supply will reach 1.5 Mt by 2030. Demand for fresh and frozen fish will decrease, while prepared molluscs, prepared/preserved commodities and raw molluscs will experience an increase in consumption. Fish filets and cured fish products will also increase their share of the British market but by lesser amounts.

The decrease in fresh fish consumption can be explained by the fact that, in most EU states in northern Europe (and to a lesser extent in the South), there is a growing trend towards the consumption of secondary processed products, especially value added items such as ready meals and “food on the move” products (Anon., 2001c). With consumers seeking more convenience foods to fit with their increasingly busy lives, the UK ready meals market for all food types has achieved strong growth over the last decade and since 1997 the market rose by 27 percent in value to reach £1.7 billion in 2001 (Broomfield, 2003).

Table 382: United Kingdom - FU net supply by OECD group of commodities 2005-2030 (tonne live weight)

Gp of commodities	Ave. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	1073	2155	2155	2155	2155	2155	2155
Crus., mol. & other aquatic inv., prepared	2169	4431	4941	5505	6128	6817	7577
Crustaceans	85001	89073	89073	89073	89073	89073	89073
Fish, cured	78215	107744	108457	109269	110194	111247	112447
Fish, fillets	630316	744181	755210	766782	778923	791662	805028
Fish, fresh/chilled	73586	52339	52346	52356	52370	52388	52410
Fish, frozen	243825	247039	246435	245771	245043	244250	243390
Molluscs	20004	28905	29766	30639	31524	32423	33336
Prepared/preserved fish	157316	174803	180924	187238	193751	200470	207401
Total FU net supply	1291507	1450670	1469306	1488787	1509162	1530485	1552815

Source: database

As the changes mentioned above are not species specific but affect all groups of species, the general trend of the net supply will be reflected by increases in all groups of fish species.

Table 383: United Kingdom - FU net supply by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2000	2005	2010	2015	2020	2025	2030
Freshwater fish	11690	14189	14225	14262	14301	14341	14384	14429
Diadromous fish	50860	43035	43820	44642	45504	46406	47352	48344
Marine fish, pelagic, tunas	93748	95904	99676	103568	107583	111727	116003	120415
Marine fish, pelagic, small	10022	2592	1693	782	137	1062	1988	2912
Marine fish, demersal	540287	614731	624237	634255	644811	655936	667659	680012
Marine fish, others	476652	539125	542456	545863	549353	552932	556607	560387
Crustaceans	85001	89073	89073	89073	89073	89073	89073	89073
Molluscs	21708	31371	32589	33859	35184	36570	38021	39543
Cephalopods	1073	2155	2155	2155	2155	2155	2155	2155
Aquatic animals	465	655	747	848	959	1083	1219	1370
FU net supply	1291507	1432830	1450670	1469306	1488787	1509162	1530485	1552815

Source: database

As the British population will grow less during the period considered (+5 percent) than will the net supply (+9 percent), consumption per capita will increase in the UK to reach 25 kg per capita per year by 2030.

The UK market is becoming progressively younger with purchases within the 27-44 age bracket increasing by the greatest amount over the past three years. Much of this success is due to the rising popularity of value added products. These products are of course readily available at the major supermarkets chains, which have been increasing their market share of seafood year on year (Broomfield, 2003).

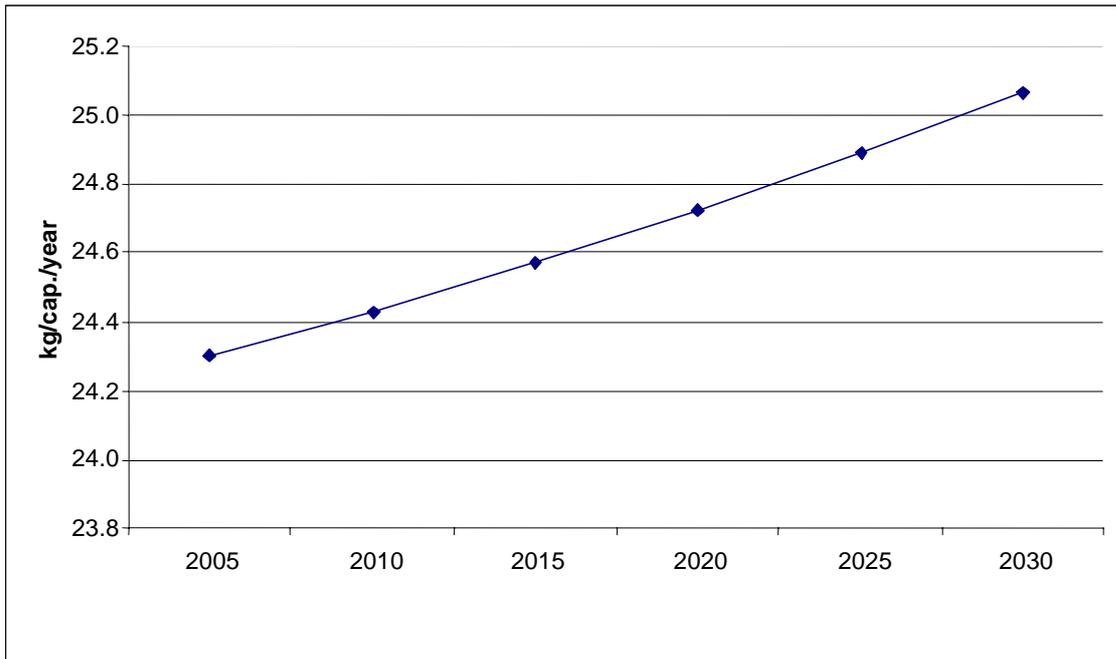


Figure 71: Fish consumption per capita per year in the United Kingdom 2005-2030

Cod increases its lead by a point as the main species consumed in the UK. Consumption of shrimps and mackerel decrease slightly, while tuna rises also by one percent.

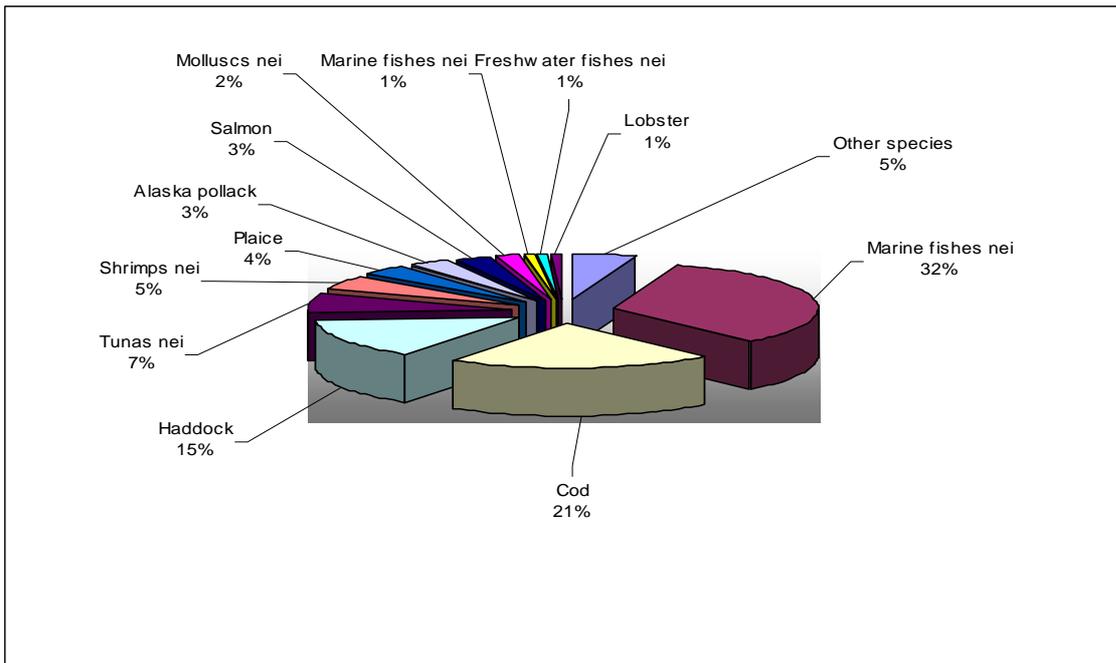


Figure 72: United Kingdom - Main species consumed in 2030

Non-food use net supply 2005-2030

The UK non-food use net supply is not expected to change until 2030, as imports, exports and production of non-food use commodities stagnate. Net supply will thus remain stable around its 1998 level of 560 000 tonnes.

Production 2005-2030

Capture and aquaculture

Aquaculture production will increase by nearly 30 percent to reach 185 000 tonnes by 2030. Mollusc production will be the more active sector with an increase of nearly 60%. Diadromous fish will also increase but at a slower pace. Total increase for diadromous on the period will be around 25%.

Table 384: United Kingdom - Aquaculture by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	56	0	0	0	0	0	0
Diadromous fish	102057	134942	140635	146645	152989	159683	166744
Molluscs	9189	11358	12520	13814	15253	16852	18628
Total gp of species	111302	146301	153155	160459	168241	176535	185373

Source: database

Species affected by an increase in production are farmed species, as capture production remain stable. As for diadromous fish, the increase in salmon production will be compensated by a decrease in rainbow trout production. Blue mussels and Pacific cupped oyster will be the two most important species of molluscs that will see their output rise in the UK.

Table 385: United Kingdom - Total production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Ave. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	65	8	8	8	8	8	8
Diadromous fish	104199	137084	142776	148786	155130	161824	168886
Marine fish, pelagic, tunas	200	200	200	200	200	200	200
Marine fish, pelagic, small	352855	352855	352855	352855	352855	352855	352855
Marine fish, demersal	402360	402360	402360	402360	402360	402360	402360
Marine fish, others	4563	4563	4563	4563	4563	4563	4563
Crustaceans	57170	57170	57170	57170	57170	57170	57170
Molluscs	72906	75076	76237	77531	78970	80569	82346
Cephalopods	8806	8806	8806	8806	8806	8806	8806
Others	8225	8225	8225	8225	8225	8225	8225
Total gp of species	1011348	1046347	1053201	1060505	1068287	1076581	1085419

Source: database

Commodities

Food use commodities production will increase slightly in the UK between 2005 and 2030, with a total growth of around 2%. Molluscs, fresh fish and frozen fish production will rise slowly while the rest of the commodities remain at their 1998 level.

The major evolution of the sector will be an intensification of the concentration process already experienced in the nineties, especially due to the increasing dominance of supermarkets in retail fish sales, as their requirements (volume, packaging, health and safety regulation, pricing policies) are met with difficulty by small processors (Guillotreau and Le Grel, 2001; Antle, 1999).

Table 386: United Kingdom - FU Commodities Production by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Crustaceans	37264	32861	32861	32861	32861	32861	32861
Fish, cured	88547	114891	114891	114891	114891	114891	114891
Fish, fillets	453368	552150	552150	552150	552150	552150	552150
Fish, fresh/chilled	277061	305936	308277	310636	313013	315409	317822
Fish, frozen	213858	211592	213211	214843	216487	218144	219813
Molluscs	36600	49124	49861	50609	51369	52139	52922
Prepared/preserved fish	36843	49646	49646	49646	49646	49646	49646
Total FU Production	1143541	1316200	1320897	1325636	1330417	1335239	1340105

Source: database

As the increase in production in certain commodities will not be really significant, it will not have much impact on the relative share of the species used in the UK processing industry. Demersal fish remain the primary group of species used in commodities production, with cod and haddock accounting for more than 70 percent of the production within this group.

Table 387: United Kingdom - FU Commodities Production by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	840	560	564	568	573	577	582
Diadromous fish	33313	39979	39980	39980	39980	39981	39981
Marine fish, pelagic, small	208745	211827	213056	214295	215544	216802	218070
Marine fish, demersal	332550	419668	419759	419850	419943	420036	420130
Marine fish, others	494228	562181	564816	567471	570147	572843	575559
Crustaceans	37264	32861	32861	32861	32861	32861	32861
Molluscs	36600	49124	49861	50609	51369	52139	52922
Total FU Production	1143541	1316200	1320897	1325636	1330417	1335239	1340105

Source: database

Trade 2005-2030

Imports

The UK food use commodities imports will increase between 2005 and 2030 by more than 10 percent to reach 910 000 tonnes at the end of the period. Imports increase both to answer domestic demand and to fuel domestic production. Cured fish products (mainly smoked, salted or dried products) will experience the biggest rise during the period, as imported quantities will have doubled by 2030. Prepared molluscs imports will also increase significantly, while fish fillets, prepared/preserved products and fresh molluscs will rise more slowly. Other commodities imports will remain stable. Still, the main commodities imported into the UK remain fish fillets, followed by fresh fish and crustaceans.

Table 388: United Kingdom - FU Commodities Imports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	7400	9595	9595	9595	9595	9595	9595
Crus., mol. & other aquatic inv., prepared	3318	4883	5394	5958	6581	7269	8029
Crustaceans	111614	132500	132500	132500	132500	132500	132500
Fish, cured	4197	5130	5843	6655	7580	8633	9833
Fish, fillets	205088	224088	235117	246689	258830	271569	284935
Fish, fresh/chilled	133052	126150	126150	126150	126150	126150	126150
Fish, frozen	99237	103066	103066	103066	103066	103066	103066
Molluscs	7652	9083	9206	9331	9458	9586	9716
Prepared/preserved fish	171387	193951	200072	206386	212899	219618	226548
Total FU Imports	742943	808445	826942	846328	866657	887985	910371

Source: database

The main species affected by the rise in UK imports during the period 2005/2030 are: tunas and bonitos for large pelagic species; sardines, mackerels and herring for small pelagic species; cod, pollock and haddock for demersal species; and mussel for molluscs.

Table 389: United Kingdom - FU Commodities Imports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	11659	14666	14702	14741	14782	14825	14869
Diadromous fish	58769	54801	55893	57026	58203	59426	60697
Marine fish, pelagic, tunas	101978	125683	129577	133595	137740	142018	146432
Marine fish, pelagic, small	47342	44439	45361	46337	47373	48473	49645
Marine fish, demersal	354853	374766	385718	397220	409299	421987	435317

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Marine fish, others	38359	38029	38996	40026	41128	42307	43572
Crustaceans	111614	132500	132500	132500	132500	132500	132500
Molluscs	10055	12999	13532	14109	14735	15415	16155
Cephalopods	7400	9595	9595	9595	9595	9595	9595
Aquatic animals	915	967	1068	1180	1303	1439	1590
Total FU Import	742943	808445	826942	846328	866657	887985	910371

Source: database

Exports

British food use commodities exports will rise slightly to reach nearly 700 000 tonnes by 2030. This rise will be induced by two commodities only, namely frozen and fresh fish. Small surpluses of these products will be available to the export market as their national demand will decrease while national production continues to increase between 2005 and 2030. As the other commodities remain stable, frozen fish will become the second largest food use commodities among British fish exports by 2030, while fresh fish continues its generous lead.

Table 390: United Kingdom - FU Commodities Exports by OECD group of products 2005-2030 (tonne live weight)

Gp of commodities	Av. 94-98	2005	2010	2015	2020	2025	2030
Cephalopods	6327	7440	7440	7440	7440	7440	7440
Crus., mol. & other aquatic inv., prepared	1148	452	452	452	452	452	452
Crustaceans	63877	76288	76288	76288	76288	76288	76288
Fish, cured	14529	12277	12277	12277	12277	12277	12277
Fish, fillets	28140	32057	32057	32057	32057	32057	32057
Fish, fresh/chilled	336526	379746	382081	384429	386793	389170	391562
Fish, frozen	69269	67619	69842	72138	74510	76959	79490
Molluscs	24248	29302	29302	29302	29302	29302	29302
Prepared/preserved fish	50914	68793	68793	68793	68793	68793	68793
Total FU Exports	594978	673975	678532	683177	687912	692739	697661

Source: database

Only fish species found in fresh or frozen form will thus be affected by this rise in exports. This will concern mostly salmon for diadromous fish; mackerel and herring for small pelagic species; and blue whiting, plaice, ling and megrim for demersal species.

Table 391: United Kingdom - FU Commodities Exports by FAO group of species 2005-2030 (tonne live weight)

Gp Species	Av. 94-98	2005	2010	2015	2020	2025	2030
Freshwater fish	809	1001	1005	1009	1013	1018	1022
Diadromous fish	41223	50960	51230	51502	51777	52054	52334
Marine fish, pelagic, tunas	8230	26007	26009	26011	26013	26015	26017
Marine fish, pelagic, small	246066	254574	257636	260770	263978	267263	270627
Marine fish, demersal	147116	170197	171222	172258	173306	174364	175434
Marine fish, others	55935	57754	57948	58144	58342	58542	58745
Crustaceans	63877	76288	76288	76288	76288	76288	76288
Molluscs	24946	29534	29534	29534	29534	29534	29534
Cephalopods	6327	7440	7440	7440	7440	7440	7440
Aquatic animals	450	220	220	220	220	220	220
Total FU Export	594978	673975	678532	683177	687912	692739	697661

Source: database