3 MAIN RESULTS FOR 2015 AND 2030

Projections relating to the net supply, consumption per capita, imports, exports, production intended for human and non-human consumption are presented below. Tables and figures presented are compiled from national tables (a synthesis table of results is presented in Annex 7). The projections include those countries that may join the European Union.

A presentation of the trends, over the period 1989-1998, related to consumption, production and trade is available in Annex 5.

3.1 Consumption 2005–2030

European consumption will be characterized by three important factors over the next 30 years. The first is concerned with changing consumption habits (paralleled by the predominance of supermarkets in the retailing sector), the second deals with ecological concerns, and the third relates to the improvement in the quality of the fish processing industry.

3.1.1 Changes in consumption habits and predominance of supermarkets

Although in terms of volume traditional products continue to be dominant, it is convenience meals and products with sea-fresh appeal that are easy to prepare and eat that are gaining ground. In addition to adapting seafood products to increase their appeal as a normal, easy inclusion in everyday diet, the consumption of seafood in restaurants, hotels and other catering establishments has also increased (Anon., 1990; Backman, 1996).

European consumers are increasingly looking to purchase good quality portion-size fish, boneless, skinless and, if possible, odourless fish fillets, steaks, prawns and other products that are quick and easy to prepare (Richardson, 2002). The profile of the type of product that most retail multiples and their suppliers are aiming to sell in the future is ready-to-cook, partly-cooked or even ready-to-eat dishes with cooking instructions, a serving suggestion and perhaps even a sauce. Although convenience costs money, consumers are increasingly willing (and able) to pay a little extra for that convenience. Time saving, but healthy, nutritious and mess-free dishes are the current trend. Preparing whole fish (and the blood and guts that entails) is a thing of the past.

Most European countries generate well over half of their total seafood turnover through supermarket sales, with the UK, France and Germany selling in excess of 70 percent through retail multiples (Anon., 1999b). Not only do retail multiples rule the domestic seafood market, but through acquisitions, take-overs and mergers, many are now also in a position to command the European market as a single entity. Retail multiples need a steady supply of uniform quality product; it must not be forgotten that their mission is to provide the right product at the right price, week-in and week-out.

3.1.2 Organic concerns

The European demand for organic proteins of all kinds has grown quite dramatically over the last decade. Much of the impetus has come on the back of "food scares", particularly BSE. Indeed, there has been an overall rise in the degree to which consumer choice is dictated by consideration of health benefits, food safety, environmental and animal welfare concerns

(Lappalainen *et al.*, 1998). On all of these counts, organic food scores high. Although consumer attitudes to organic fruit, vegetables, dairy produce and meat are reasonably well documented, there has been less work done on attitudes to organic fish. Such studies as exist indicate that consumers are confused by the concept of "organic" as applied to fish (Cameron *et al.*, 2002).

Much of this confusion stems from the fact that many consumers are unaware that the salmon they buy from the supermarket is farmed. The distinctions between "organic", "natural" and "wild" remain blurred in the shopper's mind. Further potential confusion - for both consumers and producers - arises from the plethora of organic standards within Europe, and the fact that other production standards (e.g. Label Rouge in France) may seem to offer similar guarantees of high quality and good standards of husbandry (International Consumer Research and Testing Ltd. 1995).

At present, organic salmon production contributes a small fraction of the total in both Scotland and Ireland; in Norway, it is practically non-existent, in France it is in its infancy. Producers feel that there is scope for a steady increase in the market for organic fish, and are confident that demand will continue to outstrip supply (Anon., 1998b). However, the switch to organic production is a long, costly and potentially risky business and it is hampered by the drop in productivity needed to meet organic standards (a significant aspect in all organic production practices is the issue of transition from the "traditional" practice to organic production), the high cost of certification and the lack of regulation of private certification bodies (Charles and Paquotte, 1998). If common and transparent standards, based on sound science, are introduced, the future could be bright in some selected markets (EIFAC, 2001).

3.1.3 Quality improvement

Doubts about intensive farming methods have over the recent period resulted in consumers being ready to pay more for quality products. There is a much better chance of getting products accepted by the consumer, even at high prices. People are beginning to realize that the emphasis on very cheap food products cannot continue, creating more opportunities for quality products (Honkanen *et al.*, 1997; Ilbery and Kneafsey, 2000).

This assertion is currently leading the fishing industry to promote worldwide consumption of high quality seafood products at the retail and catering levels. Quality will be the leitmotiv of the processing industry. To achieve this, frank communication and sincere cooperation between boat-owners (upstream industry), packers (midstream industry) and marketers (downstream industry) are the first steps. Better information and a wider range of products free of any chemicals or genetic modification (GM) will satisfy consumers.

The processing industry is setting up some strategy to improve fish quality from capture to the consumers’ plate. In return for efforts made toward better quality fish, consumers will pay premium prices for these quality fish - a win-win situation for both parties. Therefore, the mission of the industry should be to ensure good catching practices and uphold a principle that only good quality fish should be delivered to packers, instead of primarily focusing on

limiting the supply of fish, or fixing fish selling prices[20]. From the industry point of view, a quality product is the only key to boosting consumers' consumption of products.

3.1.4 Consumption per capita 2005-2030

Consumption per capita represents the total apparent consumption divided by the number of inhabitants of a country. The consumption can be made at home or outside, mainly through the gathering. The consumption per capita is an indicator of the overall consumption, but it doesn't reflect internal changes in fish consumption. For example, in Spain, the current consumption per capita is decreasing due to the diminution of frozen fish while the consumption of prepared/preserved is going up. Consumption patterns will be as follow for the EUR-28 countries:

- Increasing: Austria, Belgium-Luxembourg, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, United Kingdom, Czech Republic, Hungary, Poland, Slovenia, Bulgaria, Latvia, Lithuania, Malta, Romania and Slovakia;
- Decreasing: Ireland, Portugal, Spain, Sweden, Cyprus, Estonia, and Norway.

[20] Packers should also take initiatives to make sure that the total-quality concept is addressed in all steps of their production processes in order to provide the quality products desired by the market. Packers and marketers/ distributors should work closely together to create higher quality and value-added seafood products, as well as innovations. These premium products should enhance the market demand for seafood products.

Table 3-1: Consumption per capita for all EUR-28 countries from 2005 to 2030

(kg/caput/year)

	Av. 94-98	2005	2010	2015	2020	2025	2030	% 98-30	# 98-30
Austria	11	11	11	12	12	12	13	17	2
Belgium-Luxembourg	22	22	22	23	23	23	24	9	2
Denmark	24	24	25	26	27	28	29	24	6
Finland	34	34	35	35	36	36	37	8	3
France	31	32	32	32	32	33	33	4	1
Germany	13	15	15	16	16	17	18	23	3
Greece	26	26	26	26	27	27	27	3	1
Ireland	21	21	21	21	21	21	20	-5	-1
Italy	23	24	25	26	27	28	29	24	6
Netherlands	16	15	15	15	15	16	16	6	1
Portugal	61	60	59	59	58	58	57	-7	-4
Spain	41	40	39	39	39	39	39	-5	-2
Sweden	27	28	28	27	27	27	27	-5	-2
United Kingdom	22	24	24	25	25	25	25	4	1
EU-15 Average	**24**	**26**	**26**	**26**	**26**	**27**	**27**	**6**	**2**
Cyprus	22	25	24	24	23	23	23	-10	-2
Czech Republic	9	10	10	11	11	12	13	42	4
Estonia	21	14	14	14	14	14	14	-5	-1
Hungary	4	5	5	5	5	6	6	42	2
Poland	12	12	13	13	14	15	16	41	5
Slovenia	7	7	7	8	8	8	9	34	2
EUR-6 Nc Average	**10**	**10**	**11**	**12**	**12**	**13**	**14**	**41**	**4**
Bulgaria	3	5	5	6	6	7	7	60	3
Latvia	41	37	37	38	38	38	39	4	2
Lithuania	18	17	19	21	23	25	27	81	12
Malta	27	30	31	32	33	34	36	24	7
Norway	46	46	45	45	45	45	45	-3	-1
Romania	3	3	4	4	4	5	5	58	2
Slovakia	7	6	6	7	7	8	8	55	3
EUR-7 NC Average	**11**	**11**	**11**	**12**	**12**	**13**	**13**	**1**	**0**
EUR-28 Average	**21**	**22**	**22**	**23**	**23**	**24**	**24**	**9**	**2**

Source: database

The general consumption trend for EU-15 countries shows a rise in the consumption of seafood products (Anon., 1993; GLOBEFISH, 1995; Eurostat, 1998; Laureti, 1999; Anon. 2001h). This increase is largely due to the rise in the consumption of convenience products, reflecting that consumers have less time available for preparing meals. Frozen products trend downward, whilst the consumption of fresh fish is stagnant or decreasing. The growing dominance of supermarkets in the retail of seafood products increases their availability and

hence consumption. In addition, the growing emphasis on healthy eating, triggered in part by various food crises (e.g. BSE, dioxin), is another determinant in the positive seafood consumption trend.

In Austria, main consumption trends between 2005 and 2030 assume an increase in the demand for higher value products and species (for example cephalopods, crustaceans, prepared molluscs, cured fish, fish fillets, frozen fish and molluscs) that will lead to an increase in per capita consumption of around 2 kg/c/yr, reaching 13 kg/c/yr by 2030. Healthy eating and the demand for environmentally friendly products will be the two factors driving Austria's consumption of seafood. A similar trend will be seen in neighbouring Germany, with a shift away from traditional patterns of consumption in favour of products from the fish fillets and prepared/preserved groups. By 2030 annual per capita consumption of seafood products will reach nearly 18 kg/c/yr.

Per capita consumption will also rise in Belgium to reach 24 kg/c/yr by 2030, largely due to an increase in prepared/preserved products that reflect the demand for ready to eat products due to diminished time available for meal preparation. This will also negatively impact consumption of traditionally eaten products such as flatfish and mussels.

The same trend towards "food on the move" products is experienced in the Netherlands with prepared/preserved products and fish fillets on the increase. Another trend towards higher value and more exotic commodities such as cephalopods is seen, bringing the annual consumption per capita up to 16 kg/c/yr in 2030.

The assumption of changes in consumer demand for various commodities in Denmark lead to some redistribution of consumption levels between product groups, with a net increase in the consumption of fish fillets and frozen fish. To a lesser extent, the consumption of prepared molluscs also increases, whilst that of cured fish and fresh crustaceans follows a downward trend. As the net supply will grow by more than 30 percent between 2005 and 2030, but over the same period the population will grow by only 6 percent, the apparent annual per capita consumption will increase from 25 kg/c/yr to nearly 20 kg/c/yr in 2030.

Consumption per capita in Finland will reach 37 kg/c/yr in 2030 due to the Finns' positive attitude to fish, which is considered to be a light foodstuff with a high nutritional value and a reasonable price (Guillotreau and Le Grel, 2001). Most of the increase will be based on increased consumption of prepared crustaceans and molluscs, as well as fresh/chilled fish. Cheap salmon from Norway will continue to increase its market share at the expense of locally produced rainbow trout.

In France, consumers choose crustaceans, molluscs (both fresh and prepared), fresh fish and fish fillets. The apparent per capita consumption of fish and seafood products will increase by 2 kg/c/yr to reach 33 kg/c/yr in 2030.

By 2030, apparent per capita consumption of fish products in Greece will increase slightly from 26kg to 27 kg/c/yr. Sociological changes such as a reduction in the time allowed for, and a shift away from traditional methods of preparing of a meal, together with an increase in the number of women pursuing careers will lead to an increase in the consumption of convenience foods. The same sociological changes impact the consumption pattern amongst Spanish consumers, although in this instance the per capita consumption will fall over the period to 39 kg/c/yr in 2030. In Spain, the decreased demand for products traditionally consumed (fresh fish and unprepared frozen commodities) cannot be offset by an increase in the consumption of convenience products. Portugal also sees its per capita consumption fall, from 61 kg/c/yr in 1998 to 57 kg/c/yr in 2030, largely due to stagnation in the demand for its main product (dried and salted cod) as a result of supply problems.

The demand for prepared/preserved products will also influence Italian seafood consumption, largely because these packaged and labelled goods offer quality and assurance in terms of health. The growing role of supermarkets in the distribution of seafood products (making them more readily available to consumers) will also have a positive influence on Italian per capita consumption, which will increase from 24 kg/c/yr to 29 kg/c/yr by 2030.

The UK seafood market will also be affected by the trend for ready meals and "food on the move" as British consumers seek more convenience food, mostly available in supermarkets, to fit in with their increasingly busy lives. Demand for fresh and frozen fish will consequently decrease, and British consumption per capita will increase by only 1 kg/c/yr to reach 25 kg/c/yr in 2030. Despite some increase in fresh fish consumption, Irish seafood

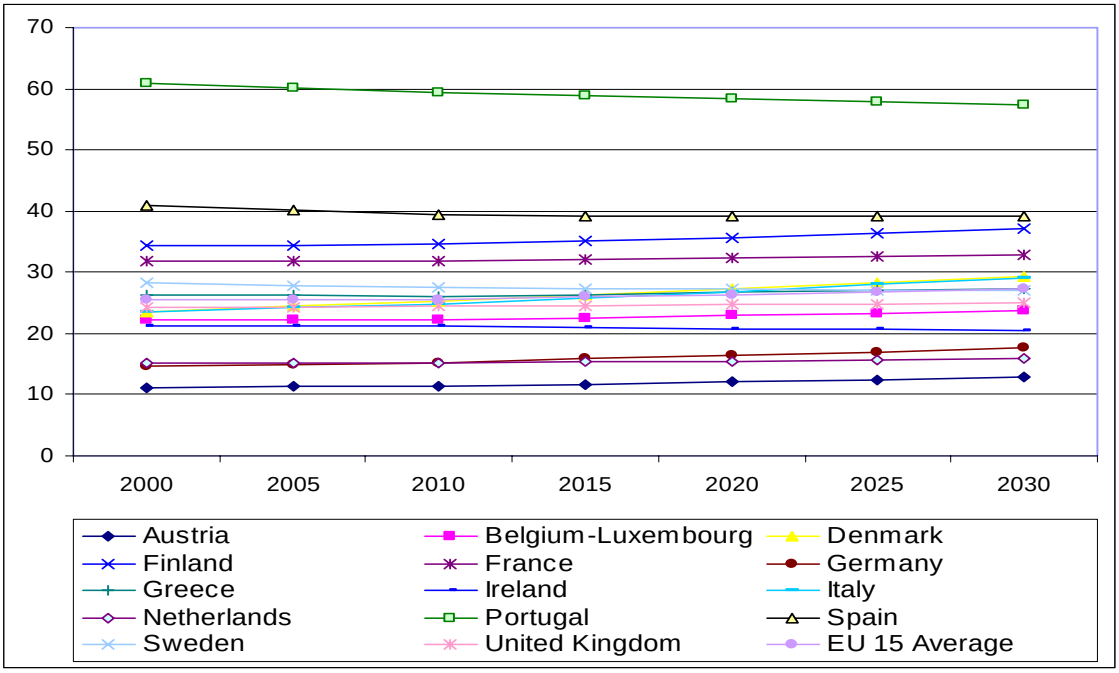

Figure 3-1: Fish consumption in the EU-15, from 2005 to 2030 (kg/caput/year)

consumption per capita decreases slightly to 21 kg/c/yr, as consumption is slower than the population growth rate and younger generations appear to have less taste for fish products.

In general, former communist countries within this group (with the exception of Estonia) see an increase in per capita consumption largely thanks to an improvement in their economic situation. Consumption moves away from traditional freshwater species and towards marine products. Of these, the consumption of frozen fish tends to increase more slowly than before, and small pelagic species are increasingly replaced with higher value species such as diadromous fish and large pelagic or demersal species. Consumption patterns in Cyprus are similar to those in other Mediterranean countries such as Spain and Portugal, also experiencing a decrease in per capita consumption.

Per capita consumption in Cyprus will fall to 23 kg/c/yr in 2030, mostly because the net supply will not be able to keep up with rapid population growth. There also appears to be a change in the pattern of consumption, with consumers moving away from fresh fish products (that increase only marginally over the period) and towards prepared/preserved products, which enjoy a dramatic increase. This is a reflection of the changing tastes of younger consumers who are increasingly reluctant to prepare fresh fish themselves and instead turn to convenience products.

As for other former communist countries, the improved economic conditions in the Czech Republic lead to a shift away from cheap frozen products towards higher quality prepared and preserved products and more exotic species such as cephalopods and crustaceans. In terms of species, marine fish are mostly responsible for the increase in consumption to 13 kg/c/yr.

Hungary, another landlocked country, sees a decrease in the consumption of fresh water fish and a move towards marine species. This leads to a shift away from fresh fish and traditional species (largely freshwater species) towards frozen products and prepared/preserved products (e.g., canned large and small pelagic species). Regional economic disparities will gradually disappear, leading to an overall increase in fish consumption of 2 kg/c/yr, from 4kg to 6 kg/c/yr.

In Estonia, the increase in consumption of prepared/preserved products, fresh fish and fish fillets will not be sufficient to offset the decrease in consumption of frozen fish and imported crustaceans, as Estonian consumers will favour quality over quantity. In addition, meat seems to have replaced fish as the primary component of the Estonian diet since the collapse of the centrally planned economic system. Consequently consumption per capita will slightly decrease from above 14 kg/c/yr to below 14 kg/c/yr.

An improvement in the economic situation will also be the main contributing factor to changes in the consumption of fish products in Poland. Consumption per capita will rise from 12 kg to 16 kg/c/yr in tandem with the increasing wealth of the population (Anon., 2001a). Consumers will increasingly target higher value products, such as crustaceans, large pelagic species (tuna) and diadromous fish (trout and salmon).

The demand for convenience products (included in the prepared/preserved products denomination) is driving the increase in fish consumption in Slovenia as the number of single and childless households is on the rise, primarily due to young people waiting longer to have a family, and more women entering the professional job market. Consumption per capita will increase from 7 kg to 9 kg/c/yr by 2030.

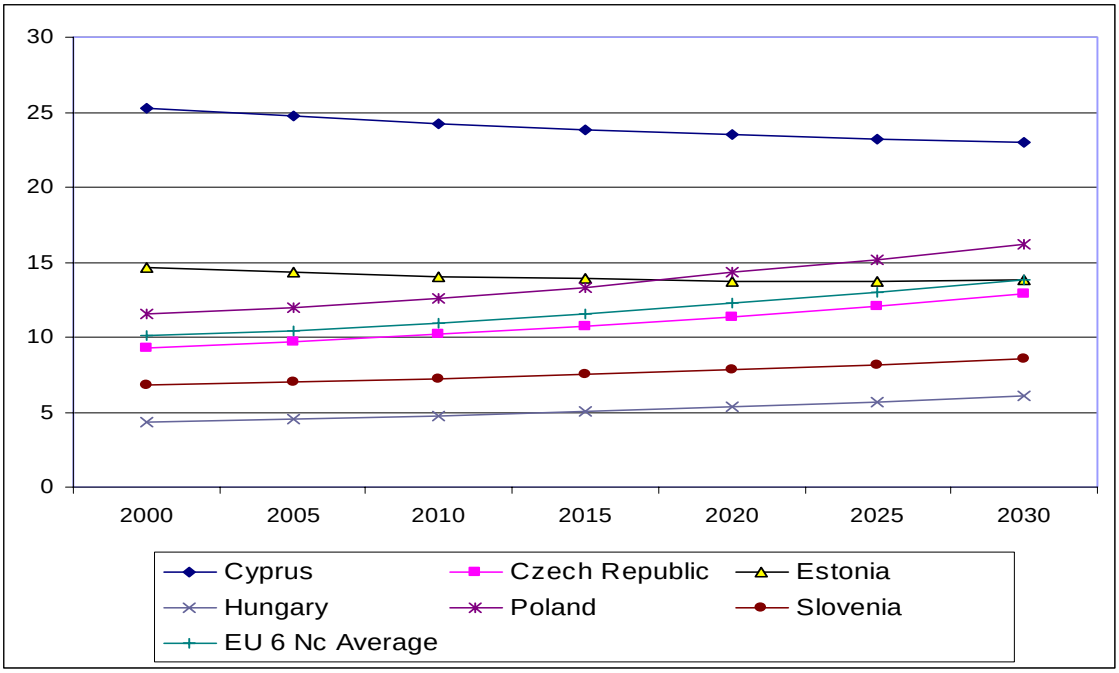

Figure 3-2: Fish consumption in the EUR-6 NC, from 2005 to 2030 (kg/caput/year)

The improvement in economic conditions is the main force behind the increased per capita consumption in the former communist countries of the EUR-7 NC group. Frozen fish still accounts for the bulk of fish consumption, but the variety of species in this group increases with small pelagic losing ground to demersal species or other more exotic species such as crustaceans, molluscs and cephalopods. Freshwater fish are gradually replaced by marine species, as the latter are often easier to prepare, offer a wider variety of taste and are made increasingly available thanks to the spread of supermarkets throughout these countries. Baltic countries are the main consumers within the group, while Slovakia, Romania and Bulgaria remain small seafood consumers due to a lack of seafood tradition. Maltese and Norwegian consumption reflect the southern and northern EU-15 pattern respectively.

Improved economic conditions affect Latvia's very high level of seafood consumption, which will reach 39 kg/c/yr by 2030. Commodities that will benefit the most from consumer demand are higher value commodities such as crustaceans, fish fillets and fresh fish that people could not afford before.

By 2030, seafood consumption in Lithuania will have increased dramatically (from 17 to 27 kg/c/yr) because consumption levels were very low during the 1990s for this traditionally fish eating nation. Fresh fish and cephalopod products benefit the most from the increased Lithuanian consumption, reflecting the same trend for higher value commodities as neighbouring Latvia.

Slovakia is becoming a wealthier market and the standard of living and per capita disposable income are high compared to many other European Union accession countries. This will drive consumption per capita up to 8 kg/c/yr by 2030.

The growth in Bulgarian fish consumption can be explained by the abnormally low level of consumption during the 1990s coupled with an expected rise in the standard of living. In addition, the expansion of the range of new products available to Bulgarian consumers

together with the increased availability of seafood products as a result of the spread of supermarkets throughout the country will drive per capita consumption from 5 kg to 7 kg/c/yr in 2030. Although neighbouring Romania will be influenced by the same factors, per capita consumption will reach only 5 kg/c/yr in 2030.

Norwegian per capita consumption of fish will decrease to 45 kg/c/yr, as the net supply increases more slowly than the population and young people are reported to be buying less fish than older generations (OECD, 2003). Fish consumption still remains very high and is reported to be increasing in urban areas where the convenience food and healthy eating sectors are increasingly dynamic.

Malta's per capita consumption will reach 36 kg/c/yr in 2030, largely due to an increase in the consumption of prepared/preserved products (canned salmon and prepared tuna and mackerel) and fresh fish (tuna, dolphinfish and salmonids).

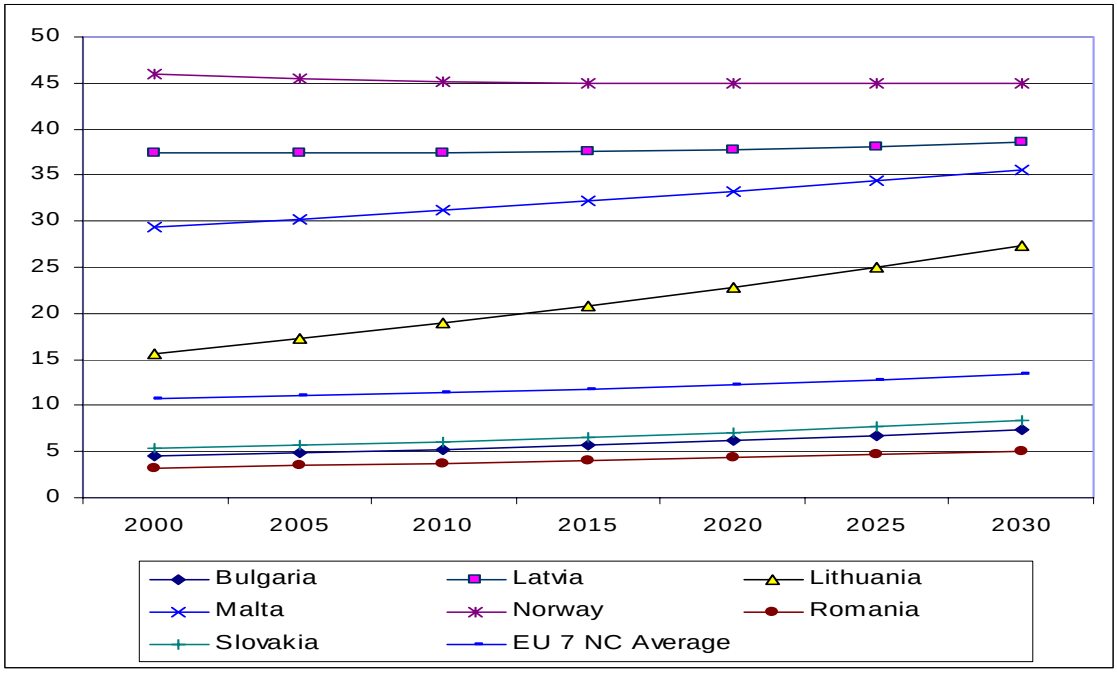

Figure 3-3: Fish consumption in the EUR-7 NC, from 2005 to 2030 (kg/caput/year)

3.1.5 Main species and commodities consumed 2005–2030

The species consumed in 2030 will be the same as those consumed in 2005 since all of the important stocks of fish in the world are already exploited. Some marine species, such as cod or other demersals, may be produced by aquaculture but this is only a shift in the means of production, and not the introduction of new species (Sutherland, 1997). Deep-sea fishing, for which many had great hopes, has already demonstrated its limits. In short, any changes over the next 30 years in terms of species will be simply a case of change in market share.

Overall, the main groups of species consumed in 2030 will be the same as those in 1998. Furthermore, these groups will account for the same share of total consumption. Marine demersal fish such as cod, Alaska pollock and hake will be the dominant white fish species. Groundfish will account for about 40 percent of the total consumption of fish in the EUR-28 (taking into account the category "marine fish other", which is mainly demersal fish used as

the raw material for prepared commodities). The EUR-28 consumers will eat about 9 kg/c/yr of demersal fish in 2030, with tuna and small pelagic species accounting for 15 percent and 14

percent respectively (compared to 14 percent each in 1998), which corresponds to a consumption rate of 3.6 and 3.4 kg/c/yr. The majority of the tuna and small pelagic species will be consumed as canned produce. However, in northern European countries the latter will also be consumed pickled.

Of the total species consumed in 2030, crustaceans, cephalopods and molluscs will account for 7 percent, 4 percent and 7 percent by weight respectively (about the same share as in 1998). To break these groups into species, per capita consumption of shrimp, crab and lobster will be 1.7 kg/c/yr, consumption of squid, cuttlefish and octopus will be about 1 kg/c/yr, and consumption of mussels, oysters, scallops and other molluscs will be about 1.7 kg/c/yr. Over the next 30 years, the consumption of crustaceans will increase by 25 percent, with cephalopods and molluscs both increasing by 17 percent.

Between 1998 and 2030, the consumption of freshwater and diadromous fish will increase by 6 percent and 12 percent respectively. The annual per capita consumption of carp, eel, perch and pike will be around 400 kg/c/yr, whilst that of salmon and will be about 1.7 kg/c/yr. Landlocked European countries will continue to consume freshwater fish, but increasingly in the form of prepared dishes and not as fresh, whole fish as before. Salmon and trout will continue their market penetration, but Norwegian and Scottish fish farmers will have to change their strategy (up to now based on the comparative price advantages compared to white fish) because of a selling price that nearly corresponds with the cost of production, indicating that there is no room for further price reduction (Anon., 1994; Asche and Bjondal, 2002). In short, fish farms will have to innovate in order to add further value to their product.

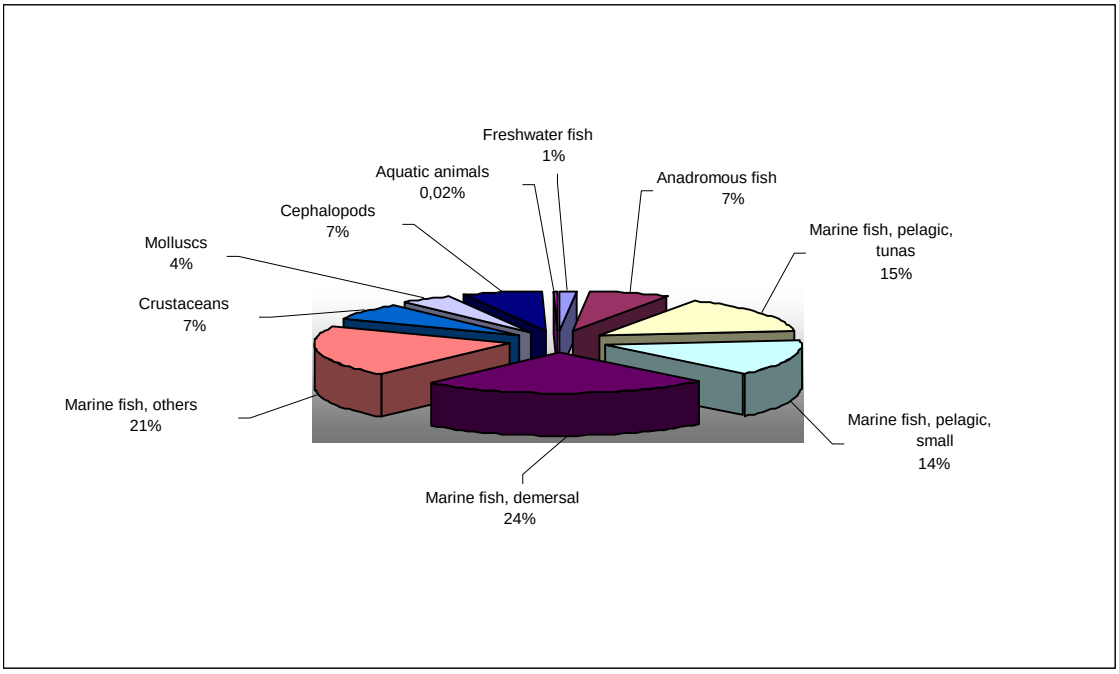

Figure 3-4: Main FAO group of species consumed by the EUR-28 in 2030

Over the next 30 years, consumption of commodities will change. Frozen fish commodities (showing a decrease of 1 percent) will lose some market share, falling from 18 percent in 1998 to 16 percent in 2030. The significant loss in the EU-15 will be partially compensated

for by a slight increase in the EUR-6 and EUR-7 NC. Consumers will increasingly lose interest in frozen fish commodities because of the negative appearance of frozen fish when compared to fresh or prepared fish products. The importance of long-term (and safe) conservation of frozen fish will decrease in the face of improvements in the transport and distribution of fresh fish throughout Europe. Nonetheless, the annual per capita consumption of frozen fish will be 3.8 kg/c/yr.

Prepared/preserved fish commodities will significantly increase in order to meet the demand of EUR-28 consumers; the share of total consumption for which they will account going from 25 percent in 1998 to 28 percent in 2030, equivalent to 6.7 kg/c/yr. Among prepared/preserved products, canned tuna, herring, mackerel and European pilchard (the main component of this category in 1998) will remain stable over the next 30 years, whilst ready-to-eat commodities will grow considerably, largely accounting for the overall increase. Prepared crustaceans, molluscs and other invertebrate will follow the same trend as prepared fish, with a growth of about 28 percent between 1998 and 2030. Their share of total consumption will remain the same at 2 percent. In prepared commodity production, the European industry will have to compete with developing countries that have invested heavily in their own industry, with Asian countries such as Thailand and the Philippines leading the way. These countries are now moving from the production of semi-processed to fully processed commodities that can enter directly into the consumption market in developed countries without passing through their plants for the final production process. In short, Europe will no longer have the advantage of adding the final touches to fish commodities; it will have to share it with countries that have numerous advantages over it (cheap running costs, proximity of fishing grounds, etc.).

The improvement of transport infrastructures and the distribution system (notably through supermarkets) will facilitate the movement of fresh products to the interior regions of the EUR-28. Although this category will suffer at the hands of young consumers who prefer ready-to-eat fish products, it will benefit from the growing concern about healthy eating (especially true of marine and organically farmed fish). Overall, fresh fish and fish fillets will increase by 9 percent and 21 percent respectively. Fish fillet commodities will profit from the fact that it is a product that does not require further preparation (apart from cooking) and is free of bones. In 2030, consumption of fish fillets will be 5 kg/c/yr (compared to 4.4 kg/c/yr in 1998) and that of fresh/chilled fish 2.1 kg/c/yr (compared to 2.2 kg/c/yr in 1998).

Cured fish, despite an increase in consumption of 9 percent between 1998 and 2030, will have a reduced share of the commodities that EUR-28 consumers will choose in 2030 (from 8 percent in 1998 to 7 percent in 2030). The increasing consumption of smoked salmon will be counterbalanced by a diminution of traditional smoked carp and eels in Eastern European countries. Consumption of salted and dried cod will also suffer from a lack of interest from young consumers even though the Spanish and Portuguese have consumed large amounts of salted and dried salted cod from Norway for centuries. The market for these products is decreasing because modern consumers feel that the preparation time is too long. The fish has to be desalted for at least one day before it can be prepared. The cod industry in Spain, Portugal and Norway is now developing methods to produce desalted products from wet- and dry-salted cod in order to countervail the decline of the consumption of this traditional product.

Fresh or chilled crustaceans and molluscs will account for 7 percent and 3 percent respectively of the consumption in 2030. The share of the crustacean category in the total

consumption will be increased by 1 point (7 percent in 2030 compared to 6 percent in 1998), and molluscs will remain the same: 3 percent both in 1998 and 2030. That represents a consumption of 1.7 kg/c/yr of crustaceans and 700 kg/c/yr of molluscs. Cephalopods consumption will increase by 17 percent over the period and will account for 7 percent of the total consumption with a level of 1.7 kg/c/yr in 2030.

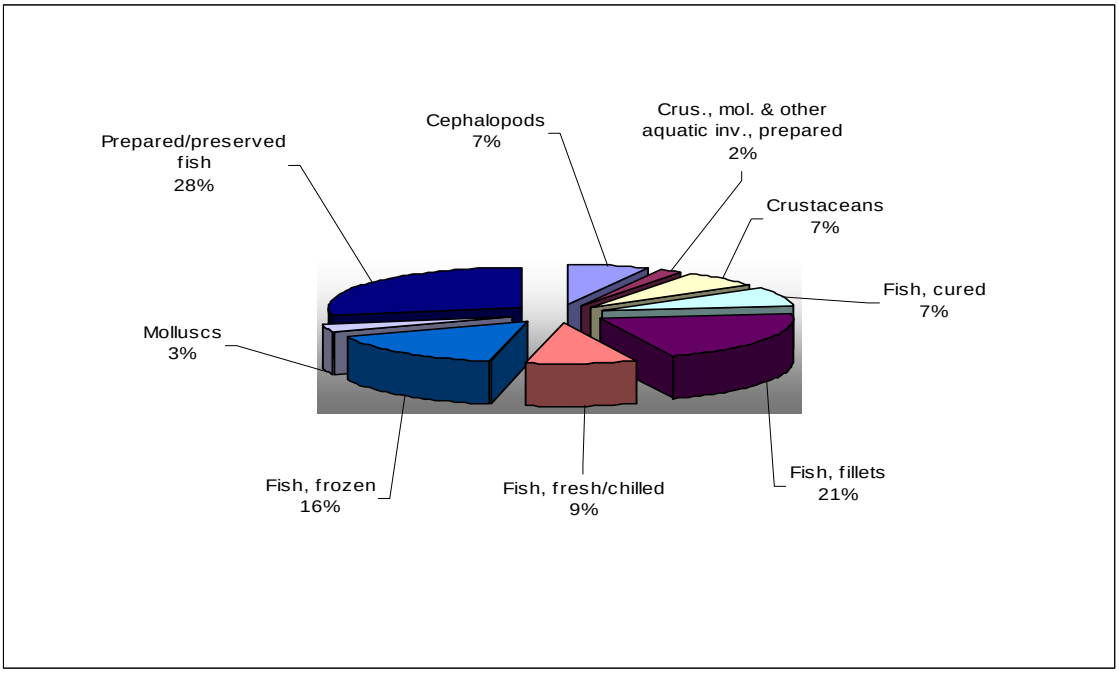

Figure 3-5: Main OECD group of commodities consumed by the EUR-28 in 2030

The main species consumed by the EU-15 countries in 2030 will remain mostly the same as the ones in 1998, with only their share of total consumption changing. Species changes will be the result of changes in commodities consumption and in commodities components. The diminishing consumption of certain type of products like dried salted cod will lead to a decrease of cod if it is not compensated for by an increase in the consumption of fresh or prepared cod. Limitation of raw material due to the difficulty of landing of particular species (for example cod or haddock in the EU after the closure of the North Sea fisheries in 2002/2003) will result in changes of the share between species.

In 2030, the ten main species chosen by consumers in the EU-15 countries will be tuna, cod, salmon, shrimp, herring, hake, common squid, Alaska pollock, haddock and skipjack tuna. These species will see an increase of between 2 percent (hake) and 33 percent (Alaska pollock). Of these ten, salmon and shrimp will be the main two species produced by aquaculture, while the rest will largely remain wild species. With groundfish falling under the category “Other species”, which will account for 28 percent of consumption, white fish will continue to dominate patterns of consumption in 2030.

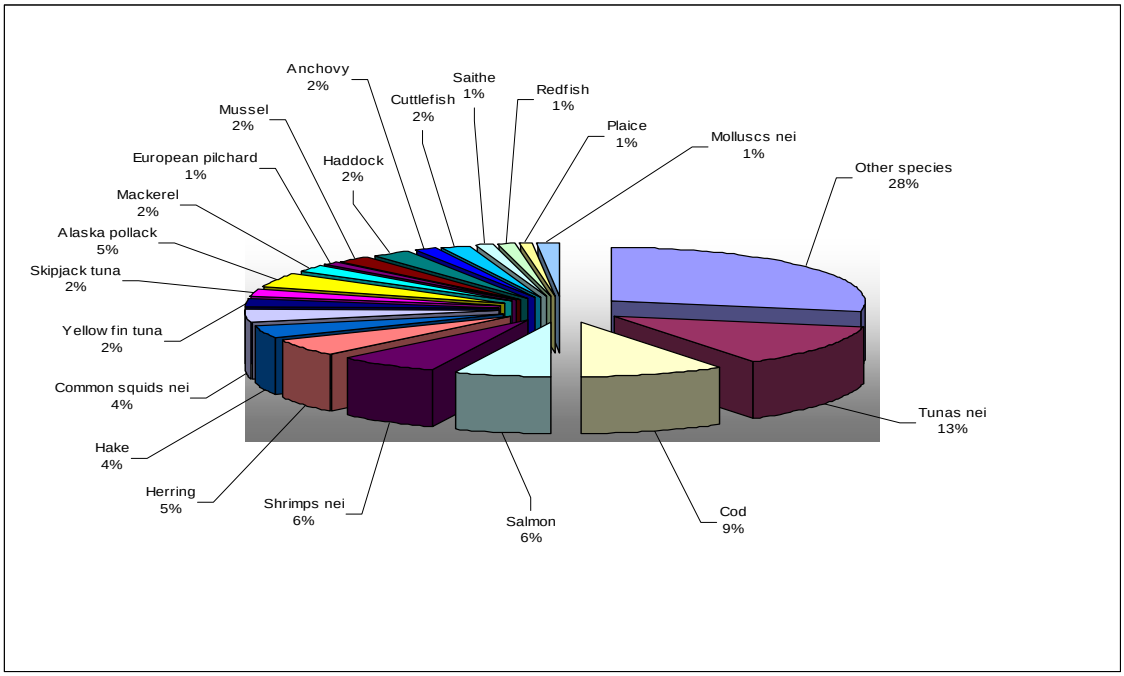

Figure 3-6: Main species consumed by the EU-15 in 2030

Consumers in the EUR-6 NC countries will concentrate their purchasing power on nine main species: herring, mackerel, Alaska pollock, hake, sprat, tuna, salmon, carp and cod. Tuna will experience the highest growth rate of 80 percent, largely due to a shift away from traditional cured products made from freshwater fish towards prepared/preserved commodities. The opening of the Eastern European economy to Western Europe and the rest of the world, combined with increased purchasing power will lead to a substantial expansion of the range of products available to EUR-6 NC consumers.

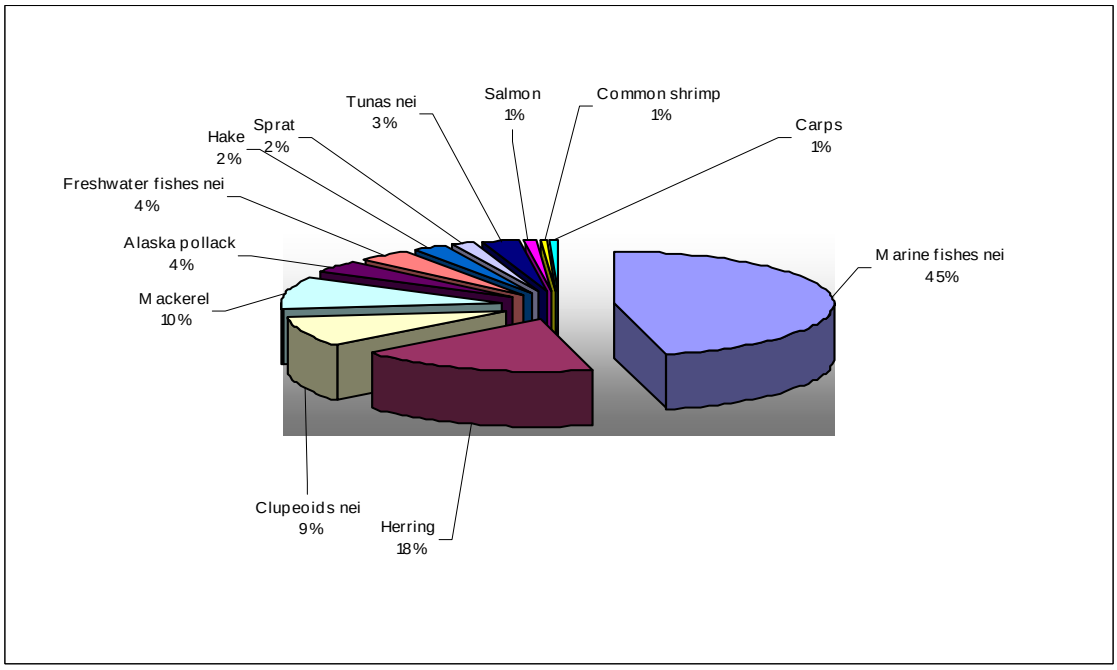

Figure 3-7: Main species consumed by the EUR-6 NC in 2030 (kg/year/capita)

The EUR-7 NC countries will largely retain the same consumption profile, but will progressively introduce new products into their markets (Trondsen, 1999). For example,

shrimp and tuna will be increasingly displayed in fishmongers and in supermarkets. However, mackerel, cod, herring, haddock, salmon and various molluscs will continue to be the principle species consumed in 2030. Salmon will see the highest growth rate with an impressive 230 percent between 1998 and 2030. Salmon is increasingly competitive in terms of price compared to wild white fish, and will consequently enter some central European markets where there is a significant niche for this species, be it fresh/chilled or cured.

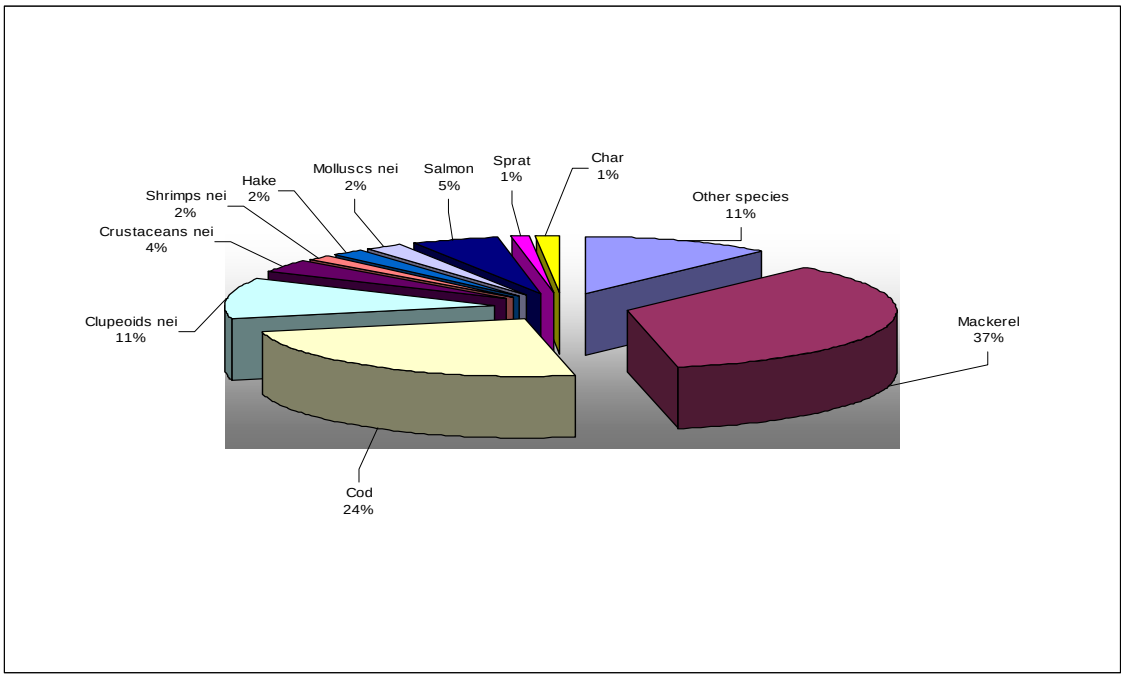

Figure 3-8: Main species consumed by the EUR-7 NC in 2030 (kg/year/capita)

Overall, species consumption will remain the same in the EU-15 while it will be more varied in former countries of the soviet bloc. Thus, consumption habits will keep changes within certain limits and will reinforce the importance of prepared products. Species will not be affected by changes but commodities shapes will change significantly giving a new challenge for the EUR-28 industry.

3.2 Net supply 2005–2030

The net supply of food use commodities at the European level is the aggregated result of the projection of national consumptions translated into national production, imports and exports of fish for human consumption. As production is more or less stable, except in countries where there may be growth in aquaculture, the evolution of the net supply of fish will largely be a consequence of variations in imports.

Globally, the net supply of fish for human purposes will increase by 2 Mt reaching 12.2 Mt in 2030, whilst non-food use commodities will remain more or less stable for the next three decades at around 4 Mt.

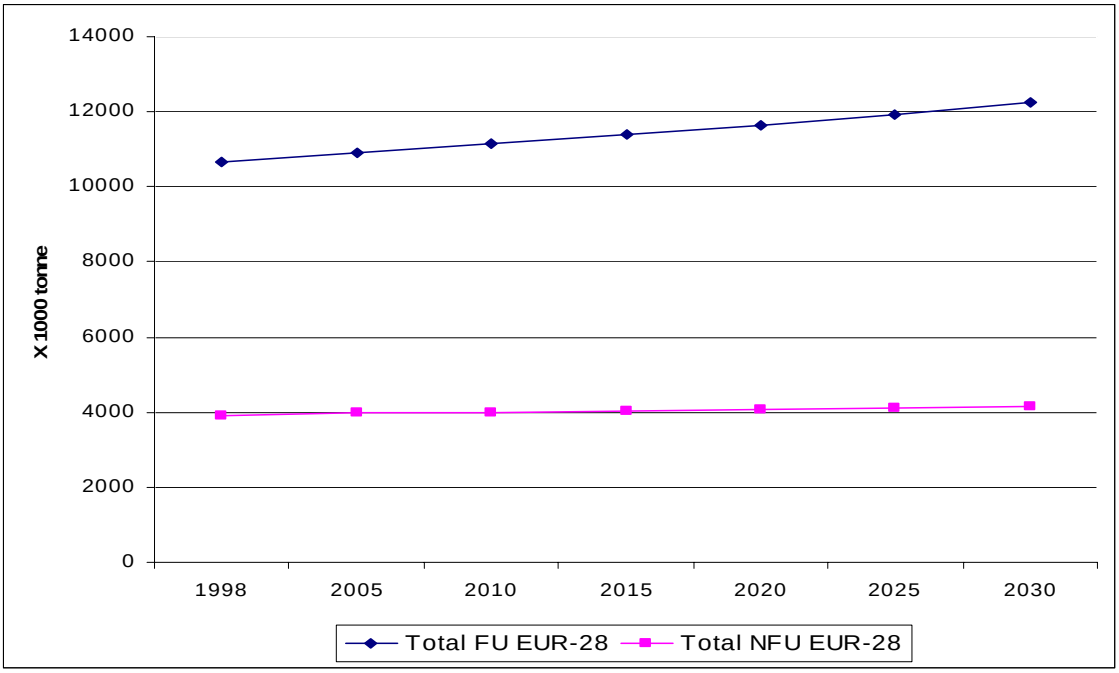

Figure 3-9: Food use and non-food use by the EUR-28 from 1998 to 2030

3.2.1 Food use net supply 2005–2030

Population growth in EUR-28 countries is slower than that of the net supply of fish, which indicates that the increase in apparent consumption is not attributable to this factor (see Annex 4 for population growth). The increase in the net supply of fish is largely due to the increase in individual consumption. In other words, people in the EUR-28 will eat more fish in 2030 than they did in 1998 (see next section on consumption for details).

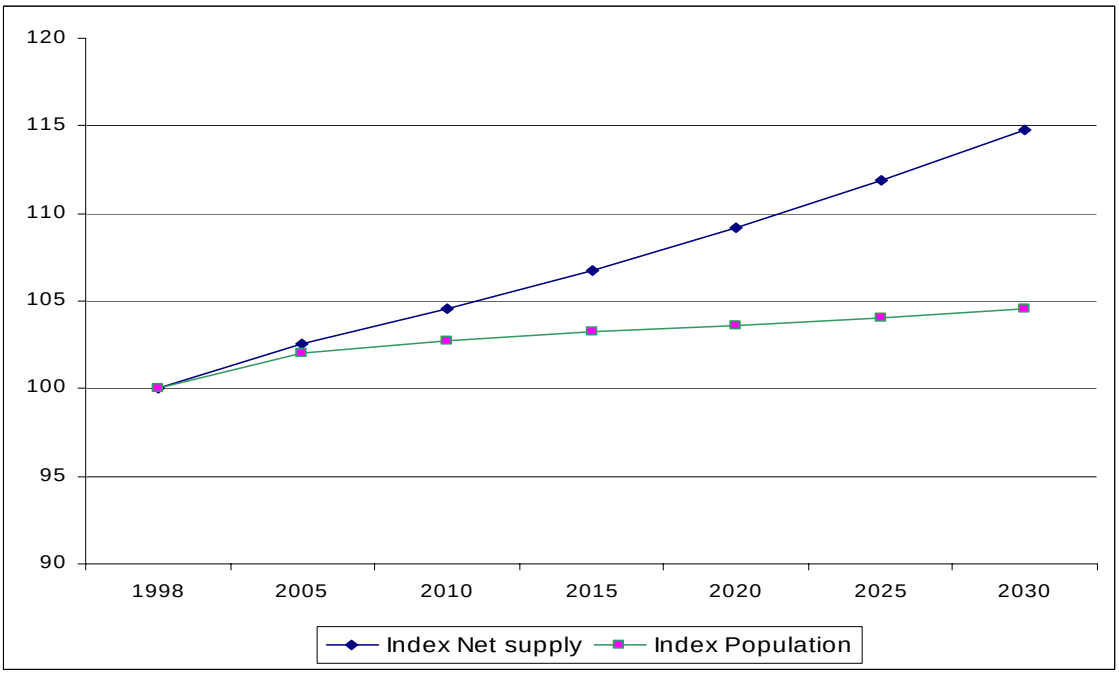

Figure 3-10: Comparative growth index of EUR-28 population and fish net supply from 1998 to 2030

There are some differences at the country level (see Annex 15). Some countries will experience a stable apparent consumption (e.g. Spain, Ireland, the Netherlands, Norway) while others will face a significant increase (e.g. Denmark, Finland, Poland, Lithuania, Malta).

Overall, between 1998 and 2030, the EUR-28's apparent consumption (or the net supply of fish) will see an increase of 2 Mt, from 10.2 Mt to 12.2 Mt In 2030, EU-15 will still have the greatest share of the net supply (10.6 Mt), whilst the EUR-6 NC and EUR-7 NC will have only 900 000 tonnes and 700 000 tonnes respectively. However, in terms of growth, the EU-15 net supply will increase by only 12 percent, which is low compared to that of the EUR-6 NC (43 percent) and EUR-7 NC (35 percent); overall, the growth rate will be 15 percent. This means that even if a large part of the growth in volume is coming from the EU-15, over the next thirty years the 13 candidate countries will increasingly contribute to the rise in apparent consumption.

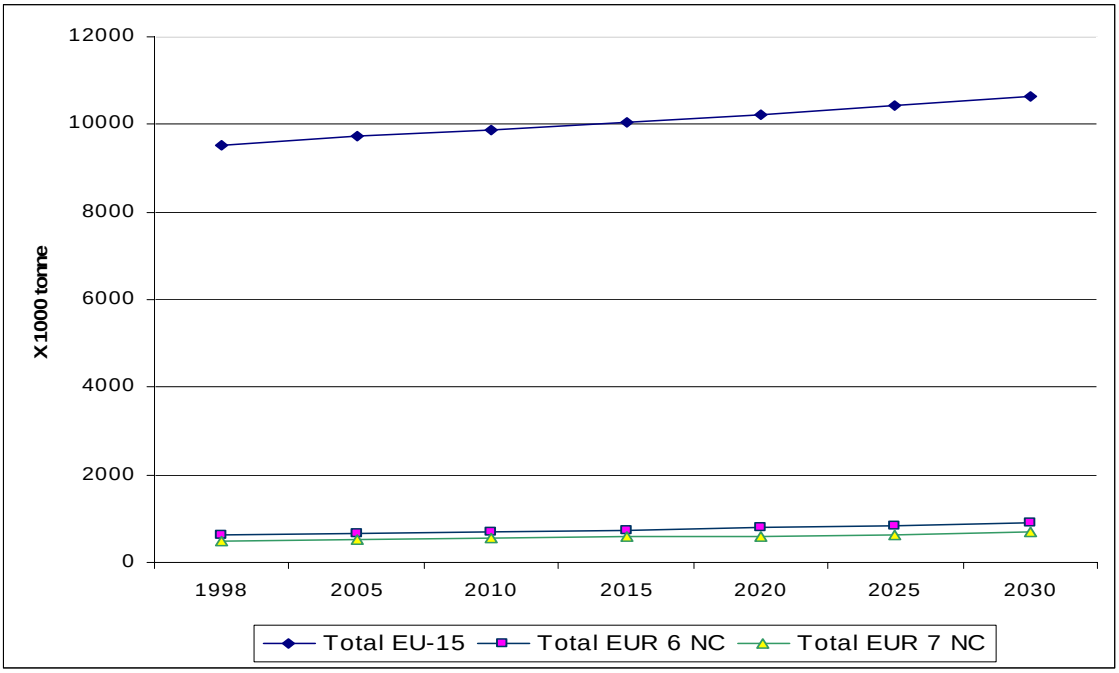

Figure 3-11: Food use net supply for the EU-15, EUR-6 NC, EUR-7 NC from 1998 to 2030

In terms of commodities, the net supply of fish for human consumption at the EUR-28 level will present three tendencies over the period 1998-2030:

- Cured fish and fresh/chilled fish will remain more or less stable;
- Crustaceans, molluscs and other prepared aquatic products, fish fillets and prepared/preserved fish, molluscs, crustaceans and cephalopods will see an increase;
- Frozen fish will decrease.

Changes are more remarkable for the EUR-6 and EUR-7 NC countries than for EUR-15. However, due to the high differential in terms of volume (10.6 Mt compared to 1.6 Mt), any changes that occur within the new EUR countries will be insignificant at the EUR-28 level.

At the EU-15 level, the 12 percent increase in net supply can be attributed to the preserved/prepared commodities that will reach almost 3 Mt in 2030, compared to 2.5 Mt in 1998. This type of commodity will increase its share of the total apparent consumption by 1 point[21] (to 27 percent in 2030). Between 1998 and 2030, the net supply of fish fillets will increase by 20 percent and in 2030 will represent 23 percent of the total net supply (+2 points from 1998). The net supply of fresh/chilled fish will increase at a higher rate than the total net supply, but will account for less of the total net supply in 2030 than in 1998 (9 percent in 2030, down from 10 percent in 1998). Frozen fish, which will decline by 10 percent, will still account for 13 percent of the total net supply in 2030 (down from 16 percent in 1998). All of these shifts reflect changes in consumption habits and marketing practices. 2030 will see more and more ready to eat products increasingly bought at supermarkets or at take-away shops (see next section on consumption for details).

Fresh or prepared crustaceans, cephalopods and molluscs will also increase over the next 30 years. Better transport infrastructures and availability through supermarket chains will significantly improve the spread of fresh seafood products other than finfish over the EU-15.

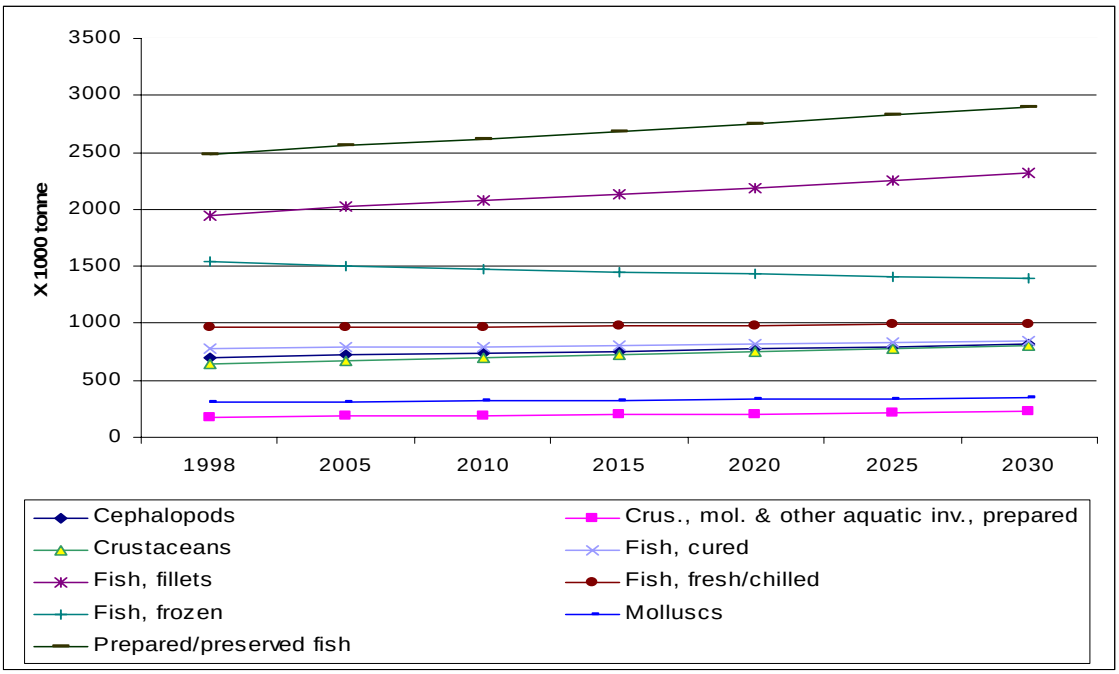

Figure 3-12: Food use net supply in the EU-15 from 1998 to 2030

Globally, the apparent consumption of the EUR-6 NC will increase by 43 percent over the next three decades (628 000 tonnes in 1998; 895 000 tonnes in 2030). As mentioned in Annex 5 in the chapter concerning net supply for the period 1989-1998, the figures for the EUR-6 NC may be biased because they over-represent Poland, whose important population of 39 million inhabitants combined with a high level of consumption (16 kg/c/yr in 2030) influence considerably the overall consumption pattern of the EUR-6 NC (64 million inhabitants and an average consumption of 14 kg/c/yr). So, the reader is advised to examine the country-level details presented in Annex 15 and Part 2 of the report.

[21] One point corresponds at 100 000 tonnes for the EU-15 net supply.

The significant increase in net supply (compared to the situation immediately after the separation from the Soviet bloc) is largely the result of increased consumer demand for preserved/prepared commodities (partly canned fish and ready to cook meals). This type of commodity will gain 13 points over 30 years (equivalent to 180 000 tonnes), accounting for 43 percent of the net supply at the end of the projected period. The economic overtures of Western countries in parallel with increased purchasing power will result in increased trade with the rest of the world including duty free trade with other EU countries.

Frozen fish will also contribute to the increased net supply (from 230 000 tonnes in 1998 to 380 000 tonnes in 2030) with a 33 percent share of the total. Demersal species, small pelagics and tuna coming from northern Europe and southern countries will be the main species in this category.

Filleted and cured fish will decline by 3 percent and 2 percent respectively. A shift from these to prepared/preserved commodities is the main reason for this decline. Therefore, fish fillets will account for 14 percent of the total net supply in 2030 compared to 20 percent in 1998. The consumption of smoked and salted freshwater fish is currently quite saturated in many Eastern European countries.

The other three categories (cephalopods, crustaceans and molluscs fresh and prepared) are not currently a part of the diet in the EUR-6 NC. It is therefore unlikely that they will appear significantly in their meal composition over the next 30 years. For this reason, the net supply of these commodities remains low in 2030.

Despite some cultural habits involving freshwater fish[22], the next three decades will see a huge influx of marine fish into the seafood market of Eastern European countries. The improvement of the Eastern counties national and household financial situation will lead to a rise in the standards of consumption, to which fish is a component choice.

Fish will play a significant role in the improving standards of consumption that will be brought about by improvements in national and domestic finances in Eastern European countries.

[22] Except for Cyprus, which is a maritime country with quasi-exclusively a marine seafood consumption.

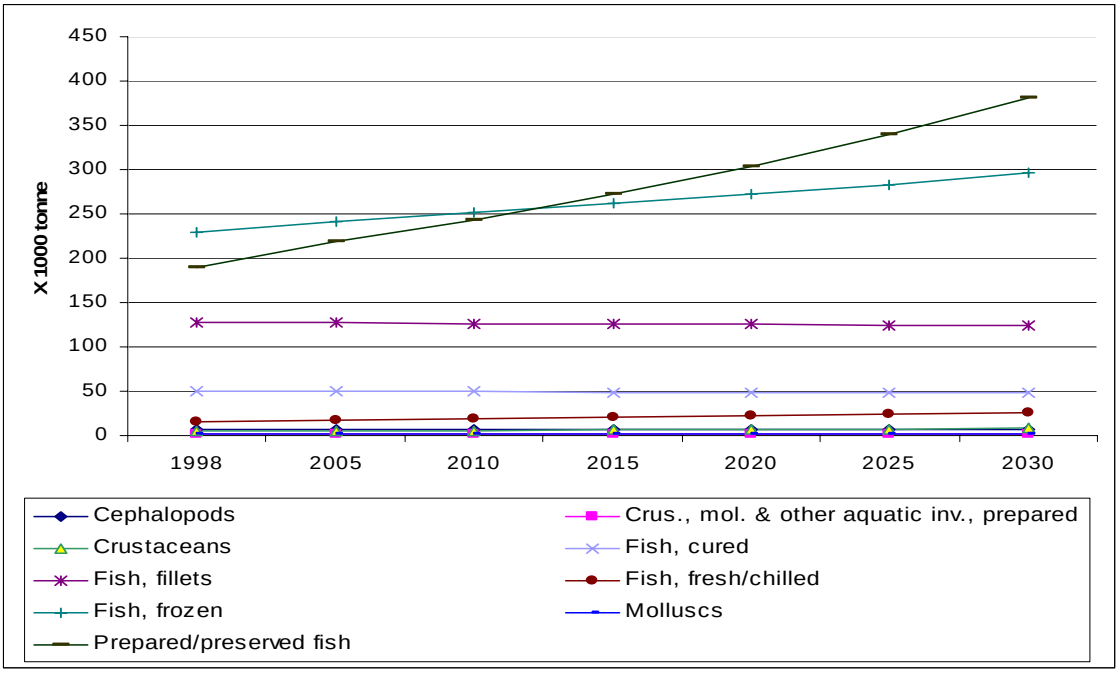

Figure 3-13: Food use net supply for the EUR-6 NC from 1998 to 2030

With a 38 percent net supply increase the EUR-7 NC countries will contribute to an overall EUR-28 net supply increase of 200 000 tonnes. However, the extent to which each EUR-7 NC country contributes to this increase is not proportionate to its size. Romania accounts for 50 percent of the total inhabitants of the EUR-7 NC countries (25 M of a total of 51 M in 2030), but its per capita consumption is low (only 5 kg/c/yr) whilst Norway accounts for only 10 percent of the total population but has a much higher rate of consumption at 40 kg/c/yr, which more than compensates for its small population. The effect of population is countervailed here by the importance of individual consumption. Thus, in 2030, Norway will account for 32 percent of the total net supply of the EUR-7 NC whilst Romania, Latvia and Lithuania will account for 18 percent, 15 percent and 14 percent respectively.

Overall, the different groups will benefit from an increase in net supply. Frozen fish, with a growth rate of 37 percent between 1998 and 2030, will maintain its premier position in 2030 with a 35 percent share of the total net supply (240 000 tonnes in 2030 compared to 170 000 tonnes in 1998). In 2030 frozen commodities will be largely composed of demersal and small pelagic species. More specifically, cod and Alaska Pollock will be the main demersal species whilst herring and mackerel will form the largest part of frozen small pelagic commodities. Northern European countries such as Iceland, Greenland and the Faeroes will be the main suppliers of the EUR-7 NC. Norway, with its 3.5 Mt of captures and aquaculture production in 2030 will also play a significant role, but its exports will be deemed intra-EUR trade.

Fish fillets and fresh/chilled fish will increase by 28 percent and 80 percent respectively over the next three decades, reaching 112 000 tonnes and 95 000 tonnes in 2030. Despite the category's growth, fish fillets will lose two points between 1998 and 2030 (its share will be 16 percent in 2030), whilst fresh/chilled fish will gain three points over the same period, growing from 52 000 tonnes in 1998 to 94 000 tonnes in 2030. Like frozen fish, these two categories will mainly be composed of demersal and small pelagic species even though tuna imports increase during the period.

The preserved/prepared fish category follows the same tendencies already seen in the EU-15 and EUR-6 NC, showing an increase of 45 percent with the volume of commodities reaching 160 000 tonnes in 2030. Less time for cooking and improved purchasing power drives the

consumers' preference for ready to eat meals. Produced as much in Eastern Europe as in the West, prepared products will gradually replace some traditional marinades, canned products and cured commodities.

Other types of commodities such as cephalopods, molluscs and crustaceans will remain low in terms of their share of the total net supply accounting for 8 percent. Cured fish will also be stable by accounting for 3 percent of the total net supply in 2030, as it did in 1998.

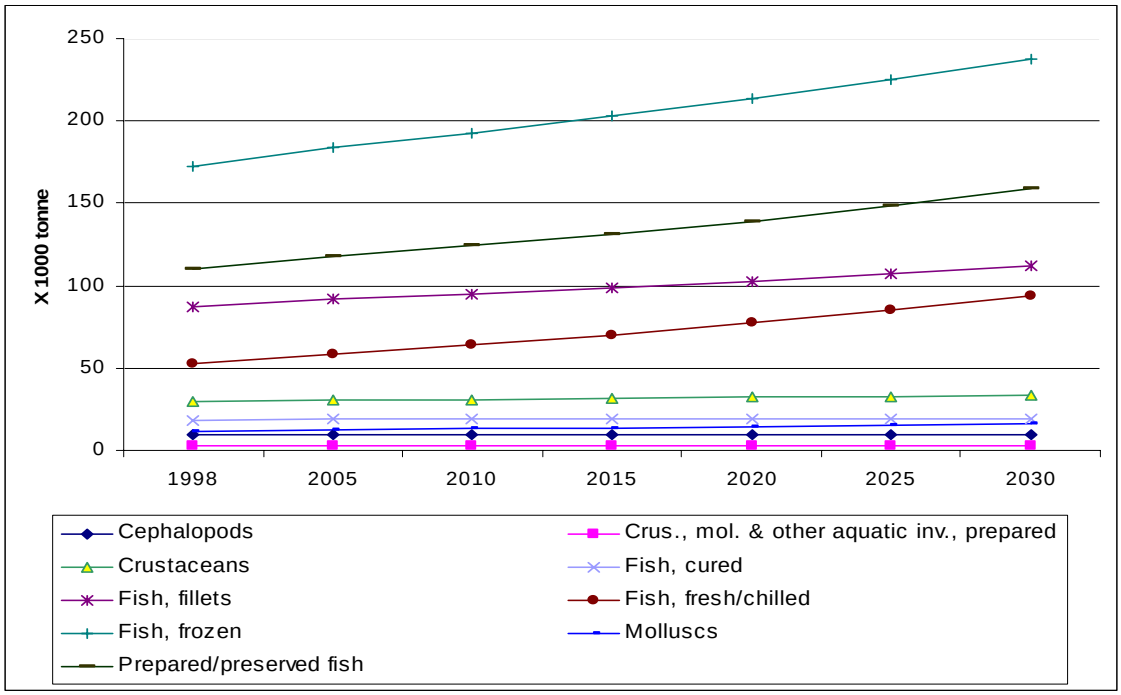

Figure 3-14: Food use net supply for the EUR-7 NC from 1998 to 2030

Overall, between 1998 and 2030, there will tend to be an increase in the net supply of all species groups. Demersal species will benefit most from this increase (in terms of volume) as they are a component part of ready to eat dishes and fish fillets both of which will increase. Demersal species are also included in the category "Other marine fish" due to the fact that some commodities are not related to any particular species group.

Tuna and small pelagics will both reach 1.7 Mt in 2030 with a growth of 9 percent and 18 percent respectively since 1998. Tuna supplied by Spanish and French vessels operating in African waters, the Indian Ocean and recently in the Pacific Ocean[23] will provide 20 percent[24] of the net supply of tuna. The remainder will be provided by imports from Asian countries such as Thailand and the Philippines, both countries that are playing an increasing role in the production and export of the world's canned tuna[25]. With a net supply of 1.7 Mt, the EUR-28 will absorb one third of the world tuna production, which can be considered fully exploited at the current level of 4 Mt.

Herring, mackerel and European pilchard will compose the main part of the net supply of small pelagic species in 2030. Mainly provided by EUR-28 vessels, with an average annual production of 4 Mt, the net supply of small pelagic species will not depend on imports and

[23] Thanks to the fishing agreement with Kiribati.
[24] With an annual average of 350 000 tonnes of tuna species caught inside the EEZs of coastal countries that the EU has agreements with and in international waters.
[25] Without being producer countries, these countries have developed a world competitive canned tuna industry. This is a good example of the de-localisation of the canning factories to third countries where fiscal and labor conditions are favorable.

will largely increase the intra-EUR trade due to the fact that major producers and exporters are northern countries like Norway and Poland.

Cephalopods will account for 7 percent of total net supply in 2030 (no change since 1998). With Spain and Italy as the key markets for octopus in EUR-28 in 2030, imports will have to increase to fill the growing gap between increasing demand and stagnant production (mainly in Spain) in the EUR-28 (Anon., 2000d). Morocco should remain the main exporter country to EUR-28, but other countries such as Tunisia, China and Senegal should, based on current trends, increase penetration of key European markets (O'Sullivan, 2003). The import of squid and cuttlefish from Thailand, Morocco and China will contribute to the supply of the EUR-28 market up to 2030, and help fill the gap between EUR-28 production (150 000 tonnes) and apparent consumption (830 000 tonnes).

Diadromous and freshwater fish will together account for 8 percent of the total net supply in 2030 (7 percent and 1 percent respectively) with a growth rate of 11 percent for the former and 6 percent for the latter. Their share of the total net supply will be unchanged from 1998 despite their growth rate being below the EUR-28 average. Farmed salmon from Norway (and to a lesser extent Scotland) will dominate the market for freshwater and diadromous fish in EUR-28. With the EUR-28 producing around 1Mt of these two species groups, the cover rate will exceed 100 percent allowing some room for exports outside of EUR-28.

The net supply of molluscs and crustaceans will increase by 25 percent and 18 percent respectively between 1998 and 2030. Whilst the majority of molluscs consumed in EUR-28 countries in 2030 will be produced by European aquaculture, the apparent consumption of crustacean (mainly shrimp) will inevitably lead to increased imports to supply the growing market. The development of world aquaculture will allow other producer countries to increase their exports to meet EUR-28 demand.

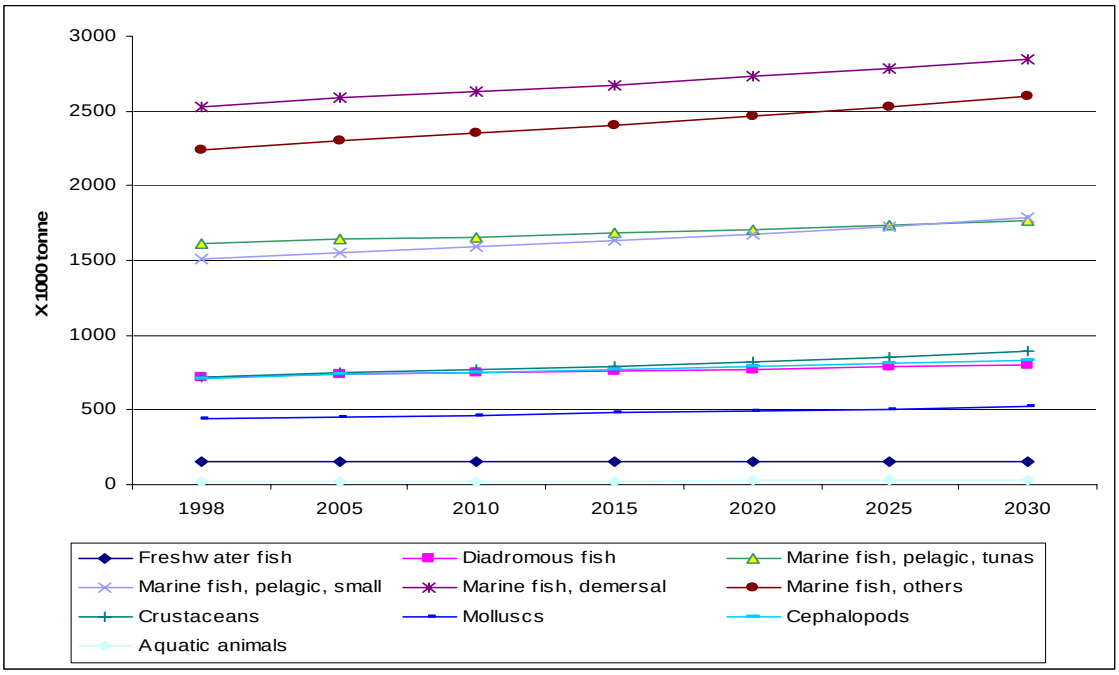

Figure 3-15: Food use net supply for EUR-28 from 1998 to 2030

3.2.2 Non-food use net supply 2005–2030

Between 2005 and 2030, non-food use net supply will increase slightly from 3.9 Mt in 1998 to 4.1 Mt in 2030 in response to the growth of aquaculture production. Regarding farmed

animals (particularly chickens), the development of new feeding methods will help to significantly reduce dependence on wild small pelagic and demersal industrial species. Nevertheless, the demand from the growing EUR-28 aquaculture industry combined with the current difficulties in substituting aquatic meal flour with vegetal source proteins leads to an increase in demand and subsequently an increase in the net supply of non-food use commodities between 2000 and 2030.

3.3 Production 2005–2030

Forecasts to 2030 of the EUR-28 capture production predict stagnation in catches as stocks become fully or over-exploited. Therefore, in order to meet growing consumption needs, total production will need to be maintained through increased output from aquaculture. It is possible, therefore, that farmed production may increase by 1 Mt by 2030, exceeding 2.1 Mt by 2015 and reaching 2.5 Mt in 2030.

The recent decline of some of the major European stocks like cod will enhance the role of the European Common Fishery Policy (CFP). Its task will not only be to manage and control the fishing industry but also to develop plans that promote a sustainable use of European waters. For that purpose, the Green Paper on reform that the European Commission published in March 2001 singled out many aspects of the 'old' CFP that had proved a failure. The main reforms agreed related to:

- The phasing out of public aid for fleet renewal and modernization;
- The phasing out of public aid for the permanent transfer of EU vessels to third countries, including through the creation of joint ventures;
- Further incentives to scrap fishing vessels via decommissioning schemes;
- Multi-annual recovery plans for stocks outside safe biological limits, and multi-annual management plans for other stocks;
- Current restrictions on access to the 6 - 12 mile zone to fishing vessels which have traditionally fished there;
- Other access arrangements, such as those restricting access to the Shetland Box are retained meantime;
- The principle of relative stability;
- The legal right of free access to Community waters such as the North Sea for Spain, Portugal and Finland;
- Strengthening and harmonization of control and enforcement measures;
- Setting up of Regional Advisory Councils (with a purely advisory role) to increase stakeholder involvement;
- An action plan for Mediterranean fisheries.

Although the European Commission perceives the reforms as far-reaching, many observers have expressed the view that they do not go far enough. In the final analysis, during more than half of the period over which CFP reform was discussed by the European Council, the entire issue was overshadowed by the drastic interim cod protection measures proposed by the Commission following scientific advice on stocks delivered by ICES (the International Council for the Exploration of the Sea) in October 2002. The post-reform debate has, to a great extent, been similarly hi-jacked by the issue of the North Sea cod fishery[26] (Cameron, 2003).

[26] For more details, see: http://europa.eu.int/comm/fisheries/news_corner/discours/disc_en.htm

3.3.1 Capture 2005-2030

As mentioned earlier in the report, capture is deemed to be stable over the next 30 years while aquaculture will experience an overall increase, although some species will encounter some decrease in terms of farm production (mainly inland freshwater species). The table below presents the capture production by country and by FAO groups of species.

Table 3-2: Capture by country and by FAO groups of species from 2005 to 2030

(tonnes)

Country	Av 94-98	2030	FAO Gp Species	Av. 94-98	2030
Austria	432	432	Freshwater fish	139245	140711
Belgium	32401	32401	Diadromous fish	377843	1215609
Denmark	1789849	1789849	Marine fish, pelagic, tunas	466211	466211
Finland	174446	174446	Marine fish, pelagic, small	2699175	2701120
France	656280	656280	Marine fish, demersal	2603613	2685083
Germany	246458	246458	Marine fish, others	162471	164440
Greece	163489	163489	Crustaceans	208088	208357
Ireland	360804	360804	Molluscs	1088041	2521610
Italy	364551	364551	Cephalopods	189676	189676
Netherlands	451518	451518	Others	137157	138252
Portugal	249962	249962	**Total EU-15**	**8071519**	**10431069**
Spain	1124993	1124993	Freshwater fish	88267	90623
Sweden	386150	386150	Diadromous fish	10446	142797
United Kingdom	900046	900046	Marine fish, pelagic, tunas	165	165
Total EU-15	**6901379**	**6901379**	Marine fish, pelagic, small	202061	202061
Cyprus	2580	2580	Marine fish, demersal	233279	234772
Czech Republic	3733	3733	Marine fish, others	1800	1800
Estonia	122585	122585	Crustaceans	18623	18657
Hungary	7561	7561	Molluscs	41	90
Poland	362391	362391	Cephalopods	1585	1585
Slovenia	2254	2254	Others	1289	1289
Total EUR-6 NC	**501103**	**501103**	**Total EUR-6 NC**	**557557**	**693839**
Bulgaria	9074	9074	Freshwater fish	32448	18507
Latvia	127602	127602	Diadromous fish	322428	773250
Lithuania	38241	38241	Marine fish, pelagic, tunas	1273	1273
Malta	869	869	Marine fish, pelagic, small	1273325	1273325
Norway	2844335	2844335	Marine fish, demersal	1484623	1486854
Romania	21374	21374	Marine fish, others	15424	16543
Slovakia	1537	1537	Crustaceans	48419	48419
Total EUR-7 NC	**3043032**	**3043032**	Molluscs	7408	7615
Total EUR-28	**10445515**	**10445515**	Cephalopods	3842	3842
			Others	197331	197331
			Total EUR-7 NC	**3386521**	**3826959**
			Total EUR-28	**12015597**	**14951867**

Source: database

Concerning EU fishing agreements with third countries, the incidence of government aid granted to the fisheries sector is a thorny question currently being debated within World Trade Organization (WTO) (Failler and Lecrivain, 2002). At the time of the Doha declaration, the

members of the WTO committed themselves to clarifying and improving the disciplines concerning the subsidies in fishing. An increase in the number of fishing agreements with southern countries will not affect substantially the volume of production since southern countries are less and less important in terms of production (European Parliament, 1999a).

3.3.2 Aquaculture 2005-2030

3.3.2.1 European Commission point of view

The European Commission may end subsidies for increasing aquaculture production for species such as salmon where the market "is close to saturation" (European Commission, 2001). In its 2001-published Green Paper on the future of the Common Fisheries Policy the Commission suggests that the market should be the driving force for aquaculture development, "Production and demand are currently finely balanced, and any increase in production in excess of the likely evolution in demand should not be encouraged".

In the 1980s, aquaculture (and, more particularly, marine aquaculture) was still essentially a high-risk activity. Today, these risks no longer exist for a number of farmed species. It is therefore questionable whether the Community should continue to subsidize investments by private companies in production capacity for species where the market is close to saturation.

Instead of subsidies for increased production, the Commission suggests that future aid should cover costs in relation to training, control, research and development (in particular for new species), the processing of waste water and the eradication of diseases. It points out that its development aid for aquaculture comes mainly through the Financial Instrument for Fisheries Guidance (FIFG), and says that the scope of FIFG has been widened to include such aid, "Public aid should in particular be devoted to encouraging the development of 'clean' technologies."

The Commission says that the "adoption of sustainable farming practices must be achieved, alongside the imperatives of health and quality standards for products". It adds that the Biodiversity Action Plan for fisheries and aquaculture should help achieve this aim (see also Ben-Yami, 2000). "The plan should foresee a series of actions related to the reduction of environmental impact as well as actions to limit the potential problems arising from the introduction of new species, and secure animal health."

Earlier in the document, the Commission suggests that conflicts between aquaculture and other coastal users need to be resolved if the industry is to have a stable future. Whilst it acknowledges that aquaculture has played a "significant role" in the development of coastal communities, "Nonetheless, while the overall framework shows a positive development, Community aquaculture still experiences a number of problems… In particular, as aquaculture expands, it is increasingly seen as a threat to other activities. The tourism industry is especially critical of aquaculture, which is blamed for occupying space that could be used for recreation, as well as for producing waste materials that affect the quality of nearby bathing water."

3.3.2.2 Potential development, limits and constraints 2005-2030

The potential development of aquaculture will depend on a number of crucial factors such as environmental constraints, market demand, feed supply, innovation (in terms of the production of new species) and organic production.

Regarding all the factors enumerated above, it seems that aquaculture production is approaching a flat asymptote, and consequently the marginal growth rate will be constantly decreasing. Potential growth can occur for new species, especially ones that compensate for the loss of capture production (cod, for example) and for which there is some significant market demand. However, these new developments will have to cope with the same environmental constraints, feed supply, etc. as traditional aquaculture, and will therefore enter into competition with them in many of these aspects.

3.3.2.2.1 Environmental constraints

Environmental constraints to the future growth of the European aquaculture are mainly related to the diseases, heath and safety, and the interaction between aquaculture farms and their biological and physical environment (Mc Allister, 1999).

In 2000, Scottish salmon farms experienced problems with algae blooms and jellyfish attacks. Estimates indicate that due to these events, farmers lost about 8-9 000 tonnes of harvest-ready fish. The January estimates would have been fairly accurate, but they didn't allow for unforeseen events like algae and jellyfish (Fishery Research Service, 2001).

3.3.2.2.2 Market demand for aquaculture products

In 2002, the price of Norwegian farmed salmon went close to the minimum price of 3.25 €/ kg stated in the Norway-EU salmon agreement. The main reason for the falling salmon prices was that Chile had produced enormous amounts of salmon, and the US market had therefore been flooded. Chile also sends salmon to Europe. In addition, the UK, the Faeroe Islands and Norway also produced much more salmon than previously, which led to prices falling. The European market can't handle that much growth. The 2003 crisis in the Norwegian salmon industry proved that the market is a key parameter to defining potential growth and is more important than price in the way that it forces price to go down below the production costs.

World production has an impact on Norwegian production and profits. Projections should not be based only on growth potential (based on natural resources, feeding and spaces available). It has to take into account the capacity of the market to absorb new production.

3.3.2.2.3 Aquaculture feed supply

The 1998 El Niño was one of the strongest ever recorded. The result was a decline in the Chilean and Peruvian production of fishmeal (by 50 percent) and oil (by 65 percent) compared to the average observed in previous years. The impact on the world market was considerable[27]: prices went up to 800 €/t (compare to a “normal” price of 400 €/t). Shortfall in raw material for aquaculture feeding purposes is inevitable due to high inter-dependency of reduction species with up-welling conditions. The aquaculture industry does not seem to be aware of variations in the fishmeal supply because most of the time the industry considers only the technical aspects of the feeding process.

Running parallel with the growth of aquaculture and the subsequent increased demand in fishmeal and oil, there has been a growing demand for better quality, which means that there are five different quality levels of fishmeals now available on the world market[28]. Aquaculture, which can afford to pay for high quality meal (compared to poultry and pig

[27] Chile and Peru provide nearly 40% of the world fish reduction products.

[28] Quality is based on the freshness of the raw fish being manufactured into meal and the drying process used to ensure that the fishmeal is heated gently (Barlow, 1999).

sectors) is taking more of the best quality meals, which has led to some reduction of its consumption per unit of product (Barlow, 1999).

A 35 percent improvement in the food conversion rate is theoretically possible, suggesting scope for further gains from modified diets and feeding systems. Increased automation looks likely as long as farm units continue to increase in size under pressure to reduce production costs. Further research will help provide a better understanding of the environmental factors affecting feeding and food assimilation, which should lead to further refinement of the type of systems described above.

3.3.2.2.4 Organic products

The farmgate value of UK organic fish increased from 2.8 M€ in 1999/2000 to 5 M€ in 2000/2001, a rise of 80 percent. Of this, trout production accounted for 1.2 M€ and salmon 3.8 M€. The number of registered organic fish producers rose from ten in April 2000 to 15 in April 2001. However, despite the 80 percent growth rate, many producers reported difficulties in establishing a stable market. Part of the problem is that consumers are attracted to artificially pigmented “pink” salmon, which is not permitted in organic fish farming (Agra Europe, 2001).

At the European level, the growing organic market suggests that demand for organic food will be more and more important in the next three decades. The success of organic salmon has encouraged producers to change their production patterns in order to offer products free of chemicals and follow sustainable development processes. It also suggests that there is a growing potential for other organic seafood products (Aarset *et al.*, 2000). If in the past some ideology constituted the roots of organic production, it is now the expected profitability that drives producers’ behaviour toward organic production.

3.3.2.2.5 News species 2005-2030

Many different species of fish can be reproduced artificially under intensive and controlled conditions, and most species grow extremely well in aquaculture systems. The problem is seldom solving the biological needs of new species in aquaculture, nor is it overcoming the obstacles of technology. Such hurdles are relatively easily overcome by the use of professional companies dealing with design and construction of modern fish farms.

The difficult part is to carry the "invention" of a new species all the way through to the market, keeping costs down and making a profit at the end. Of all the species that can be cultivated in Europe today, only about 10 species have shown commercial viability, and of these, two species (salmon and rainbow trout) account for approximately 80 percent of the total production of fish in European aquaculture.

The aquaculture fish market in Europe is dominated by the production of salmon, rainbow trout, sea bass, bream and carp. Salmon farming is undoubtedly the most successful, followed by rainbow trout, a traditional species with the ability to survive under different conditions, and therefore one that can be reared in almost any European country.

Of the new species that have been tried in recent years, only the culture of seabass and seabream have been strong commercial successes, whereas species like turbot, sturgeon and eel, although cultured in many countries, have never reached a level comparable to the turnover in the salmon and trout industry.

This does not mean that the fish farmer who is farming turbot, sturgeon, eel or similar is losing out. He may be very successful on an individual scale and have high earnings, but seen

on a national level, only the farming of salmon, trout, sea bass and bream has had a significant overall impact on the economy of the sector.

Cod is an example of a new species in fish farming that may become as successful as salmon and trout. The rearing technology is more or less solved and production is now directed towards a broad scale of commercialization. Cod fingerlings are produced in controlled recirculation systems and later stocked in cages at sea for grow-out to market size. The technology works, and currently a large expansion in cod culture is expected. The main concern at present is whether the production price and marketing effort of farmed cod can compete in the long run with the market price and marketing of wild cod from commercial fishing. Undoubtedly, this unknown future market situation will be a nerve-wracking experience for the cod farming industry (Bregnballe, 2003).

In Norway, the Government wants to invest in the breeding of cod as a new branch of fish farming and to take for that purpose a long term initiative towards developing cod for fish farming (Anon., 2001b). Troms and Finnmark will become the new region for research and development of this type of aquaculture, with Tromsoe as the natural centre. Globally, the following points can be highlighted (Solsletten & Cameron, 2002):

- 100 new market-ready fish production licences were allocated in Norway in 2001, and in 2002 there is a total of 280 cod farming licences in Norway.
- In 2002, Norwegian production of cod juveniles will be tripled to three million juveniles.
- More than 64 million cod juveniles will be produced in 2005.
- In theory it will be possible to produce more than 190 000 tonnes of farmed cod in 2007.
- Norway will be able to produce 400 000 tonnes of cod after 2015.

In the United Kingdom, cod farming began at the end of the 1990s. Due to the collapse of the North Sea cod stock, cod farming is seen as an invaluable substitute to the wild species. A few points on the UK's cod farming and markets are:

- Ten tonnes of UK farmed cod went on sale in January 2000.
- The market for cod in the UK is around 170 000 tonnes per year – 33% of the world wild-catch supply.
- The British Marine Finfish Association, which represents a total of 22 members working in the various new finfish species, has a production target of 25 000 tonnes of cod within ten years.

3.3.2.3 Aquaculture projections 2005-2030

Aquaculture projections were made for each species at the country level. Refer to Part 2 of the report for a detailed country presentation.

The two tables below present the aquaculture production by country and by FAO groups of species respectively. The production of aquaculture species should increase from 1.8 Mt in 1998 to more than 2.5 Mt in 2030. Some countries, like Norway and UK with salmon production, for example, are making a significant contribution to the growth. To a lesser extent, southern European countries like Greece and Italy and Spain, with the production of sea bream and sea bass should also contribute to the augmentation of aquaculture volume to 2030.

Austria, Finland, Sweden, Hungary and Poland should experience a decrease in aquaculture production. In three Baltic states (Estonia, Latvia and Lithuania) production should remain stable. The remainder of the EUR-28 countries should present varying positive trends (from 5 percent to 125 percent) in their production.

Having experienced declining aquaculture production of freshwater species such as carp, pike, roach and tench between 1989 and 1998, Austria, Hungary and Poland will continue to follow the same negative trend up to 2030. Aquaculture in Finland (largely dependent on rainbow trout production) showed significant reduction in output between 1989 and 1998, which suggests a reduction to the scale of operation in that country of almost 40 percent.

Climatic conditions in the Baltic States are not favourable to any freshwater aquaculture. The period of non-freezing water is too short to develop any sustainable production. With the EU-FAIR program there was an attempt to sow the rivers with juveniles, but it was limited to salmon.

Most of the maritime countries will face a significant growth of their aquaculture production. Spain, France and to lesser extent the UK will increase their share of the EUR-28 aquaculture production by increasing their production of molluscs and marine demersal fish. Norway, with diadromous fish, will augment its predominance in this market by producing more than 60 percent of the 1.3 Mt EUR-28 production (compared to 50 percent on the average 1994-1998).

Table 3-3: Aquaculture production by country from 2005 to 2030

(tonnes)

Country	Av 94-98	2005	2010	2015	2020	2025	2030	% 98-30
Austria	2954	2084	1707	1436	1244	1113	1029	-64
Belgium	865	802	789	789	801	824	857	1
Denmark	42064	45565	48013	50604	53347	56252	59328	40
Finland	16827	14431	13397	12443	11563	10752	10005	-38
France	281739	282963	290429	298621	307497	317031	327211	19
Germany	60427	66507	67352	68915	71026	73570	76466	14
Greece	42886	65452	69782	74452	79486	84912	90764	51
Ireland	33619	44673	48098	51825	55881	60298	65108	61
Italy	224572	257964	264564	271694	279363	287593	296414	19
Netherlands	102284	125535	129681	134011	138534	143263	148209	23
Portugal	6307	6727	6627	6800	7188	7757	8488	13
Spain	237200	327221	337830	349086	361017	373693	387222	24
Sweden	7093	5068	4822	4624	4473	4368	4306	-22
United Kingdom	111302	146301	153155	160459	168241	176535	185373	35
Total EU-15	**1170139**	**1391292**	**1436247**	**1485759**	**1539664**	**1597960**	**1660780**	**24**
Cyprus	731	1387	1564	1770	2012	2298	2639	124
Czech Republic	18061	19792	21852	24126	26637	29410	32471	88
Estonia	298	260	260	260	260	260	260	0
Hungary	9376	7300	6049	5245	4750	4470	4341	-58

Country	Av 94-98	2005	2010	2015	2020	2025	2030	% 98-30
Poland	27156	29118	28756	28493	28328	28263	28296	-5
Slovenia	831	1015	1121	1238	1367	1509	1666	88
Total EU6 NC	**56453**	**58872**	**59601**	**61132**	**63355**	**66209**	**69672**	**17**
Bulgaria	5024	4841	5377	6027	6816	7774	8940	111
Latvia	444	412	412	412	412	412	412	0
Lithuania	1631	1516	1516	1516	1516	1516	1516	0
Malta	1420	2240	2473	2730	3015	3328	3675	88
Norway	318762	466065	511905	562381	617967	679189	746624	83
Romania	14948	9547	9615	9693	9779	9875	9982	5
Slovakia	1258	731	807	891	983	1086	1199	89
Total EUR-7 NC	**343489**	**485351**	**532106**	**583650**	**640488**	**703180**	**772347**	**81**
Total EUR-28	**1570082**	**1935515**	**2027954**	**2130541**	**2243506**	**2367349**	**2502799**	**37**

Source: database

Molluscs production will grow substantially for Spain (325 000 tonnes in 2030), France (235 000 tonnes) Italy (195 000 tonnes) and the Netherlands (140 000 tonnes). In Spain, the main species should be the blue mussels that will represent 90 percent of the molluscs' production in 2030 even if production of the common edible coke, pullet carpet shell, and European flat oyster is increasing. Between May and August 2002, sales of Galician processed mussels increased 200 percent, although the mussels were smaller due to the rough winter weather. The total amount of sales reached 32 000 tonnes compared to 18 000 tonnes during the same period of the previous year. Galicia is one of the principal mussel producing regions in Europe with an annual harvest volume reaching 250 000 tonnes. The sinking of the Prestige in Galician waters on 19 November 2002, and the subsequent spilling of its cargo of oil seriously damaged aquaculture production for a number years but it should recover and take advantage of this accident experience[29].

[29] In December 2002, the European Commission announced that 30 million € of financial support would be made available to help affected fishermen and fish farmers. In view of the exceptional damages caused by this spill, compensation for cessation of activities – currently only available to fishermen and vessel owners under FIFG rules (Financial Instrument for Fisheries Guidance) – would be available also for shellfish fisheries and fish farming. Aid would also be paid to help the industry replace damaged fishing gear and shellfish stocks, and clean, repair and rebuild aquaculture sites. To do this, the Commission proposed two things: to adapt some FIFG provisions to allow Spain to provide financial help to this sector, and to allow Spain to re-allocate some 30 million € from money earmarked for the reconverting of the Spanish fleet that used to fish under the EU fisheries agreement with Morocco. In addition, an estimated 80 million € would be reprogrammed under Spain's share of FIFG (European Commission, 2002).

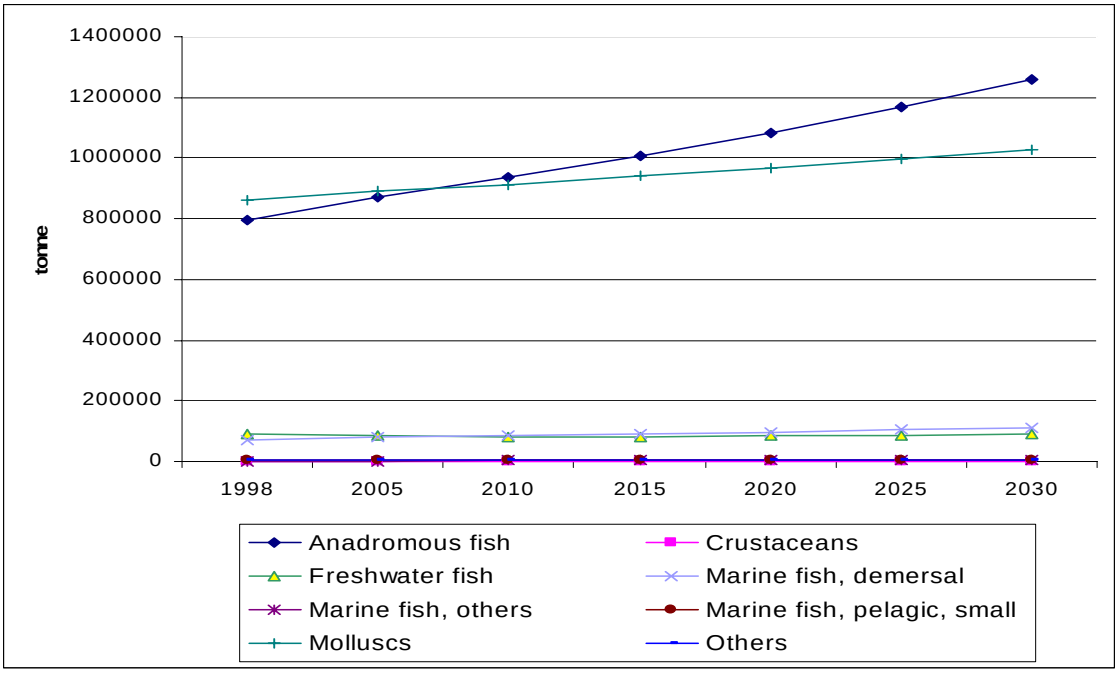

Figure 3-16: Aquaculture production by FAO groups of species from 1998 to 2030

French production of Pacific cupped and European flat oysters should grow slightly (170 000 tonnes in 2030), maintaining France as the largest oyster producer in the EUR-28.

Salmon production alone will increase aquaculture production by nearly 350 000 tonnes. Norway (680 000 tonnes in 2030) and Scotland in the United Kingdom (150 000 tonnes) will be the two major producers within the EUR-28. By 2030, trout production will also have grown to reach 65 000 tonnes in Norway and 60 000 tonnes in France.

When the proposed Eastern European countries join the EU, there should be a number of changes in the carp market. Total carp pond area will increase threefold from 60 900 to 195 000 hectares, thereby increasing the risk that fiercer competition will reduce the profits of many companies. However, EU membership will open up additional opportunities since the market will become larger. Nevertheless, it seems that only the Czech Republic will be able to benefit from this market opportunity because of its increasing production of carp up to 2030 (28 000 tonnes).

The production of demersal species will be the biggest challenge facing aquaculture in the next few decades. A great many expectations are being put on cod farming to compensate for the decrease in capture in the North Sea[30]. Despite the early good results in Norway and Scotland, there is too much uncertainty to accurately predict the real growth capacities of this type of aquaculture. More common species such as sea bass and sea bream, which have been considered a major success over the last decade, show some potential for further growth. Greece (a combined tonnage of 55 000 in 2030), Italy (20 000 tonnes), Spain (9 000 tonnes), France (9 000 tonnes) and Malta (4 000 tonnes) will be leaders in the production of sea bass and sea bream in 2030. Finally, turbot and common sole have not met the expectations placed upon them. In 2030, turbot will be a minor production of maritime countries engaged in aquaculture with the exception of Spain (producing 3 000 tonnes in 2030) and France (1 700 tonnes).

3.3.3 Total production 2005-2030

The total production of capture and aquaculture species should increase from more than 12 Mt in 1998 to nearly 13 Mt in 2030. Countries that will benefit the most from the total production are those in which aquaculture will increase due to the constant capture assumption. Diadromous species and molluscs are the two main groups of species that will underlie the growth of the total production until 2030.

[30] Atlantic cod was only recorded in Norway as an aquaculture species and nowhere else in the 1989-1998 aquaculture database.

Table 3-4: Capture by country and by FAO groups of species from 2005 to 2030

(tonnes)

Country	Av 94-98	2030
Austria	3386	1461
Belgium	33266	33258
Denmark	1831913	1849177
Finland	191274	184451
France	938019	983491
Germany	306885	322923
Greece	206375	254253
Ireland	394423	425912
Italy	589123	660965
Netherlands	553802	599727
Portugal	256269	258451
Spain	1362193	1512215
Sweden	393243	390456
United Kingdom	1011348	1085419
Total EU-15	**8071519**	**8562159**
Cyprus	3310	5218
Czech Republic	21794	36204
Estonia	122884	122845
Hungary	16937	11902
Poland	389547	390686
Slovenia	3084	3920
Total EUR-6 NC	**557557**	**570775**
Bulgaria	14098	18014
Latvia	128046	128014
Lithuania	39872	39757
Malta	2290	4544
Norway	3163097	3590959
Romania	36322	31356
Slovakia	2796	2736
Total EUR-7 NC	**3386521**	**3815379**
Total EUR-28	**12015597**	**12948314**

FAO Gp Species	Av. 94-98	2030
Freshwater fish	139245	130583
Diadromous fish	377843	527100
Marine fish, pelagic, tunas	466211	466211
Marine fish, pelagic, small	2699175	2701120
Marine fish, demersal	2603613	2664485
Marine fish, others	162471	164440
Crustaceans	208088	208272
Molluscs	1088041	1372021
Cephalopods	189676	189676
Others	137157	138252
Total EU-15	**8071519**	**8562159**
Freshwater fish	88267	91907
Diadromous fish	10446	18450
Marine fish, pelagic, tunas	165	165
Marine fish, pelagic, small	202061	202061
Marine fish, demersal	233279	234772
Marine fish, others	1800	1800
Crustaceans	18623	18657
Molluscs	41	90
Cephalopods	1585	1585
Others	1289	1289
Total EUR-6 NC	**557557**	**570775**
Freshwater fish	32448	30291
Diadromous fish	322428	749886
Marine fish, pelagic, tunas	1273	1273
Marine fish, pelagic, small	1273325	1273325
Marine fish, demersal	1484623	1486854
Marine fish, others	15424	16543
Crustaceans	48419	48419
Molluscs	7408	7615
Cephalopods	3842	3842
Others	197331	197331
Total EUR-7 NC	**3386521**	**3815379**
Total EUR-28	**12015597**	**12948314**

Source: database

Detailed total production tables by country and by group of species are available in Annex 13.

3.3.4 Commodity production

3.3.4.1 Food use commodity production

In the light of these assumptions, commodity production will remain stable over the next three decades due to the fact that capture production will stay at the 1998 level and imports will fill the gap between the increasing demand and the national or EU supply. There is here an implicit assumption that imports of raw materials will not be used by the EUR-28 processing industry to increase their production quantities. One of the main reasons for this is that third countries exports to Europe (especially Asian ones) are increasingly refined products. Only ACP countries continue to export unprocessed fish to the EU due to their barrier and tariff preferences (that end in 2008) (Failler and Lecrivain, 2003).

Commodity production follows the total production pattern in the sense that its evolution depends mainly on the aquaculture one. EUR-28 production will go up by 3 percent reaching 9.3 Mt in 2030. The main part of this growth can be attributed to cured and preserved/prepared fish commodities in relation with the processing of aquaculture species.

Table 3-5: Food use commodity production from 2005 to 2030

(tonnes)

	Av. 94-98	2005	2010	2015	2020	2025	2030	% 98-30
Austria	3386	2624	2222	1882	1594	1350	1143	-65
Belgium-Luxembourg	35413	33632	33632	33632	33632	33632	33632	0
Denmark	417241	435656	438628	441685	444831	448068	451398	5
Finland	119320	125530	125637	125746	125856	125969	126082	1
France	879250	823438	823480	823522	823567	823612	823659	0
Germany	324543	380772	381661	382557	383460	384370	385287	2
Greece	221634	213001	214444	215909	217394	218900	220428	4
Ireland	412100	418663	423024	427563	432289	437210	442338	7
Italy	578547	564930	571979	579138	586408	593790	601287	8
Netherlands	536994	587275	589724	592230	594792	597413	600095	3
Portugal	233554	218783	218783	218783	218783	218783	218783	0
Spain	1238827	1273644	1278736	1283901	1289141	1294457	1299851	3
Sweden	337006	361288	361288	361288	361288	361288	361288	0
United Kingdom	1143541	1316200	1320897	1325636	1330417	1335239	1340105	2
Total EU-15	**6481357**	**6755435**	**6784137**	**6813473**	**6843451**	**6874081**	**6905374**	**3**
Cyprus	3310	3668	3668	3668	3668	3668	3668	0
Czech Republic	33275	31500	31500	31500	31500	31500	31500	0
Estonia	131982	130269	130269	130269	130269	130269	130269	0
Hungary	19760	20844	20844	20844	20844	20844	20844	0
Poland	378462	269883	270370	270861	271356	271854	272356	1
Slovenia	3069	3061	3061	3061	3061	3061	3061	0
Total EUR-6 NC	**569858**	**459225**	**459712**	**460203**	**460697**	**461196**	**461698**	**1**
Bulgaria	23063	18815	18815	18815	18815	18815	18815	0

	Av. 94-98	2005	2010	2015	2020	2025	2030	% 98-30
Latvia	156966	142795	142795	142795	142795	142795	142795	0
Lithuania	49956	35991	35991	35991	35991	35991	35991	0
Malta	2290	2907	2907	2907	2907	2907	2907	0
Norway	1643608	1678962	1694462	1710345	1726621	1743301	1760395	6
Romania	36221	18385	18385	18385	18385	18385	18385	0
Slovakia	2796	1984	1984	1984	1984	1984	1984	0
Total EUR-7 NC	**1914900**	**1899838**	**1915338**	**1931222**	**1947498**	**1964178**	**1981271**	**5**
Total EUR-28	**8966115**	**9114498**	**9159187**	**9204897**	**9251646**	**9299454**	**9348344**	**3**

Source: database

2003 has seen the UK fishing industry face one of the worst crises in its history after EU scientists called for a complete ban on catches of cod in a desperate attempt to preserve stocks. Fishermen's leaders have said that the measures could sound the death knell of the white fish industry, putting 20 000 jobs at risk, and devastating numerous coastal communities. The measures recommended by the ICES report[31] included a total ban on cod fishing in the North Sea off the west coast of Scotland, and in the Irish Sea. Fishing for haddock and whiting could also be curbed because cod can be caught when these other species are targeted. Industry leaders have said that adopting the recommendations would all but wipe out fishing in the UK, particularly in Scotland, where 70 percent of the fleet is based. The British fleet has already undergone decades of restructuring and the EU recently announced the most radical overhaul yet of the Common Fisheries Policy, including a reduction of the European fleet by 8.5 percent (the UK fleet has already been reduced by 20 percent through voluntary decommissioning).

The Baltic states and Poland will shortly accede to the EU. For the Baltic fish processing industries, the advantages of becoming EU member states will be immediately apparent with direct access to duty free imports of raw materials from other member states. Currently, the Baltic states mainly concentrate on three types of production:

- Fresh fish filleting of Baltic cod, Baltic salmon, flounder and large Baltic herring.
- Salted and marinated mackerel and herring fillets (Atlantic imports), Baltic sprat and Baltic herring, including smoked products.
- Canned products, including the most popular and well-known smoked sprats in oil.

A further benefit to the Baltic fish processing industry will be the enlarged internal market, although the industry will need to upgrade its processing facilities, procedures and hygiene standards, and implement the Hazard Analysis Critical Control Point (HACCP) in order to be in line with EU legislation (Higuera-Ciapara and Norierga-Orozco, 2000; Panisello *et al.*, 2000). Further, the EU Commissioner for Food Safety and Health has announced that dispensations will not be given to any industry in the new member states when they accede to the Union (Ellegaard and Larsen, 2003).

This will create difficulties for many of the smaller businesses supplying only the local market, Eastern European countries and Russia, as their poorer production facilities will not be able to comply with EU legislation, but are nonetheless capable of producing safe, good quality products. Currently, the survival of these small companies is only due to the

[31] The report from the International Council for the Exploration of the Seas on stock levels is used as the basis for EC fishing quotas every year. It is understood the scientists believe cod stocks are reaching levels from which they may never recover.

dispensations they receive under national legislation. Although national legislation in the Baltic States is very similar to EU legislation (and in some cases, stricter), practical enforcement is less thorough. Once they become member states, EU legislation will supersede national, and stricter enforcement will force many of the smaller companies to close. This will have the effect of making the fish processing industries in the Baltic states smaller in number, but made up of larger individual units, a trend seen throughout the rest of the EU in the last 10-15 years (Ellegaard and Larsen, 2003).

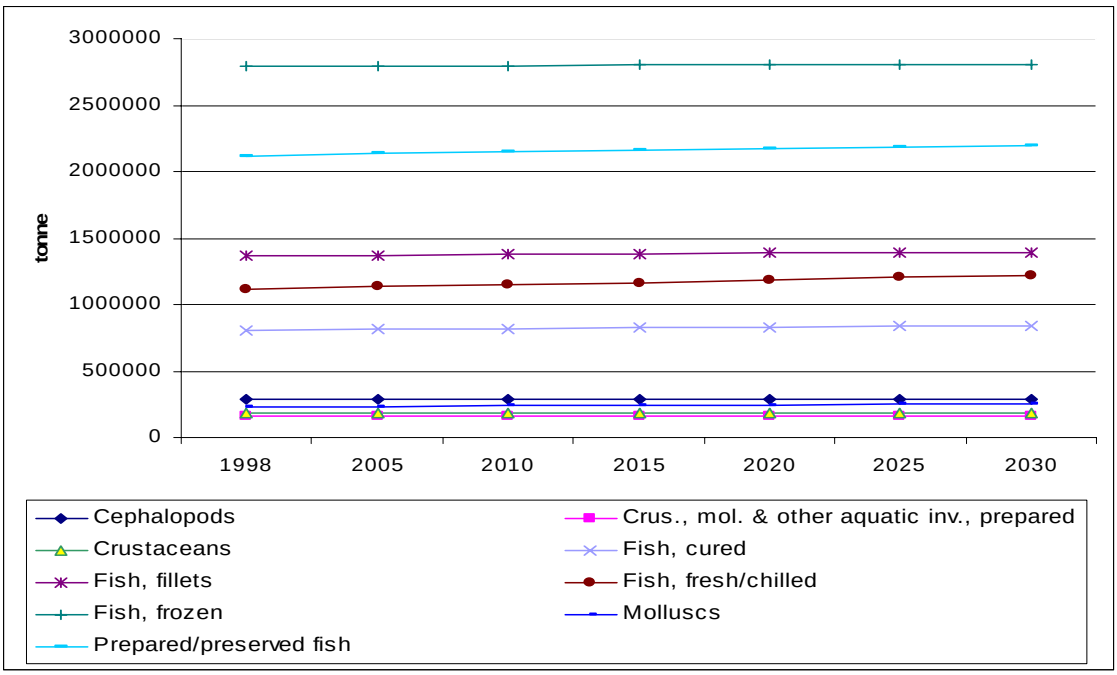

Figure 3-17: Commodity production by OECD groups of commodities from 1998 to 2030

A Spanish report entitled "The industrial seafood processing sector 2000", produced by the country's National Association of Fish and Shellfish Canners (ANFACO), showed that the production of preserved fish and shellfish increased in 2000, maintaining the rising trend observed in previous years. According to the report, production of canned seafood rose by 2.6 percent in volume and 2.4 percent in value. The species that recorded the biggest increases in volume and value included tuna (5 percent and 1 percent respectively), white tuna (4 percent and 6.5 percent), cockles (3 percent and 2.5 percent) and anchovy (3 percent and 4.5 percent). Tuna was the main species processed by the Spanish industry, representing 55 percent of the total volume of canned fish and shellfish products. The second most important species was anchovy, followed by white tuna, cephalopods, mackerel and mussels.

3.3.4.2 Non-food use commodity production

The International Fishmeal and Fish Oil organization projects that in 2010, assuming 6.5 million tonnes net weight of fishmeal is still being produced, about half the fishmeal produced will go into aquafeed, leaving considerable scope for more to be put to this use as aquaculture grows. Therefore, it does not see fishmeal becoming a constraint on the growth of the aquaculture industry for some years. However, fish oil presents a different scenario. Based on an annual world production of 1.25 million tonnes of fish oil (net weight) and an aquafeed demand of about 1 million tonnes (net weight) in 2010, the projections (depending on the production of fish oil) suggest that 80 percent or even close to 100 percent of fish oil will go into aquafeed, leaving little or no room for growth. Aquafeed will therefore be impacted by the projected lack of fish oil.

Non-food use production will stay at the 1998 production level of around 3.3 Mt due to the limits already reached by reduction fisheries at the EU and world level. If the industry is concerned about the future availability of raw material for fishmeal and fish oil production, it also knows that levels of fish landings can't increase in the future. The only possibility is to reduce wastage and increase the recycling of discarded and wasted fish, which is equal to the current quantity of raw material going into the fishmeal industry[32] (Barlow, 2003).

Table 3-6: Non-food use production by FAO groups of species and OECD group of commodities from 2005 to 2030

(tonnes live weight)

Gp Species	Av. 94-98	2005	OECD gp	Av. 94-98	2005
Marine fish, pelagic, small	1534381	1447255	Fish/marine mammal, fat, oil	365594	329203
Marine fish, demersal	93322	51777	Flour, meal unfit for human consumption	17087	791572698
Marine fish, others	446671	402869	**Total NFU Production EU-15**	**20743**	**741901901**
Total NFU Production EU-15	**2074374**	**1901901**	Fish/marine mammal, fat, oil	11	50
Marine fish, pelagic, small	11483	18324	Flour, meal unfit for human consumption	63202	55409
Marine fish, demersal	42077	32456	**Total NFU Production EUR-6 NC**	**63213**	**55459**
Marine fish, others	9653	4679	Fish/marine mammal, fat, oil	291723	301139
Total NFU Production EUR-6 NC	**63213**	**55459**	Flour, meal unfit for human consumption	7774	361027671
Marine fish, pelagic, small	770104	1020641	**Total NFU Production EUR-7 NC**	**10691**	**591328810**
Marine fish, demersal	13761	12819	**Total NFU Production EUR-28**	**32067**	**463286169**
Marine fish, others	284649	295349			
Aquatic mammals	646	0			
Total NFU Production EUR-7 NC	**1069159**	**1328810**			
Total NFU Production EUR-28	**3206746**	**3286169**			

Source: database

3.4 Foreign trade 2005-2030

3.4.1 New rules and regulations

Foreign trade will see significant changes from the previous period due to the progressive disappearance of trade barriers and tariffs and the emergence of new regulations dealing with quality, safety[33] and the environment. The World Trade Organization's rules about the most

[32] An FAO (2000) survey showed that something like 25 million to 30 million tonnes of fish are being discarded or wasted and not produced into any usable product.

[33] For example, in late January 2003 the EU Standing Veterinary Committee suspended the import of animal

privileged nations will be more and more applied which means that all trade countries will benefit from the same advantages that the ACP countries currently enjoy. Hence, the evolution of the EU-ACP countries is crucial for the issues concerning the EU's international trade in general.

Tariff concessions for fishery products granted to ACP countries by the EU have become less preferential. Tariff differentials have been eroded by the general reduction of customs rates generated by GATT agreements, whilst more and more countries benefit from access to the European market, which is free of custom duties. For example, since 2001, under the Everything but the Arms (EBA) initiative, Least Advanced Countries (LAC) have received the same benefits as ACP countries. This tariff reduction has, for several years, been accompanied by changes to the conditions of access to the market (Failler & Lecrivain, 2003).

After 2008, the principle of non-discrimination among ACP States, pillar of the Lome partnership, will no longer apply. The 40 LAC are guaranteed to keep the not-reciprocal preferences of Lome after 2008 (see in Annex 12 the list of counties). The 31 non-LAC countries can preserve their current level of access to the European market only within the framework of an Economic Partnership Agreement (EPA)[34]. Any country that chooses not to sign an EPA could be transferred to an alternative system that has yet to be defined. However, it is likely that this as yet undefined system will be similar to the only option currently allowed by the WTO, namely the General Preference System (GPS) (Jabot, 2000; Lecomte, 2000). From 2004, the EU will study the alternative possibilities of the current partnership; 2004 is also the year in which the next revision of the European GPS will take place (Failler and Lecrivain, 2003).

Labelling and traceability will also be major issues in both intra-EU and third country trade for next years. As Ababouch (2002) pointed out, labelling and traceability could result in the erection of some new barriers or the introduction of another discriminatory principle in the EU international trade. Principal exporting countries of the ACP group thus benefited form EU funds to set up safety and techniques measures that any potential exporter company must from now respect. Regarding labelling, a few points can be highlighted:

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products originating from China, asserting that potentially risky chloramphenicol residues were found in samples of shrimps and prawns imported from China. Also, on July 30, 1997, the EU banned imports of fishery products from Bangladesh as a result of EU inspections of Bangladesh's seafood processing plants. The inspections found serious deficiencies in the infrastructure and hygiene in the processing establishments and insufficient guarantees of quality control by Bangladeshi government inspectors. The ban was estimated to cost the Bangladesh shrimp-processing sector nearly $15 million € in lost revenues from August to December 1997. The impact on both the industry and the economy of Bangladesh was substantial. The only way Bangladesh can improve its export position in the shrimp market is to improve the safety and quality of its exports. Safety improvements over the last two decades, with a major effort in the late 1990s, have been made by the industry and government, and by bilateral and multilateral agencies providing technical assistance. While the short-term loss in foreign currency from the EU ban was high for a developing country, the ban did increase the commitment by industry and government to raise product quality to meet international standards. Both exporters and government made major investments in plant infrastructure and personnel training in order to achieve international technical and sanitary standards. This included new employee acquisition and employee training, sanitation audits, plant repair and modification, and also new equipment (Cato & Subasinghe, 2000).

[34] The Cotonou agreement, signed into 2000, proposed a new comprehensive framework for the ACP-UE partnership. In order to be compatible with the rules of OMC, the European Union recommended a treatment differentiated from the ACP countries, according to the level of development and areas (ECDPM, 2001). Three possibilities are offered to the ACP countries:

- Signature of Economic Partnership Agreements (EPA).
- The least Advanced Countries (LAC), which will choose for the period of negotiation not to conclude some EPA, will preserve the tariff preferences of Lomé.
- The non-PMA, which will choose not to conclude some EPA, will profit from a new mode to define.

- On January 1, 2002, new labelling requirements (Regulation 2065/2001) for fishery and aquaculture products went into force. All products offered for retail sale in the EU must be properly labelled providing the following information:
- commercial name of the species (each member state has established a list of commercial designations)
- production method: "caught in..."; "caught in freshwater"; "farmed" or "cultivated". Member states may decide to omit this requirement when the commercial designation and catch area clearly indicate that the species were caught at sea.
- catch area: for products caught at sea, a reference to one of the areas listed in the Annex; for products caught in freshwater, a reference to the country of origin; for farmed products, a reference to the country in which the product undergoes the final development stage. Operators may indicate a more precise catch area.
- To improve the traceability and control at all marketing stages - from the ship to the shop - the information concerning the commercial designation, the production method and the catch area for all fishery and aquaculture products must be provided either on the label, on the packaging or by means of a commercial document accompanying the goods (e.g. the invoice).

3.4.2 Imports 2005–2030

In 2002, EU-15 imports came from countries on the North Atlantic (Norway, Iceland and the Faeroe Islands), which account for 30 percent of all imports, South America (Argentina, Ecuador and Chile), South East Asia (Thailand, India, etc.) and Africa. Russia, China and the United States are also significant suppliers. In value, ACP countries accounted for only 14 percent of total imports in 2002.

For the import of fishery products for human consumption and bivalve molluscs, the European Commission divides third countries into two categories. The first category includes countries whose processing systems and health standards are at least equivalent to the EU's and whose competent authorities have been audited by an EU inspection team. The countries in the second category have provisional clearance until 31 December 2003, and have not yet been audited by an EU inspection team. Products from this category may be subject to additional national legislation[35].

Since EU production will not be sufficient to cover the needs of the 500 million inhabitants in 2030, imports of raw material and commodities will help to fill the gap between a EUR-28 with more or less stable production (less exports) and increased consumption in most of the member states.

3.4.2.1 Food use imports 2005-2030

In 2030, EUR-28 will import 11 Million tonnes of food use commodities, which corresponds to an increase of 1.4 Million tonnes since 1998 (+15 percent); highest growth rates will be

[35] Directive 97/78/EC, as amended, lays down principles for veterinary check on products imported from third countries. Inspections of consignments include: documentary check (health certificates), identity check (visual inspection to ensure consistency between certificates and product) and physical check (inspection of the product itself). Directive 2002/99/EC establishes animal health rules governing the production, processing, distribution and introduction of products of animal origin for human consumption.
Each shipment must be accompanied by a health certificate using the model provided by Commission Decision 2001/67/EC for fishery products and by Commission Decision 96/333/EC for molluscs, echinoderms, tunicates and marine gastropods.

experienced in the EUR-6 NC (47 percent) and EUR-7 NC (28 percent). The significant increase in market power as a consequence of EU adhesion will be moderated by an increase of higher commercial value commodities in a general sense. A growing part of the trade with Russia should shift towards Eastern European countries. Imports to the EU-15 will only increase by 12 percent. In terms of quantity, the EU-15 will account for more than 70 percent of total growth.

Germany, France, Italy and Poland will be the major contributors to an increase in imports, with volumes between 190 000 tonnes and 280 000 tonnes. Spain alone will see a reduction of its imports due to a decrease in national demand (a consequence of a very slow population growth, i.e. less than 100 000, and a subsequent decrease in demand from consumers). Candidate member states from the former Soviet Union that have been forced to reduce their consumption of fish by the collapse of the Soviet Union, should recover and better supply their national markets with imports from other European countries and the rest of the world.

Table 3-7: Food use imports by country from 2005 to 2030

(tonnes live weight)

Country	Av. 94-98	2005	2010	2015	2020	2025	2030	# 98/30	% 98-30
Austria	88250	93846	96872	100201	103865	107905	112362	22303	25
Belgium-Luxembourg	327049	366120	370663	375952	382032	388953	396769	35831	10
Denmark	564041	610941	614054	617348	620836	624532	628450	21583	4
Finland	67561	71622	74650	78110	82062	86576	91731	23723	35
France	1382082	1545030	1582132	1620991	1661715	1704417	1749224	253375	17
Germany	1222634	1382762	1422901	1465856	1511762	1560766	1613020	281965	21
Greece	118116	157688	161706	165993	170569	175457	180682	28205	18
Ireland	35377	44525	44771	45025	45290	45565	45853	1658	4
Italy	877741	995492	1027111	1061091	1097642	1136991	1179390	224555	24
Netherlands	572331	592280	596981	601888	607009	612352	617927	31898	5
Portugal	486304	514084	514861	515864	517113	518629	520437	7095	1
Spain	1041343	1150508	1135216	1122518	1112234	1104200	1098268	-78392	-7
Sweden	185820	216458	217351	219104	221727	225248	229715	13035	6
United Kingdom	742943	808445	826942	846328	866657	887985	910371	126418	16
Total EU-15	**7711594**	**8549802**	**8686210**	**8836269**	**9000513**	**9179576**	**9374200**	**993251**	**12**
Cyprus	13162	15616	16401	17274	18244	19322	20521	5874	40
Czech Republic	78179	81166	86404	92389	99210	106966	115774	40830	54
Estonia	48532	78919	78846	78870	78999	79239	79600	428	1
Hungary	22654	29374	31909	34837	38221	42136	46667	20283	77
Poland	319405	388487	414312	443123	475293	511242	551452	194716	55
Slovenia	13470	14053	14615	15234	15917	16669	17501	4149	31
Total EUR-6 NC	**495403**	**607616**	**642487**	**681728**	**725882**	**775575**	**831515**	**266280**	**47**
Bulgaria	11741	25269	28437	32030	36109	40741	46007	24557	114
Latvia	47917	45685	46730	47991	49516	51364	53610	9098	20
Lithuania	82809	116224	123641	131684	140414	149901	160218	53431	50
Malta	9168	11141	11773	12449	13175	13951	14784	4458	43

Country	Av. 94-98	2005	2010	2015	2020	2025	2030	# 98/30	% 98-30
Norway	303377	369583	371454	373478	375671	378051	380636	13440	4
Romania	28075	62892	70090	78290	87656	98384	110707	56470	104
Slovakia	34179	29741	32086	34693	37589	40809	44387	17539	65
Total EUR-7 NC	**517265**	**660536**	**684211**	**710615**	**740131**	**773201**	**810347**	**178993**	**28**
Total EU-28	**8724262**	**9817953**	**10012909**	**10228612**	**10466526**	**10728352**	**11016063**	**1438523**	**15**

Source: database

All the OECD groups of commodity production will benefit from the augmentation of imports. The group of crustacean, molluscs and other prepared invertebrates will grow at the highest rate (40 percent), but its contribution will still be minor with about 170 000 tonnes of a total of 11 Mt The main groups will be unchanged from the period 1989-1998: prepared/preserved fish (2.2 Mt in 2030) fresh/chilled fish (2.1 Mt), fish fillet (1.9 Mt), frozen fish (1.8 Mt); but the share of the total volume will be different: prepared/preserved fish (20 percent in 2030, instead of 17 percent in 1998) fresh/chilled fish (20 percent, 22 percent), fish fillet (17 percent, 16 percent), frozen fish (19 percent, 17 percent). Globally, the fresh fish share will be gradually eroded by preserved and prepared fish commodities.

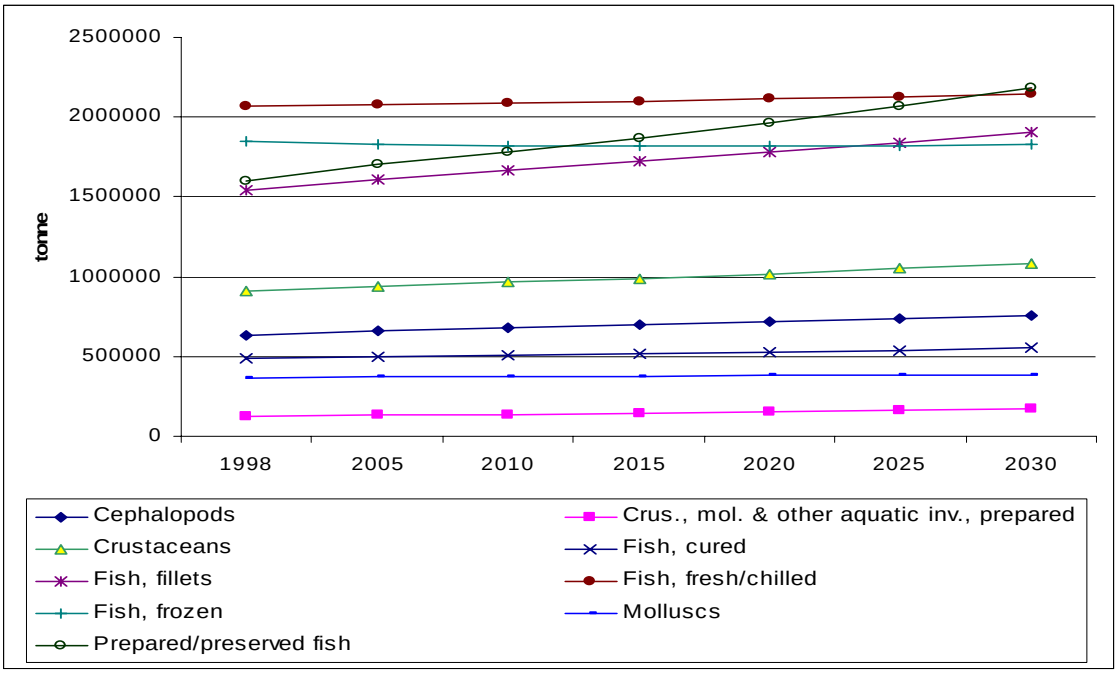

Figure 3-18: Imports by OECD groups of commodities from 1998 to 2030

The import of all groups of species will increase. Each group will continue to account for the same percentage (within one or two percent) of total imports. In 2030, demersal species will remain the most significant imported species, increasing by 12 percent and accounting for 30 percent of the total value of imports (as in 1998). Cod, Alaska pollock and hake will be the three principle species imported by EUR-28 in 2030, coming in as fresh/chilled, frozen or filleted fish. Cod and Alaska pollock will come from Northern European countries, Russia and North America, whilst hake will be imported from West Africa and Argentina.

Two million tonnes of small pelagic species will be imported in 2030, of which herring and mackerel will account for nearly 80 percent (1.6 Mt). Pilchard, sprat and anchovy will be the other important species. Imports of small pelagics will consist of prepared/preserved (canned), fresh/chilled and frozen commodities. Northern European countries (Iceland and the Faeroe

Islands) will provide a substantial part of the herring, mackerel and sprat imports, whilst South American and North West African countries will contribute to imports of pilchard and anchovy.

Over a million tonnes of tuna, crustaceans and other marine fish will be imported in 2030. Asian countries such as Thailand will be largely responsible for imports of tuna. The Seychelles in the Indian Ocean will be able to export its own production to Europe by 2030, as it is currently developing its own fishing fleet (seiners) to compliment (and supply) its tuna canning factory in Victoria. Tuna will be imported both frozen and in cans. Eighty percent of imported crustaceans will be shrimp from Asia, South America and the southern countries of Africa (Josupeit, 1999, 2000). Most of these shrimp will be frozen. The other crustaceans like crab and lobster will be imported to Europe alive or fresh from places such as Canada and Morocco.

By 2030, imports of freshwater and diadromous fish will have increased by 7 percent. Imports of freshwater fish will be largely composed of carp, tilapia and Nile perch, coming from China, South America and Africa. A proportion of diadromous fish imports will be intra-European trade, since Norway will be a member of the EUR-28 by 2030 (Ospad, 2000).

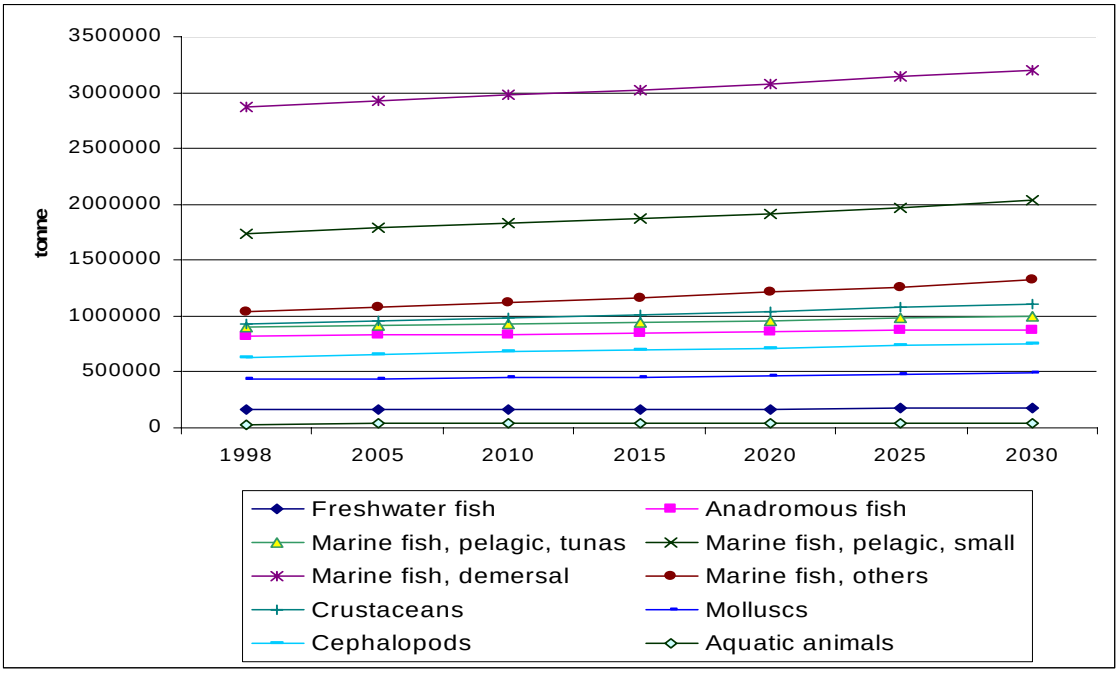

Figure 3-19: Imports by FAO groups of species from 1998 to 2030

Detailed tables of food use imports by FAO groups of species and by OECD groups of commodities are presented in Annex 14.

3.4.2.2 Non-food use imports 2005-2030

Non-food use imports decreased slightly between 1989 and 1998, but will remain stable up to 2030 except in those countries where it is expected aquaculture production will increase significantly. Norway will be the only EUR-28 country to increase its imports of fishmeal and fish oil in order to satisfy its aquaculture producers. The estimated volume of aquafeed products will be about 750 000 tonnes and will come from Iceland, Peru and Chile. In 2030, the total volume of EUR-28 non-food use imports will be around 3 Mt.

3.4.3 Exports 2005-2030

3.4.3.1 Food use exports 2005-2030

Countries that will see an increase in their exports will be those that increase their production from aquaculture. Therefore, Norway will increase its export of diadromous fish to other European countries and Japan by 100 000 tonnes. Overall, EUR-28 exports will increase by 100 000 tonnes to reach 8.1 Mt This small size of the increase can be explained by the fact that increased production from aquaculture will be largely absorbed by the national market and will not enter into the trade circuit (see Annex 12 for tables).

3.4.3.2 Non-food use exports 2005-2030

Non-food use exports in 2030 will stay at their 1998 level: around 2.3 Mt.

3.4.4 Intra-EU trade 2005-2030

Intra-EUR fish trade for human consumption will significantly increase as:

- Norway will provide the majority of intra-EU trade in salmon;
- Newly joined Eastern European countries will absorb an increasing part of the processed products made in the former EU-15;
- There should have some delocalisation of the processing activities toward the Eastern countries.

Overall, the development of intra-EU trade will depend mainly on the marginal costs reduction that will occur with the development of new infrastructures and communications between the new Member states and old Member States (Bernard, 1997; Anon., 2001f; Guillotreau *et al.*, 1998).