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### Revision Control

Role	Name	Organisation	Date	File suffix <sup>3</sup>
Authors	Paul Steinar Valle	Kontali		PSV
Authors	Dimitar Taskov,	U Stirling		DT
Authors	Carlos Alberto Espinal & Björn Suckow,	TTZ		CAE - BS
Authors	Sveinn Agnarsson & Saga Gudmundsdottir	Ulce		SA – SG
Authors	Søren Qvist Eliassen	UAib		SQE
Authors	José Luis Santiago	Cetmar		JLS
Authors	Heather Manuel	MemU		HM
Authors	Thong Tien Nguyen	NTU		TTN
WP leader	Paul Steinar Valle	Kontali	30.8.2016	PSV
Coordinator	Guðmundur Stefánsson	MATIS	31.8.2016	GS

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<sup>3</sup> The initials of the revising individual in capital letters

## **Deliverable D2.1**

# **Report on the development of prices & volumes in the European fishery & aquaculture market**

August 2016

## Executive Summary

In this report the PrimeFish project provides an overview on the European and in particular the EU seafood sector in large, in comparison with global development; i.e. development in the other continents focusing on major commodity groups for fisheries and aquaculture. Through a descriptive analysis based largely on FAO statistics from 1950 up until recent years, trends in fisheries and aquaculture quantities (supplies) are presented and compared across continents and to some degree with respect to countries. Also, using FAO statistics, major development in consumption (demand) are studied.

The report focusses mainly on volumes within the seafood sector. The information on values (defined by price) is less detailed since this information has a much shorter history in the FAO statistics and also because there is much more uncertainty attached to it. The studies/reports to follow this overview within WP 2 in PrimeFish, will go more into detail both with respect to quantities and value (prices) for selected case species. The study and the FAOStat basis is to some degree supported with some more recent market information from EUMOFA.

Fisheries at a global level has been flattening out since the late 80-ies and the global growth in seafood supplies stems from the same period from aquaculture. Fisheries within EU has been reduced while slightly increased for other continents like in particular Asia. Aquaculture has been growing in Europe as such, but for EU there has been a flattening and declining trend from the late 90's. And, Europe lags markedly behind the growth in aquaculture in Asia both with respect to quantity and with respect to differentiation, i.e. in number of commodity groups and species.

There has been an increasing trend in seafood consumption in Europe, though flattening out for the last years, and seafood consumption is increasing also in other continents and in particular so for Asia. It is expected based on demographic information i.e. population growth and increased urbanisation, that the increase in seafood consumption and thus demand, will increase for the developing continents i.e. Asia and Africa. This situation might increase the competition over the global seafood resource and both supplies for consumption and also for the EU processing industry might be challenged and at least cause a higher price for seafood.

Currently there is an increasing imbalance in seafood trade for EU and for the last year this imbalance is related to increased value of import (higher import price) and not so much related to volume.

PrimeFish will in the following months attempt to analyse and investigate how Europe can counteract this development and strengthen the economic sustainability of both its fishery and aquaculture sectors. And further, contribute to how one can develop sustainable uses of the European and global water based resources.

## Contents

Introduction.....	5
Material and methods.....	5
Results .....	7
Global and European seafood market – some macro characteristics .....	7
Aquatic food consumption patterns and trends.....	12
Fisheries.....	38
Aquaculture.....	64
Some countries in particular .....	77
Spain.....	77
Canada.....	88
Vietnam fish and seafood production and consumption.....	91
Discussion.....	94
Conclusions.....	96
References.....	97

## Introduction

As part of WP 2 “Economic performance and prices” in PrimeFish, one task (Task 2.2) was to provide an overview on the European seafood market in perspective, i.e. to look at the development in European supplies (production) and demand (consumption) both over time, and in comparison with the development in other continents.

The report has not the intention to go deeply into many of the different sectors and/or species that make up the European seafood sector, but rather to provide a “birds view” looking for major trends in supplies and demand, and to compare the performance in Europe to other continents, with respect to the major commodity groups as defined by FAO.

The analysis and report was split into four parts providing i) some macro characteristics for the seafood market, ii) a focus on seafood consumption, iii) a look at fisheries and finally iv) aquaculture.

## Material and methods

The report is largely based on United Nations Food and Agricultural (FAO) statistics (FAOSTAT) which is the public available data providing the best historical overview when operating from a more macro perspective. The Statistics Division of FAO has launched a new version of FAOSTAT, which is part of the organization's mission to improve data collection and dissemination for development and the fight against global hunger and malnutrition.

The new platform continues to offer free and easy access to data for 245 countries and 35 regional areas from 1961 through the most recent year available. Enhanced features include browsing and analysis of data, an advanced interactive data download, and enhanced data exchange through web services.

From FAOSTAT we used:

- *Food Balance dataset ([http://faostat3.fao.org/download/FB/\\*/E](http://faostat3.fao.org/download/FB/*/E)) that relate to supplies utilized for direct human consumption. All data are expressed in primary equivalents, meaning that processed commodities are converted back to their primary form (raw material)*
- Production (capture and aquaculture; 1950-2014) downloaded from “Global workspace” FAO (<http://www.fao.org/fishery/statistics/software/fishstatj/en#downlDataset>)

The analysis of consumption does not attempt to be extensive but rather focuses on countries and regions of interest to PrimeFish which include the EU as a whole and within it the United Kingdom, France, Spain, Italy, Germany, Greece, Denmark, as well as Norway, Iceland, Viet Nam and Canada but also uses China and the USA as reference points when it speaks broadly about Asia and the Americas.

We have also on some occasions, made use of The European Market Observatory for Fisheries and Aquaculture (EUMOFA) which is a market intelligence tool on the European Union fisheries and aquaculture sector. It has the aim to i) increase market transparency and efficiency, ii) analyse EU markets dynamics and iii) support business decisions and policy-making. EUMOFA contributes to the commitments of the European Commission in terms of market intelligence (Art. 42 of EU REGULATION No 1379/2013). EUMOFA has a shorter history and provides insight for the last decade for Europe only, starting with information from early 2000 both as searchable information available on the web



(<http://www.eumofa.eu/>) and as different publications and among others “The Fish Market Report – edition 2016” (an annual publication), also available from the web.

The analysis is mainly descriptive and in large based on visual (graphical) presentation observing trends over time and comparing trends between continents.

## Results

### Global and European seafood market – some macro characteristics

The total global seafood production (quantity; FAO data) has increased over the last 6 decades (from 1950) with on average 4 % per year. The annual growth within fisheries has been on average 2.6 % for the entire period while 8 % for aquaculture. From the late 1980ies the fishery quantities flattened out and the growth in seafood quantities stems from aquaculture which still has an annual growth rate of about 8 %. Fisheries for this period, has a growth rate of about 0.5 %.

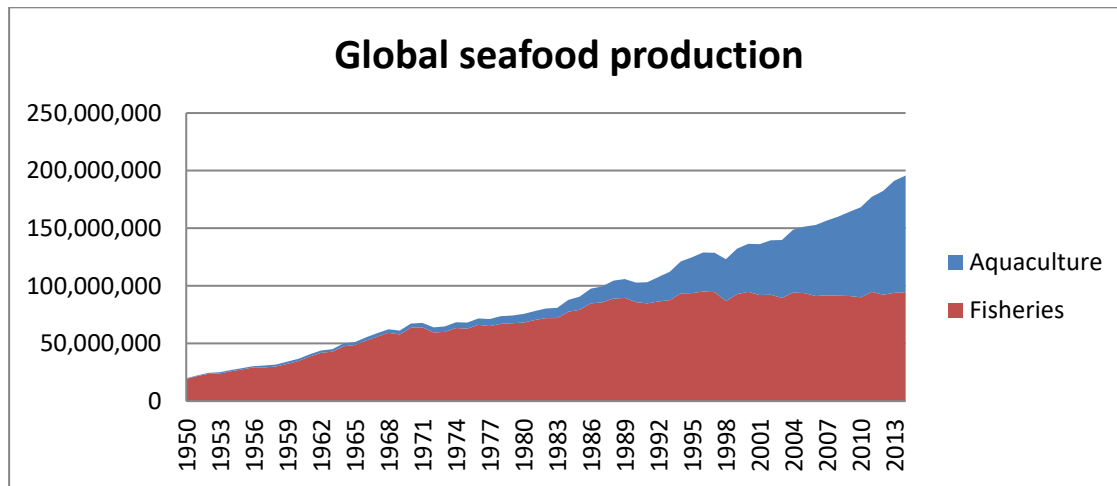


Figure 1, Global seafood production from 1950 to 2014 split into fisheries and aquaculture

However, the growth in seafood quantities is not evenly distributed over the five continents, and the major contribution to growth to both fisheries and in particular to aquaculture over the period stems from Asia.

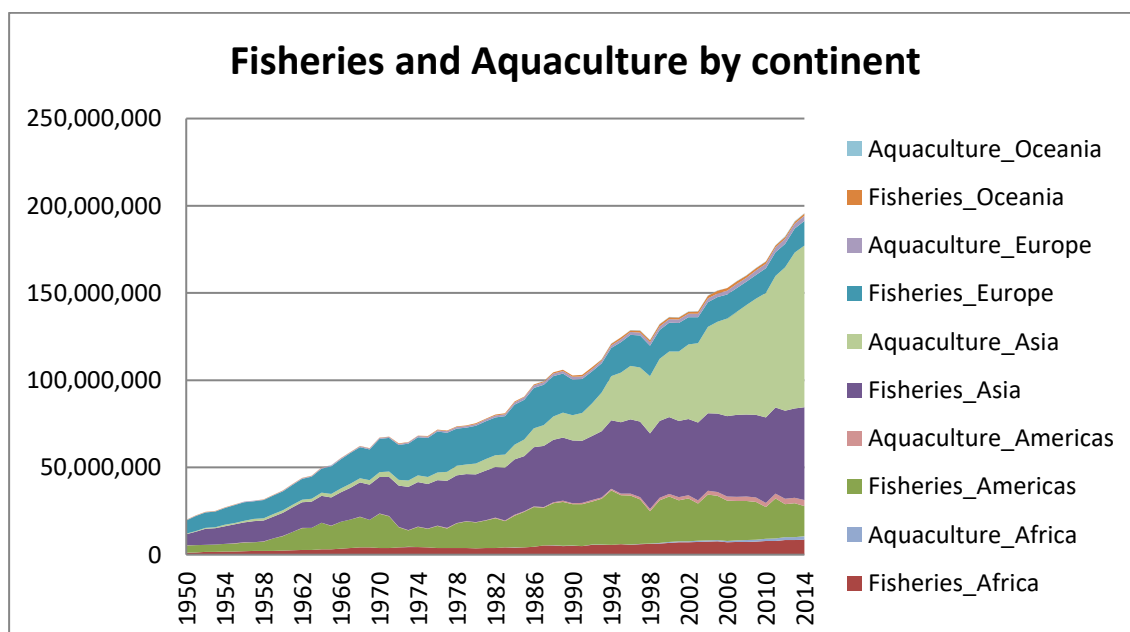


Figure 2, Global fisheries and aquaculture production by continent from 1950 to 2014

Aquaculture Volume development	Africa	Americas	Asia	Europe	Oceania	Totalsum
1990-2014	1966 %	474 %	540 %	82 %	301 %	500 %
2010-2014	31 %	33 %	30 %	15 %	5 %	30 %
2013-2014	7 %	10 %	4 %	6 %	5 %	4 %

Europe – as a continent – experienced a major increase in fishery quantities from 1950 and up until 1975, Figure 3, continued relatively flat from there until 1988, dropped markedly up until 2006 and has from then continued relatively flat. There has been a steady growth in aquaculture; however, small if comparing to Asia.

In 1990, America, Asia and Europe represented 28, 42 and 24 % of the fishery quantities respectively; while in 2014 the share is 18, 56 and 15 %, respectively. When comparing aquaculture quantities America, Asia and Europe had a share of 3, 86 and 10 %, respectively in 1990; while in 2014 these shares were 3, 92 and 3 %, respectively.

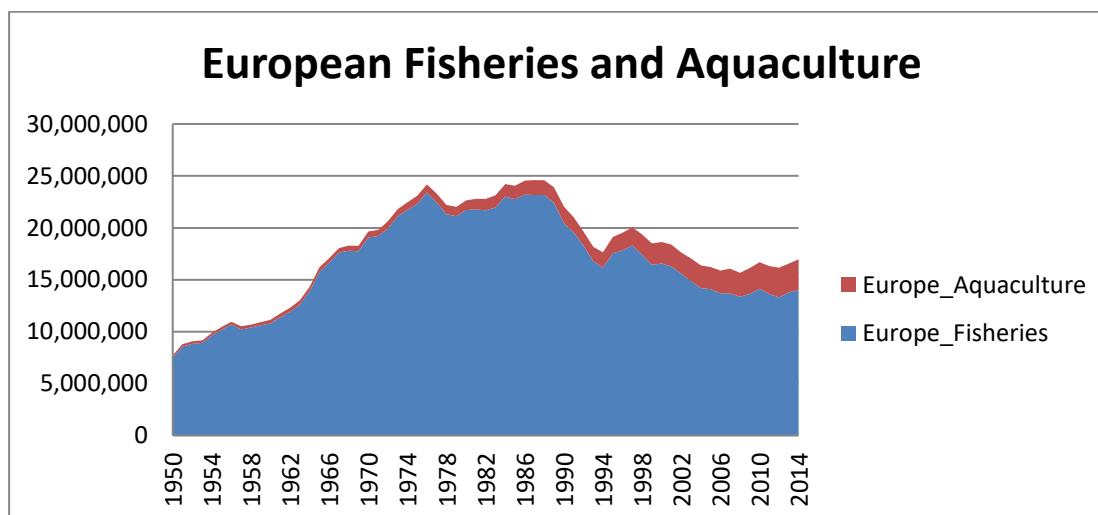


Figure 3, Fisheries and Aquaculture on the European continent from 1950 to 2014

When splitting Europe into EU and Non-EU countries, Figure 4, we observe the changes in fishery volumes showing the same trends though more markedly for Non-EU countries, and of European fisheries EU shares where 40 % both in 1990 and 2014. With respect to the growth in aquaculture, this has to a higher degree occurred in Non-EU countries; EU shares being 64 and 44 %, in 1990 and 2014 respectively.

Based on the “pictures” below, Figures 4 and 5, and the consumption Figures in the following chapter, where we observe increased consumption also within EU, it is not surprising when one in “The EU Fish market – Edition 2016” (EUMOFA), can read that the imbalance in seafood trade (higher imports than exports) has been on average, on an increasing trend since 2003. The EU trade balance deficit, in value, is reported to be EUR 17.8 billion in 2015, 1.7 billion higher than in 2014. The main cause for an increased imbalance is growing imports of frozen and fresh products to the main European markets: Spain, France, Sweden, UK, Denmark, the Netherlands and Italy.



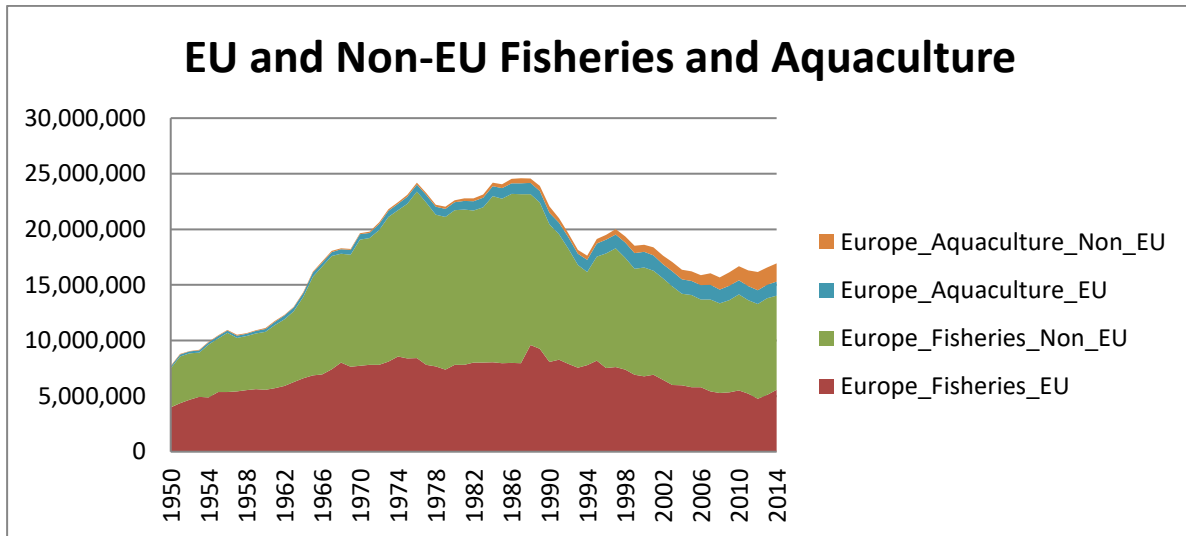


Figure 4, European Fisheries and Aquaculture within EU and Non-EU countries, from 1950 to 2014

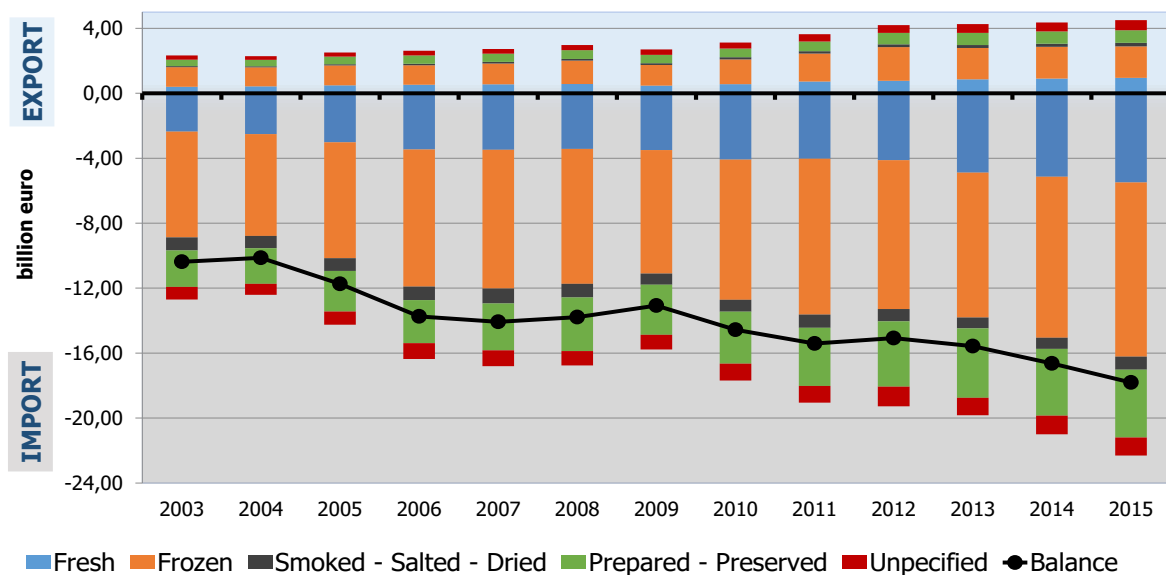


Figure 5, Export and import values in EU for seafood split by preservation states from 2003 to 2015 (EUMOFA)

The EUMOFA report show further that the imbalance is mainly due to increased value of the imported seafood such as cod, tuna, shrimps and salmon. The volumes of imported seafood volumes are relatively stable over the period from 2006 to 2015.

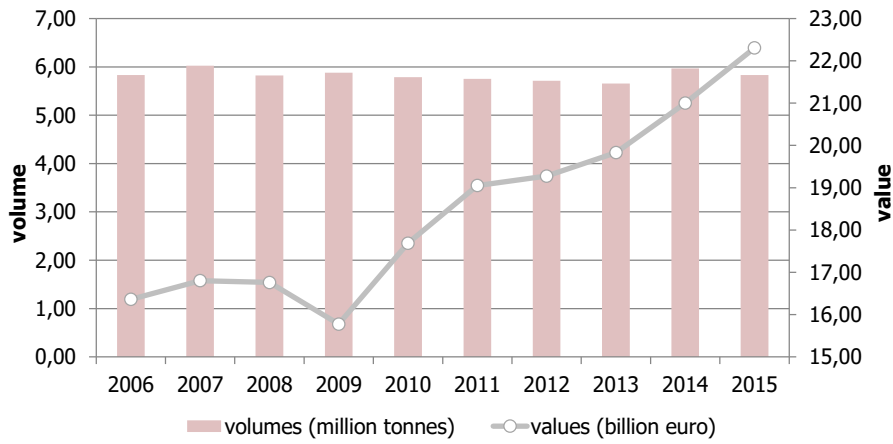


Figure 6, Seafood import volumes and values, to EU from 2006 to 2016 (EUMOFA).

In the EUMOFA report one can read that EU imports 4 times more fish than meat and also this ratio is showing an, on average, increasing trend since 2006.

## Demographic development

When looking at the demographic population we see movements to a larger share of urban population in particular in Asia and Africa, together with also these being the continents with the largest expected growth in population up to 2050. And, when seen in connection with large imports to Europe from these continents and in particular from Asia, it has been argued that Europe might be at risk of having access to less supplies of seafood in the years to come, since Asia will need the food themselves, or at least Europe will have to pay more for the food than we do today, food being a limited resource. And, judged by the trends reported by EUMOFA above, we may already be observing this effect.

Limitations of seafood available for import is not only a potential risk for seafood available for consumption, but will, if so, also limit the resources available for a relatively large seafood processing industry like tuna canning. And, might this affect the number of jobs within the European seafood industry.

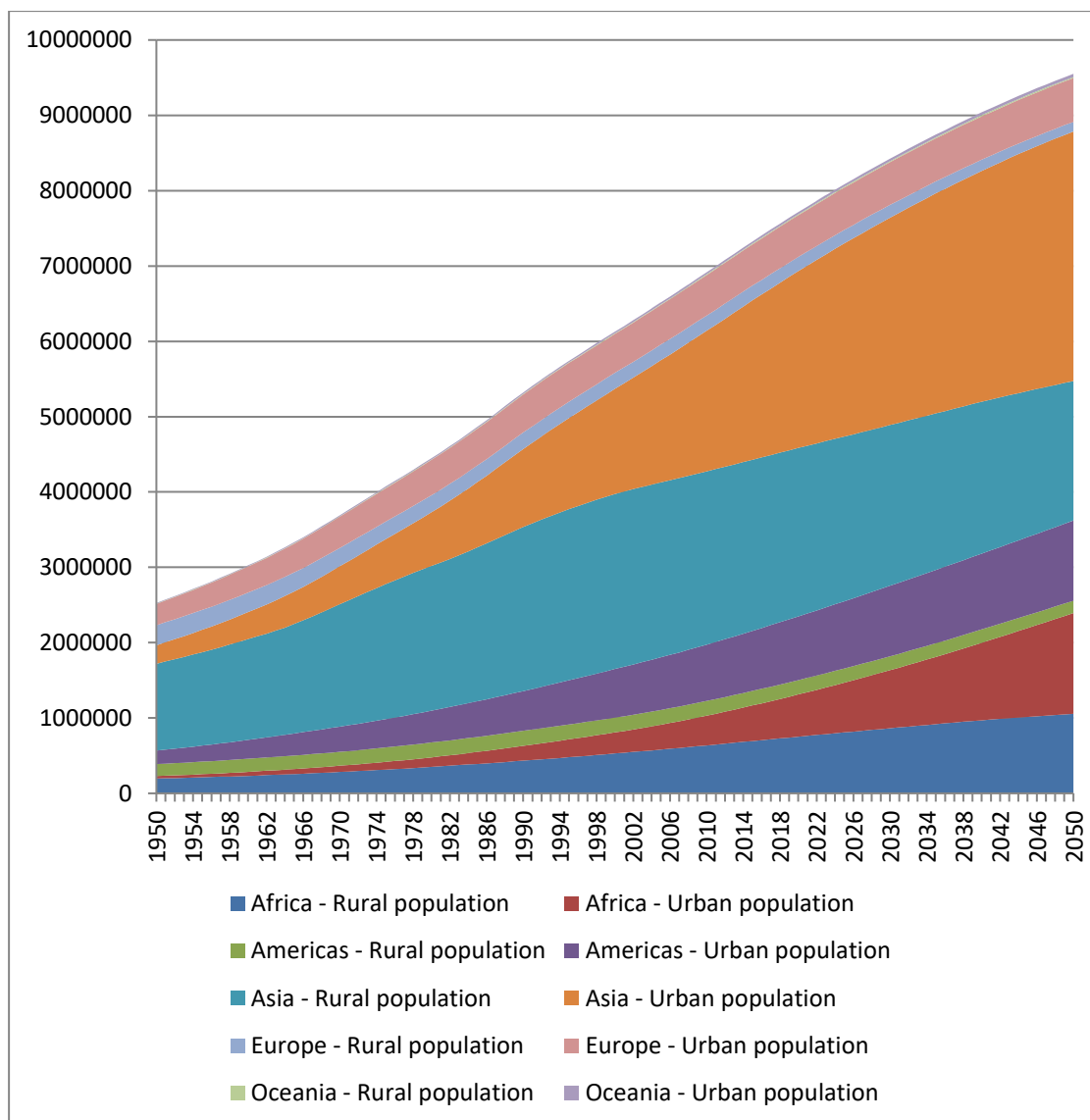


Figure 7, Demographic development by continent 1950 to 2050 (FAOSTAT)

## Aquatic food consumption patterns and trends

### Global context

The global consumption of aquatic food products, including fish, seafood and plants, has been growing steadily over the last 50 years, reaching a peak of nearly 143 million tonnes in 2011, Fig. 8. However, growth has been highly uneven, coming primarily from Asia which marked a nearly 8-fold increase in apparent consumption over the same period and alone comprising more than 70 % of the global consumption in 2011.

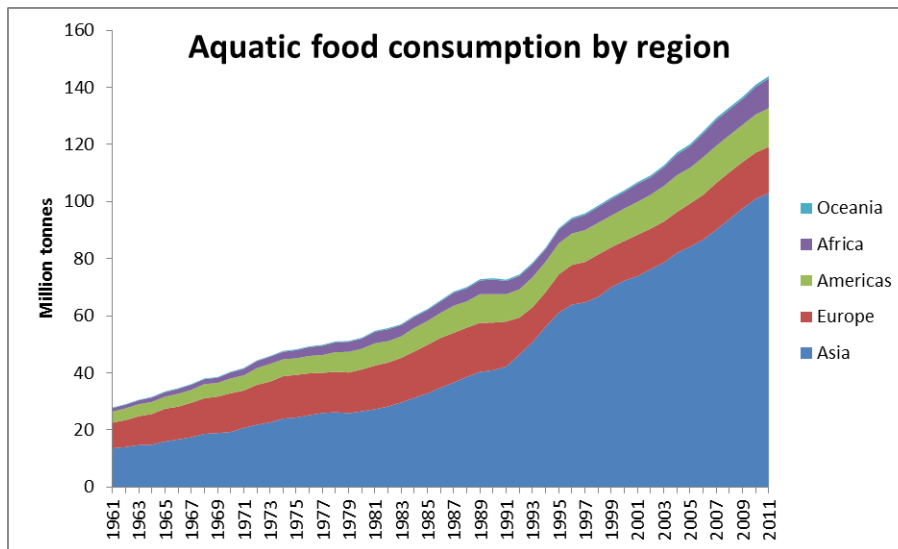


Figure 8, Global trends in apparent aquatic food consumption. Source FAOSTAT

The increase has been driven not only by population growth but also a marked increase in per capita consumption of fish and seafood, reaching more than 20 kg/capita/year, Fig 9. Global consumption figures have correspondingly increased to about 18 kg/caput/year, likely an underestimate as the share of non-traded, subsistence fish species consumed primarily in developing countries often goes unaccounted. On the other hand, seafood consumption has both in absolute and per caput terms, remained relatively stable or marked only a slight increase in other regions of the world. Europe in particular has even experienced a slight decline in absolute consumption relative to the late '80s.

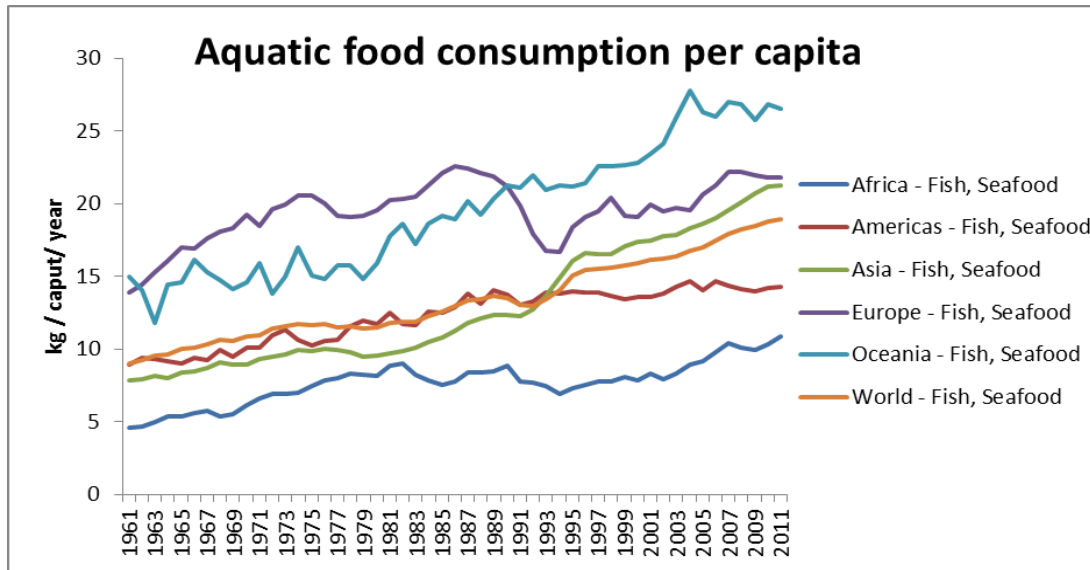


Figure 9, Global trends in per capita aquatic food consumption by continent. Source: FAOSTAT

In terms of commodity type, growth in the consumption of freshwater fishes, crustaceans, molluscs and aquatic plants has been most marked, with freshwater fish alone comprising about 30% of the apparent global consumption in 2011, Fig 10.

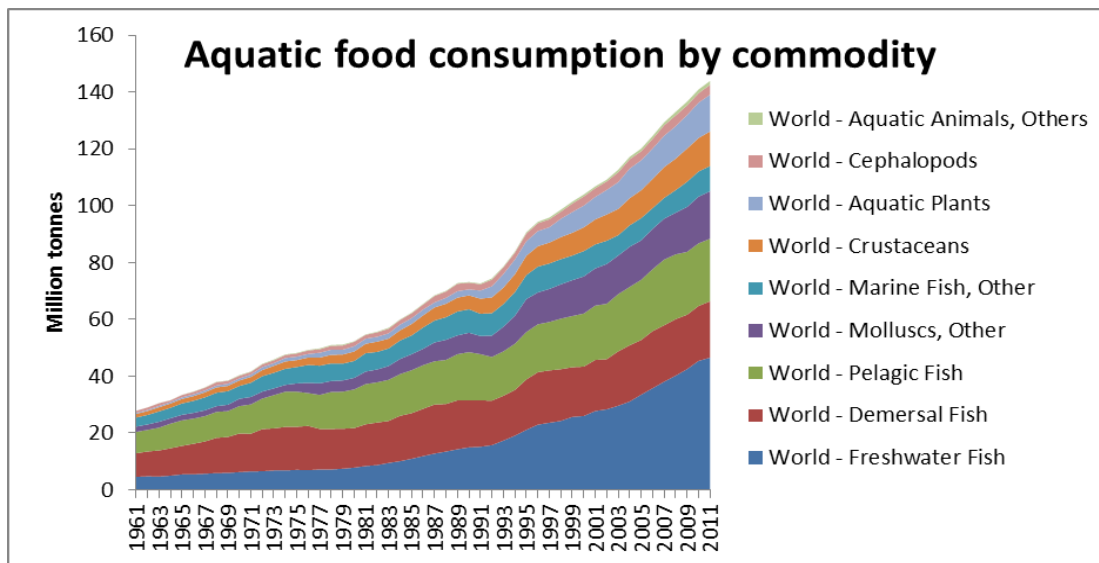


Figure 10, Global trends in apparent aquatic food consumption by commodity. Source: FAOSTAT

Per caput global consumption of freshwater fish has grown from 1.5 kg to 7 kg for the period 1961-2011, Fig 11, driven primarily by increased supply due to a rapid development of the freshwater aquaculture sector in Asia. Consumption of marine capture fishes (demersal, pelagic and other) on the other hand has remained relatively stable over the last 3 decades.

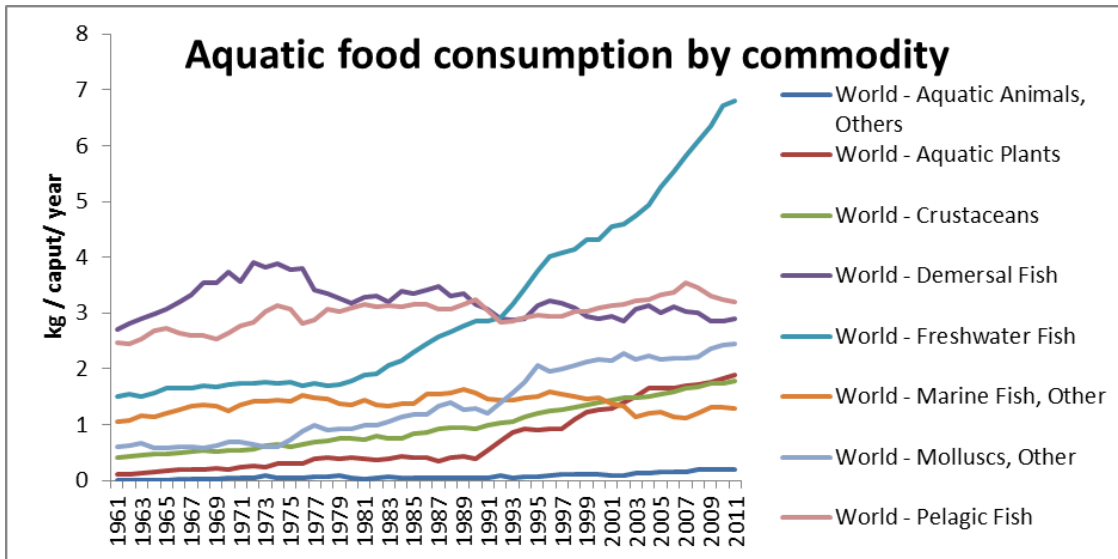


Figure 11, Global trends in per capita aquatic food consumption. Source: FAOSTAT

On a global scale, the consumption of aquatic foods has grown alongside other major food commodities, Fig 12, and while being only a half and a tenth of the absolute apparent consumption values of meat and cereals in 2011 respectively, it has shown a higher average growth rate for the period 1961-2011.

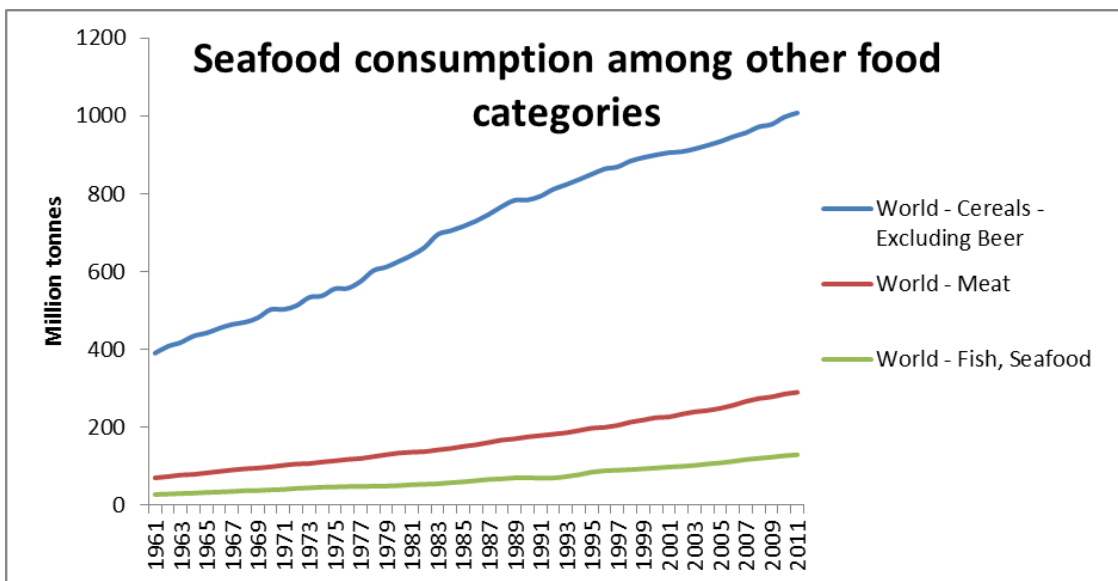


Figure 12, Global apparent consumption trends of major food categories. Source: FAOSTAT

The global expansion of cereal and meat markets has come primarily from Asia and the Americas, Figs 13 and 14. In Europe however, both meat and cereal consumption has declined relative to late 1980s, mainly as a result of political changes and corresponding transformation of the food production systems and food markets in Russia and Eastern European nations at that time, while on the other hand fish and seafood consumption has remained relatively stable, Fig 15.

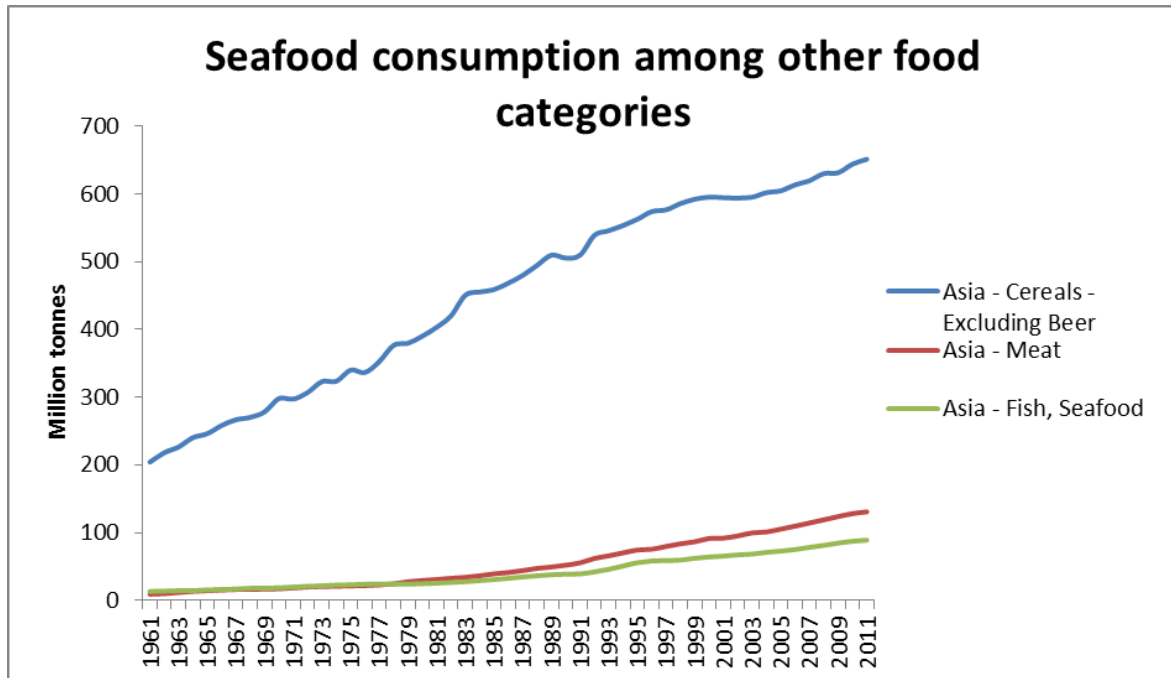


Figure 13, Apparent consumption of major food categories in Asia. Source: FAOSTAT

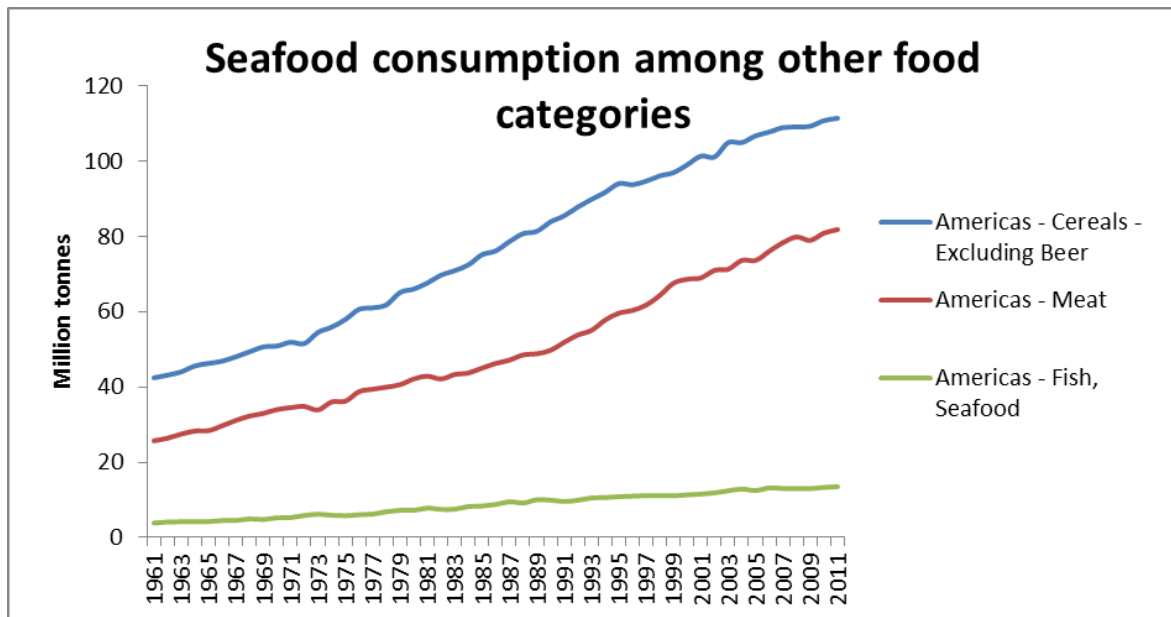


Figure 14, Apparent consumption of major food categories in the Americas. Source: FAOSTAT

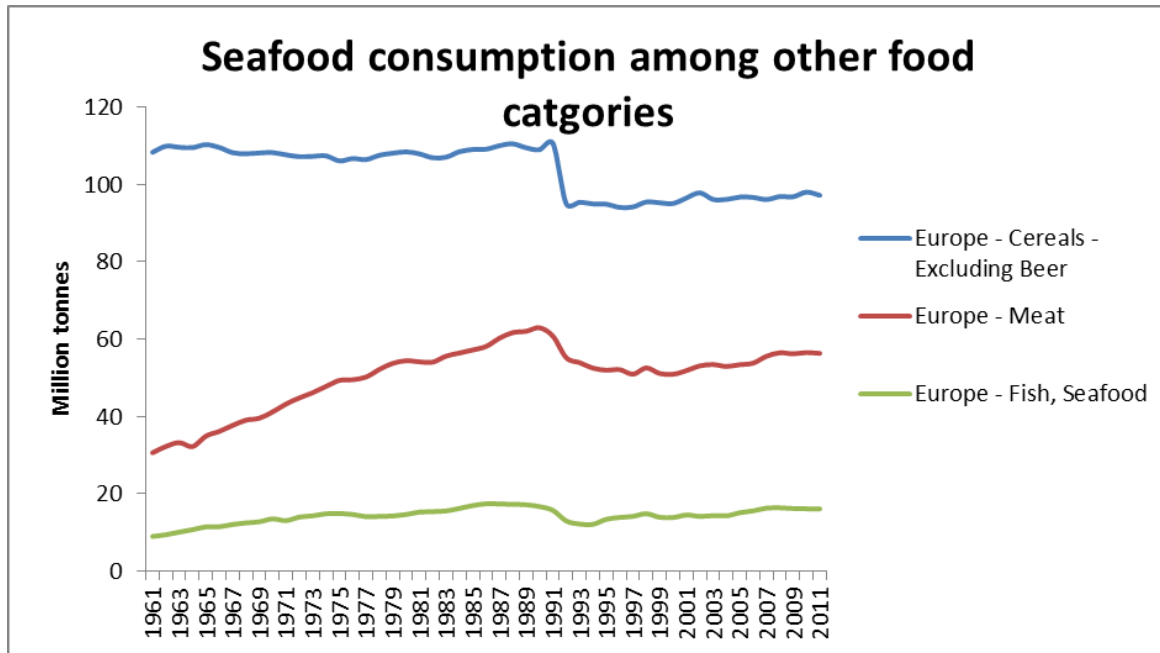


Figure 15, Apparent consumption of major food categories in Europe. Source: FAOSTAT

### Asia

Aquatic food consumption in Asia has been driven mainly by growth in China, which increased its share to more than 50 % of the region since mid-1990s, in 2011 alone representing nearly 60 % of the total consumption in Asia, Fig 16. Self-sufficiency in Asia and China as such, Fig 18, is well above 100 % and in Vietnam close to 180 % in 2011.

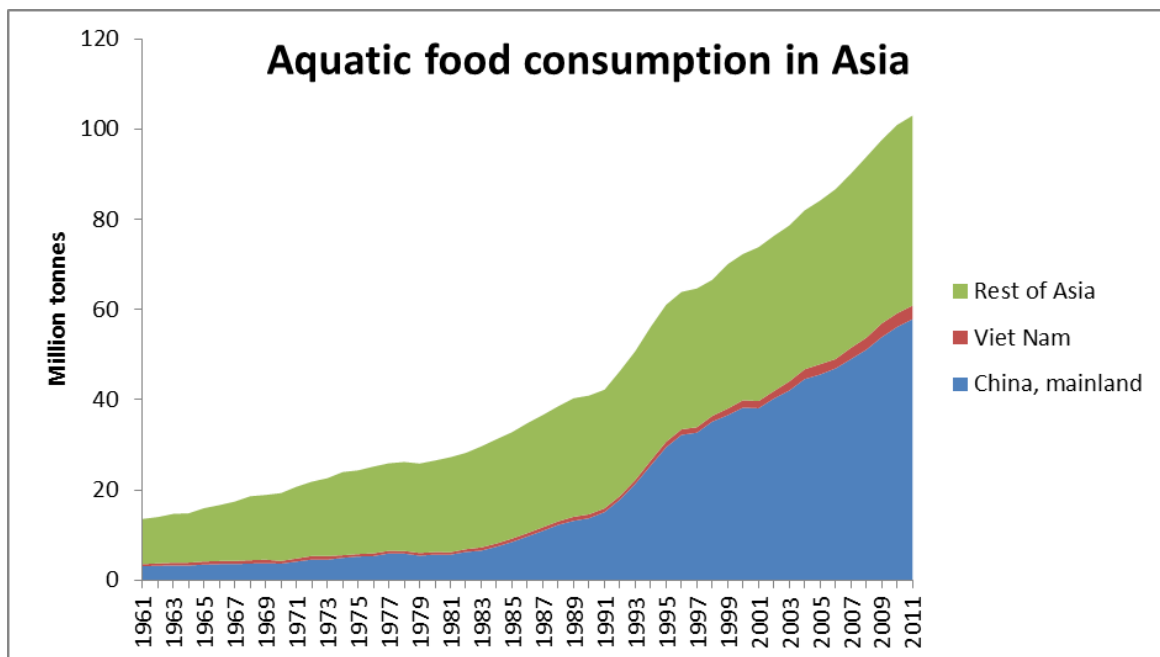


Figure 16, Apparent food consumption in Asia with focus on China and Viet Nam. Source: FAOSTAT



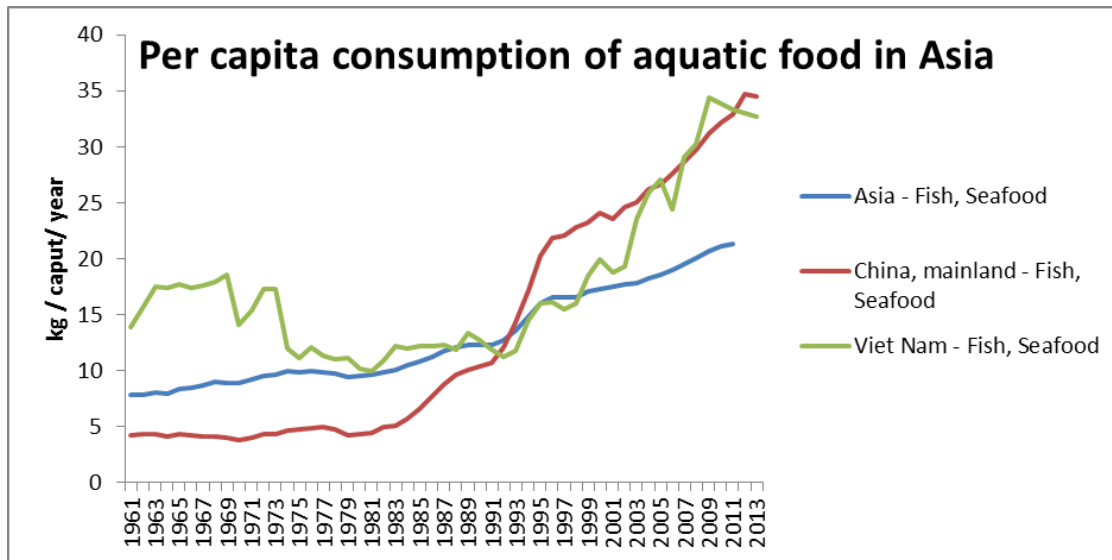


Figure 17, Per capita fish and sea food consumption in Asia. Source: FAOSTAT

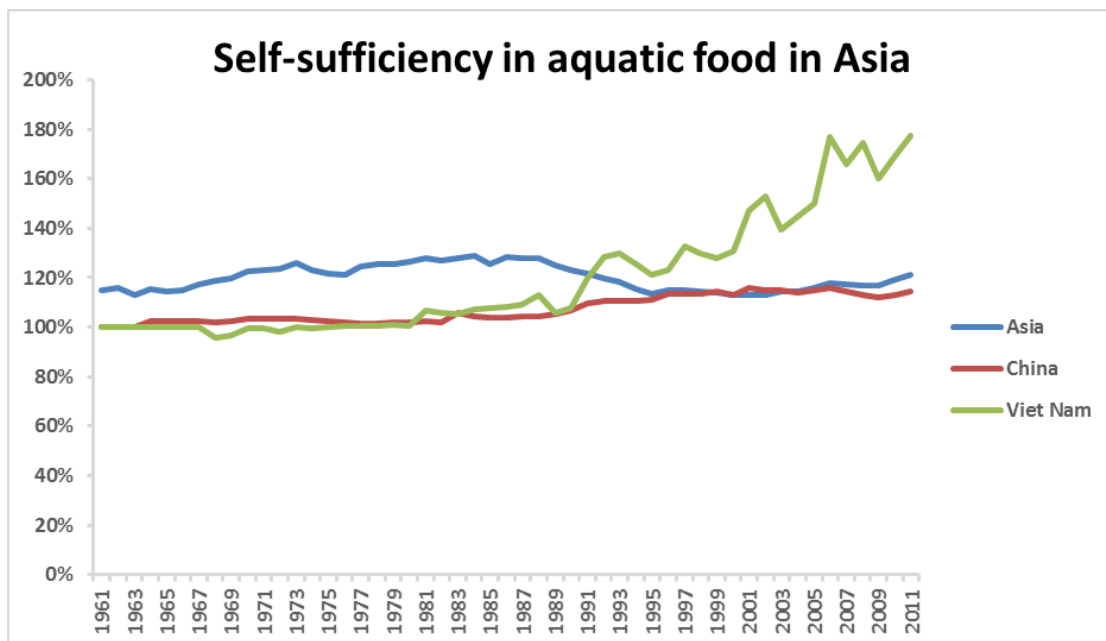


Figure 18, Self-sufficiency in aquatic food in Asia. Source FAOSTAT

## China

A steep growth trend in per capita consumption can be seen in China starting in early 1980s, influencing strongly the average Figures for Asia and indeed world Figures for the period after, Fig 16. This growth has been driven particularly by expansion in the consumption of freshwater fish, aquatic plants and molluscs, with freshwater fishes alone accounting for more than 40 % of the aquatic commodities consumed in 2012, Fig 19. Increased supply of freshwater fish from aquaculture has been the main driver for the increased per capita consumption of these commodities, Fig 20.

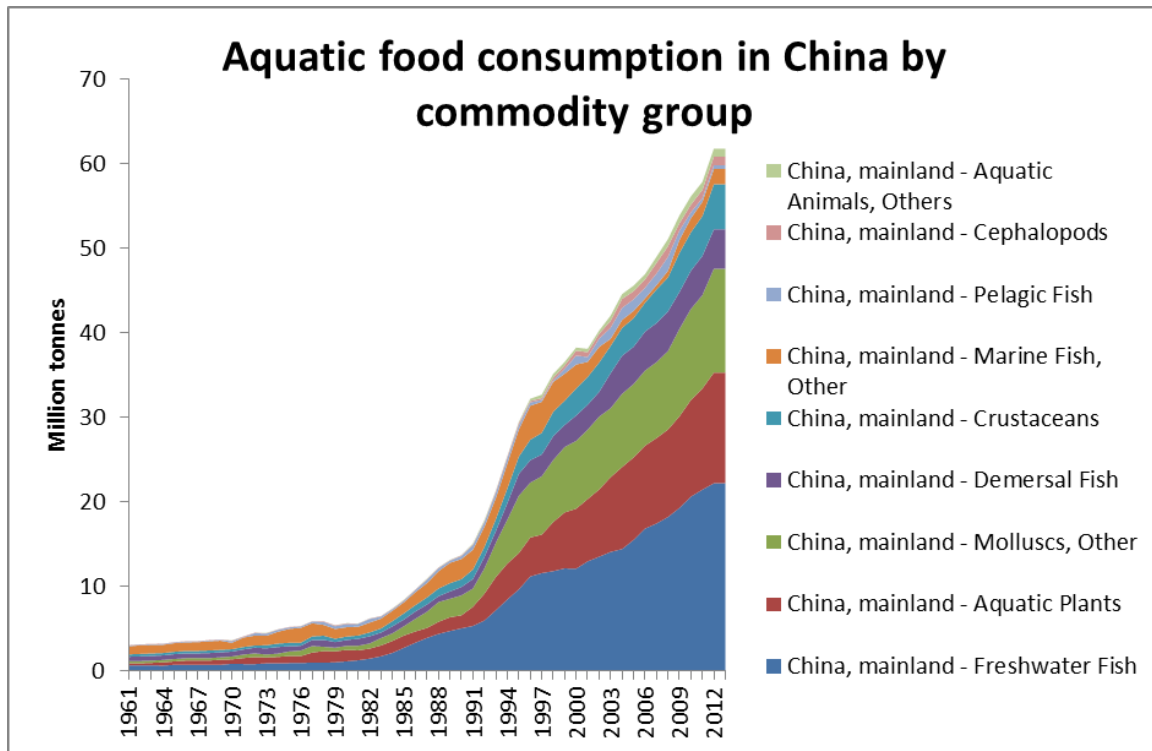


Figure 19, Apparent aquatic food consumption in China by commodity group. Source: FAOSTAT

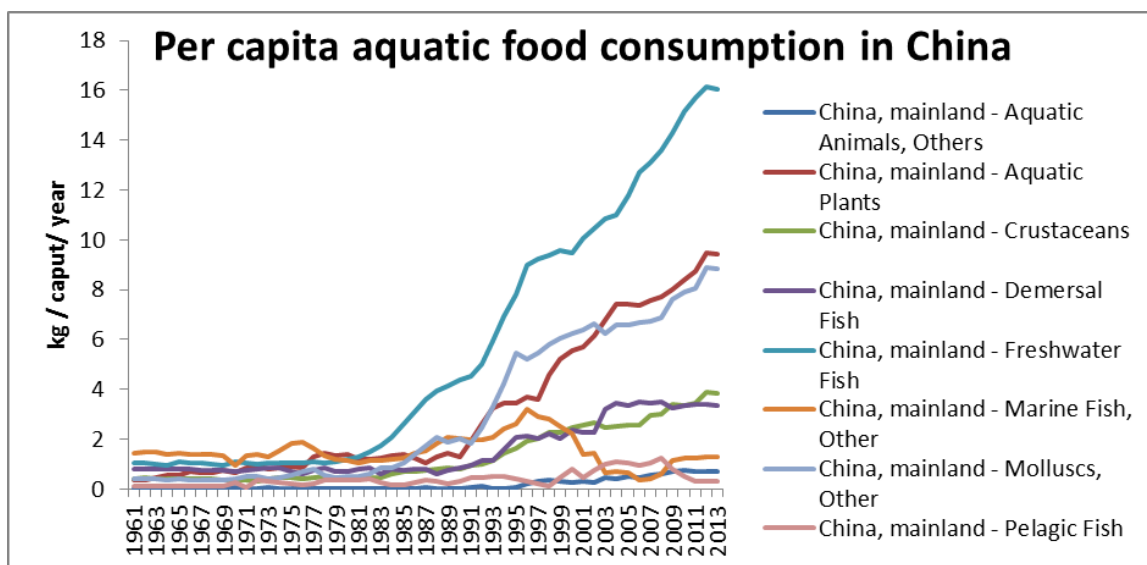


Figure 20, Per capita aquatic food consumption in China by commodity. Source: FAOSTAT

### Viet Nam

Viet Nam has also shown a marked increase in per capita aquatic food consumption but comprised only about 3 % of the apparent consumption in Asia in 2011. Similar to China, expansion in freshwater fish supply has been the main driver for growth markets and per capita consumption in Viet Nam over the same period, Figs 21 and 22.

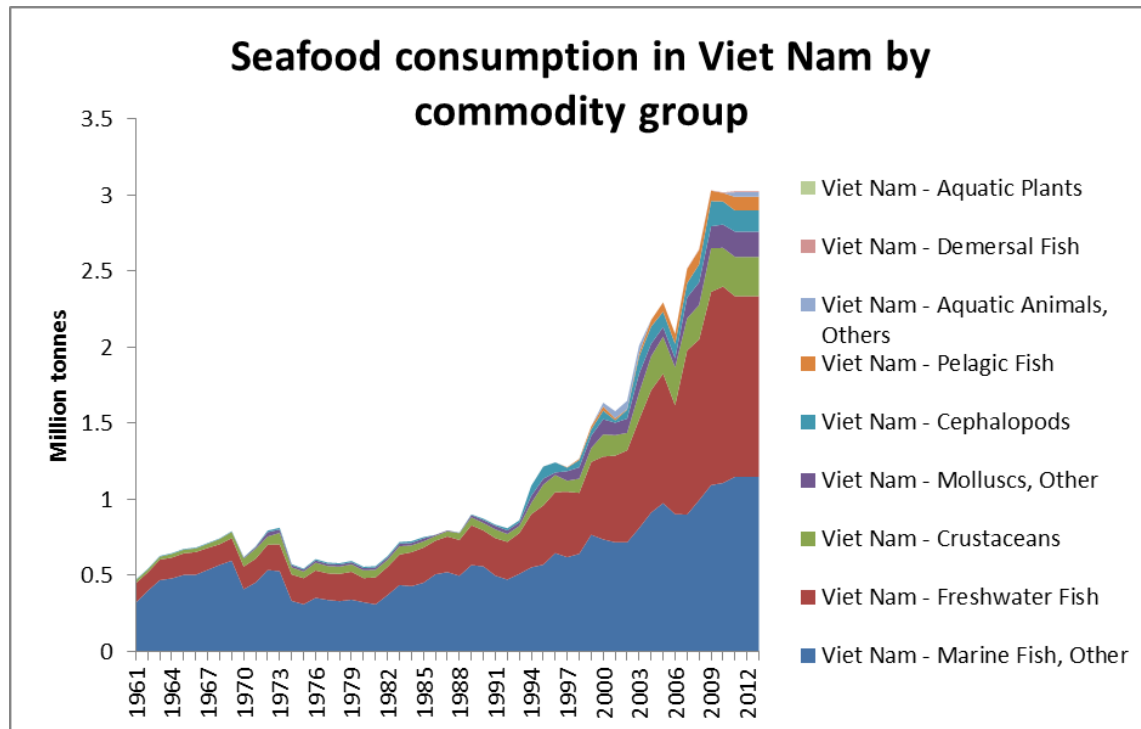


Figure 21, Apparent aquatic food consumption in Viet Nam by commodity group. Source: FAOSTAT

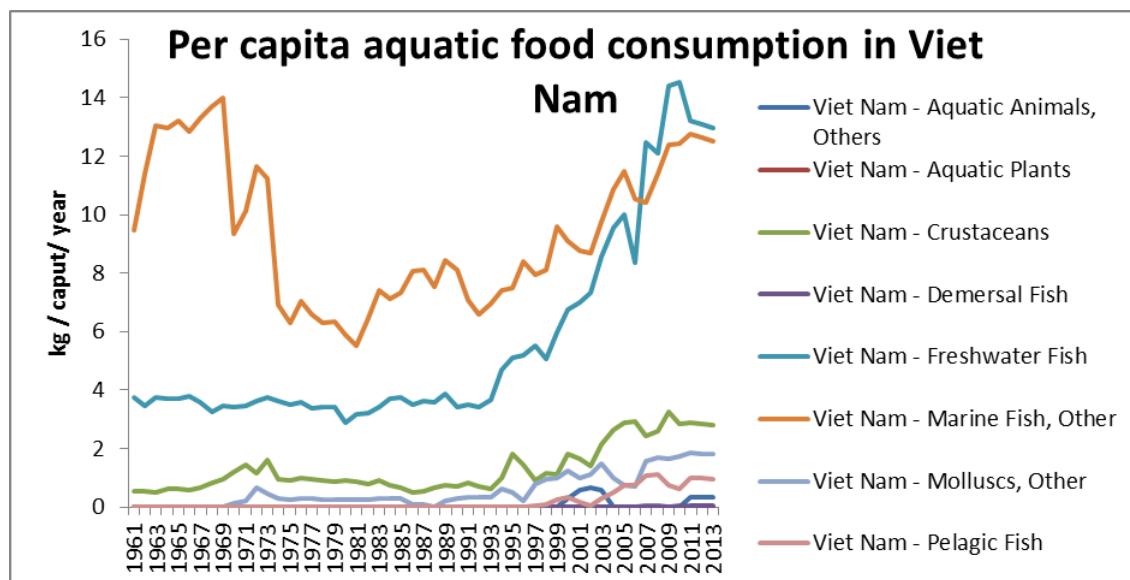


Figure 22, Per capita aquatic food consumption in Viet Nam by commodity. Source: FAOSTAT

## Americas

Leader in the consumption of aquatic food in the Americas has been the USA, accounting for about 50 % of the consumption in the region in 2011, whereas Canada represented about 6%, Fig 23. Per capita consumption in US and Canada increased up until early 2000, and shows a declining trend after that, Fig 24.

Self-sufficiency is well above 100 % for Americas and Canada and around 100 % for US, Fig 25.

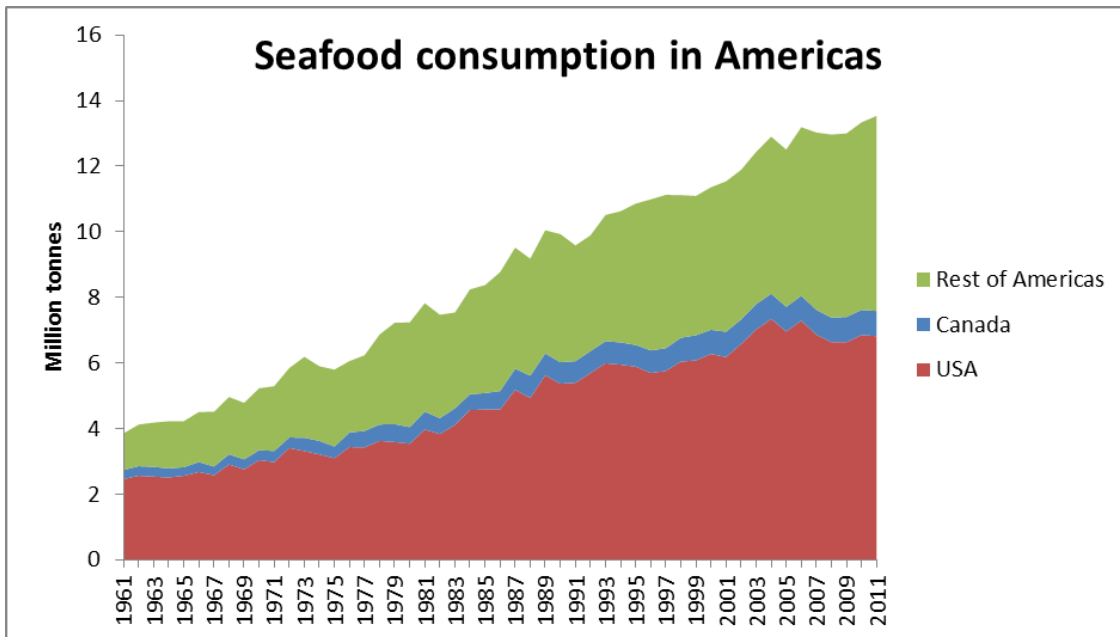


Figure 23, Apparent aquatic food consumption in Americas. Source: FAOSTAT

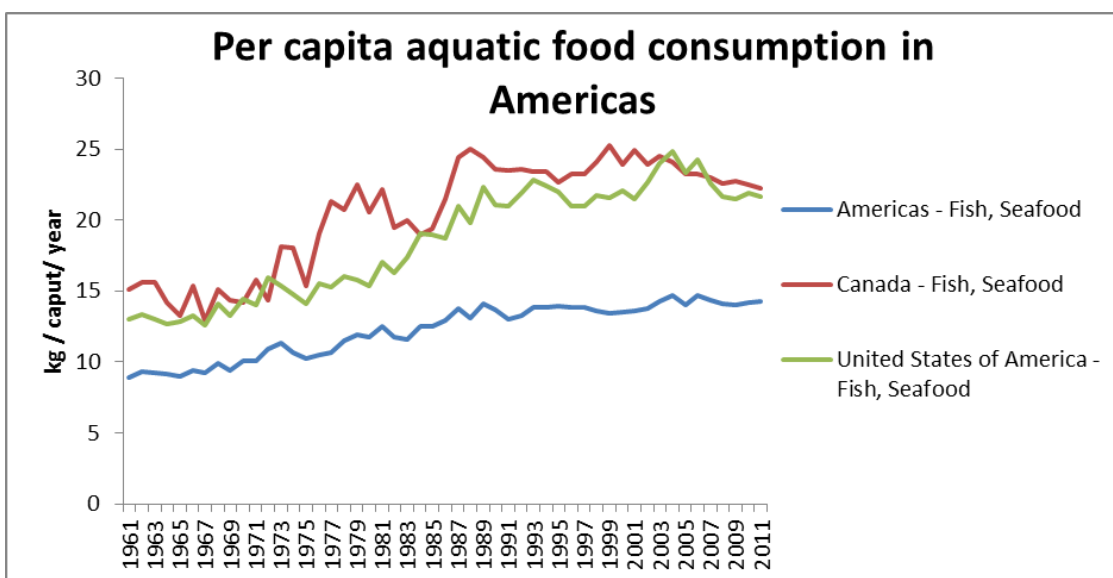


Figure 24, Per capita aquatic food consumption in Americas by commodity group. Source: FAOSTAT

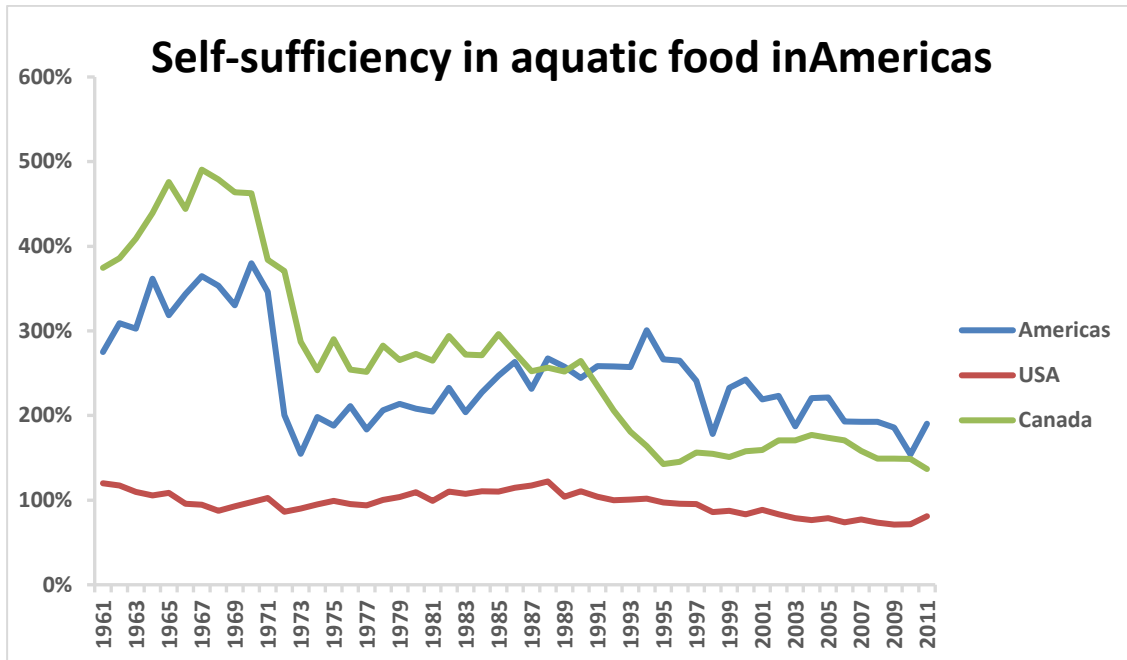


Figure 25, Self-sufficiency in aquatic food in Americas. Source FAOSTAT

### USA

The aquatic food market in the USA reached just below 7 million tonnes in 2011, a slight decline after a peak in 2003-2005. An overall expansion could be seen for the period 1961-2011, but a marked decline in the demersal fish consumption since early 1990s, Fig 26. This however has been substituted with a rapid expansion in the crustacean and fresh water fish markets and per capita consumption, Fig 26 and 27.

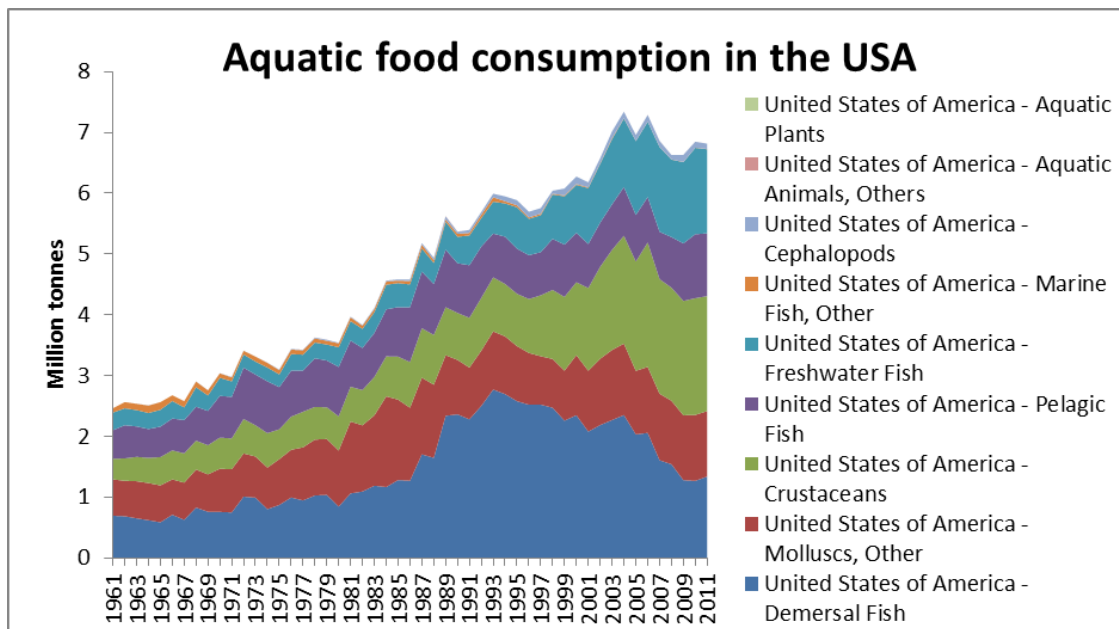


Figure 26, Apparent aquatic food consumption in the USA. Source: FAOSTAT

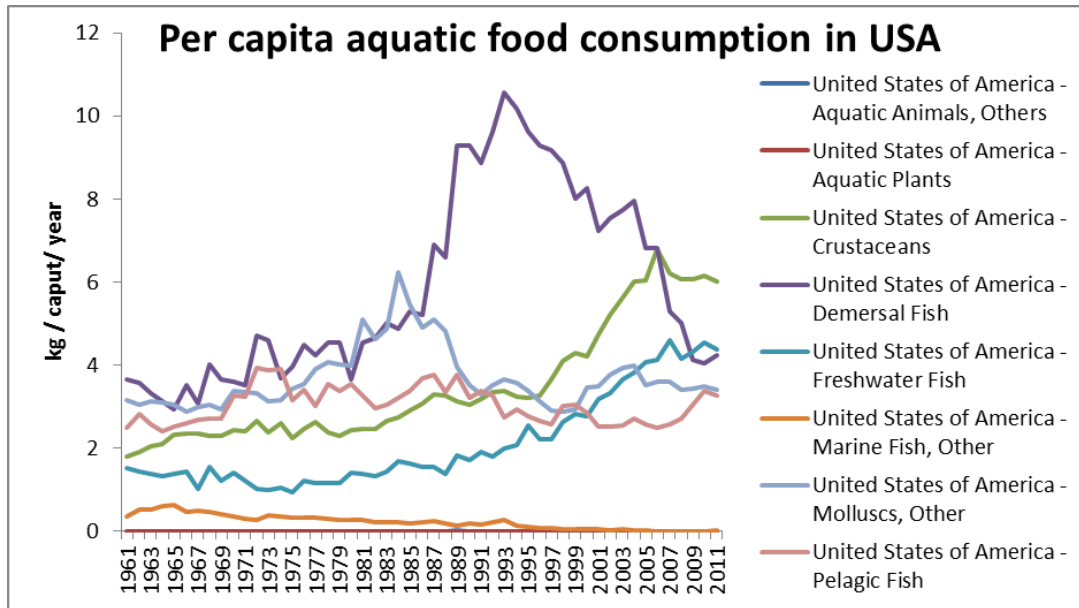


Figure 27, Per capita aquatic food consumption in the USA by commodity group. Source: FAOSTAT

### Canada

While it has increased for the period 1961-2011, aquatic food consumption in Canada has been relatively stable since late 1990s and similar to the USA, the consumption of demersal fishes has decreased relative to mid-1980s where they comprised a half of all aquatic food consumption, and were replaced to some extent by an increase in the consumption of crustaceans, pelagic fish, molluscs and freshwater fish, Figs 28 and 29.

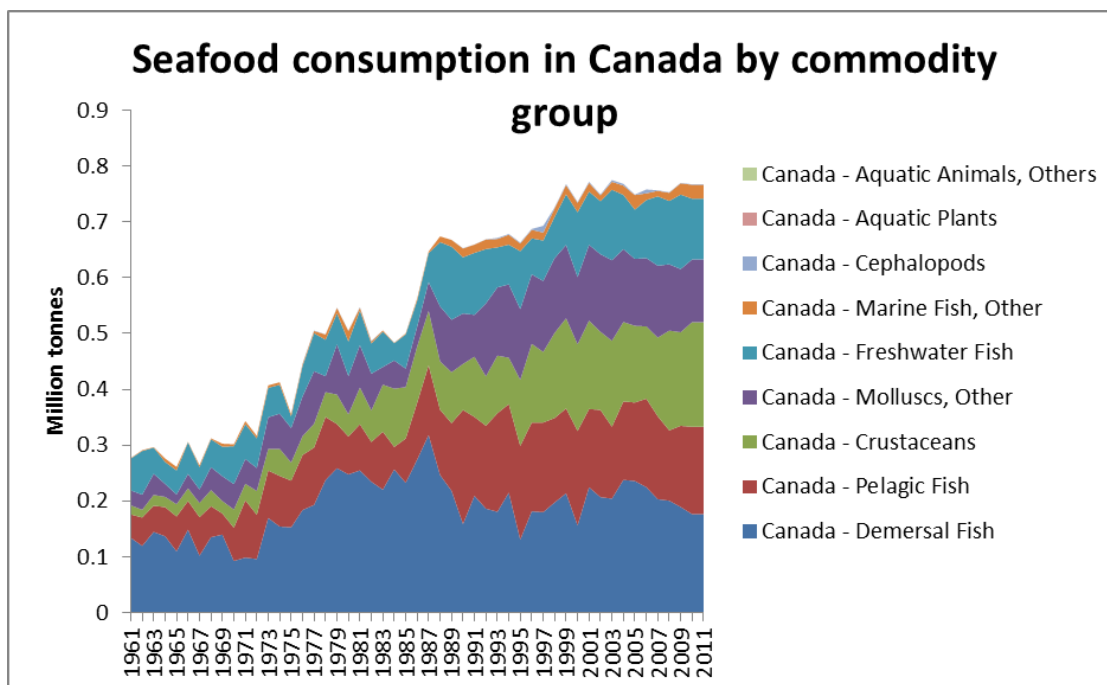


Figure 28, Apparent aquatic food consumption in Canada. Source: FAOSTAT

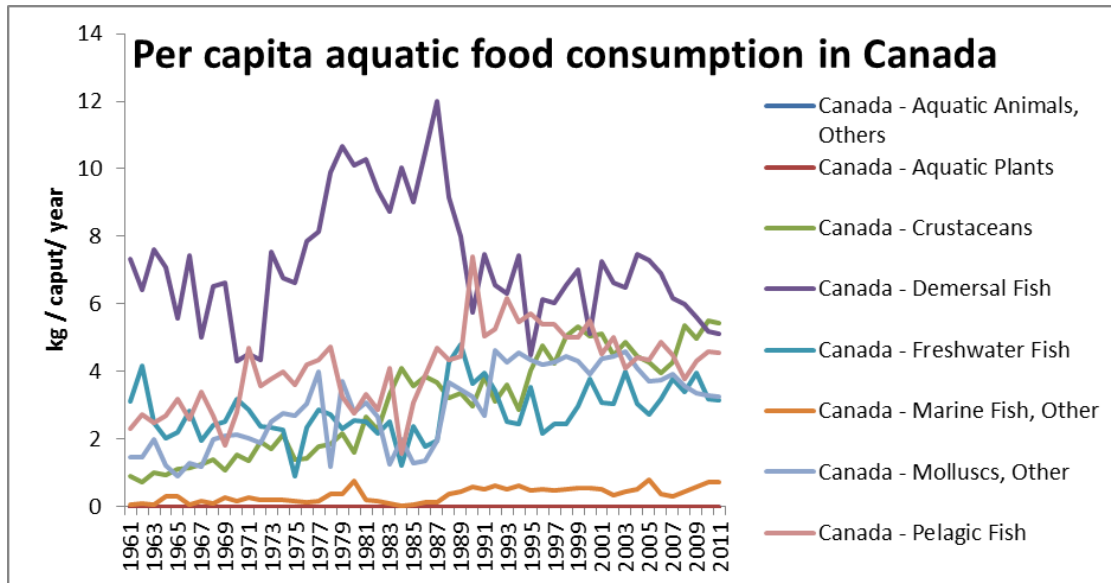


Figure 29, Per capita aquatic food consumption in Canada by commodity group. Source: FAOSTAT

## Europe

The total amount of aquatic food consumed in Europe in 2011 was about 17 million tonnes, nearly 12 million of which consumed in the European Union<sup>4</sup>, Fig 30. While Europe as a whole has experienced a slight decline in relative to a peak in mid-1980s, the consumption in the EU has shown a steady increase since the beginning of the 1980s, while in non-member European states, the development has been more dynamic, with marked ups and downs. The market appears to have stabilized at around 17 million tonnes per year since 2007.

<sup>4</sup> The most recent definition of European Union, including 28 member states, is followed here.

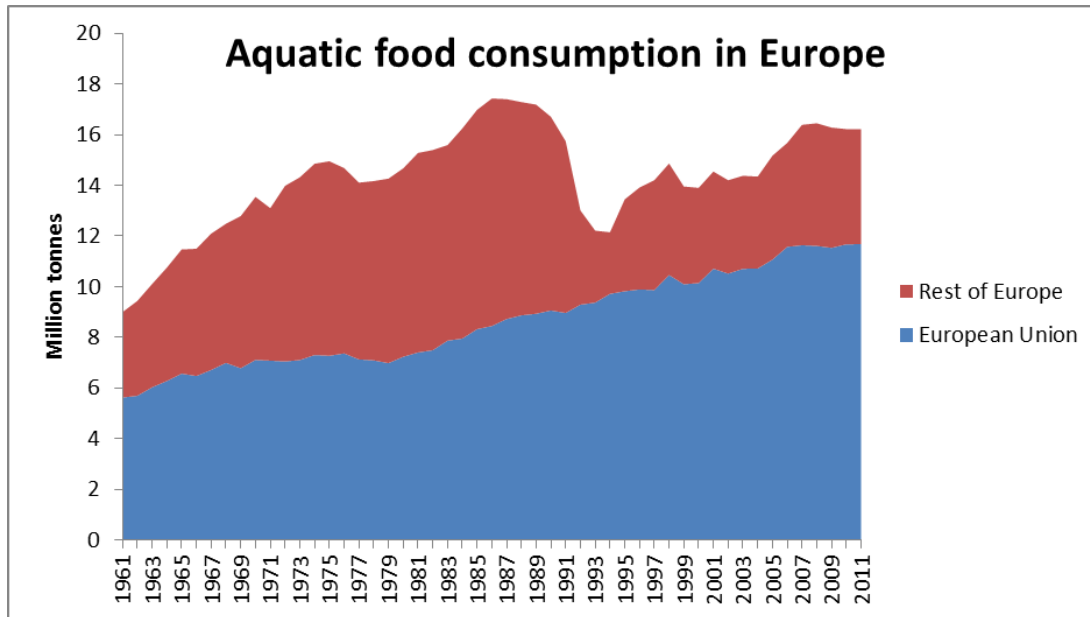


Figure 30, Apparent aquatic food consumption in Europe. Source: FAOSTAT

### European Union

Demersal and pelagic fish have had the largest share in member states for the period 1961-2011, however showing only a slight growth over the same period and together reaching about 6 million tonnes, or 50 % of all commodities consumed, Fig 31. Faster rate in consumption growth has come from freshwater fish and crustaceans, reaching 3.5 and 2.2 kg/caput/ year in 2011 respectively, Fig 32, while demersal and pelagic fish have fluctuated at around 7.5 and 5 kg/caput/year in the same period.

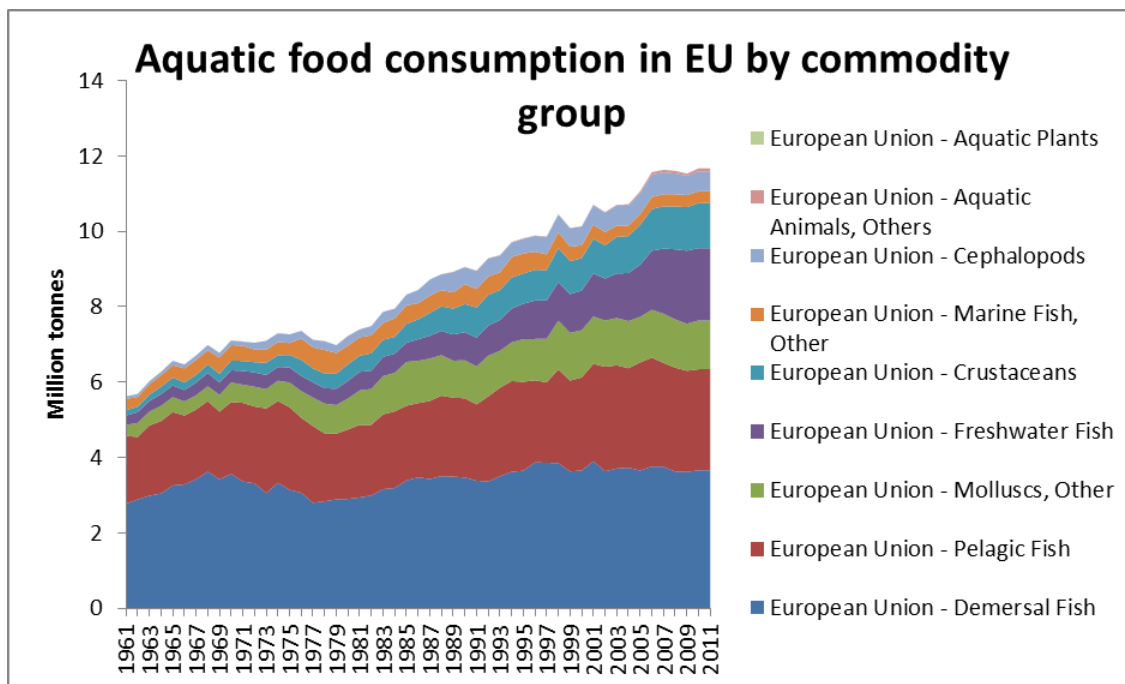


Figure 31, Apparent aquatic food consumption in the EU. Source: FAOSTAT



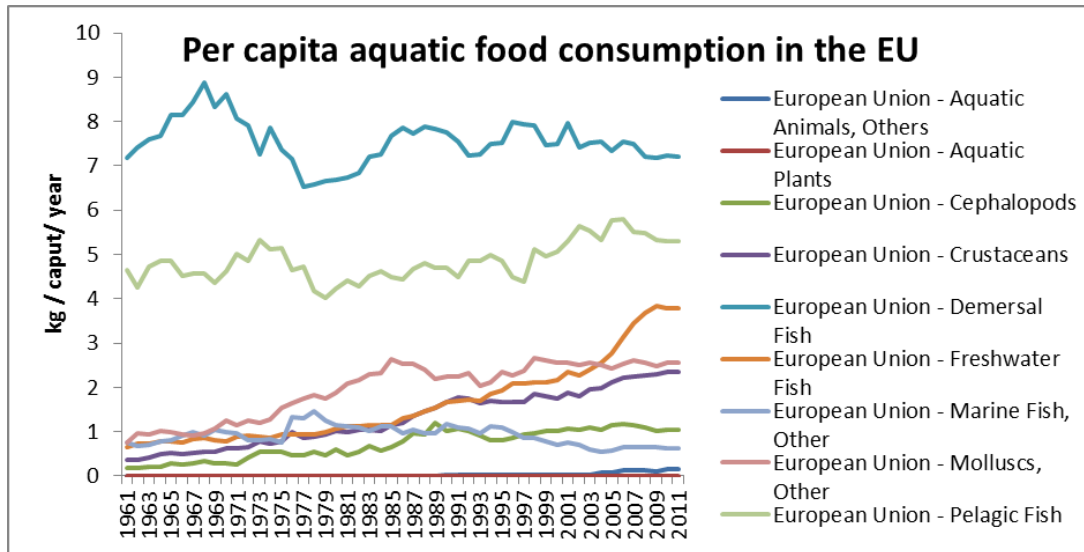


Figure 32, Per capita consumption of aquatic food commodities in the EU. Source: FAOSTAT

Of the countries of interest to Primefish, France was the largest aquatic food market in the EU in 2011, followed by Spain, Italy, the UK and Germany, Fig 33. Growth in per capita and absolute amounts of fish and seafood consumed could be seen in all countries, except perhaps for the UK, Fig 34. We observe Spain to stick out with a high per capita consumption in 1961 (25 kg/capita/year) while the other of the presented countries cluster close to 15 kg and show an increase towards 20 kg in 2011. At the same time we observe Spain has increased to over 40 kg, and interestingly France has shown a markedly higher increase than the other countries being around 15 kg in 1961, and has increased to about 35 kg in 2011.

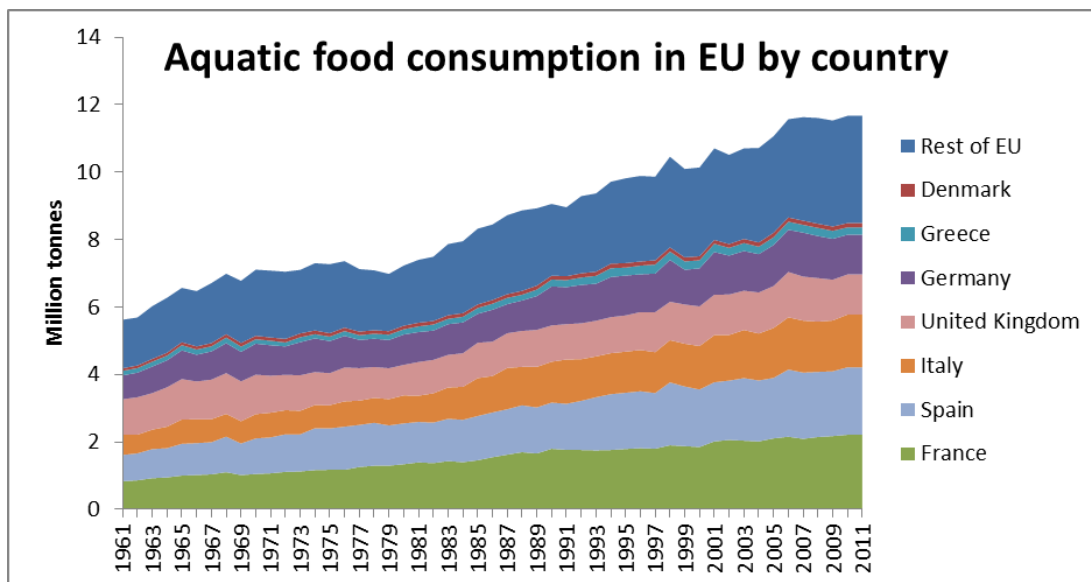


Figure 33, Apparent aquatic food consumption in the EU by country of interest. Source: FAOSTAT

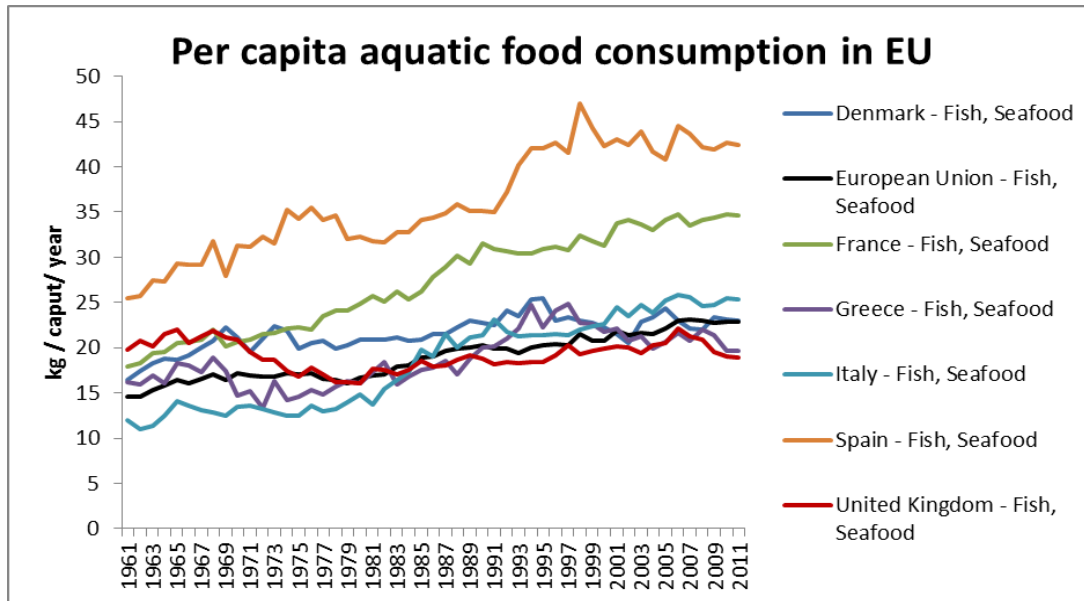
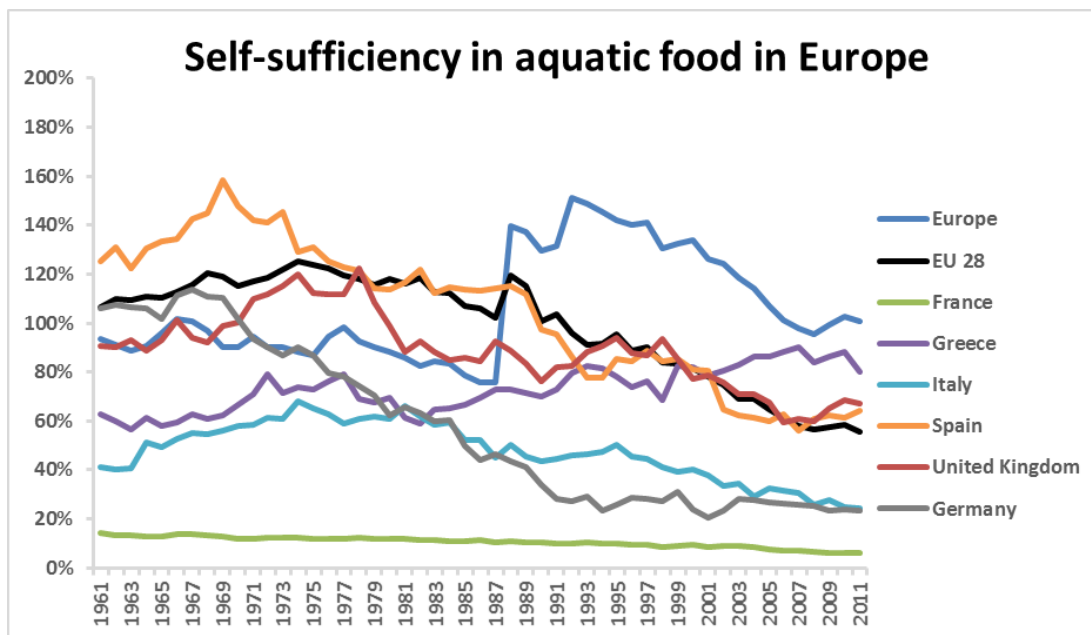


Figure 34, Per capita consumption of aquatic food in the EU by country of interest. Source: FAOSTAT

The self-sufficiency for EU 28 has dropped from above 100 % in 1990 to 60 % in 2011, Fig 35, with Spain, UK, Germany, Italy and France following the same path, while Greece sticks out with an opposite trend. Denmark, Fig 36, is presented in a separate figure due to high levels over the period, but otherwise it shows similar trends as for EU 28.



Figur 35, Self-sufficiency in aquatic food in Europe, EU 28 and selected countries. Source FAOSTAT

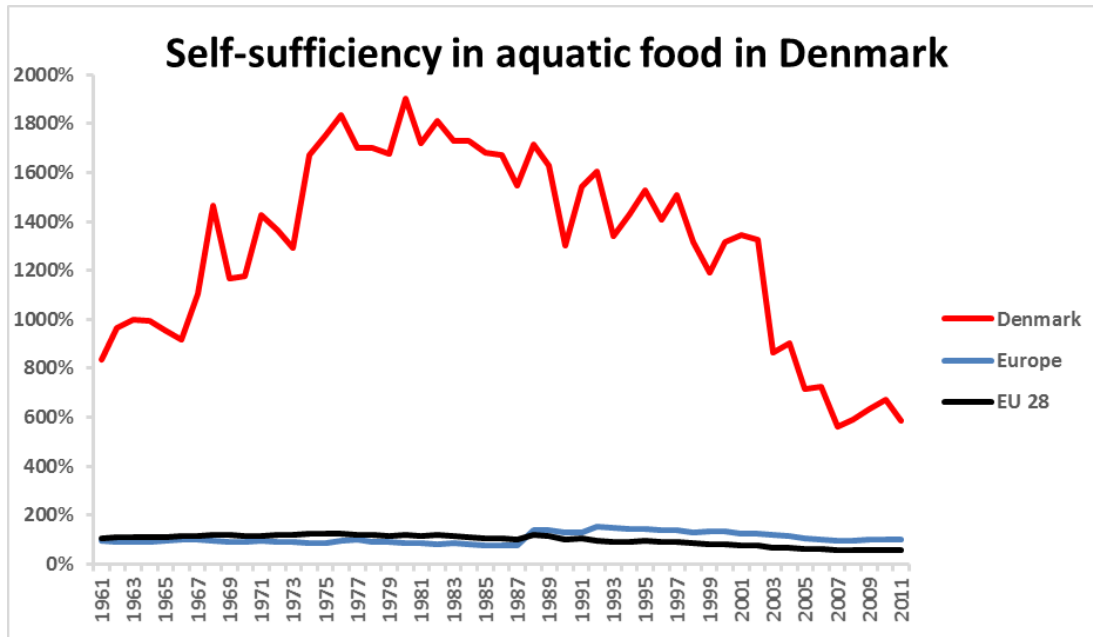


Figure 36, Self-sufficiency in aquatic food in Europe, EU 28 and Denmark. Source FAOSTAT

## France

The French market absorbed about 2.1 million tonnes of aquatic products in 2011, a nearly 150 % increase compared to 1961, Fig 37. The share of freshwater fish and crustaceans has notably expanded, also evident from per capita consumption data, Fig 37. At the same time demersal and pelagic fish have experienced only slight decrease in consumption the last years, still comprising about 50 % of the total in 2011.

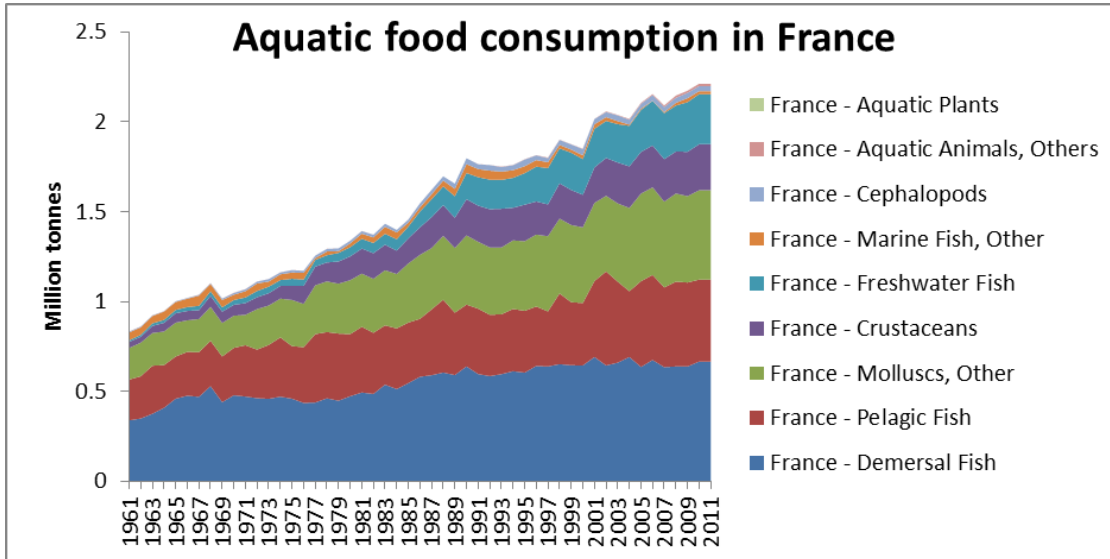


Figure 37, Apparent aquatic food consumption in France. Source: FAOSTAT

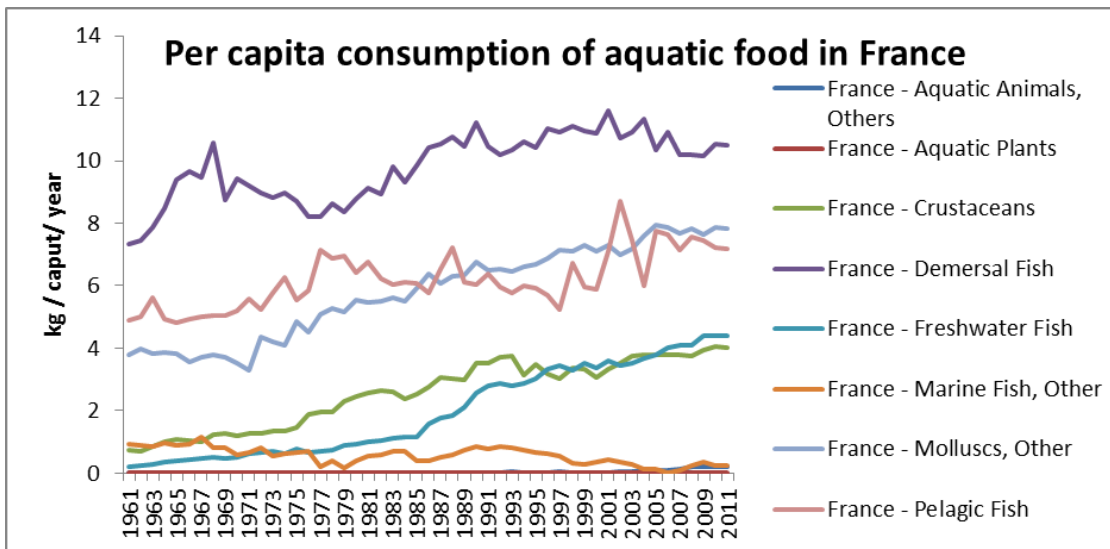


Figure 38, Per capita aquatic food consumption in France by commodity group. Source: FAOSTAT

## Italy

In Italy consumption, which in 2011 reached about 1.6 million tonnes, was also topped by demersal and pelagic fish but the share of other groups was somewhat more equally distributed than in France, Fig 39. An increase in the consumption of freshwater fish, molluscs and crustaceans can also be noted, which has however stabilised since 2005, Fig 40.

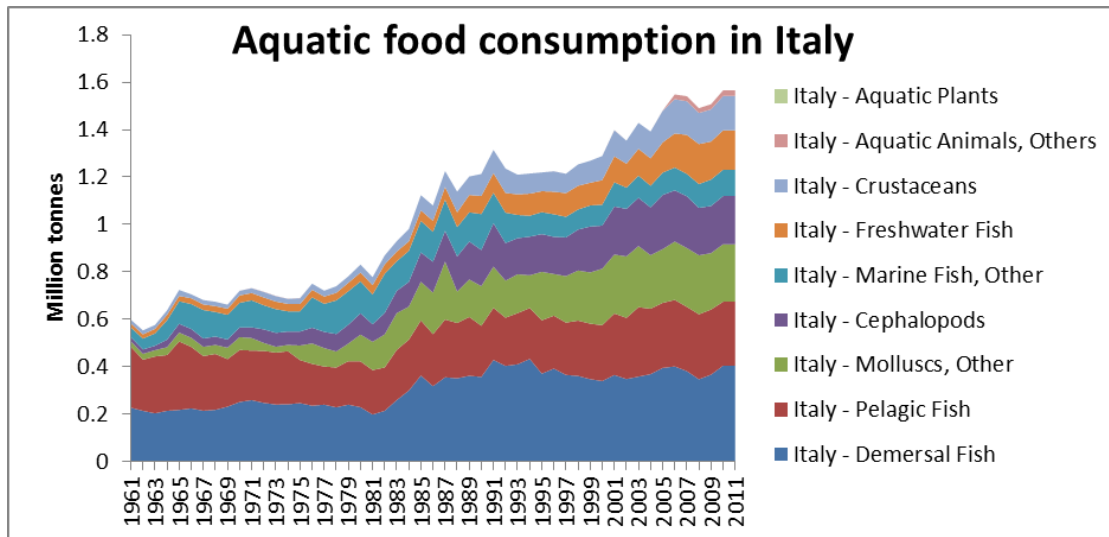


Figure 39, Apparent aquatic food consumption in Italy. Source: FAOSTAT

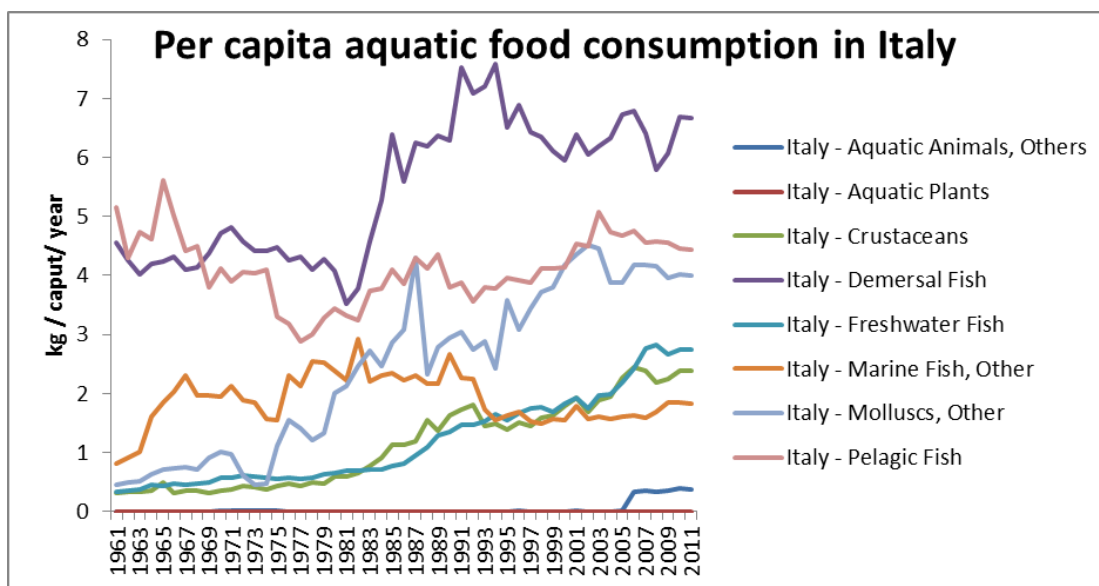


Figure 40, Per capita aquatic food consumption in Italy by commodity group. Source: FAOSTAT

## United Kingdom

The total amount of aquatic food consumed in the UK reached about 1.2 million tonnes in 2011, only slightly above the level in 1961, Fig 41. A significant decrease in the consumption of demersal fish can be observed throughout the period, both in absolute and per capita terms, Fig 42, substituted by an expansion in the markets of pelagic fish, crustaceans, freshwater fish and molluscs.

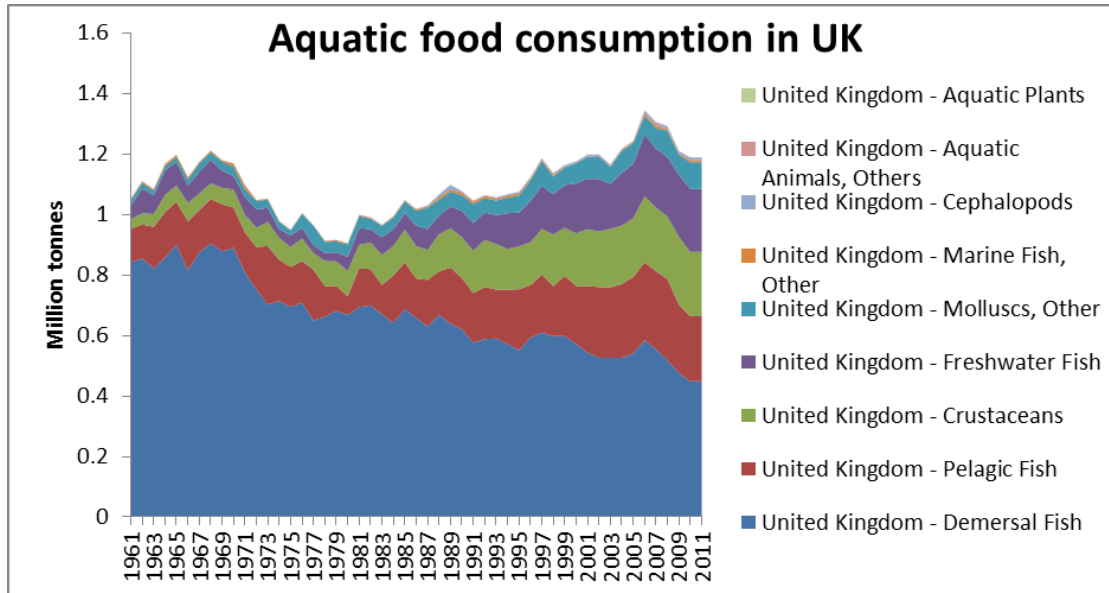


Figure 41, Apparent aquatic food consumption in the UK. Source: FAOSTAT

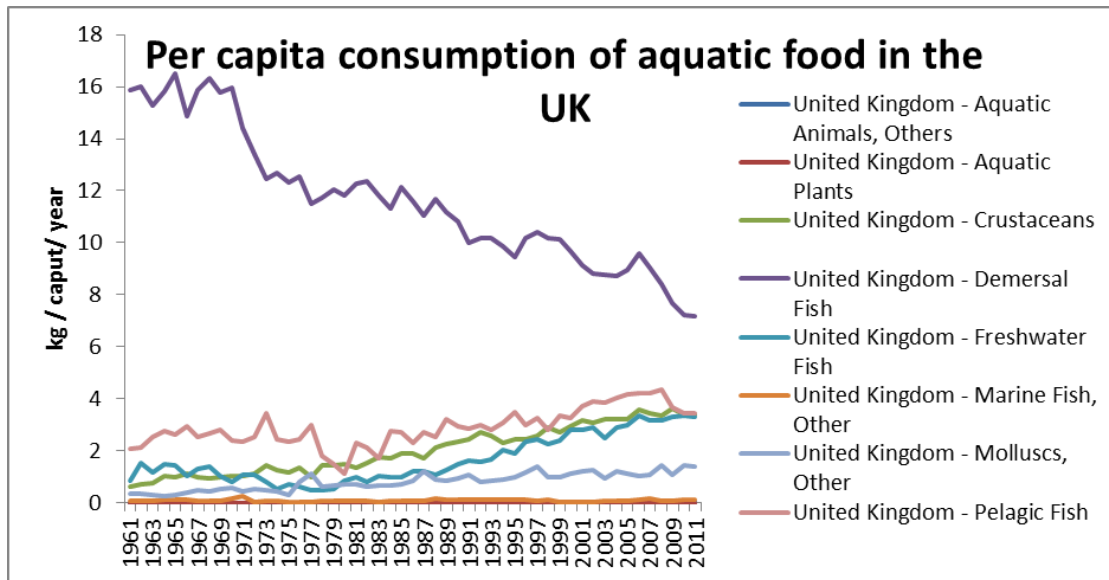


Figure 42, Per capita aquatic food consumption in the UK by commodity group. Source: FAOSTAT

## Germany

The size of the German aquatic food market in 2011 was comparable to that of the UK, or around 1.2 million tonnes. A significant decline in the consumption of pelagic fish has been compensated by an expansion of the freshwater fish and demersal fish markets, both in absolute and per capita terms, Fig 43 and 44.

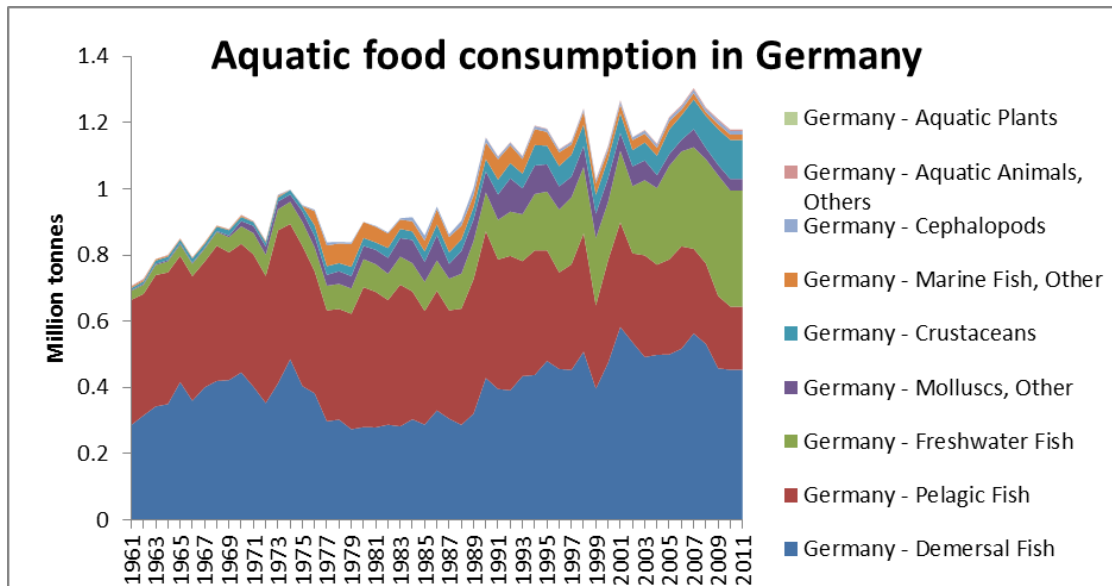


Figure 43, Apparent aquatic food consumption in Germany. Source: FAOSTAT

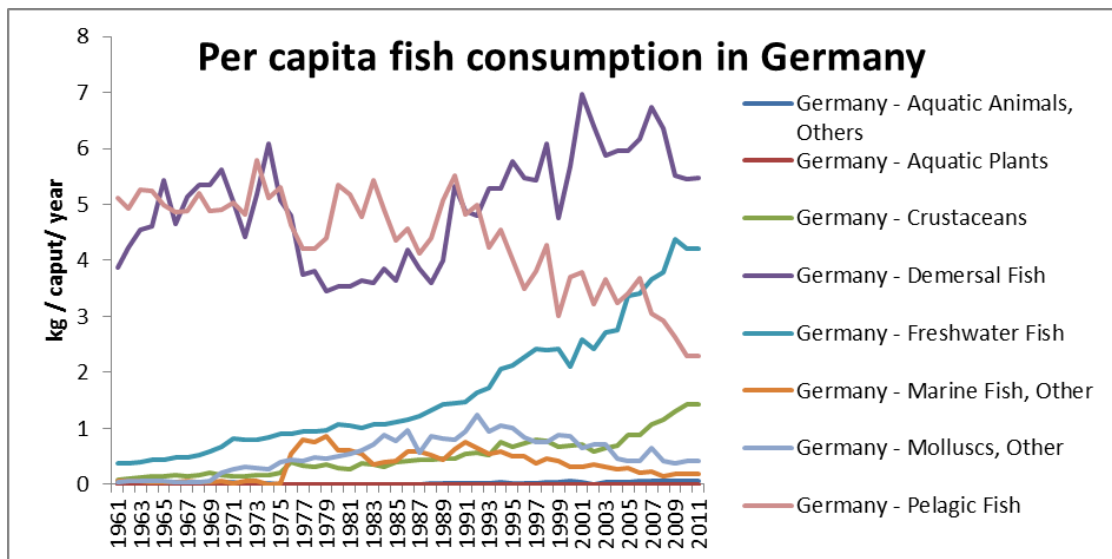


Figure 44, Per capita aquatic food consumption in Germany by commodity group. Source: FAOSTAT

## Denmark

In 2011 the Danish aquatic foods market reached 0.13 million tonnes, showing an only minor growth over the last 50 years, Fig 45. Pelagic fish comprised 50 % of the consumption in 2011, with per capita figures approaching 14 kg/year, Fig 46.

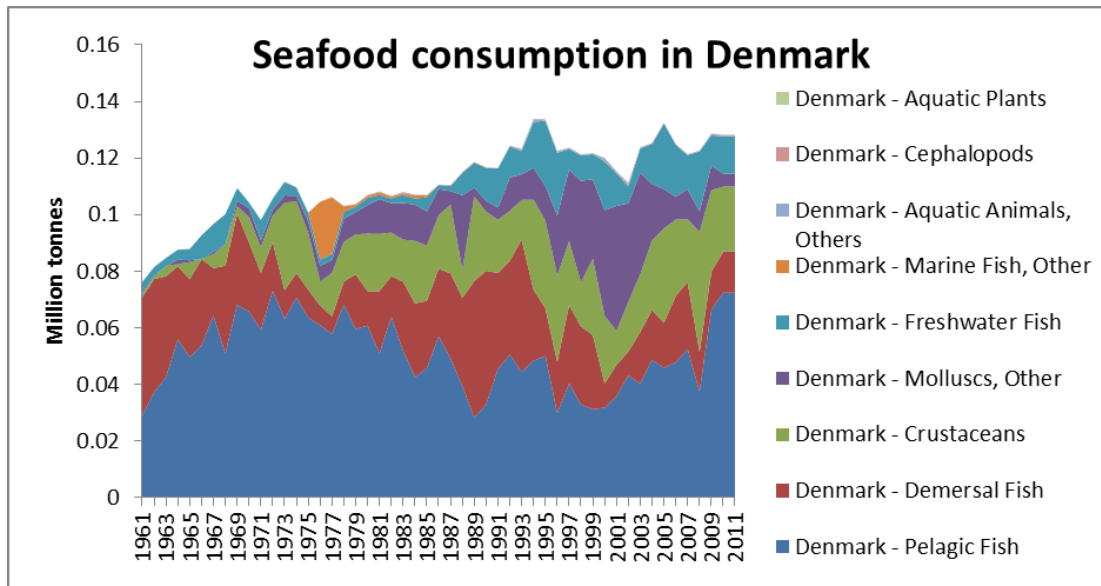


Figure 45, Apparent aquatic food consumption in Denmark. Source: FAOSTAT

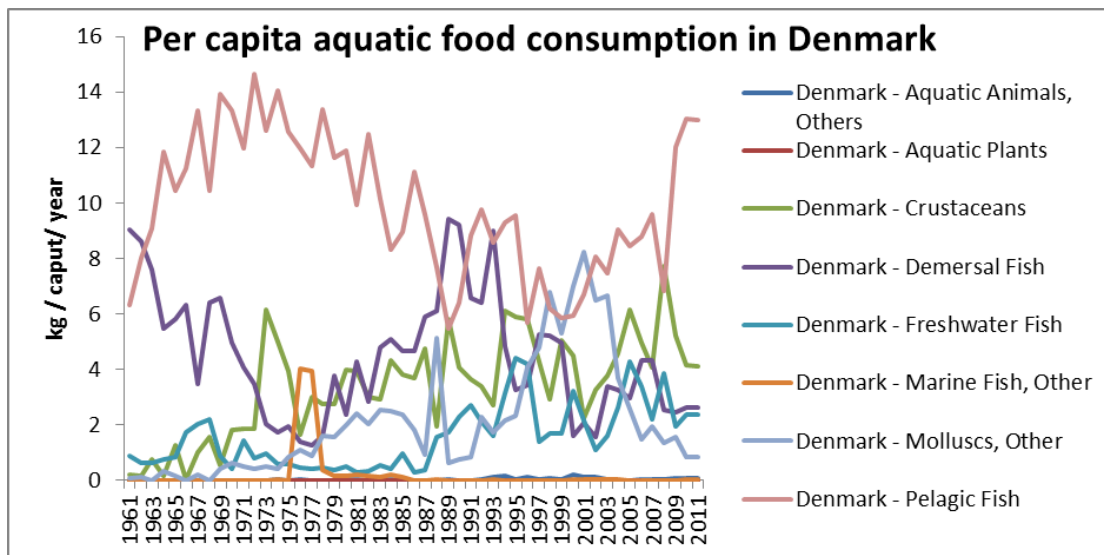


Figure 46, Per capita aquatic food consumption in Denmark by commodity group. Source: FAOSTAT



## Greece

In 2011 about 0.23 million tonnes of aquatic food were consumed in Greece, a relative decline from a peak of 0.27 million tonnes in mid-1990s, Fig 47. The decline has been mainly due to a decrease in the per capita consumption of demersal fish, Fig 48.

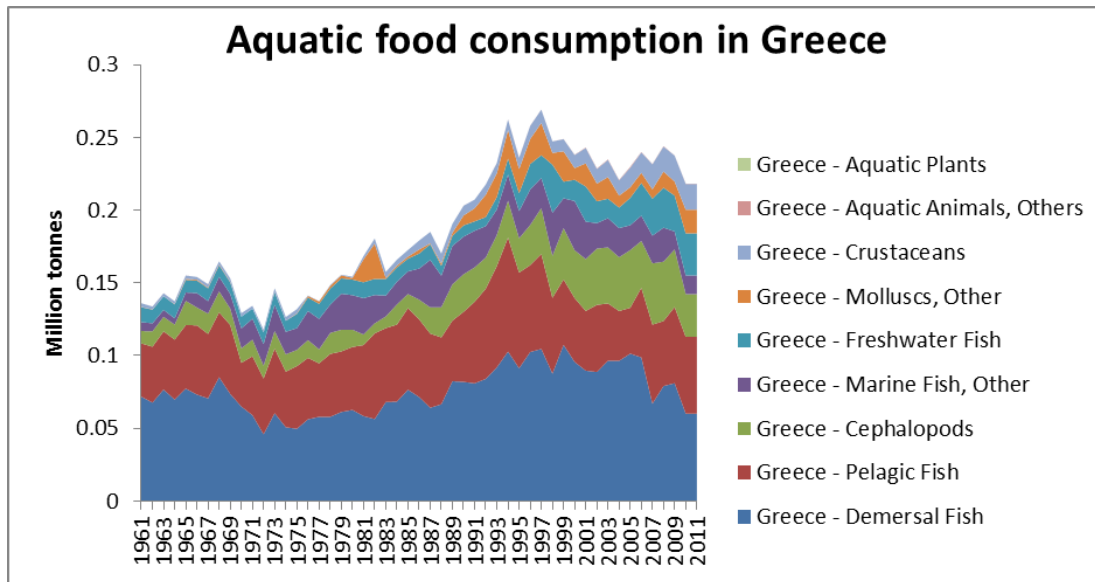


Figure 47, Apparent aquatic food consumption in Greece. Source: FAOSTAT

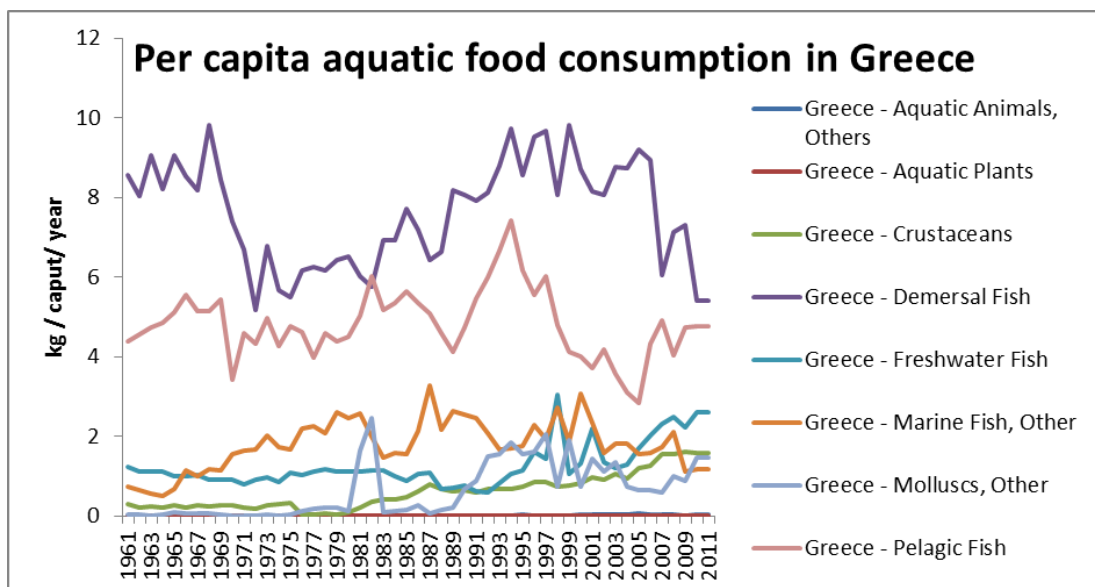


Figure 48, Per capita aquatic food consumption in Greece by commodity group. Source: FAOSTAT

### Non-EU states

Consumption of aquatic food in European countries outside the EU were dominated by USSR/Russian federation. A sharp decline in consumption can be observed in early 1990s following notable political changes of that time, Fig 49. The Icelandic and Norwegian markets in 2011 combined represented less than 10% of the consumption in non-EU countries, however had an above average per capita consumption for the entire period 1961-2011, Fig. 50.

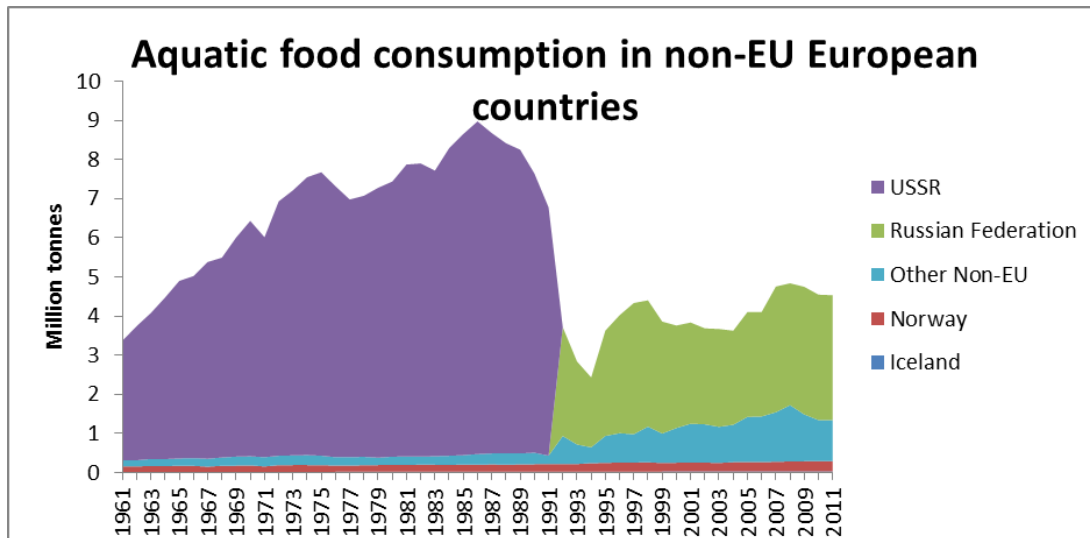


Figure 49, Apparent aquatic food consumption in non-EU European states. Source: FAOSTAT

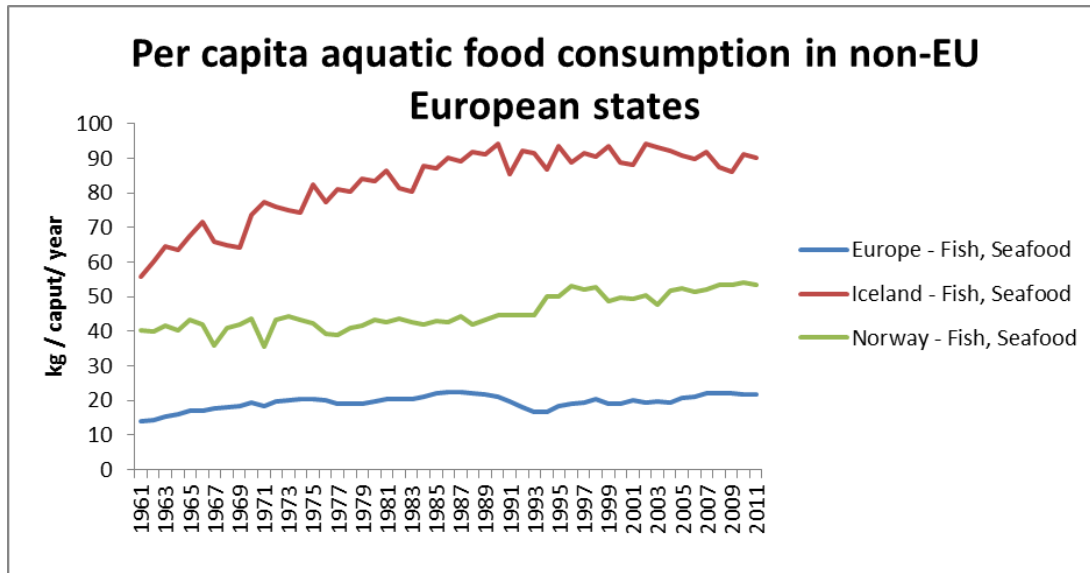


Figure 50, Per capita aquatic food consumption in non-EU European states by commodity group. Source: FAOSTAT

We observe the self-sufficiency of Europe as a continent to be a mix of high coverage in countries like Iceland and Norway (raw material producers), and an increasing imbalance for EU 28 as such, Figs 51 and 52.

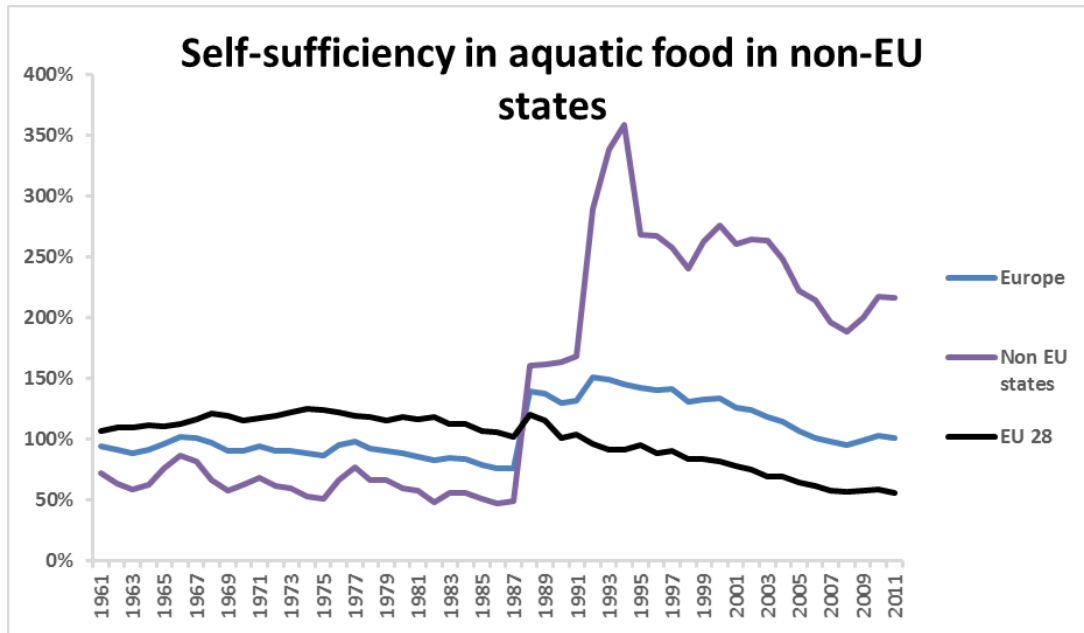


Figure 51, Self-sufficiency in aquatic food in Europe, EU 28 and Non-EU states from Europe. Source FAOSTAT

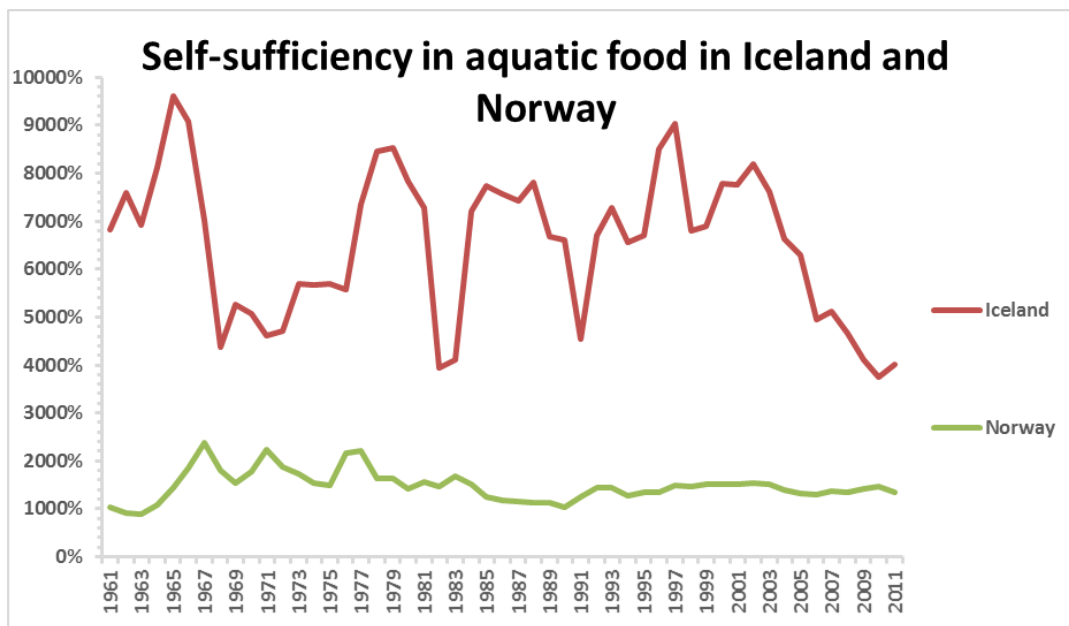


Figure 52, Self-sufficiency in aquatic food two non-EU states (Norway and Iceland). Source FAOSTAT

## Norway

Although the main fish producer of Europe, Norway's domestic aquatic foods market was around 0.27 million tonnes, Fig 53, dominated by demersal fish, which reached a per capita consumption of nearly 35 kg per year in 2011, Fig 54.

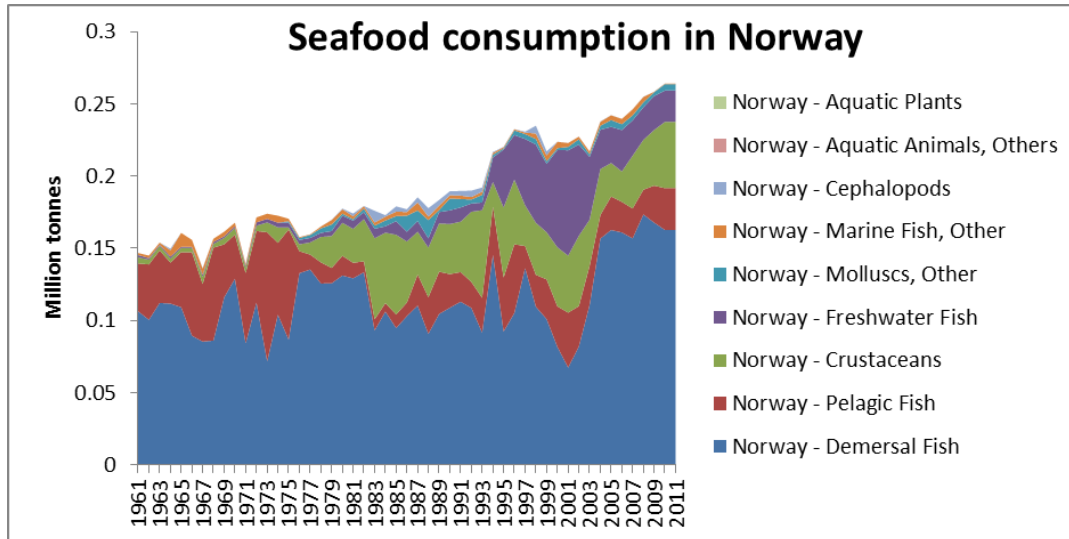


Figure 53, Apparent aquatic food consumption in Norway. Source: FAOSTAT

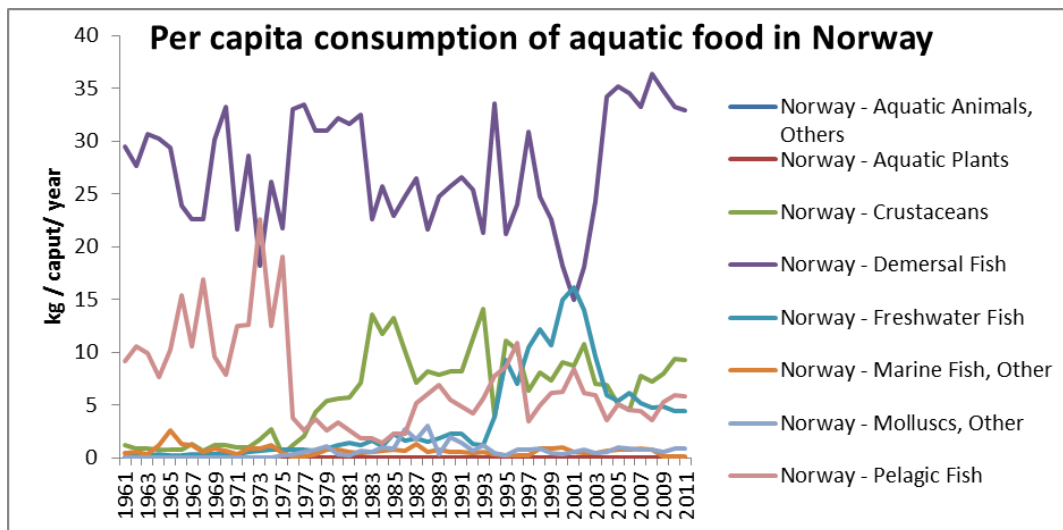


Figure 54, Per capita aquatic food consumption in Norway by commodity group. Source: FAOSTAT

### Iceland

Iceland's aquatic food market was only about 0.03 million tonnes, composed mainly of demersal and pelagic fish, Fig 55, and although fluctuating widely, the per capita consumption of those groups was on average between 20 and 60 kg/ year for the last 50 years, Fig 56.

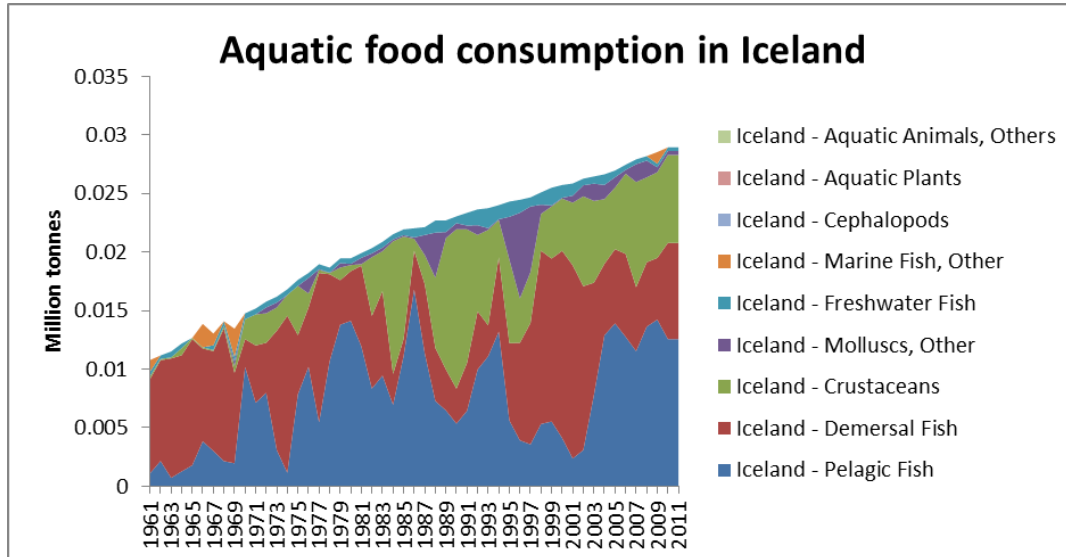


Figure 55, Apparent aquatic food consumption in Iceland. Source: FAOSTAT

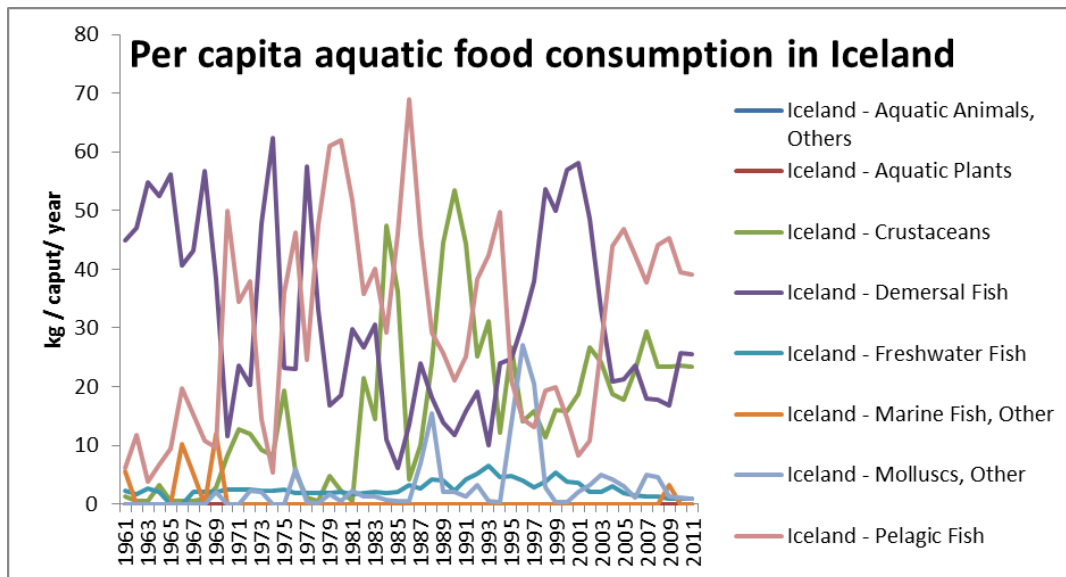
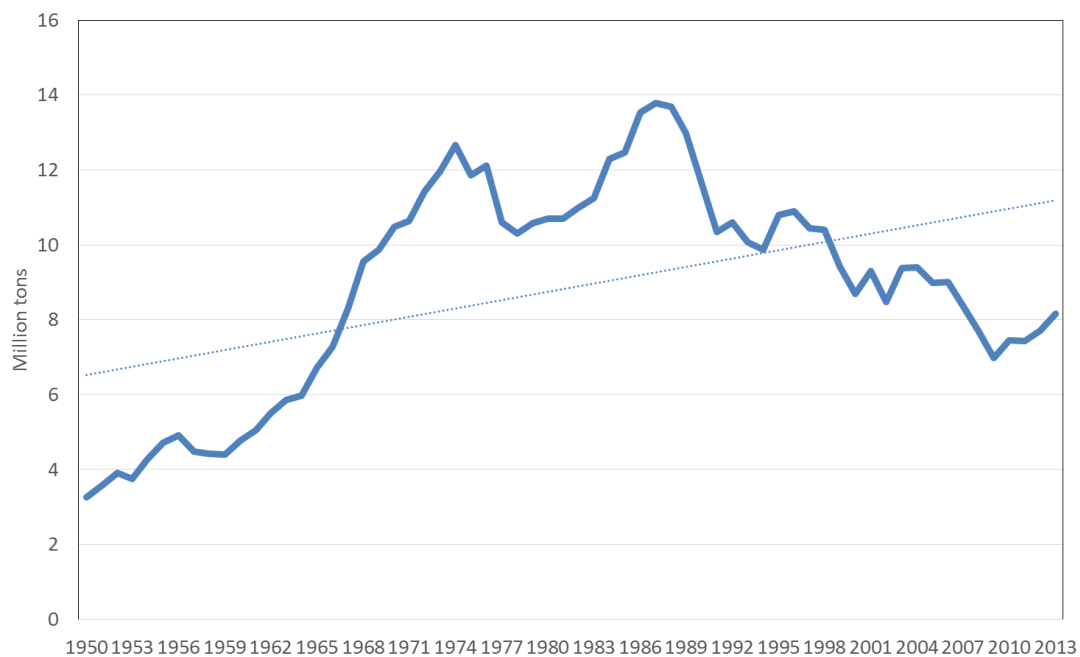


Figure 56, Per capita aquatic food consumption in Iceland by commodity group. Source: FAOSTAT

## Fisheries

### Demersal (cod) fisheries

Global production of cods, hakes and haddocks (cod-likes), as defined in the FAO-database, taking into account both capture and aquaculture, has increased by 250% from 1950 to 2013. In 1950, world production amounted to nearly 3.3 million tons but had increased to more than 8.1 million tons in 2013. The highest volume in the production of cods, hakes and haddocks was in 1987 when it reached nearly 13.8 million tons, Fig. 57.



*Figure 57, Global production of cods, hakes and haddocks 1950-2013. Source: FAO*

Most of the world production takes place in Europe and the Americas, with other continents contributing relatively little. In 2013, Europe produced 57% of all cods, hakes and haddocks and North and South America 32%, while Asian, African and Oceanian catches amounted to 5%, 4% and 2% of the world production, Fig 58. Historically, Europe has always produced the most volume of cods, hakes and haddocks. Production in the Americas, mainly North America, has grown enormously since 1975, while production in Asia has been decreasing since 1973 and is now at similar levels as production in Africa and Oceania.

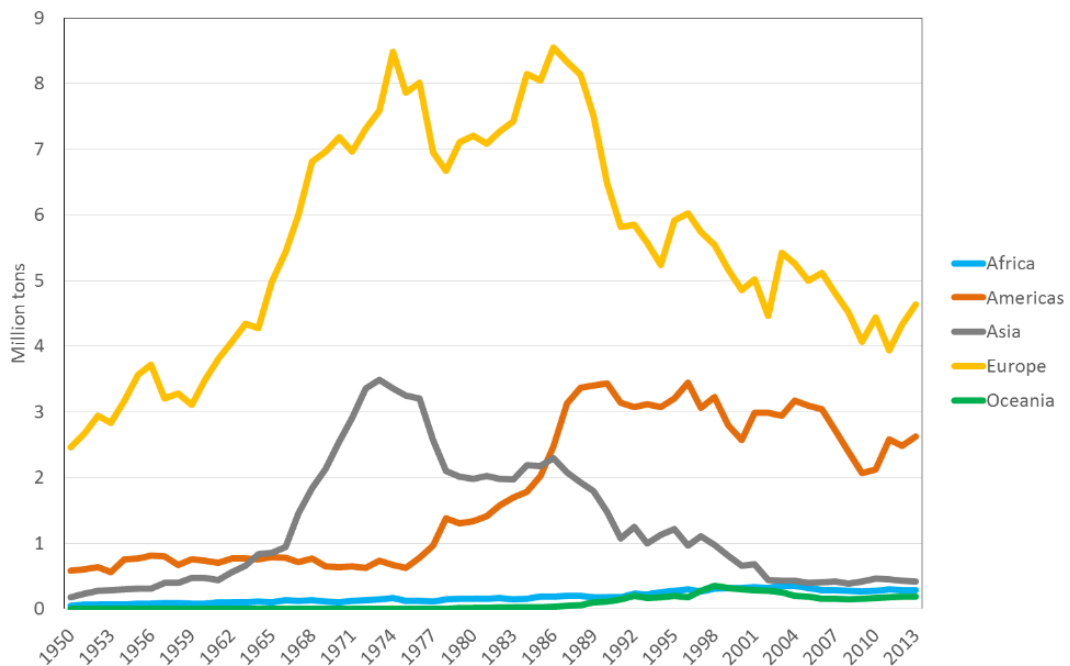
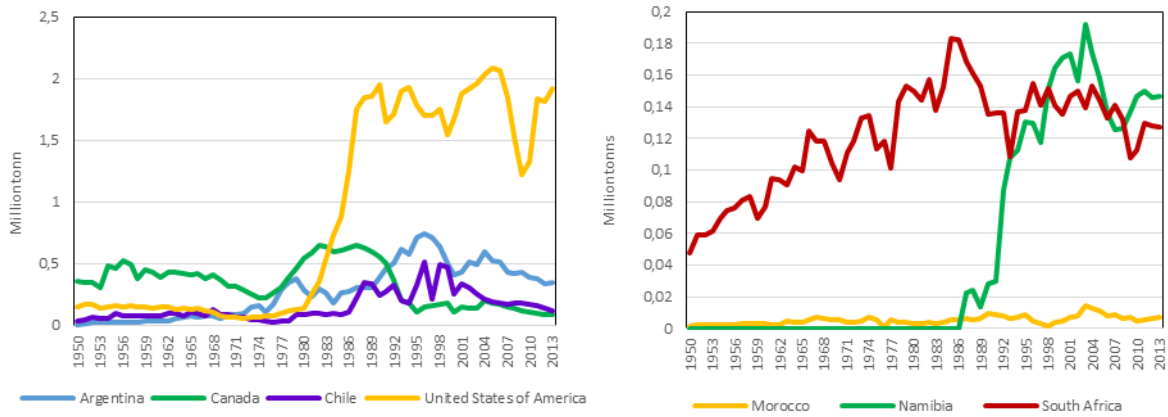


Figure 58, Landed volume of cods, hakes and haddocks by continents. Source: FAO

The main fishing nations in Europe have been Russia and the former USSR, Norway, Iceland and the Faroe Islands, while catches of other important nations such as the United Kingdom, Spain, France and Germany, have diminished. The US is responsible for most of the catches of these demersal species in the Americas, while Argentina, Canada and Chile are also important fishing nations, Fig 59. The Canadian fisheries were dealt a heavy blow with the collapse of the cod stock off Newfoundland in the 1980s. Argentina contributes quite a lot to the fisheries with her catches of Argentine hake and Chile has also registered significant harvests of Patagonian grenadier. In Asia, Japan harvests by far most of cods, hakes and haddocks, but South Korean and Chinese catches have diminished in recent years. The decline in Asian catches of cods, hakes and haddocks can mostly be attributed to changes in Japan's catches of Alaskan pollock in the 1970s and 1980s following the extension of the US Exclusive Economic Zone (EEZ) to 200-miles. The extension deprived Japanese vessels of traditional fishing grounds of the coasts of Alaska and in the Eastern Bering Sea, but increased at the same time harvests of the U.S. fleet. The bulk of cod, hake and haddock catches in Oceania are registered by



vessels from New Zealand, while Namibia, Morocco and South Africa are the main African fishing nations, mainly producing cape hakes (Criddle and Strong, 2013a).

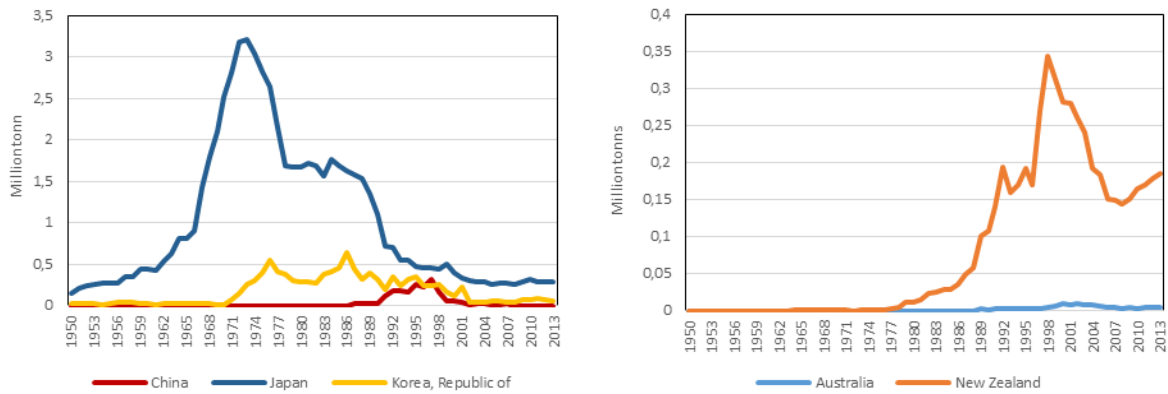


Figure 59, Main fishing countries of cods, hakes and haddocks in Americas, Africa, Asia and Oceania 1950-2013. Source: FAO

Looking more closely at Europe, Fig 60 clearly reveals the decline of cod, hake and haddock catches by EU-vessels in the last half-century. In 1970 they amounted to around 3 million tons, but have in recent years been less than a third of that. At the same time, the catches of the former USSR and Russia, Norway, Iceland and the Faroe Islands have increased significantly. Bear in mind, the USSR catches were counted by FAO until 1987 but after that year Russian catches are included in the FAO database. Fig 59 also shows that while EU-

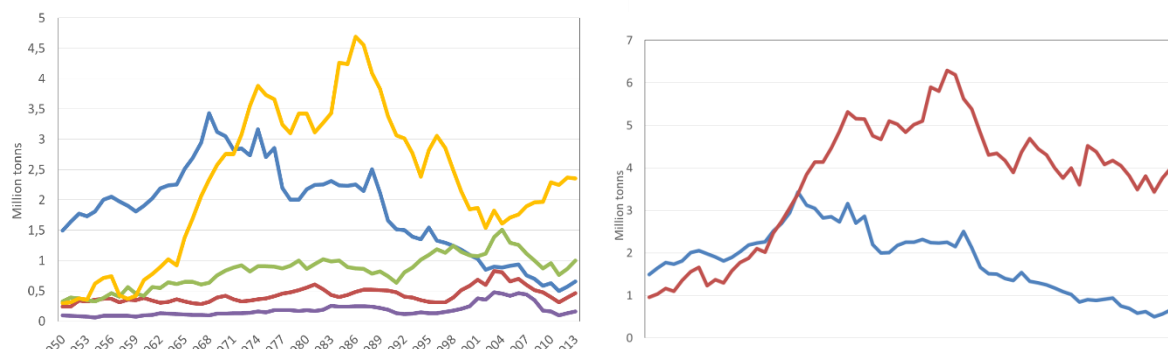


Figure 60, EU- and non-EU catches of cods, hakes and haddocks 1950-2013. Source: FAO



catches have declined in the last 25 years, demersal catches of the other main European fishing nations have remained relatively stationary, although they have also declined somewhat.

Currently, the largest European fishing nations are blessed with rich fishing grounds in the North Atlantic and Arctic. While demersal catches of traditional European fishing nations like Denmark, France, Spain and the United Kingdom have fallen substantially since 1950, Fig 61. French, Spanish and German catches of cods, hakes and haddocks have though not changed a great deal in the last 20 years. The decline of EU-catches can be attributed both to declining stocks in Europe and reduced access to historical fishing grounds, with the first reason often leading to the latter as many nations have extended their EEZ in order to protect vulnerable marine resources from overexploitation. Following the United Nations Convention on the Law of the Sea in 1982, many nations introduced a 200 mile EEZ which in many cases closed off fishing grounds that foreign fleets had exploited earlier. Some nations, such as Iceland, even extended their EEZ before the UN convention. During the period 1950-1976, Iceland fought a succession of “cod wars” against some of their neighbours in the North-Atlantic, which culminated in foreign vessels, above all British, German and Belgian, being deprived of all access to fishing grounds within Iceland’s 200 mile EEZ (Criddle and Strong, 2013b). It is believed, that this successful expansion of the Icelandic EEZ was a vital prerequisite for protection of the cod stocks in Icelandic waters. Around 1 million tonnes of cod are currently being harvested annually in the Northeast Atlantic, primarily in the Arctic and off the Norwegian and Icelandic coasts, but the stocks in the Northwest Atlantic have not fared as well. The cod stocks off the east coast of North America have collapsed and have a hard time recovering. The Newfoundland stocks yielded annually some 600.000 tonnes before collapsing at the end of 1980s after years of overfishing. This is thought to have happened, partly, because Canada did not expand her EEZ until it was too late (World ocean review, 2010).

A similar story can be told of Spain. The country had the third largest cod fishing fleet in Europe at the end of the 1960s and, just like the UK, Spain’s catches came almost entirely from distant waters. This changed in the 1980s, as developments in international sea law and of the country’s entrance into the European Community in 1986 closed the doors on several traditional fisheries, including Atlantic cod and Cape Hake (González-López, 2012). Danish catches of Norway pout and Atlantic cod have also diminished sharply. The history of the Polish Alaska pollock fishery is also interesting. It took off in the 1980s but was all but finished twenty years later.

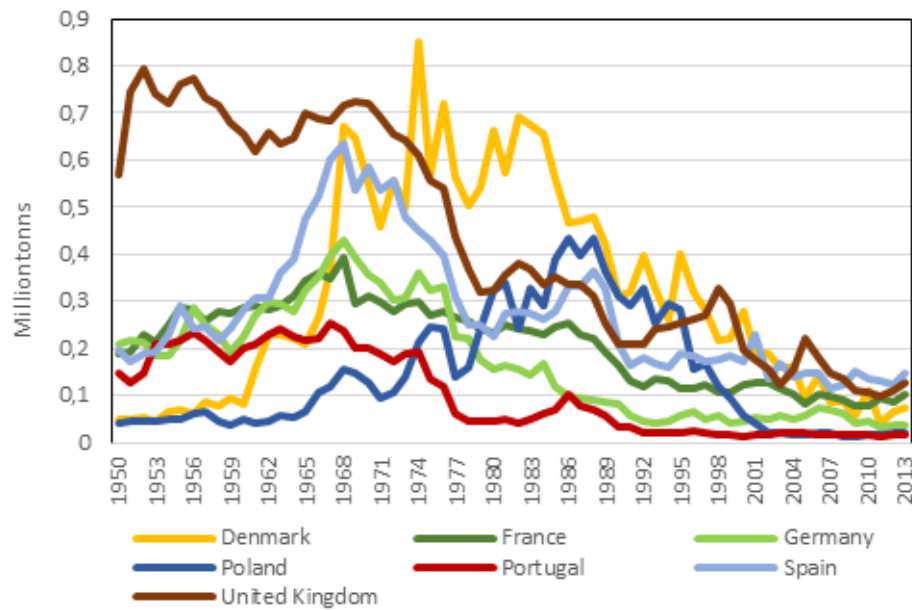


Figure 61, Catches of main EU-countries of cods, hakes and haddocks 1950-2013. Source: FAO

The Alaska pollock fishery is one of the largest fisheries in the world and is regarded as biologically sustainable (Criddle and Strong, 2013a). As Figures 62 a and b indicate, this is a rather young fishery, with the first documented fishing occurring off the coast of Asia in the late 18<sup>th</sup> century. Full-scale exploitation though only began in the mid-1960s (Criddle and Strong, 2013a & Criddle and Strong, 2013b). Japanese fleets began targeting Alaskan pollock in 1929, but the fisheries were not profitable at first and therefore supported by the Japanese government. Following technological advancements made during WWII, it became more profitable to harvest this high-volume low-value species. Vessels from the Soviet Union joined the pollock fishery in the Bering Sea in 1969. However, Japan dominated the fishery with 88% of total catches between 1964 and 1979. Japan's fast growing pollock fisheries was also fuelled by rapidly growing demand for pollock surimi in Japan, a protein paste. At the time, Japan obtained almost half of all its catches within other countries' 200-mile EEZ, and many of these grounds became unavailable following the trend toward as more and more countries extended their territorial waters. Most of the extensive Alaskan pollock fishery now takes place in U.S. jurisdiction and the catches are exported to pollock surimi processing facilities in Japan (Criddle and Strong, 2013b).

Alaska pollock is the most important species for the demersal fisheries in the Americas. Currently, the pollock fishery is number one in the U.S. by volume and number six by ex-vessel revenue (Criddle and Strong, 2013a). Pollock harvests have fluctuated between 0.8 and 1.5 million tons in the last 30 years. Other important species include Argentine hake, Pacific cod, North Pacific hake and Patagonian grenadier.

Current catches of Alaska Pollock in Europe constitute most of the Russian demersal catches, but no other European nation has access to that stock. Russia and Norway both harvest the rich Barents Sea

cod stock, while Icelandic vessels fish from local cod stock off Iceland. Russia, Norway and Iceland produce most of the haddock harvested by European nations, while Norway dominates the saithe and Blue whiting fisheries in Europe.

In Europe, catches of Alaska pollock and Blue whiting are most voluminous but as shown in Fig 61 b harvests have fluctuated wildly between years. Cod harvests have increased in recent years, mostly from the Barents Sea stock. While pollock and blue whiting are of relatively low value, cod – and haddock – fetch very high prices and are considered high-value species.

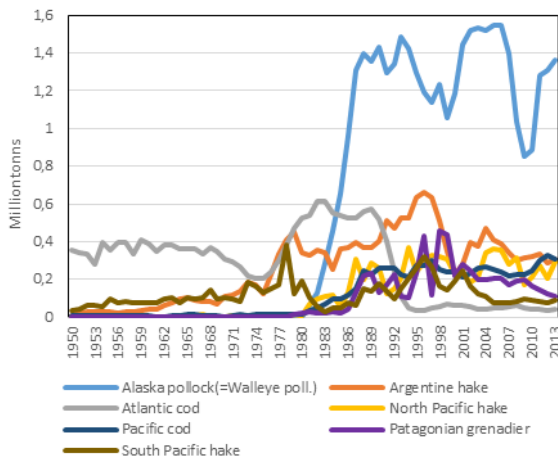


Figure 62 a Main cod-like species 1950-2013. Americas. Source: FAO

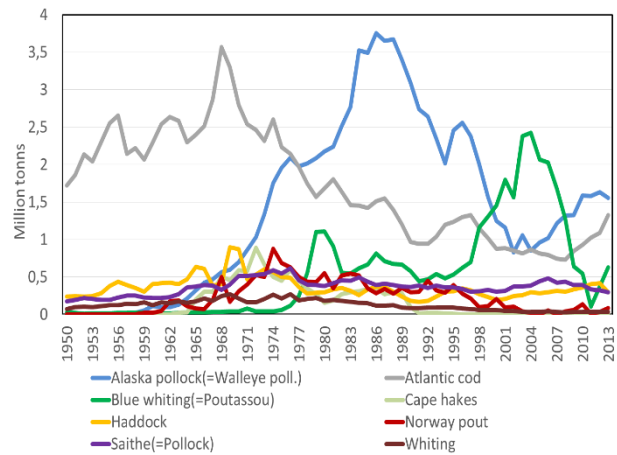


Figure 63 b Main cod-like species 1950-2013. Europe. Source: FAO

Europe and Americas have the most diverse production of cod, hake and haddock species, but harvests in other continents are mostly restricted to one species. Thus, Africa mainly harvests Cape hake, Asia harvest Alaska pollock and Oceania Blue grenadier

### International trade of cods, hakes and haddocks

The FAO databank does not contain data on trade between the world's continents, but rather data on trade between individual countries that can then be aggregated to show trade in each continent. However, these figures cannot be interpreted as trade between continents, as in many cases the trade taking place is between countries within the same continent. Moreover, the FAO database does not contain reliable data on the cod, hake and haddock trade of the former Soviet Union. That unavailability will have an effect on the following historical cod-like trade review since the USSR was a large European fishing nation. In 1975 the USSR distant-water vessels accounted for nearly half of the world's gross tonnage of such vessels and this fleet took part in cod, hake and haddock fisheries in far-away waters (Criddle and Strong, 2013b). The FAO database does, however, contain information on Russian trade of cods, hakes and haddocks after 1987.

Trade in cods, hakes and haddocks has increased since 1976. As shown in Fig 64, this development can mostly be traced to European trade, although international trade has also increased in countries in North and South America. Asian countries have imported a considerable amount of these demersal products, but trade in other continents has been negligible.

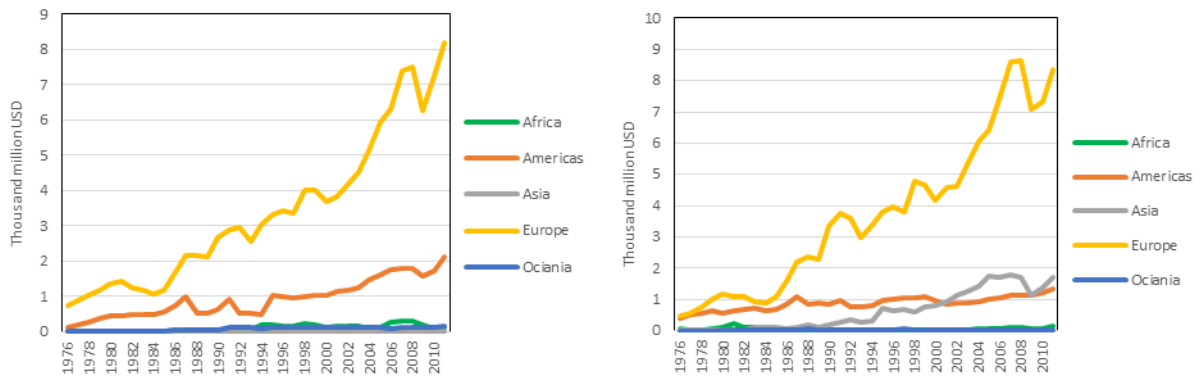


Figure 64, Export (left) and imports (right) of cods, hakes and haddocks by continents 1976-2011. Source: FAO

Perhaps the reason for Europe's fast increasing exports is the previous international development leading to the cod, hake and haddock fisheries now in fewer hands. Leaving a big market for the cod-like species in the former cod, hake and haddock fishing countries and therefore resulting in great trade between the few North Atlantic fishing countries and the mainland of Europe. That is, increase in trade between European countries can be the result of the rapid increase in both exports and imports in the continent.

In Fig 65, we look at international trade between countries in the Americas, Asia and Europe as the share of landings. The dotted line representing unity indicates that level of trade where all catches are traded. During the 1970s and 1980s, most catches by the Oceanian nations were exported, but the trade ratio has since declined, although it has lately increased again. European exports have been on the rise and now correspond to 60% of total catches.

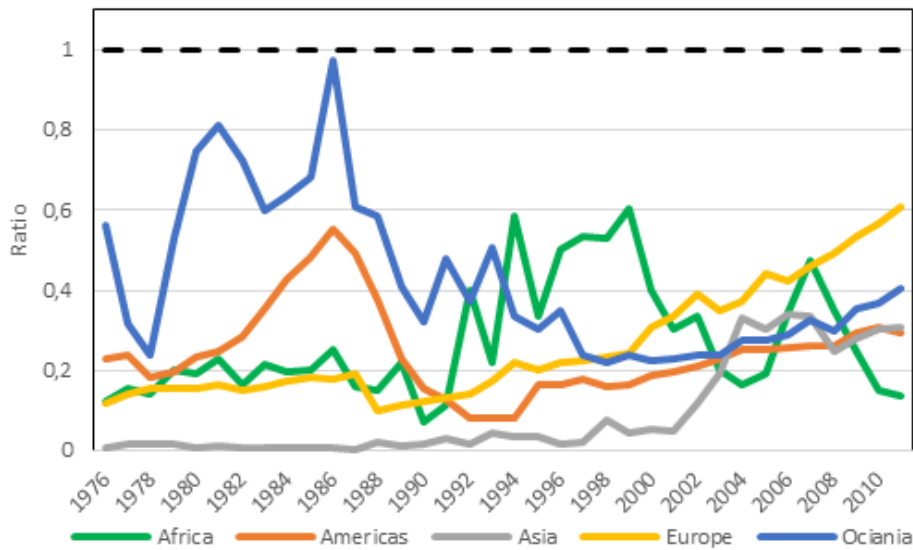


Figure 65, Exports of cods, hakes and haddocks as ratio of landed catches of the species group, by continents (quantity) 1976-2011. Source: FAO

The trade balance in the Americas, Asia and Europe is examined in more detail in Fig 66. Here the dotted line represents cases where imports and exports are completely balanced, i.e. where the value of the vertical axis equals unity, while a value of less than unity indicates that imports exceed exports, and a value of more than unity that exports exceed imports. In Europe, the trade in demersal products has been quite balance in the last 25 years, with total European exports almost equalling total imports. In Asia, by contrast, imports have far exceeded exports. Countries in the Americas were net importers in the first half of the period under consideration, but have since become net exporters.

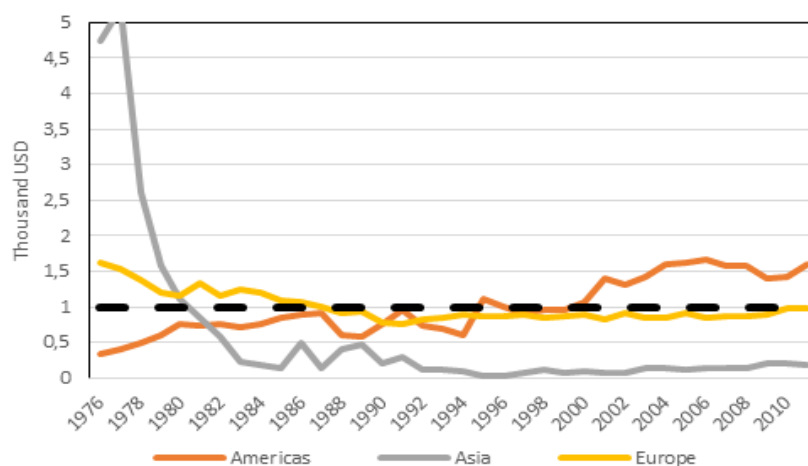


Figure 66, Export of cods, hakes and haddocks as ratio of imports, by continents 1976-2011. Source: FAO

The main exporting countries in each continent are generally also among the high-producing countries. In the Americas, the United States have the highest export value as well as the import

value, as does Namibia in Africa, New Zealand in Oceania and Japan in Asia. The main exporting countries in Europe include the main harvesting nations, Norway, Russia and Iceland, but also Denmark and Germany. The UK, Spain, Germany, France, Portugal and the Netherlands are the main importing countries. European trade is characterised by trade from the fringes of the European continent, i.e. Russia, Norway, Iceland and the Faroe Islands, to the large markets in the UK and the continent. The ratio between exports and imports is extremely high among the non- EU member countries, or up to around 350 for the Faroe Islands and Iceland, indicating that these exports in these countries are 350 times the level of imports.

In Asia, China is the biggest importer with Japan and South-Korea second and third. Japanese and S-Korean imports are mainly Alaska pollock and to a lesser degree cod, while China is also keen on cod products. China's imports have though decreased significantly since 2005 and that may be the cause of increases in aquaculture production in China. According to FAO data, Asia produced 77% of all aquaculture cods, hakes and haddocks by value and China alone 25% of all world production.

As explained above, the FAO-data does not allow for examination of trade between continents. Such information is however available from EUMOMA, albeit for a much shorter period, or only the years 2001-2015. As shown in Figure 67, in value terms, cod products account for most of the intra EU-trade, with hake a distant second. Trade in Alaska Pollock and haddock is also quite important.

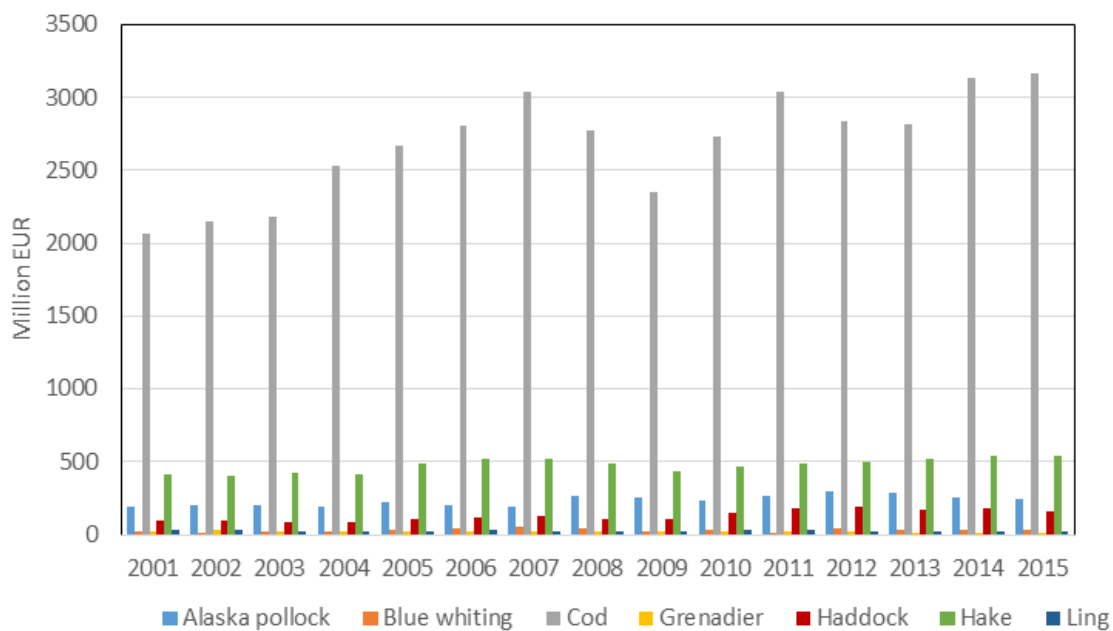


Figure 67, Intra EU trade with cods, hakes and haddocks 2011-2015. Source: EUMOMA

A similar picture emerges when trade between the EU and other parts of the world is examined in more detail, Fig 68. Cod is by far the most valuable demersal commodity, but pollock, hake and

haddock are also quite important. The cod and haddock is mostly imported from Russia, Norway and Iceland, while the pollock comes mainly from the US and Russia, and hake from the Americas and Africa.

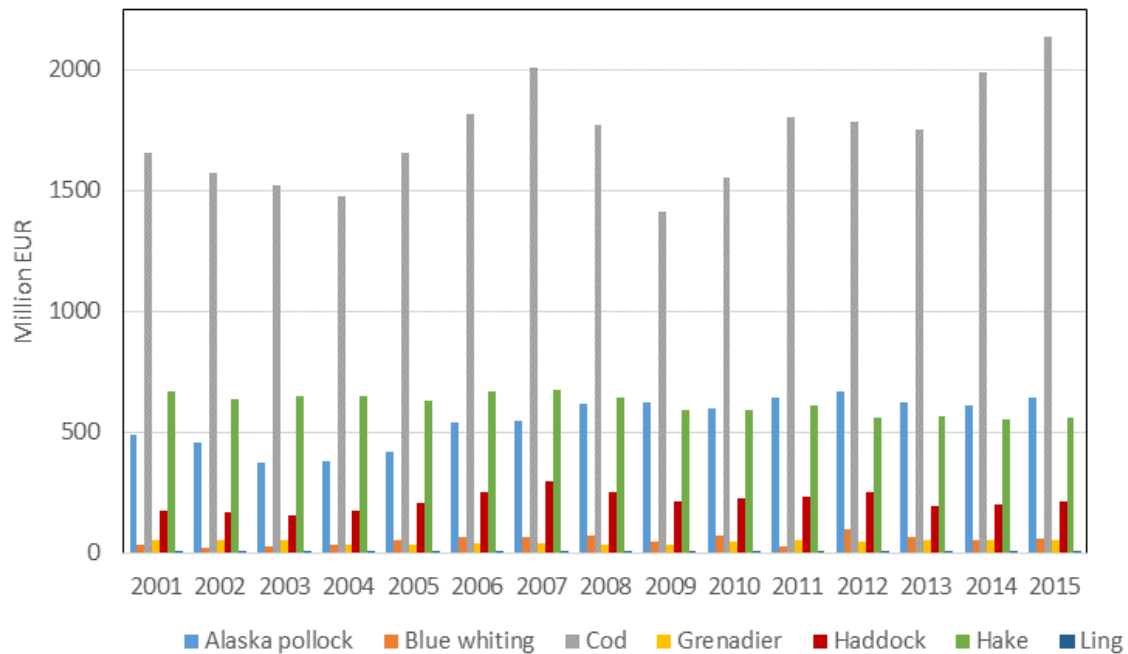


Figure 68, Extra EU trade with cods, hakes and haddocks 2011-2015. Source: EUMOFA

Of European exports, cod products have been the most valuable, but the value of pollock products has been rising in recent years. Saithe and haddock are also valuable exports, Fig 69.

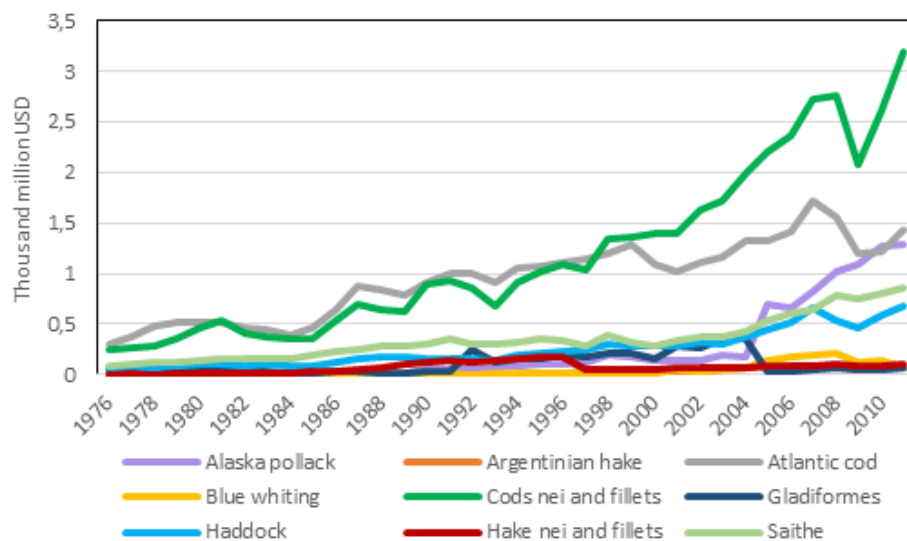


Figure 69, Europe's exports (value) of cods, hakes and haddocks 1976-2011. Source: FAO

The main fishing nations in Europe have historically exported most their demersal products as frozen fish fillets or dried, salted or smoked fish. This has changed in recent years, with fresh or chilled products becoming ever more sought after. Prices for these products have therefore soared. In addition, markets have also emerged for other parts of the fish apart from fillets and meats. As shown in Fig 70, the value of frozen products, excluding fillets and meat has risen fast in recent years, while the value of the dried, salted or smoked fish and frozen fillets have showed a more steady increase.

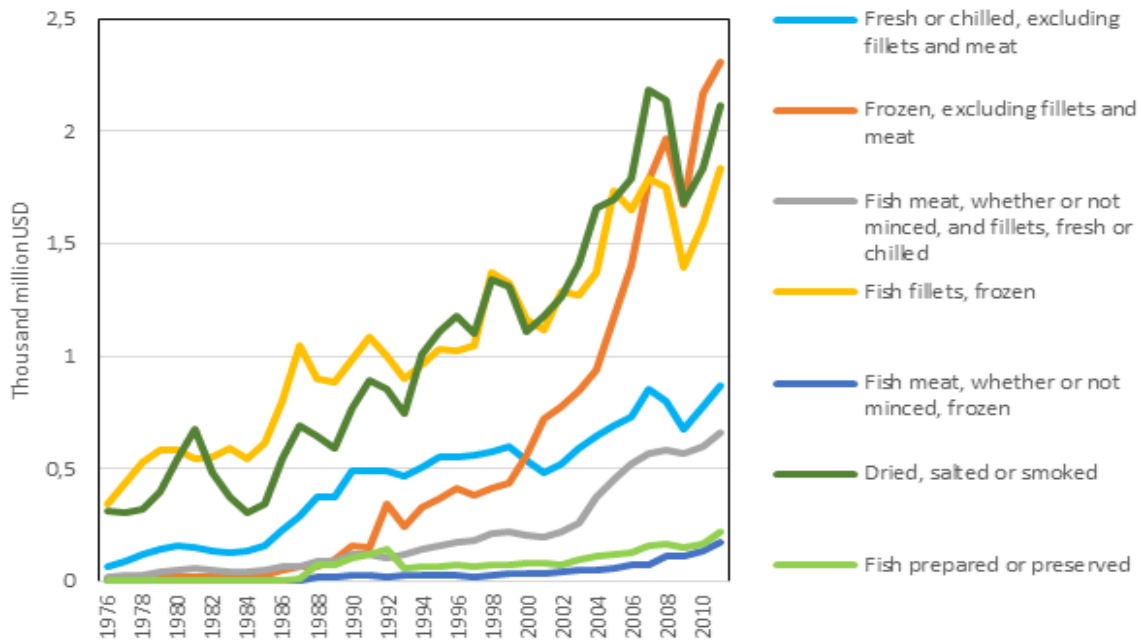


Figure 70, European demersal exports by product type 1976-2011. Source: FAO

### Development of prices

The prices of European exports of cod-like species have generally been higher than the prices of corresponding products exported by countries in other continents. This gap has though been narrowing with African and American prices converging with the European prices in the last decade, Fig 71.



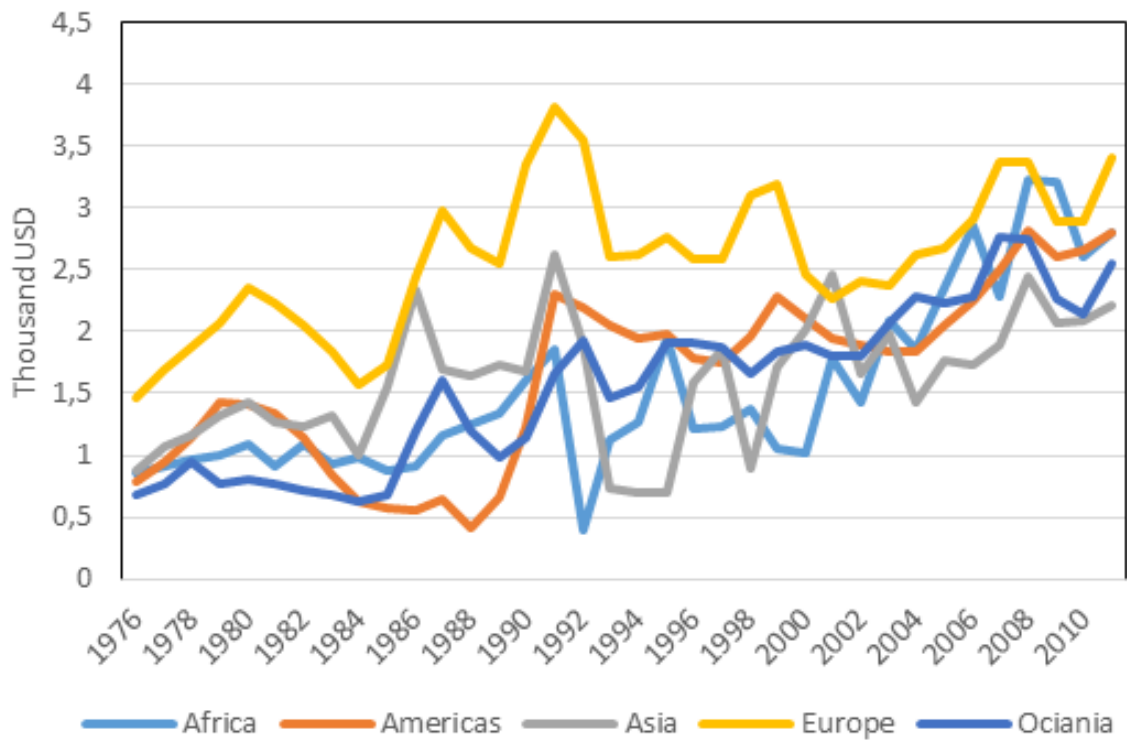


Figure 71, Average export price (value/volume) of cods, hakes and haddocks by continents 1976-2011. Source: FAO

Within Europe, Iceland has tended to produce the most valuable export products, but average prices have also been high for Danish and Norwegian exports, Fig 72. Cod fillets from Norway and Iceland fetch particularly high prices. In recent years, however, exports from Portugal and Poland have become even more expensive. The Portuguese exports mostly comprise cod products which are very valuable and sold at high prices. The same can be said about Poland. Russian products have tended to be rather less valuable, mostly because pollock – a low-value species – has usually made up a very large share of their exports. A similar story holds for the Faroe Islands. They mostly export Blue whiting, which has a rather low value. Although their exports are quite voluminous, the country's earnings from these exports are rather low

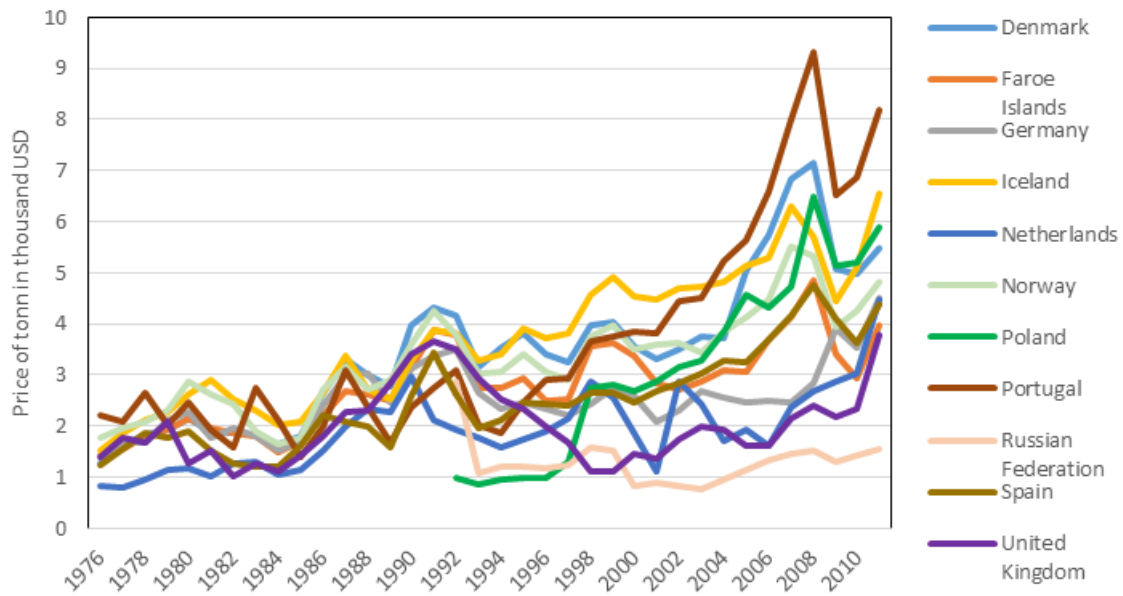


Figure 72, Average export price (value/volume) of cods, hakes and haddocks in Europe 1976-2011. Source: FAO

### Relative price of cods, hakes and haddocks

The overall consumption of fish, seafood and other aquatic products per capita has increased in the world, particularly in Asia and Oceania, Fig 74. In Europe (the former Soviet Union is here included) the consumption per person is fairly stagnant throughout the period. Looking closer, Europe's food supply of fish has for most of the period been increasing from 1961 while supply of bovine and pig has historically been higher. The rapid increase in the supply of poultry has resulted in poultry meat being the secondly most supplied meat in the continent. According to FAO data fish and fishery product's calories and protein per capita has been stagnant in Europe since 1961. This could be explained with where the Europe's population growth is mainly taking place. Variations in per capita fish consumption can be from 1 kg per capita in one country to more than 100 kg in another. These large variation across countries in fish consumption reflect various eating habits and traditions, depending on historic and current availability of marine products and other foods, prices, socio-economic levels and seasons.

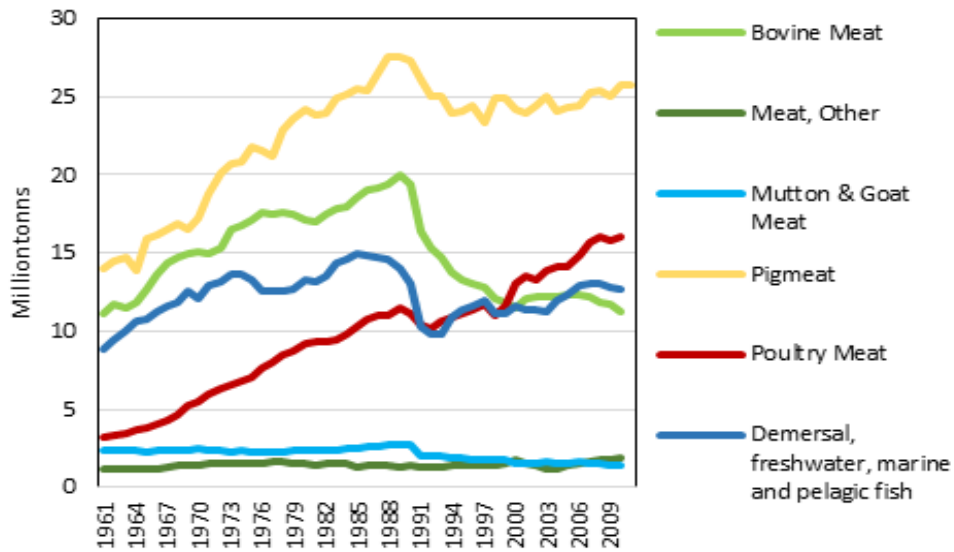


Figure 73 Food supply by meat type in Europe products per capita by continents 1961-2012. Source: FAO

Although the consumption of fish has increased globally, the prices of fish products have not kept pace with prices of other consumer goods. As revealed in Fig 75, the global fish price index shows declining prices in the 1980s and 1990s, but rising prices in the last decade. This development does though not tell the whole story, as the fish price index comprises prices of all fish products, and not just cods, hakes and haddocks.

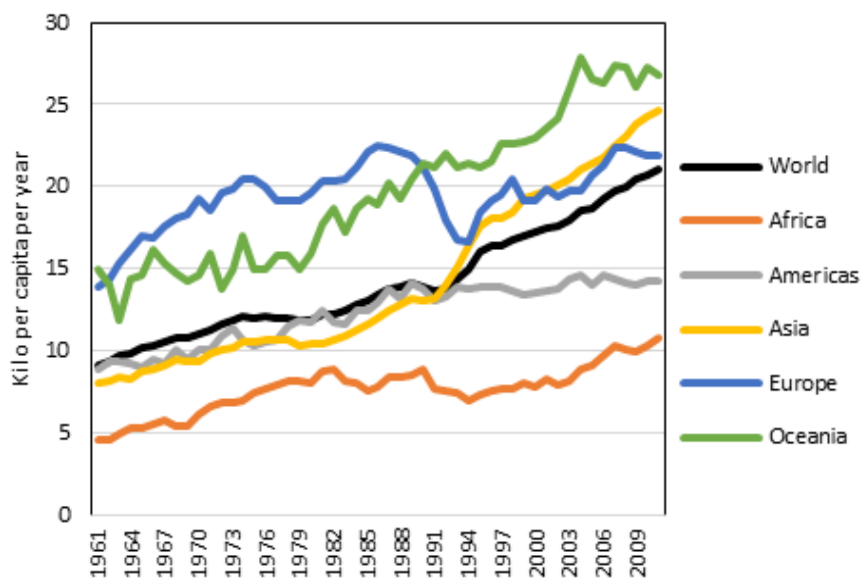


Figure 74, Consumption of fish, seafood and other aquatic 1961-2012. Source: FAO

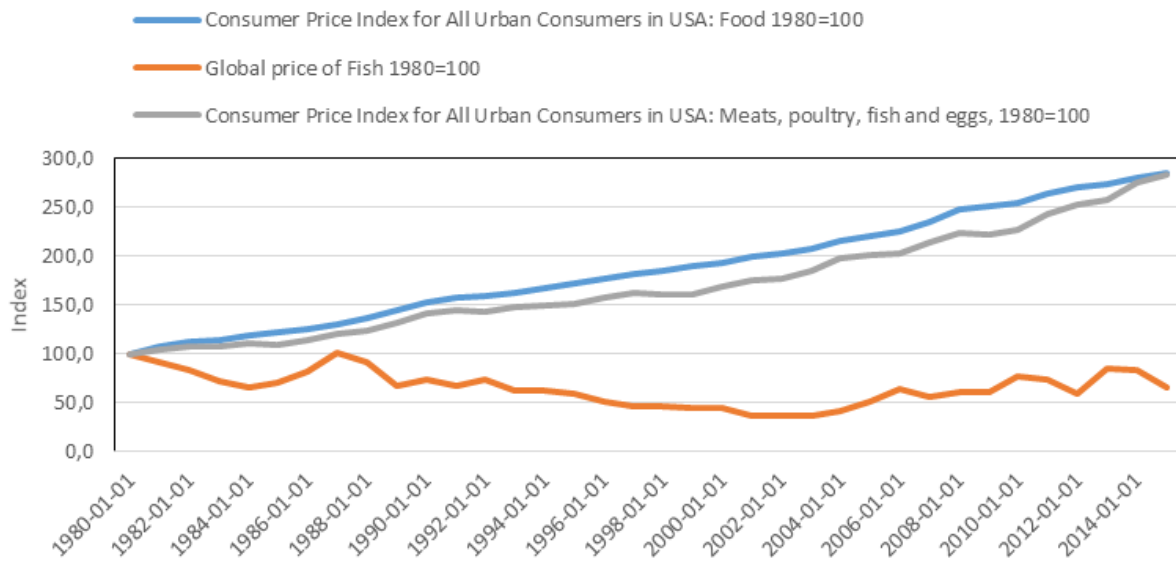


Figure 75, Consumer price index and global price of fish 1980- 2015. Source: FED

A more detailed analysis of price development can be found in EUMOFA statistics, Fig 76. This data clearly shows that in the last 15 years, cod products have in general fetched highest prices and that these prices have tended to be considerably above the prices of other products. Prices of hake and grenadier have also been quite high and stable, while those of pollock have fluctuated more. Blue whiting clearly shows up as the least valuable species.

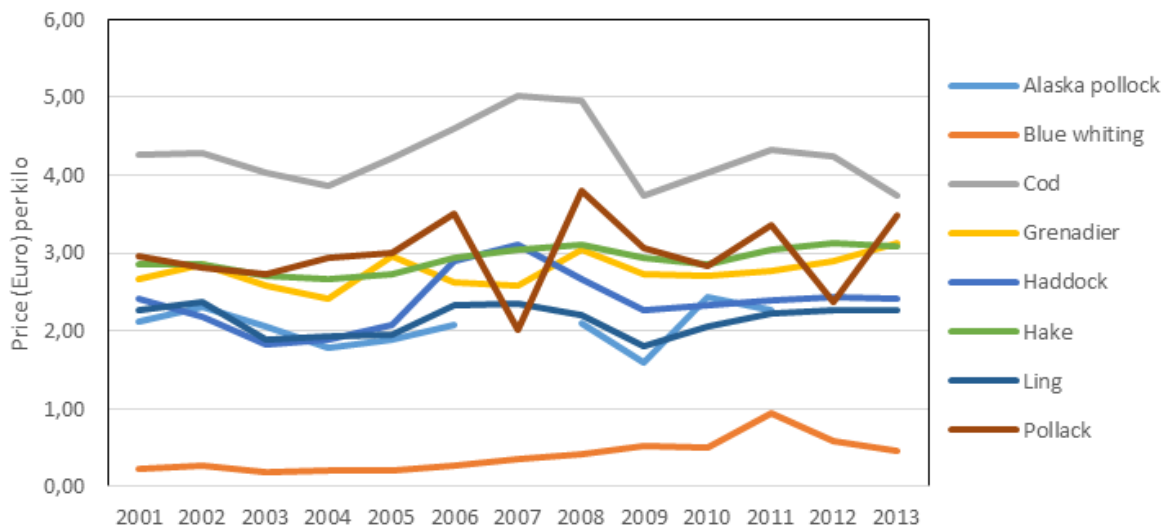


Figure 76, Prices per kilo of main cod-like species in Europe 2001-2013. Source: EUMOFA

## Pelagics

Report on the development of catch volumes and trade of all pelagic species in continents and selected countries and for Atlantic herring, Non-European countries, EU-28 countries and European non-EU countries, and selected countries. Main focus: landed value, trade and average prices.

### *Pelagic fisheries at world level, and specific Atlantic herring fisheries*

In this section we discuss the development of the quantity harvested and prices of pelagic species in general, and specifically Atlantic herring using data from FAO.

The pelagic species is a rather broad group. The focus in the PrimeFish project is herring, representing the European pelagic fishery. But globally herring is just one of several very important species among the pelagic species. Therefore the report includes first a general overview of catches and values of the pelagic species at world level, for separate continents and selected countries for 1950 – 2013, second it include a more detailed description of catches, values and prices for Atlantic herring, in three main groups; EU-28 countries, non-EU European countries and countries outside EU and in selected counties.

### *World production of pelagic species*

The focus in the PrimeFish project is herring, representing the European pelagic fishery. Globally herring is just one of several very important species included in the overall groups of pelagic species; these include besides herring, sardines, anchovies, tunas, bonitos, billfishes and miscellaneous other pelagic fishes, including various sorts of mackerel. In the following all these species will be handles under one, despite the importance (and presence at all) differs between countries and especially continents.

The global production of pelagic species as defined in the FAO-database (see the full list of species in appendix 1) has increased by 405 % from 1950 to 2013, Fig 77. In 1950, world production amounted to almost 7 million tons, but had increased to 35 million tons in 2013. The product was even higher in 1994 with 44 million tons, decreasing especially after 2005.

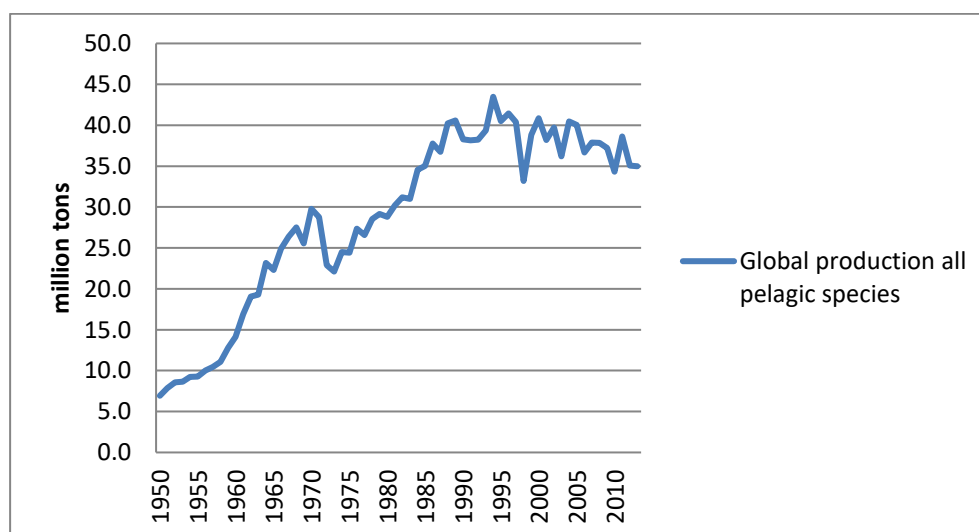


Figure 77, Global production of pelagic species 1950-2013. Source: FAO

In 1950 Europe was the dominant producer, Fig 78. This changed in the late 50'ties, where the production from the Americas (north and south) grows to over 15 million tons. Later the American and Asian production has increased. The American product has been very fluctuating, while the Asian growth has been steady, leaving Asia as the largest producer of pelagic species by 2013.

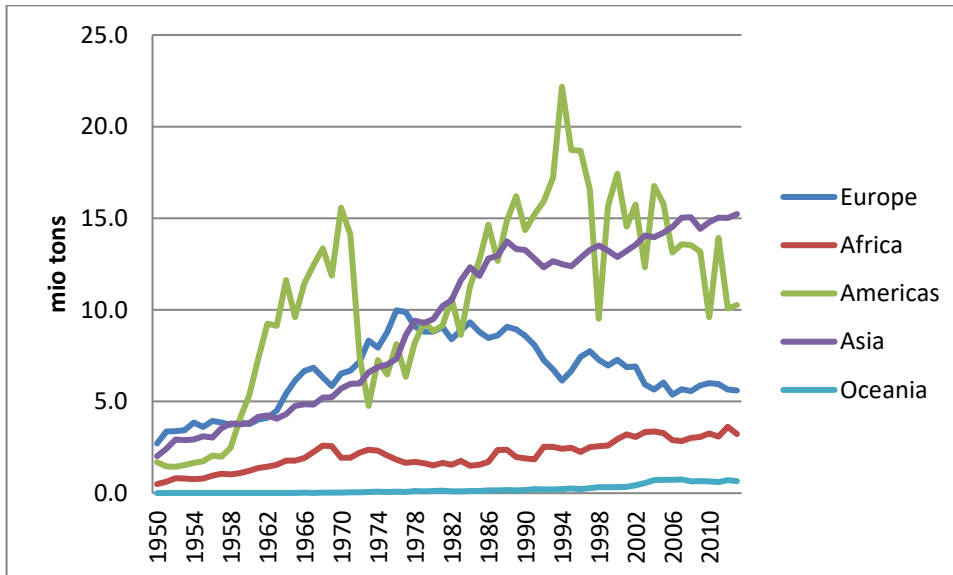


Figure 78, Landed volume of pelagic species by continents. Source: FAO

The main fishing nations in Asia have been China and Japan, Fig 79 a. The Chinese catches fell to a very low level in 1997 but have recovered after a period of very low level. For Japan, the pelagic catches peaked in 1988, and has decreased seriously since to a level of 0.5 million tons in 2013.

In the Americas, Canada, the USA and especially Chile are the dominant pelagic nations, Fig 79 b. The pelagic fishery has been relative stable in the period for the USA and Canada, with catches at a bit over 1 million tons and under 0.5 million tons respectively. The Chilean fisheries took off from 1977 and peaked at 7.3 million tons in 1994, decreasing to 1.4 million tons in 2013.

The European pelagic fishery is at a lower level than Asia and Americas, Fig c. Five nations are dominant in the pelagic fishery. Until 1992 Norway and especially USSR (later the Russian Federation) were dominant. Norway peaked in 1967 with 2.5 million tons, while the USSR and RF caught just below 4 million tons in the 70'ties and 80'ties. Despite the collapse of the Russian catches, The Russian Federation, Norway and Iceland are still the dominant producers of pelagic species in Europe with a bit below 1 million tons in yearly catches in 2013. The Danish catches have decreased the last year to 0.3 million tons in 2013, while the German catches are also decreasing to 0.2 million tons in 2013.

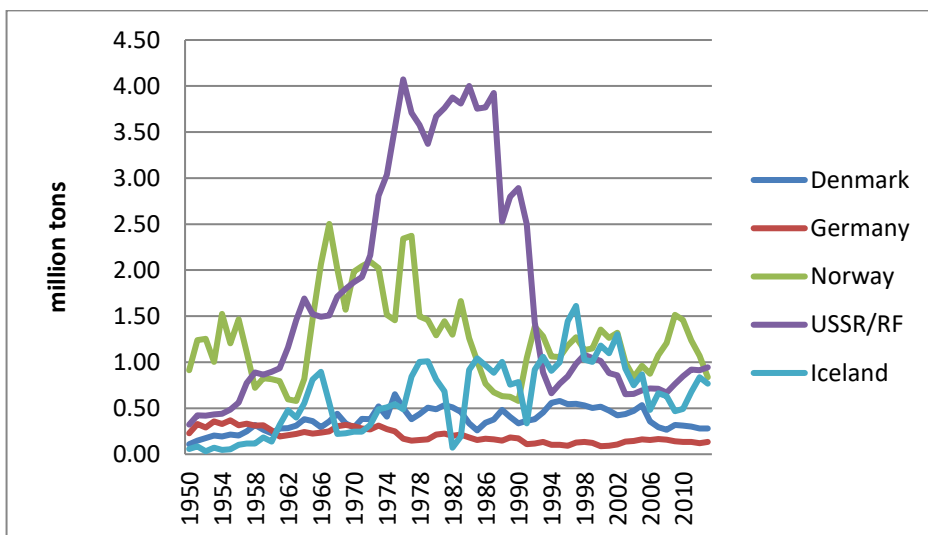
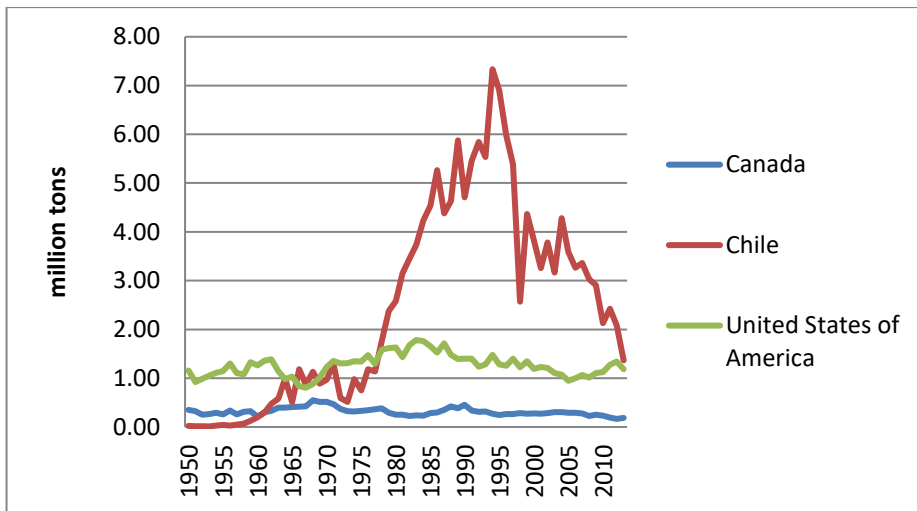
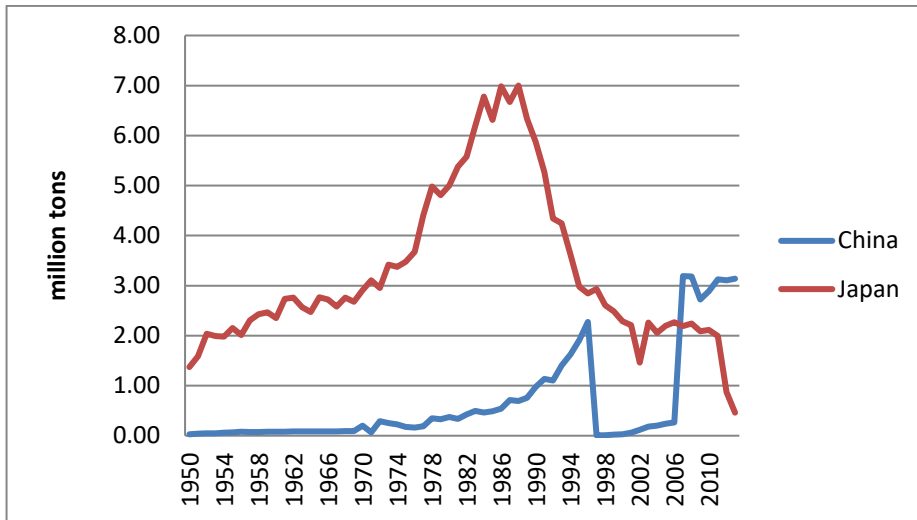


Figure 79 a, b and c, Main fishing countries of pelagic species Asia, Americas and Europe 1950-2013. Source: FAO

### World trade of pelagic species

The FAO databank does not contain data on trade between the world's continents, but rather data on trade between individual countries that can then be aggregated to show trade in each continent. However, these Figures cannot be interpreted as trade between continents, as in many cases the trade taking place is between countries within the same continent. Never the less the data below just sums the export from the individual countries, disregarding that some (maybe the main part) of the export remain within the continent, Fig 80 and 81, while the trade balance (export – import) show the trade balance between continents, as internal trade should be outbalanced here, Fig 82.

Trade in pelagics has increased over the period, indicating the increase in catches. The continued growth (though at lower pace) after stagnation of catches though indicate that an increasing degree of the catches are traded, e.g. less national catch and processing and consumption.

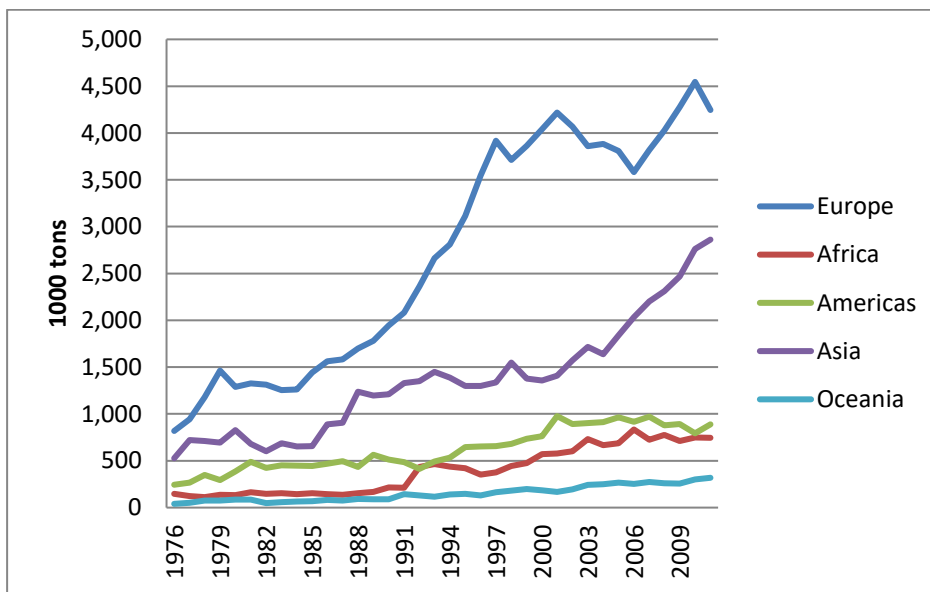


Figure 80, Export of products of pelagic species by continents 1976-2011. Source: FAO

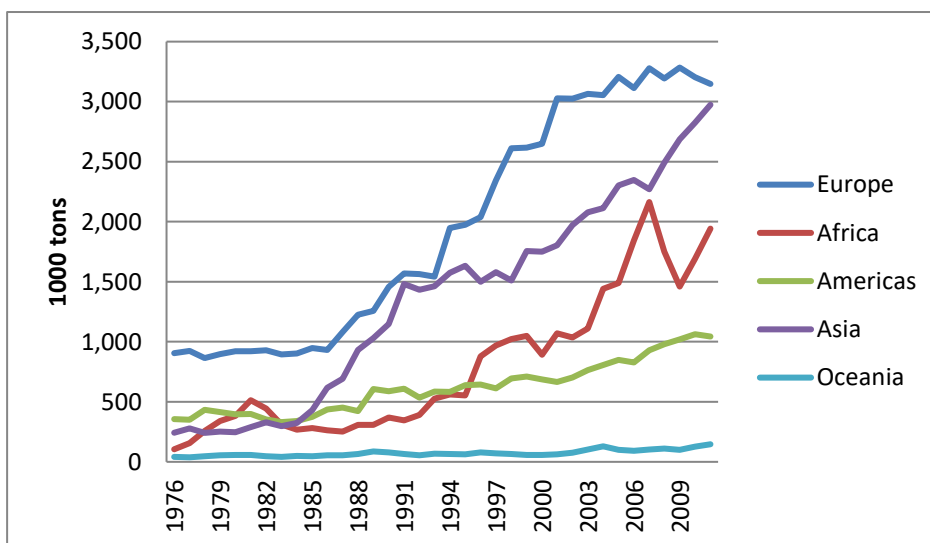


Figure 81, Import of products of pelagic species by continents 1976-2011. Source: FAO



Comparing import and export of products of pelagic species reveals that the most continents have a relative fine trade balance measured in volume. Europe has a positive trade balance, exporting up to 1.500 tons more than importing, while Africa has a negative trade balance, importing around 1.000 tons more pelagic products than exporting.

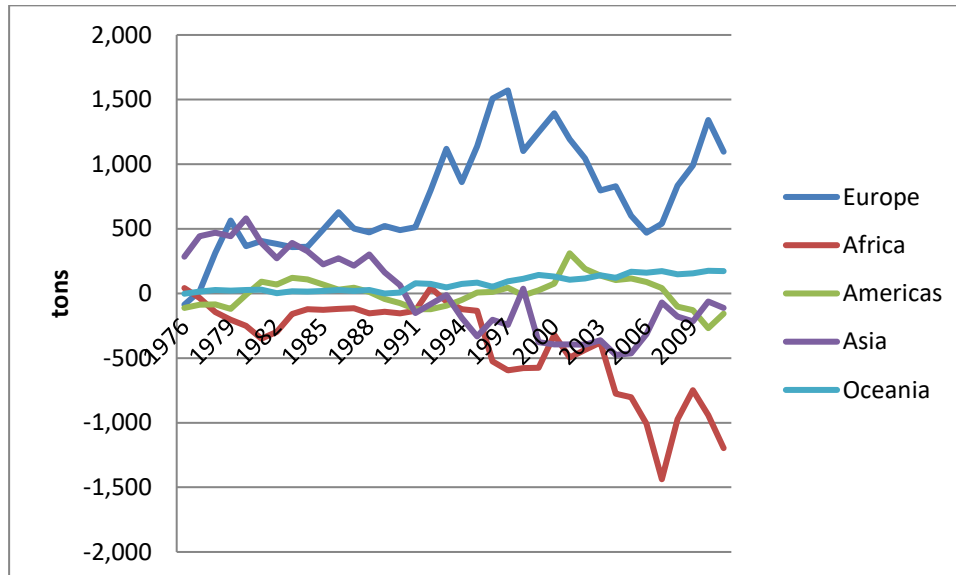


Figure 82, Trade balance of products of pelagic species by continents 1976-2011. Source: FAO

### Atlantic herring

Looking more closely at the Atlantic Herring, the catches peaked in 1965 with more than 4 million tons, Fig 83. It decreased dramatically in the following years to a low in 1979 with less than 1 million tons catches, followed by increasing catches to between 2 and 2.5 million tons in 1994-2011 where it has decreased below 2 million tons.

The herring fisheries grew from 1950 not least due to technological development, especially the purse seine technology, and the power blocks, which increased the productivity of the fishery. This resulted in collapse of the huge Atlanto-Scandian (Norwegian spring spawning) herring stock around 1970, only in the late 1990'ties the quotas and catches grew again. The other important stock, the North Sea herring stock, declined in the 1970'ties and collapsed in 1976. This stock recovered and catches grew in the 1980'ties.

Other minor herring stocks in the Celtic sea and west of Scotland and some of the stocks in the Baltic were more stable, securing continues herring landings despite of the collapse in the larger northern stocks.

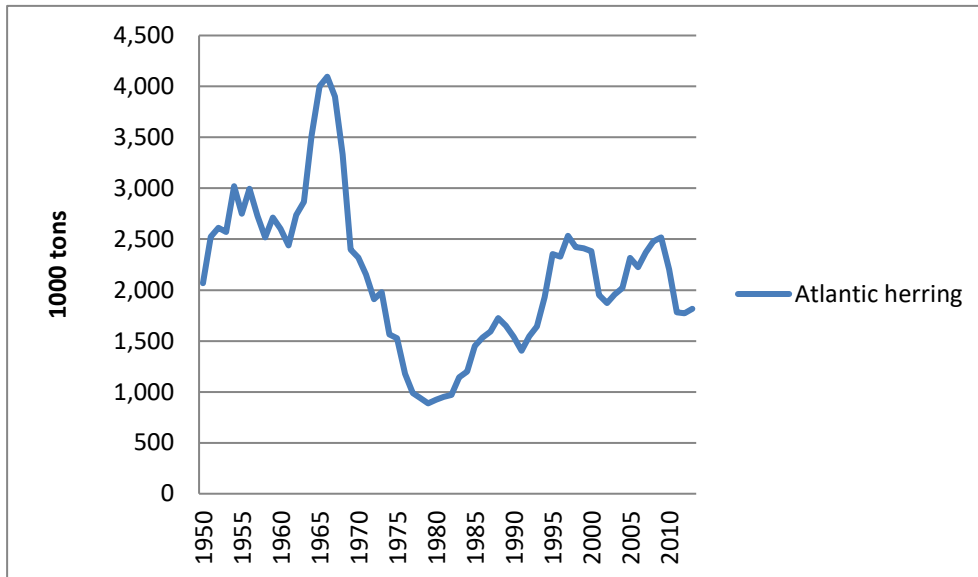


Figure 83, Total catches of Atlantic herring, 1950-2013. Source: FAO

The catches are, not surprisingly, dominated by European countries, as this is the main area of distribution for the Atlantic herring, Fig 84. The non-EU member European countries has the highest catches, while the EU-28 countries had a high catch above 1 million tons until 1972, where it decreased below ½ million tons but stabilised at 700-800.000 tons till a new decrease from 2005. The non-European countries, mainly Canada and to some degree the USA is peaked around 1970, and has since had a relative stable catch around 300.000 tons.

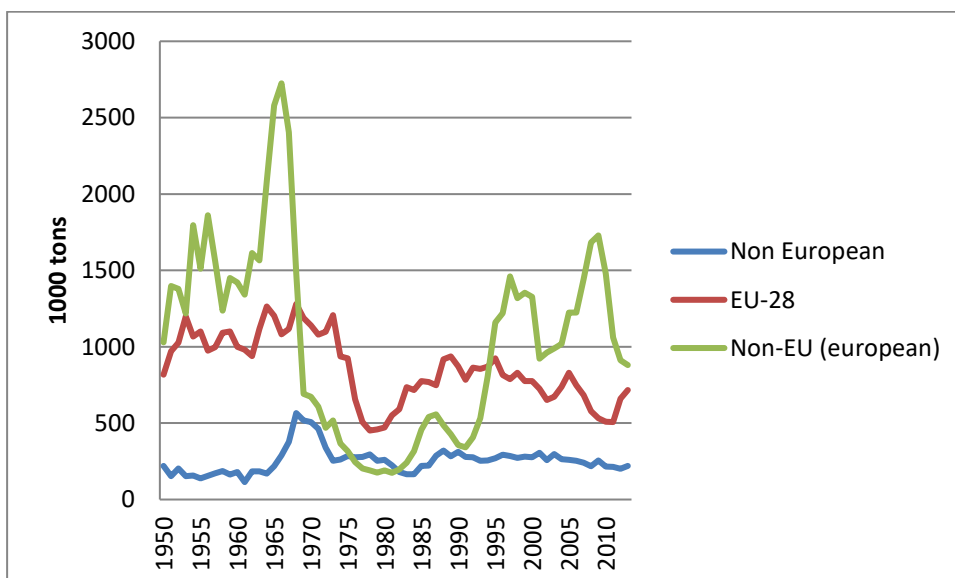


Figure 84, Catches of Atlantic herring for EU-28 countries, non-EU member European countries and non-European countries 1950-2013. Source: FAO

Broken down in countries, the dominant herring producers of European non-EU members are Norway, Iceland, Faroe Island and USSR/The Russian Federation, Fig 85. They all fish on the stocks in the northern part of the North Sea. The collapses of the Northern stocks heavily influenced the catch of these countries, of which especially Norway has managed to recover to a high level of herring catches, while catches from Russia and Iceland has remained at a comparatively low level around 2 million tons.

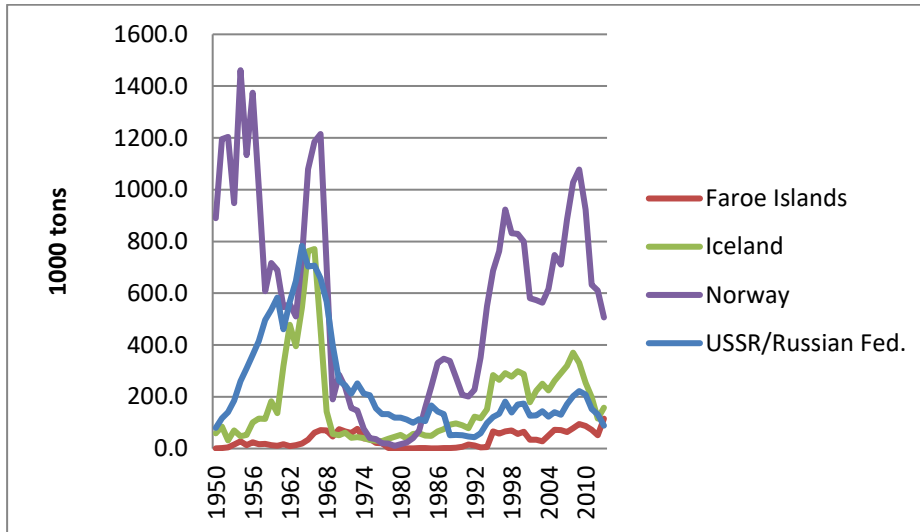


Figure 85, Catches of Atlantic herring from selected European non-EU member states 1950-2013. Source: FAO

Catch of Atlantic herring among the EU-28 member states are carried out by northern member states, Fig 86. The catch level was also heavily influenced by the collapse of the Northern stocks, which is clear for Denmark, United Kingdom, Sweden and Netherland. Catches has been more stable for Germany and Finland which used stocks in the Baltic. Denmark has the largest catches followed by Sweden, Fig 86.

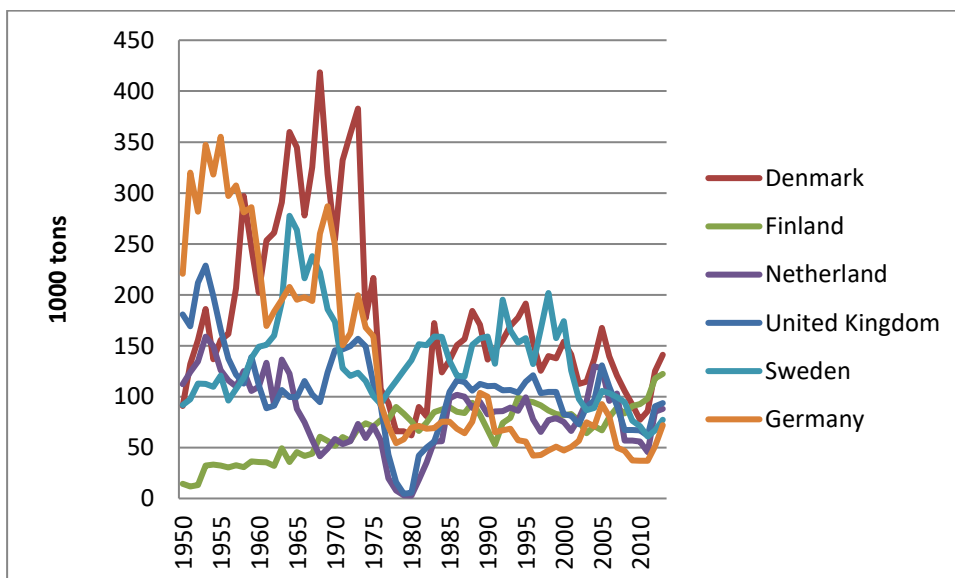


Figure 86, Catches of Atlantic herring from selected EU-28 member states 1950-2013. Source: FAO

### International trade of Atlantic herring

The FAO databank contains data on trade data at country level, but only 1976 – 2011. This is thus the period where trade is described.<sup>5</sup>

The export of products of Atlantic herring has increased in the whole period, Fig 87. This probably mainly reflects the development in the catches, which has increased most in the Northern non-EU countries following the recovering of the two northern stocks. But it might also reflect a higher degree of division of labour, where catches are exported for primary processing, re-exported for secondary processing and finally exported for consumption. The importance of the division of labour is not documented.

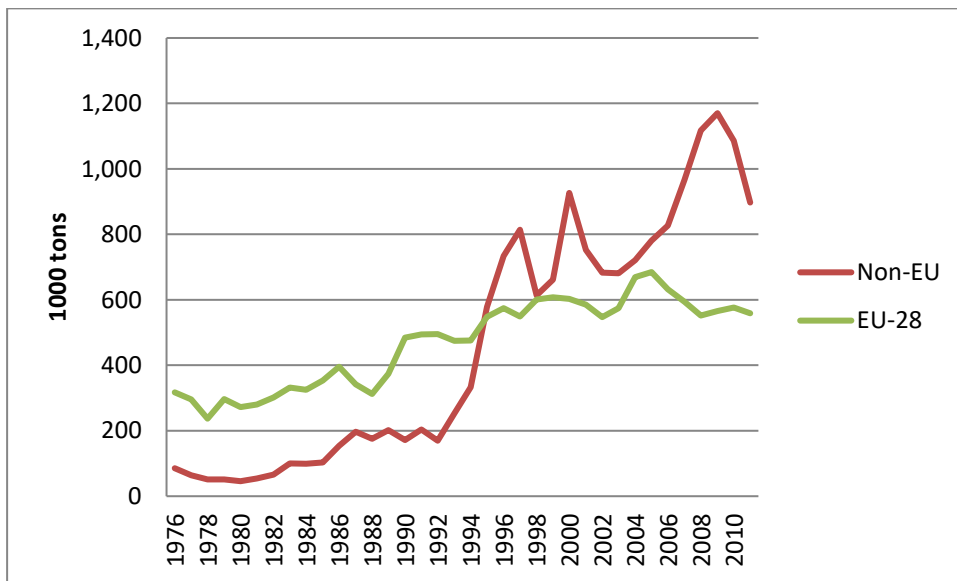


Figure 87, Export of herring, volume, EU-28 countries and non-EU countries 1976-2011. Source: FAO.

The increased export volume also result in increased export value, where the EU export reaches 900 million US \$, and export from non-EU countries reaches 1.300 million US \$ in 2013, Fig 88 – all in running prices. The increasing value of export from the non-EU countries though cover that the prices per kilo for the products is relative lower for these countries than the export kilo prices for herring products from the EU-countries. This illustrate a growing share of raw products from the (especially) northern non-EU countries while the further processing and value adding takes place in EU, Fig 89.

<sup>5</sup> The FAO databank does not contain data on trade between the world's continents, but rather data on trade between individual countries that can then be aggregated to show trade in each continent. However, these figures cannot be interpreted as trade between continents, as in many cases the trade taking place is between countries within the same continent.

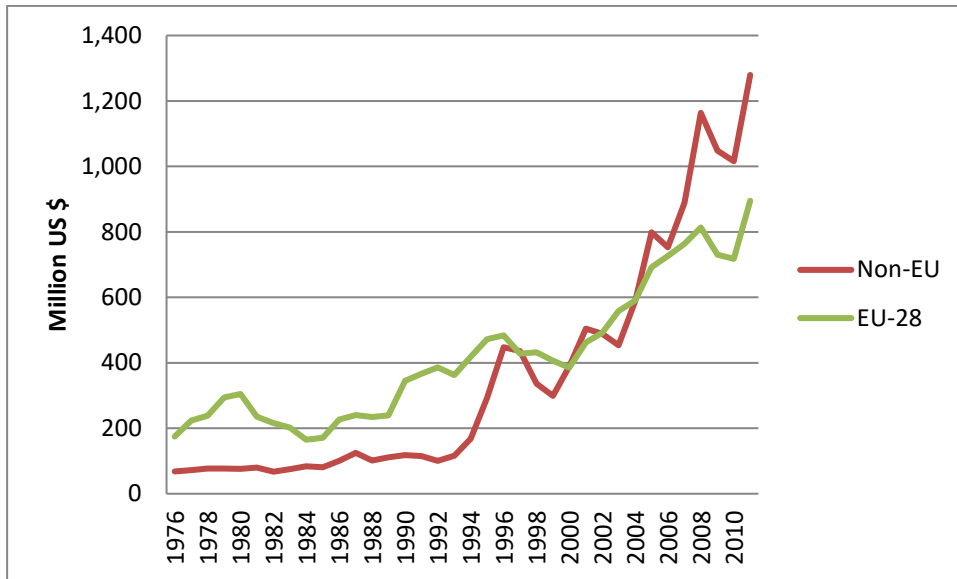


Figure 88, Export of herring, value (running prices), EU-28countries and non-EU countries 1976-2011. Source: FAO.

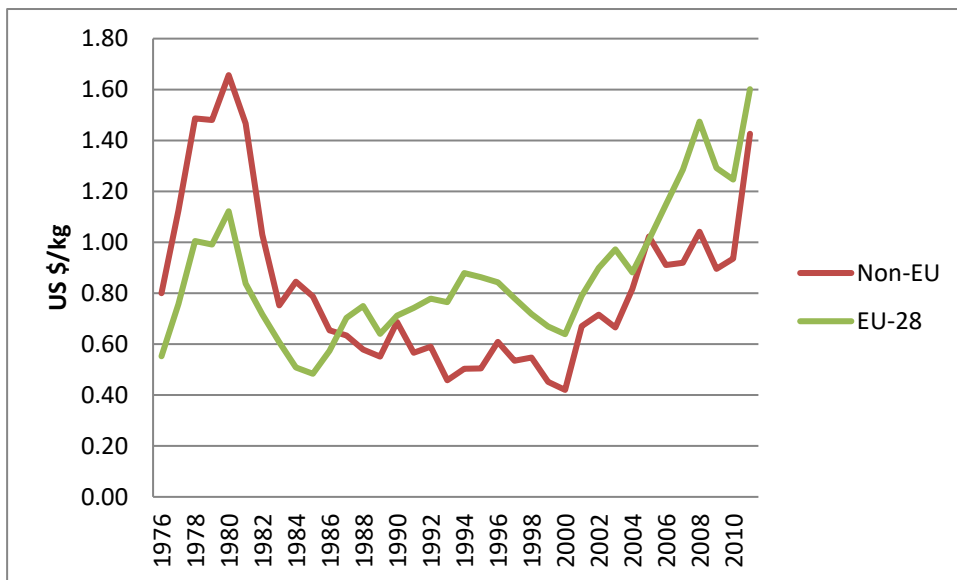


Figure 89, Average export price for herring products, EU-28countries and non-EU countries 1976-2011. Source: FAO.

A view on the average prices on the main export countries supports that the average prices is highest for the EU-countries Germany and Denmark, followed by the non-EU countries Norway and Iceland, but with other non-EU countries Russia and Faroe Islands at a lower level, Fig 90.

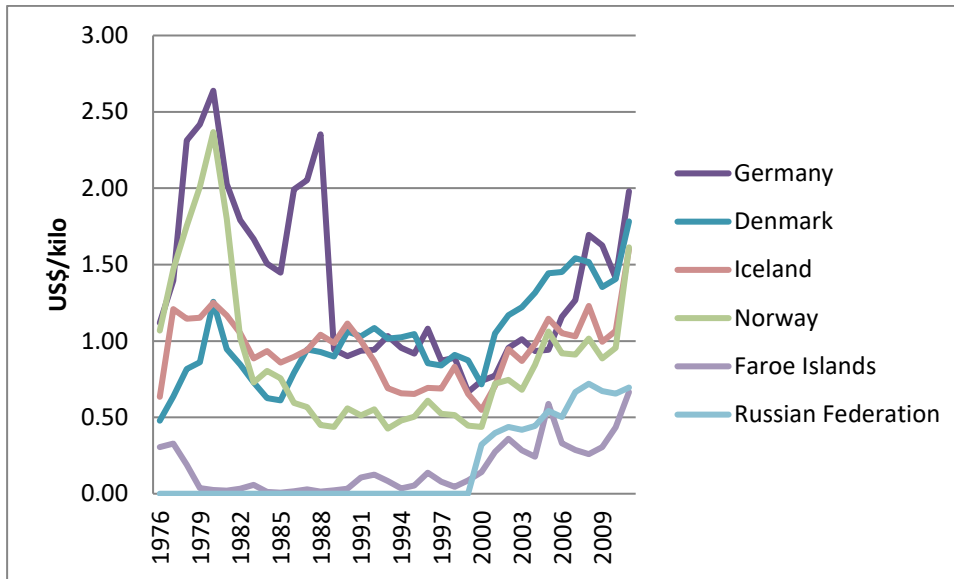


Figure 90, Average export price (US \$/kg) for products of herring European countries 1976-2011. Source: FAO.

### Consumption of fish, seafood and other aquatic products

For consumption developments per capita in general, see elsewhere in this report.

#### Notes: Pelagic species, FAO

**Miscellaneous pelagic fishes:** Chilean jack mackerel, Chub mackerel, Scads nei, Capelin, Atlantic mackerel, Cape horse mackerel, Pacific saury, Jack and horse mackerels nei, Atlantic horse mackerel, Japanese jack mackerel, Indian mackerel, Silver pomfrets nei, Indian mackerels nei, Short mackerel, Carangids nei, Yellowstripe scad, Jacks, crevalles nei, Indian scad, Bigeye scad, Amberjacks nei, Barracudas nei, Torpedo scad, Cunene horse mackerel, Pelagic percomorphs nei, Flyingfishes nei, Butterfishes, pomfrets nei, Common dolphinfish, Black pomfret, Japanese scad, Mackerels nei, Silver pomfret, Halfbeaks nei, Queenfishes, Mediterranean horse mackerel, Bluefish, Silversides(=Sand smelts) nei, Greenback horse mackerel, False trevally, Rainbow runner, Great barracuda, Atlantic bumper, Needlefishes nei, Pompanos nei, Blue mackerel, Cobia, Southern rays bream, Atlantic pomfret, Crevalle jack, Talang queenfish, Giant trevally, Shortfin scad, Japanese flyingfish, False scad, Scomber mackerels nei, Blackbanded trevally, White trevally, Pacific bumper, Blue butterfish, Atlantic moonfish, Atlantic saury, Blue runner, Leerfish, Garfish, Blue jack mackerel, African moonfish, Greater amberjack, Parona leatherjacket, Ballyhoo halfbeak, Pacific jack mackerel, Chilean silverside, Golden trevally, Needlefishes, etc. nei, Gulf butterfishes, etc. nei, Rough scad, Japanese halfbeak, Peruvian moonfish, Yellowtail amberjack, Big-scale sand smelt, Orangespotted trevally, Yellowtail scad, Southwest Atlantic butterfish, Opah, Alexandria pompano, Shortjaw leatherjacket, American harvestfish, Atlantic silverside, Pickhandle barracuda, Vadigo, Malabar trevally, European barracuda, Hound needlefish, Needlescaled queenfish, Florida pompano, Dealfish, Pomfrets, ocean breams nei, Shrimp scad, Indian pompano, Yellowspotted trevally, Ocean sunfish, Doublespotted queenfish, Obtuse barracuda, Bigeye trevally, Pilotfish, Flat needlefish, Dealfishes, Snubnose pompano, Mexican barracuda, Suckerfishes, remoras nei, Pompano, Bar jack, Bluefin trevally, Balao halfbeak, Longfin yellowtail, King of herrings, Sickie pomfret, Mediterranean dealfish, Banded rudderfish, Lookdown, Mediterranean sand smelt, Cape fathead, Lesser amberjack, Live sharksucker, Atlantic needlefish, [Odontesthes smitti], Atlantic butterfish, Odontesthes smitti, Southern opah, Pacific pompano

**Tunas, bonitos, billfishes:** Skipjack tuna, Yellowfin tuna, Bigeye tuna, Seerfishes nei, Frigate and bullet tunas, Kawakawa, Albacore, Narrow-barred Spanish mackerel, Longtail tuna, Tuna-like fishes nei, Swordfish, Indo-Pacific king mackerel, Japanese Spanish mackerel, Atlantic bluefin tuna, Blue marlin, Atlantic bonito, Frigate tuna, Eastern Pacific bonito, Indo-Pacific sailfish, Pacific bluefin tuna, Marlins, sailfishes, etc. nei, Little tunny(=Atl.black skipj), Southern bluefin tuna, King mackerel, Striped marlin, Atlantic Spanish mackerel, Pacific sierra, Black marlin, Serra Spanish mackerel, Wahoo, Atlantic sailfish, Blackfin tuna, Streaked seerfish, West African Spanish mackerel, Black skipjack, Atlantic white marlin, Plain bonito, Striped bonito, Dogtooth tuna, Bullet tuna, Cero, Shortbill spearfish, Longbill spearfish, Mediterranean spearfish, Slender tuna, Butterfly kingfish, Roundscale spearfish.

**Herrings, sardines, anchovies:** Anchoveta(=Peruvian anchovy), Atlantic herring, Japanese anchovy, European pilchard(=Sardine), South American pilchard, Japanese pilchard, Sardinellas nei, European sprat, European anchovy, Gulf menhaden, Araucanian herring, California pilchard, Round sardinella, Indian oil sardine, Clupeoids nei, Pacific herring, Stolephorus anchovies nei, Atlantic menhaden, Anchovies, etc. nei, Southern African anchovy, Southern African pilchard, Bonga shad, Goldstripe sardinella, Pacific anchoveta, Madeiran sardinella, Pacific thread herring, Bali sardinella, Longnose anchovy, Brazilian sardinella, Whitehead's round herring, Red-eye round herring, Wolf-herrings nei, Rainbow sardine, Argentine anchovy, Pacific menhaden, Californian anchovy, Atlantic thread herring, Dorab wolf-herring, Falkland sprat, Japanese sardinella, Spotted sardinella, Whitefin wolf-herring, Brazilian menhaden, Buccaneer anchovy, Scaled sardines, Australian pilchard, Silver-stripe round herring, Atlantic anchoveta, Argentine menhaden, Slender rainbow sardine, Pacific piquitinga, Bluestripe herring, Pacific flatiron herring, Marini's anchovy, Broad-striped anchovy,

## Aquaculture

### Global aquaculture

Global aquaculture has a history going long back; however, the volume and business development first got a head of steam in the 70'ies and has since then showed a rapid development, Fig 91, and especially so in Asia. Globally there has been a 30-fold increase in aquaculture quantities from 1970 up to 2014. In 2014, Asia produced 90 % of the estimated aquaculture quantities compared to 78 % back in 1970. Europe had in 1970 16 % of the global aquaculture production while representing only 5 % in 2014, while Americas has dropped from 5 to 4 % over the same period.

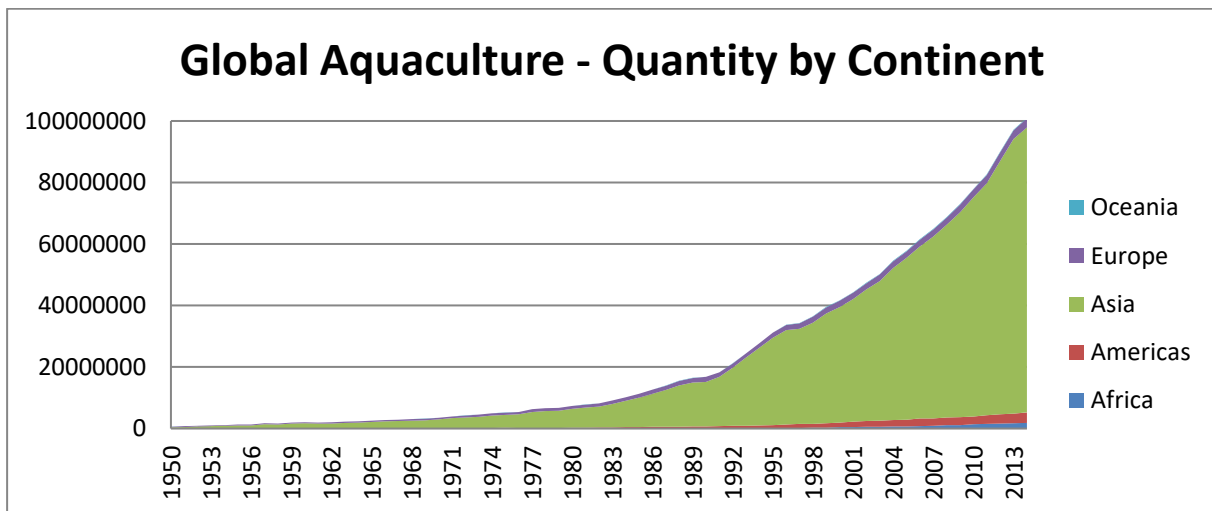


Figure 91, Global aquaculture by continent, FAO Stat

When looking at the estimated value of global aquaculture, Figure 92, we observe that relatively more value is created out of produced quantities in Europa representing 8 % of the total global estimated value, and even more so for Americas representing 11 % of global value. However, Asia still represents almost 80 % of global created value based on aquaculture.

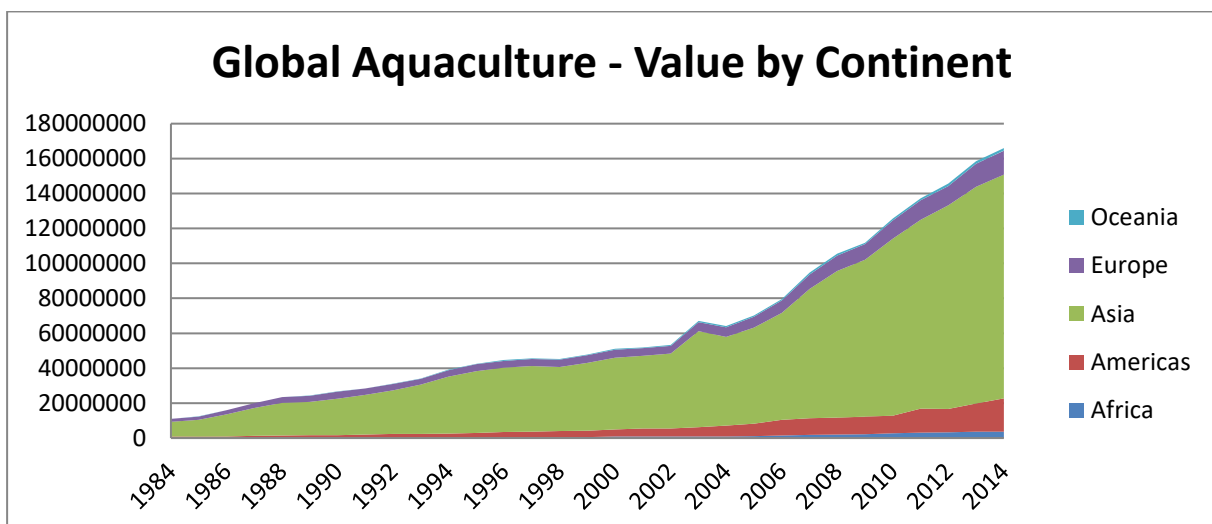


Figure 92, Global Aquaculture, Value by Continent, FAO Stat



In 1970 the main FAO Stat groups behind the total aquaculture quantities were freshwater/diadromous (41 %), Molluscs (Cephalopods excluded) (30 %) and Aquatic plants (27 %), Figure 93. In 2014 Freshwater and Diadromous and aquatic plants have a similar share, 47 and 27 % respectively, while Molluscs (Cephalopods excl.) has dropped to 16 % at the same time as Cephalopods has increased from 0.3 to 7 % and demersal marine has increased from 0.1 to 1.3 %

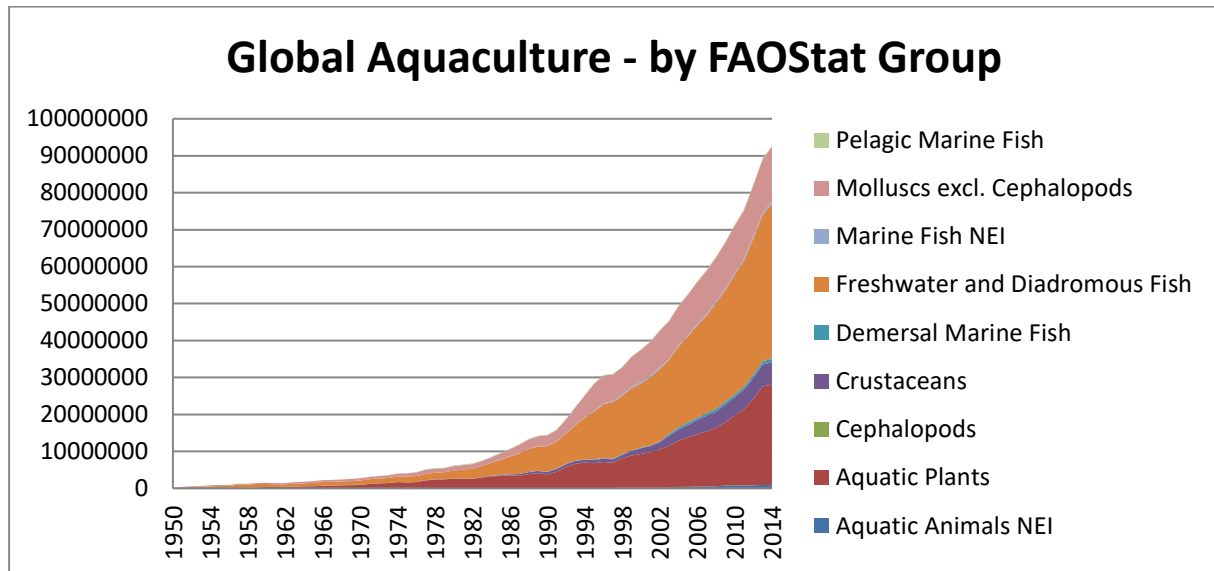


Figure 93, Global Aquaculture by FAO Stat Group, FAO Stat

## Aquaculture – continent profiles

### Africa

When looking at the production profiles i.e. what main type of production each continent has categorized according to the FAOStat groups, we observe that Freshwater and Diadromous Fish has had a major development on the African continent since the mid -90ies, Fig. 94.

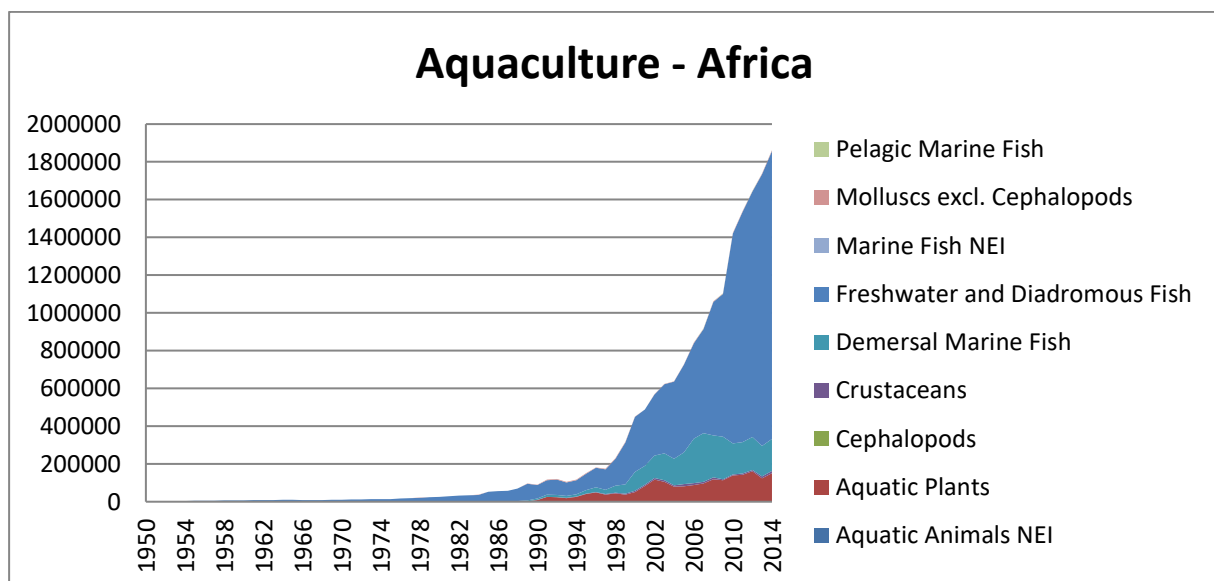


Figure 94, Aquaculture on the African continent, FAO Stat

### Americas

On the American continent we observe the main three groups showing growth since the early 80ies have been Crustaceans, Molluscs (Cephalopods excl.) and Freshwater and diadromous, Fig 95, and among these the latter is by far the biggest group in 2014.

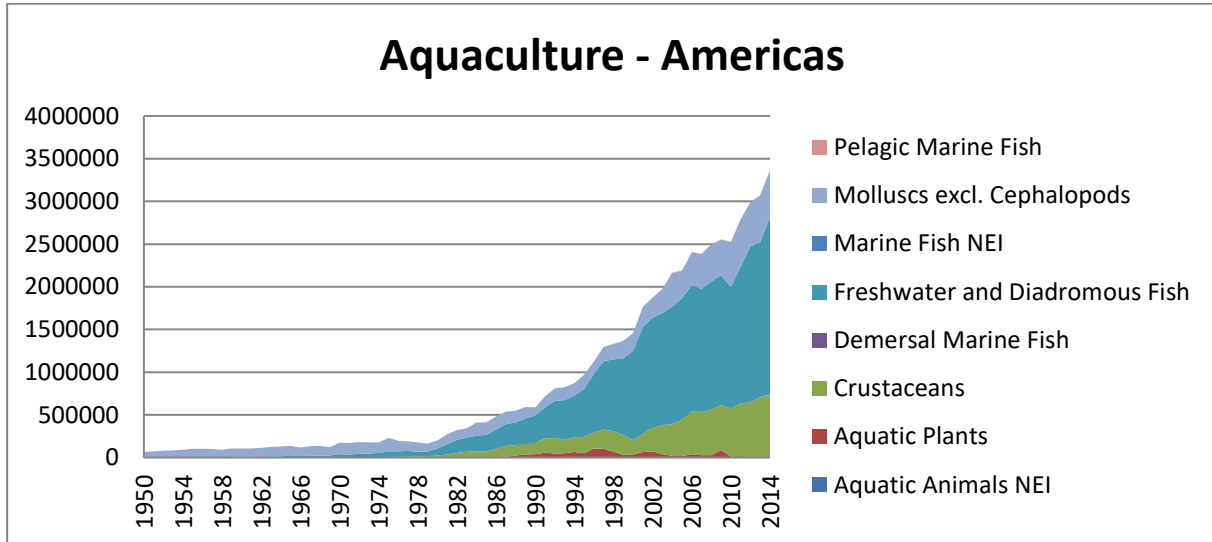


Figure 95, Aquaculture on the American continent, FAO Stat

### Asia

In Asia also Freshwater and Diadromous fish plays a major role representing 45 % of the volume in 2014, followed by aquatic plants, 29 %, Molluscs 16 % and Crustaceans 7 %, Fig 96. Asia is as seen above, a major player for most FAO Stat groups, and in particular so for aquatic plants where they produce 99 % of the total global quantities. Asia also steps out as the continent with the largest variation in aquaculture production showing high global shares within all FAO groups, the lowest share being in the demersal marine group, but also there representing 74 % of global production.

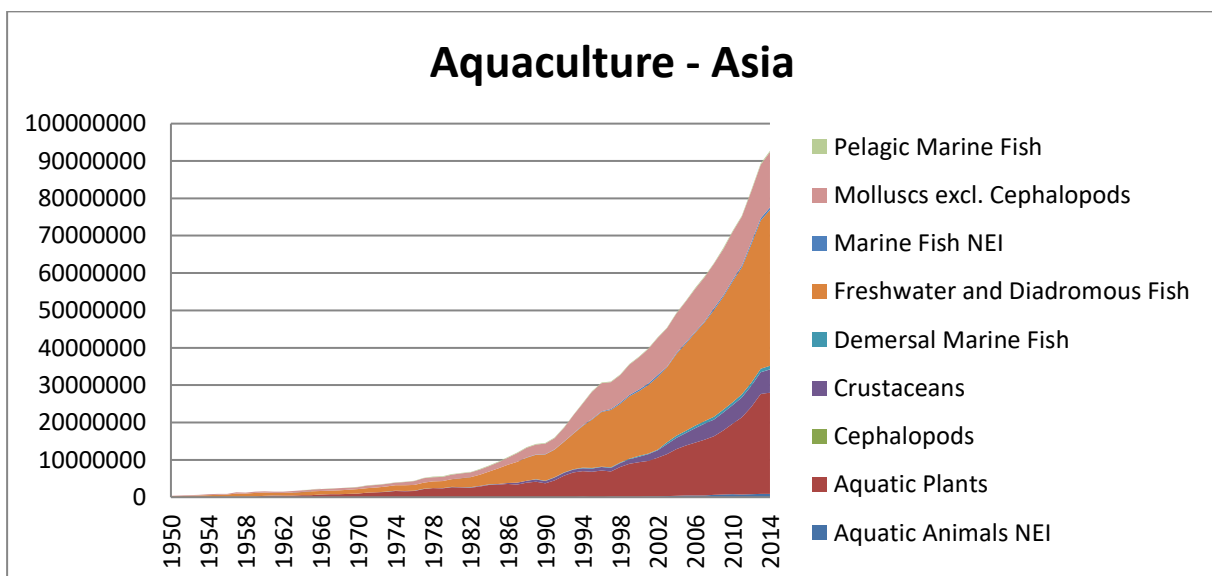


Figure 96, Aquaculture in Asia, FAO Stat

## Europe

Also in Europe, Freshwater and diadromous fish is by far the largest group representing 72 % of the produced quantities on the continent, followed by Molluscs 22 % and Demersal Marine 6 %, Fig 97. We observe that the main growth has occurred within the Freshwater and diadromous group, and if excluding this group there has been a drop in European aquaculture production since the millennium shift.

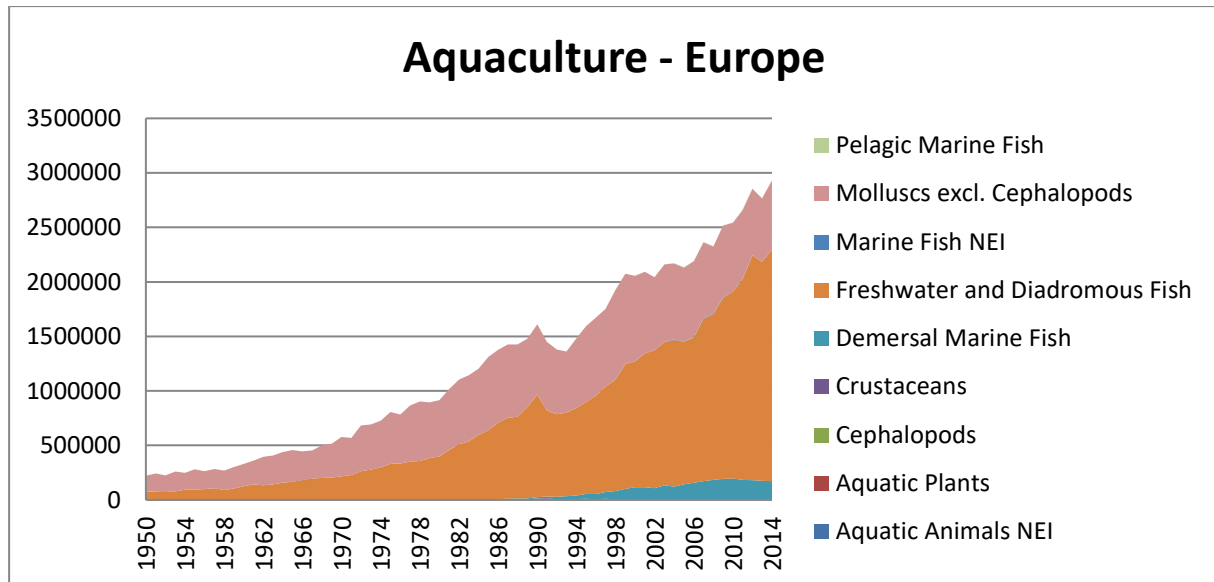


Figure 97, Aquaculture on the European continent, FAO Stat

When looking at the production for EU based on current members (EU 28) we observe a total drop in production since the millennium shift, coming as a result of a drop in Mollusc quantities, while at the same time, Freshwater and Diadromous and Demersal Marine going flat, Fig 98.

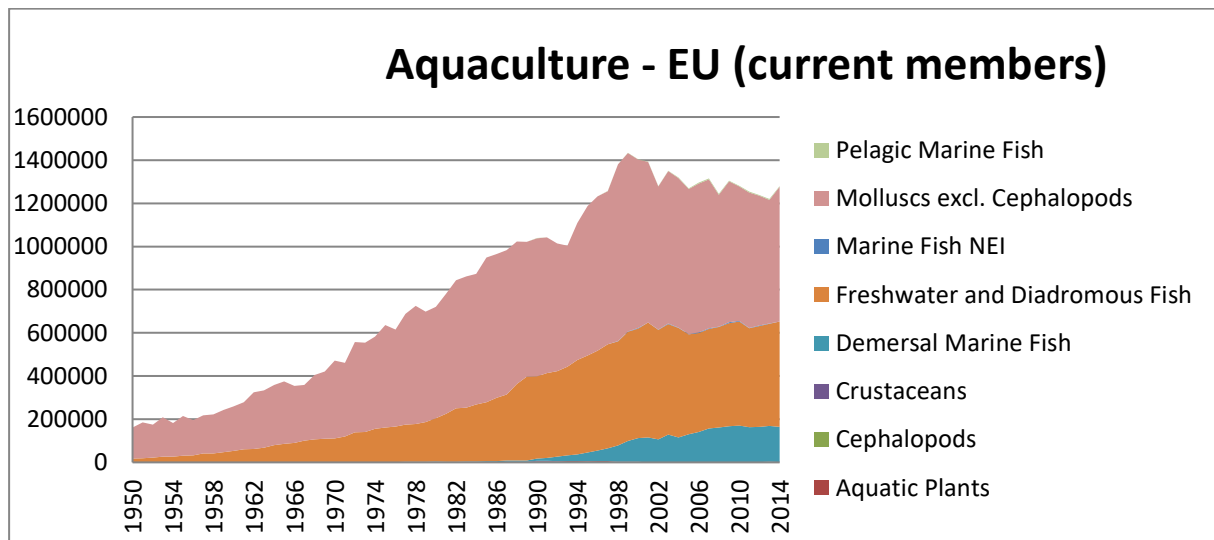


Figure 98, Aquaculture by FAO Stat group within EU 28 (current members), FAO Stat

When splitting EU 28 into the respective countries we observe the countries Italy and France being major aquaculture producers that have experienced a drop in produced total quantities, and for France this drop is coinciding with the observed drop in Mollusc production for EU 28 seen above.

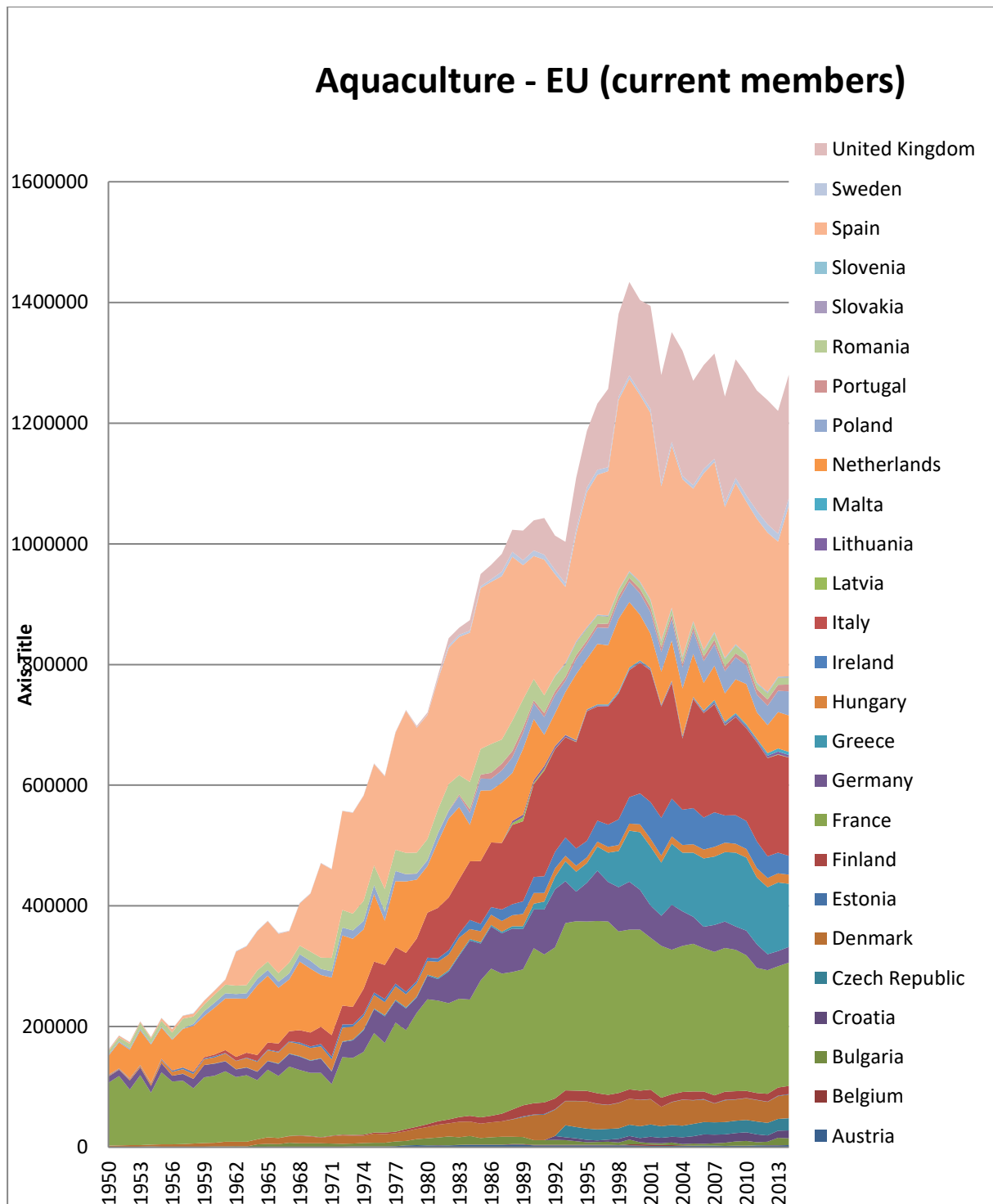


Figure 99, Aquaculture in EU 28 (current members) all FAO Stat groups, FAO Stat

When looking at the farmed species with the highest production volumes within EU, we observe the same drop in total volume from about year 2000 and a relative flat trend in the recent years, Fig 100.

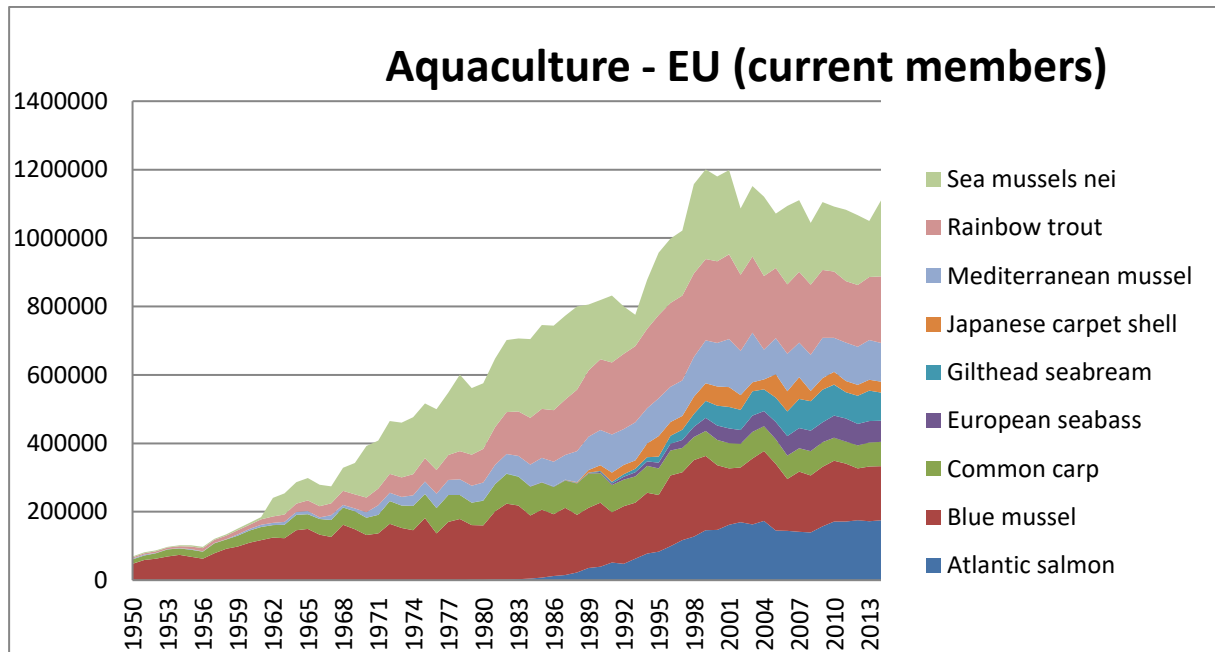


Figure 100, EU 28 aquaculture when looking at the species with highest volumes.

In Non-EU countries we observe the aquaculture production largely being related to Freshwater and Diadromous Fish and showing a peak production in the mid-80ies then a drop down to the mid 90ies where after it has shown a major increase up until now, though with tendencies of flattening out the last year, Fig 101.

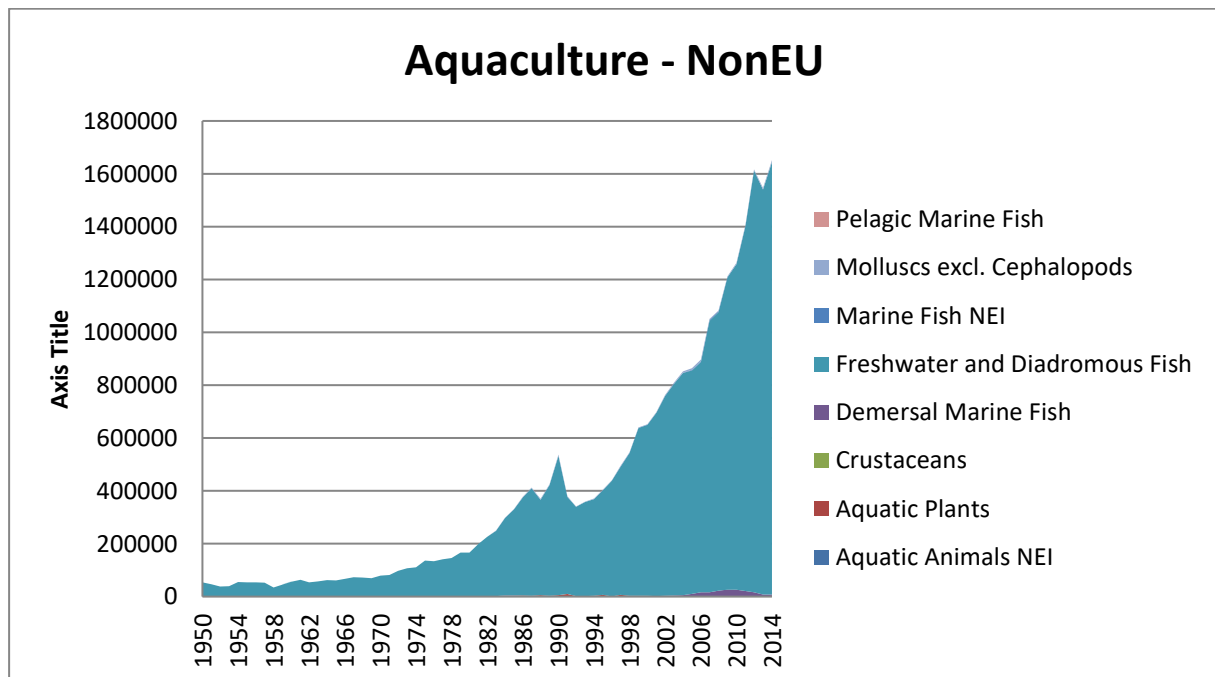


Figure 101, Aquaculture production in Non EU countries, FAO Stat.

When splitting into the main species we observe that the peak production in mid 80ies was related to a peaking common carp production together with the growth in Atlantic salmon production from the early 80ies, Fig 102. Since then Atlantic salmon has contributed largely to the significant rise in aquaculture production and current high production volumes in Europe, Fig 102.

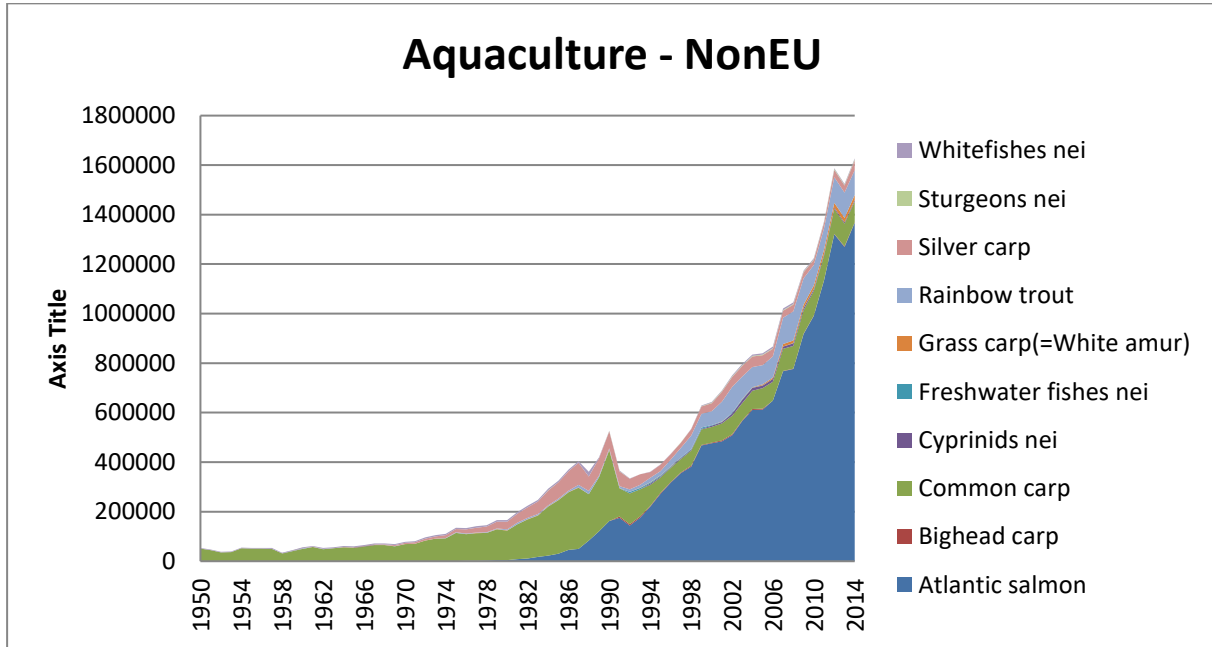


Figure 102, Aquaculture in Non EU countries by main species, FAO Stat

When splitting into each of the Non EU countries we see that Norway has played a major role in the European rise in aquaculture production and thereafter Russia and Faroe Island plays a significant role, Fig 103.

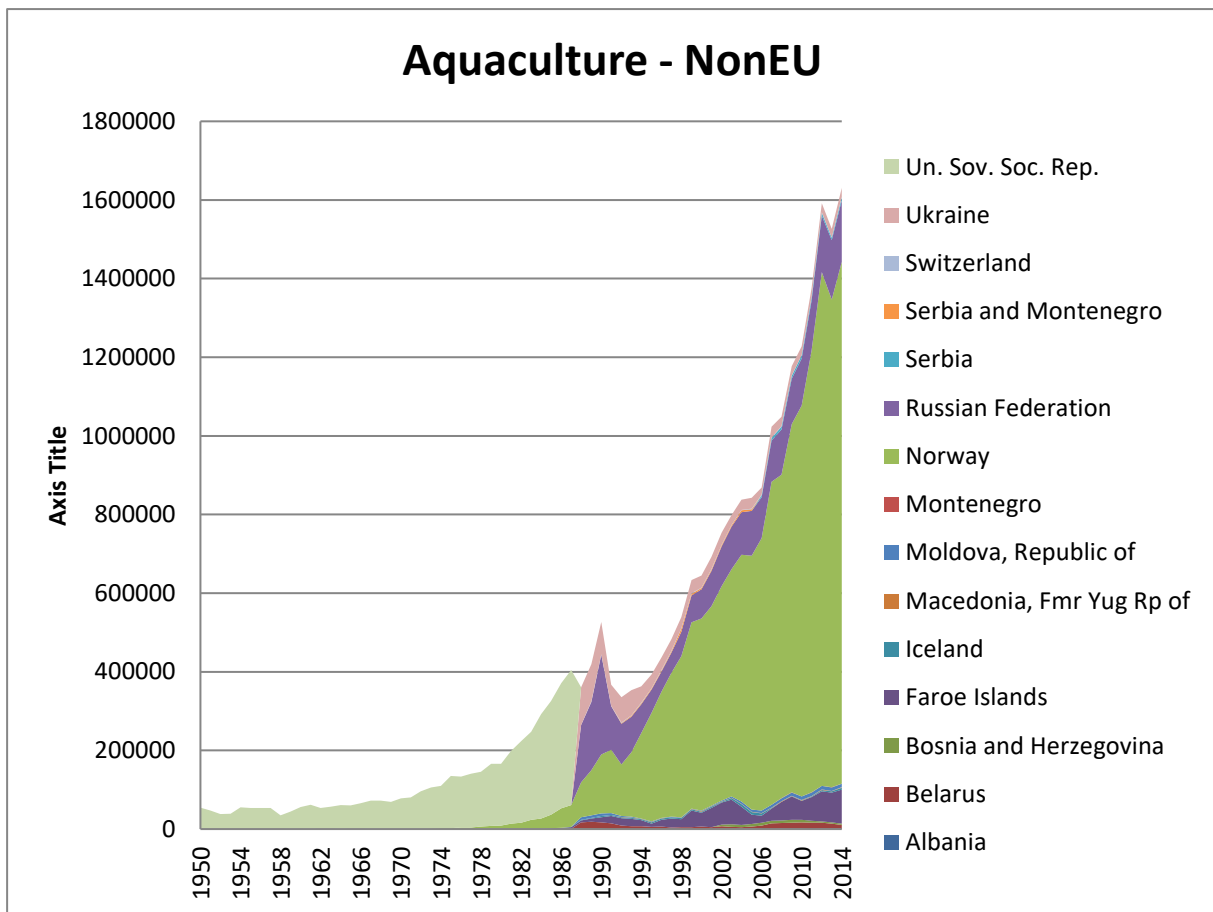


Figure 103, Aquaculture in Non-EU countries by country, FAO Stat.

### Oceania

Also in Oceania there has been a rise in aquaculture production since the early 80ies, and mainly related to the rise in Molluscs, Freshwater and Diadromous Fish and Aquatic plants, Fig 104.

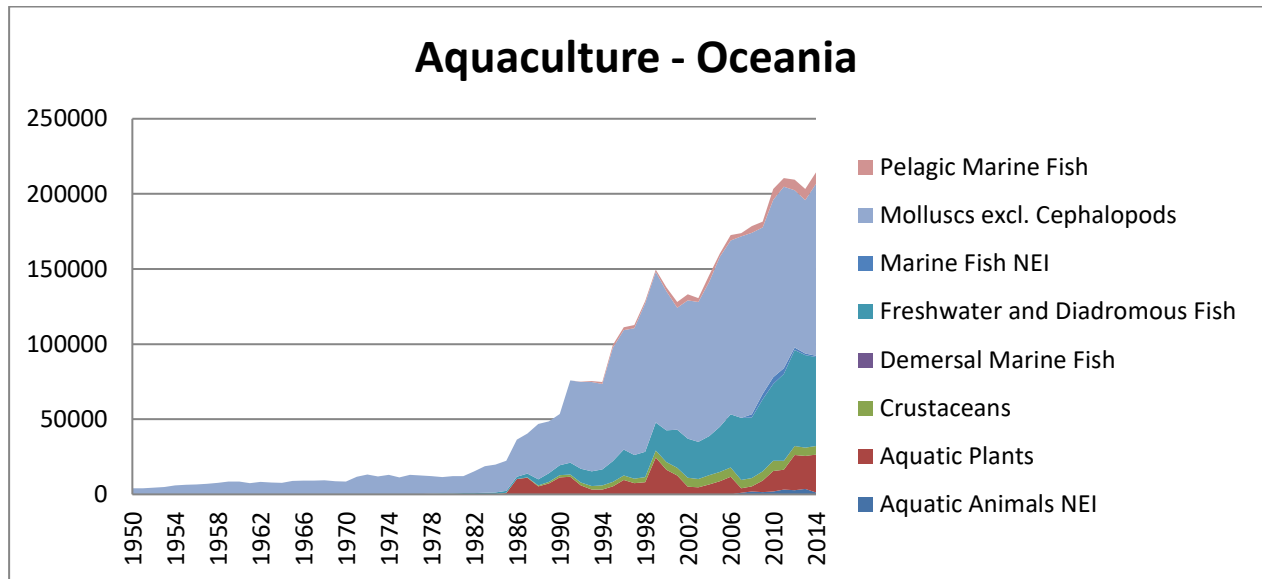


Figure 104, Aquaculture production in Oceania by FAO Fish Stat Group, FAO Stat.



## Atlantic Salmon

Atlantic salmon is in large produced in two continents Europe and Americas, Fig 105, the two main producing countries are Norway in Europe and Chile in Americas, Fig 106. We observe a massive increase since the late 1980ies and mainly so in the two main producing countries.

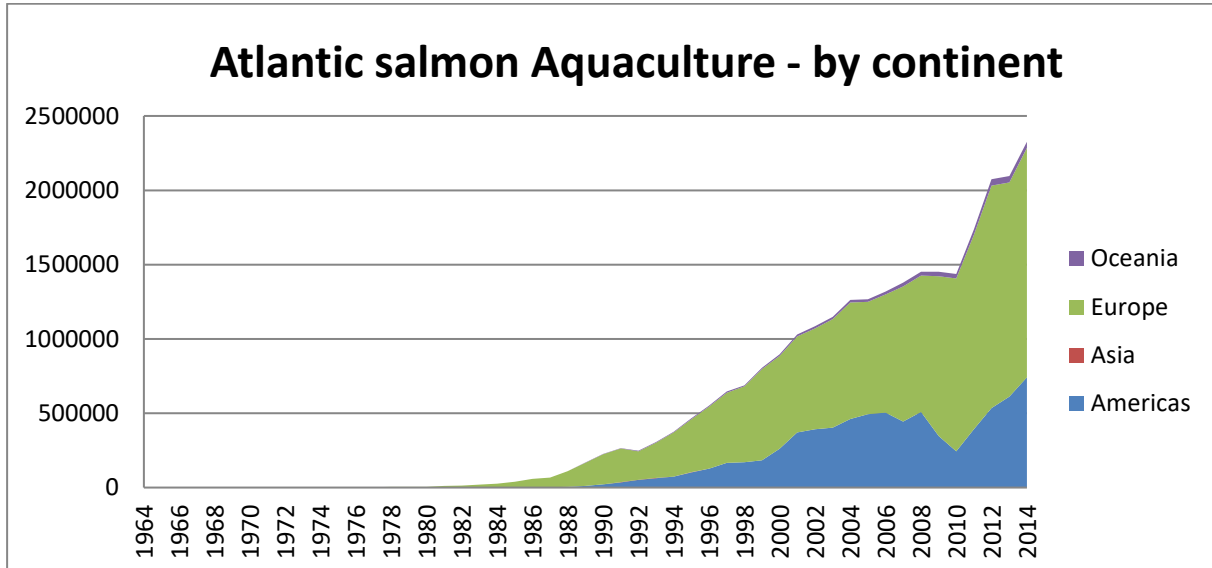


Figure 105, Atlantic salmon production by continent, FAO Stat

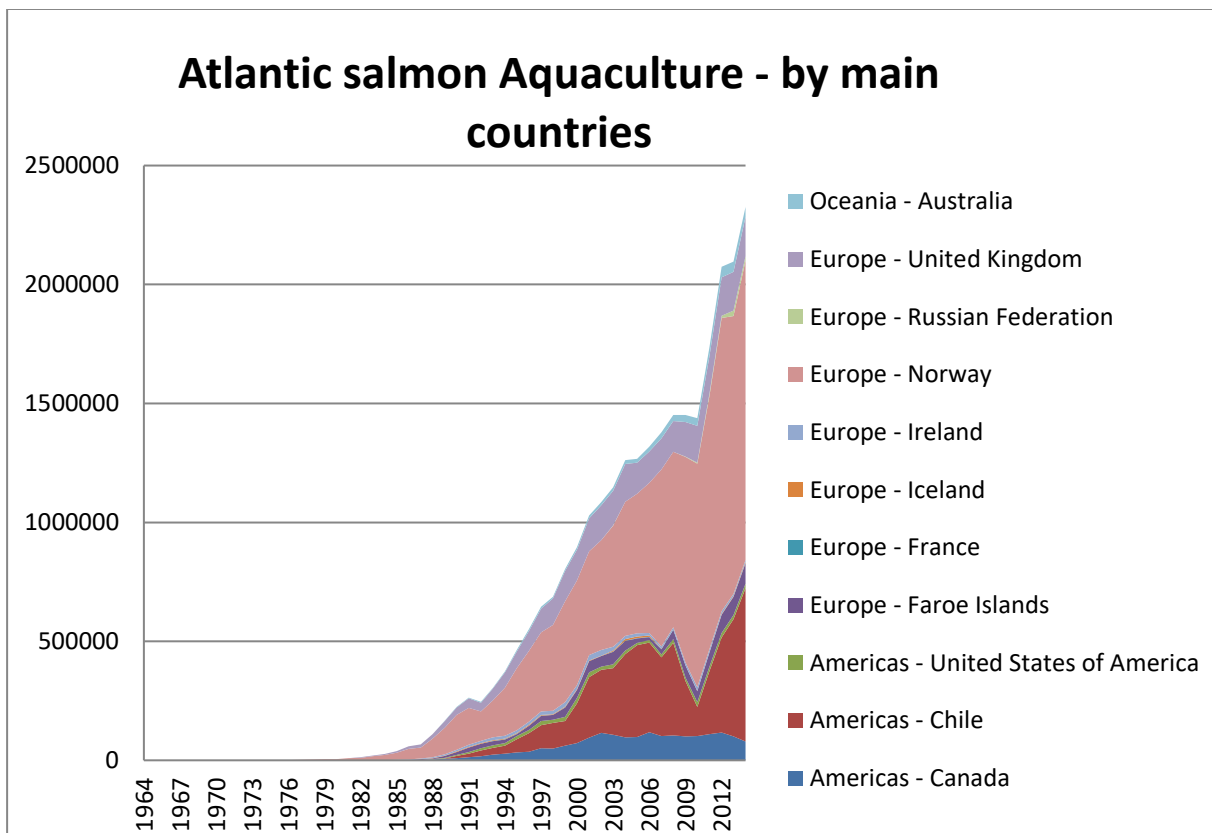


Figure 106, Atlantic salmon production by the main producing countries, FAO Stat

When investigating export and import from EU (28) we observe an increasing imbalance for salmon, and also, we observe a relative steeper increase in value of imported salmon compared to volume, Fig 107.

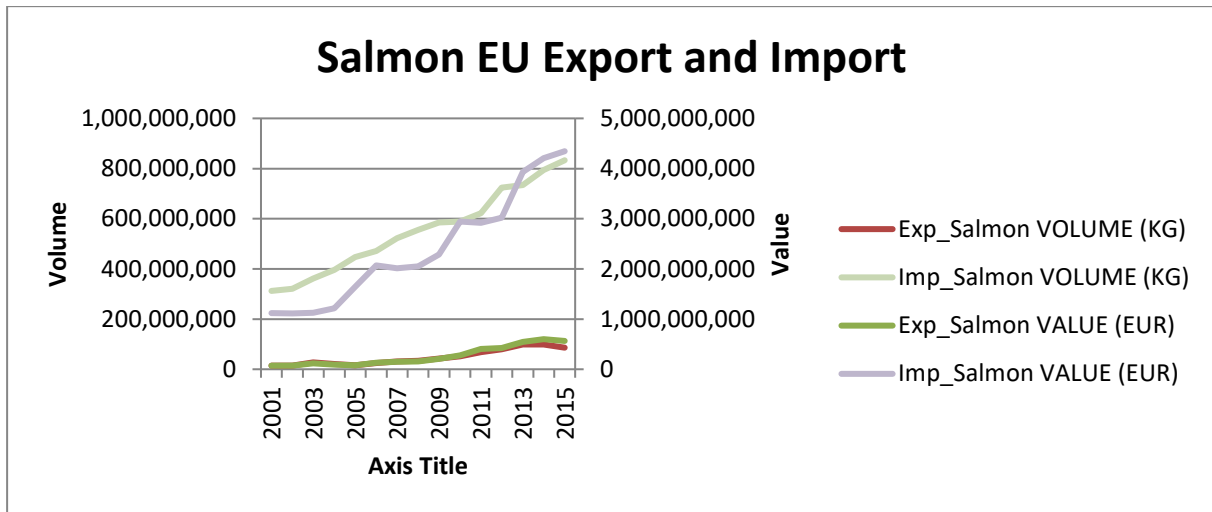


Figure 107, Export and import of Salmon to and from EU (28), EUMOFA

### Rainbow trout

Rainbow trout is mainly produced in three continents; Europe, Asia and Americas, Fig 108, and as we observed for salmon we see a significant increase in produced quantities; however, starting earlier, in early 1960ies. As for salmon we also for trout observe an increasing imbalance between export and import in EU (28), Fig 109.

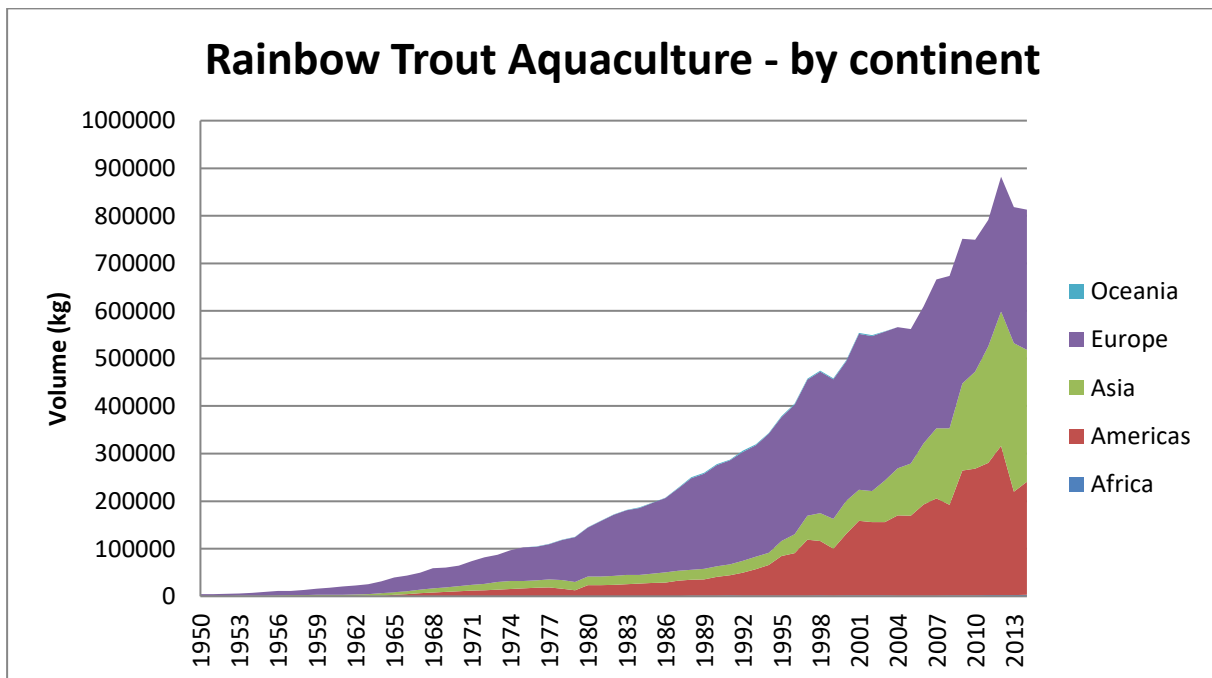


Figure 108, Rainbow trout Aquaculture by continent, FAO Stat

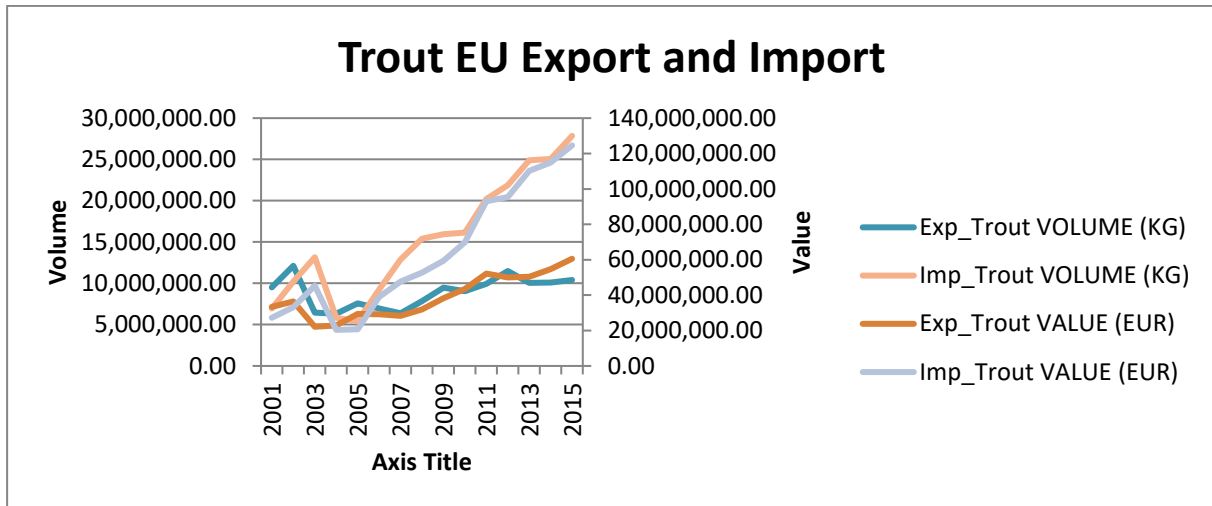


Figure 109, Export and import of trout from and to EU (28)

### Sea bass and Sea Bream

Sea bass and sea bream (European seabass and Gilthead seabream) are mainly produced in Europe, Asia and Asia, Figs 110, 111 and 112. Import of both bass and bream is increasing and value increases more than volume (indicating higher import prices), Figure 112.

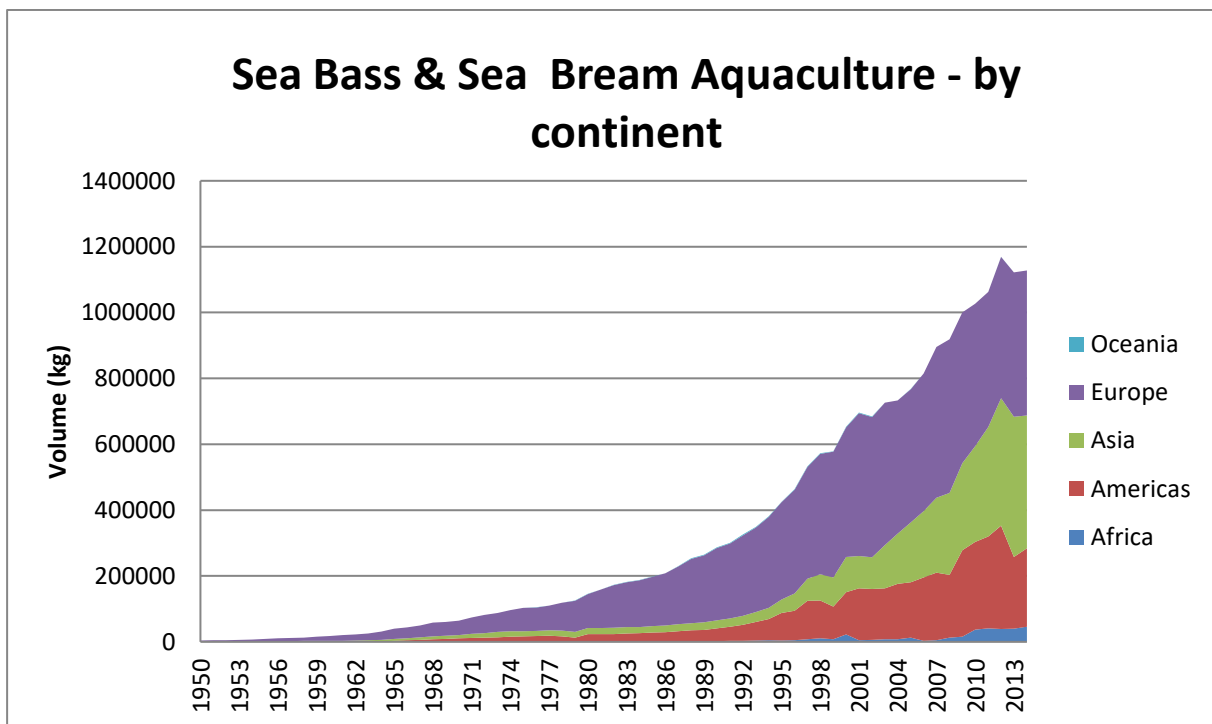


Figure 110, Sea bass and sea bream Aquaculture by continent, FAO Stat

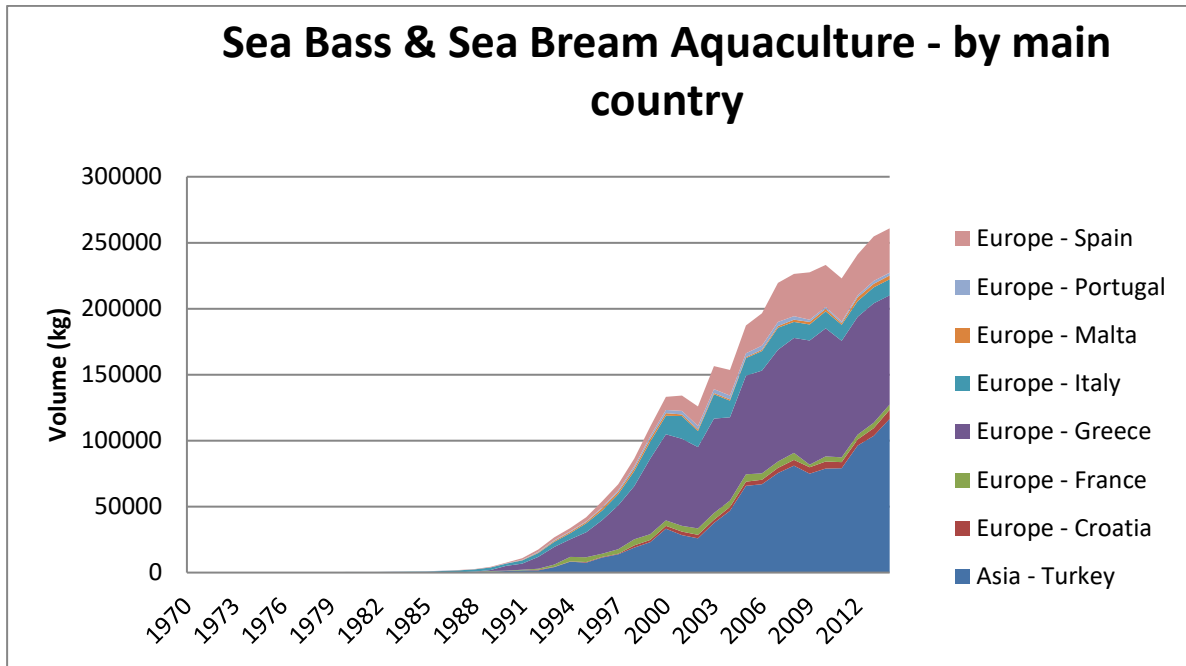


Figure 111, B&B by main countries around Mediterranean (FAOStat).

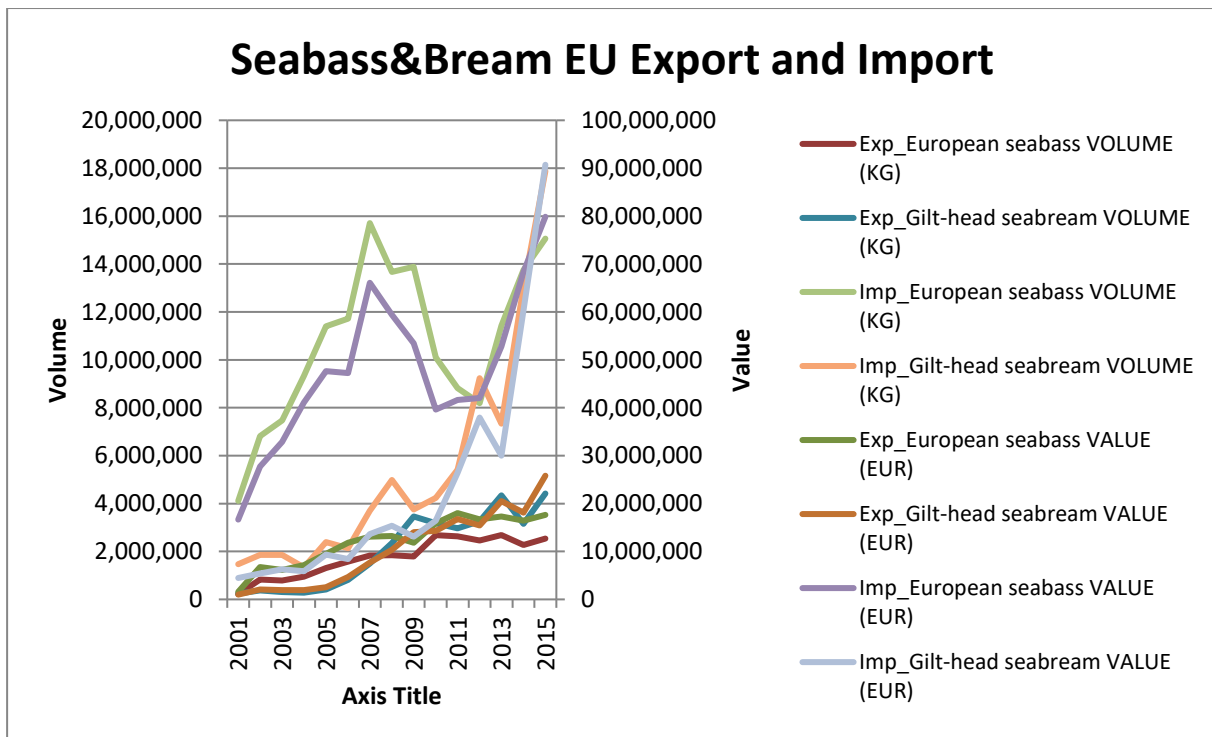


Figure 112, B&B EU Import and Export (FAOStat)

## Some countries in particular

### Spain

#### General overview

Since 1950 the Spanish overall economy evolves to an industrialized model, reducing the relevance of primary sectors e.g. agriculture or fishing. This fact can be captured in Fig 113 where the import are over the total production and the exports are increasing yearly.

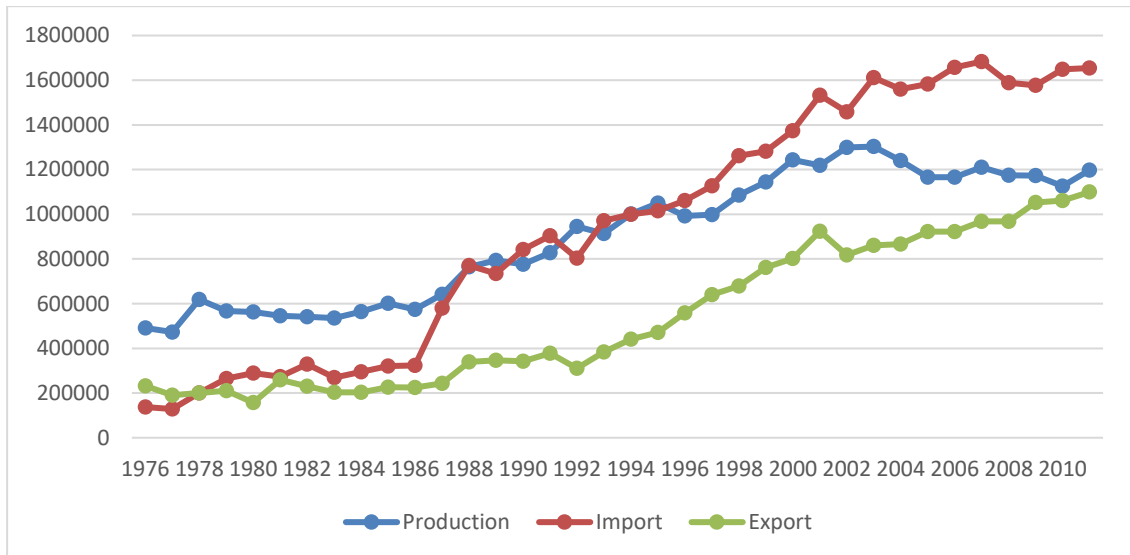


Figure 113, Spanish trade of fish and seafood commodities from 1976 to 2011 (in tonnes).

Traditionally, Spain is one of the largest markets for fish and seafood in EU (Figure 114). Spanish consumers greatly appreciate fish and seafood, being the second largest country in annual fish and seafood consumption per capita (43.01 per kg in 2011) around EU (1<sup>st</sup> Portugal with 61.1 kg per capita). This consumption in Spanish households increased by 1.8% during 2013, with an average volume of 26.8 kg per capita, however it suffers a slight decrease during the last 2 years. In 2013, the average consumer spent over 13% of his budget in the food basket on purchases of fish and seafood, an increase of 4% compared to 2012 (EUROFISH).

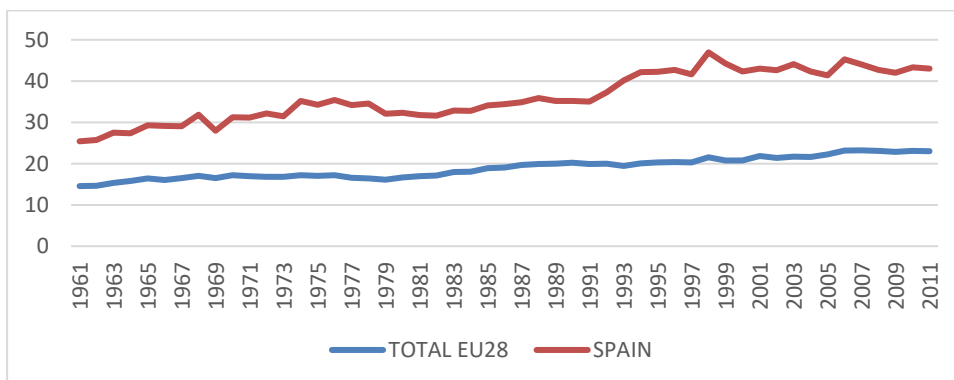


Figure 114, Seafood consumption in Spain and EU28 since 1961 (in kg per capita).



The Spanish imports has been increasing year by year since 1984, especially the demersal, crustacean, pelagic and cephalopods. The last period, 2007- 2011, has a significant decrease due to the financial crisis but the trends is still positive for the forthcoming years (Figure 115).

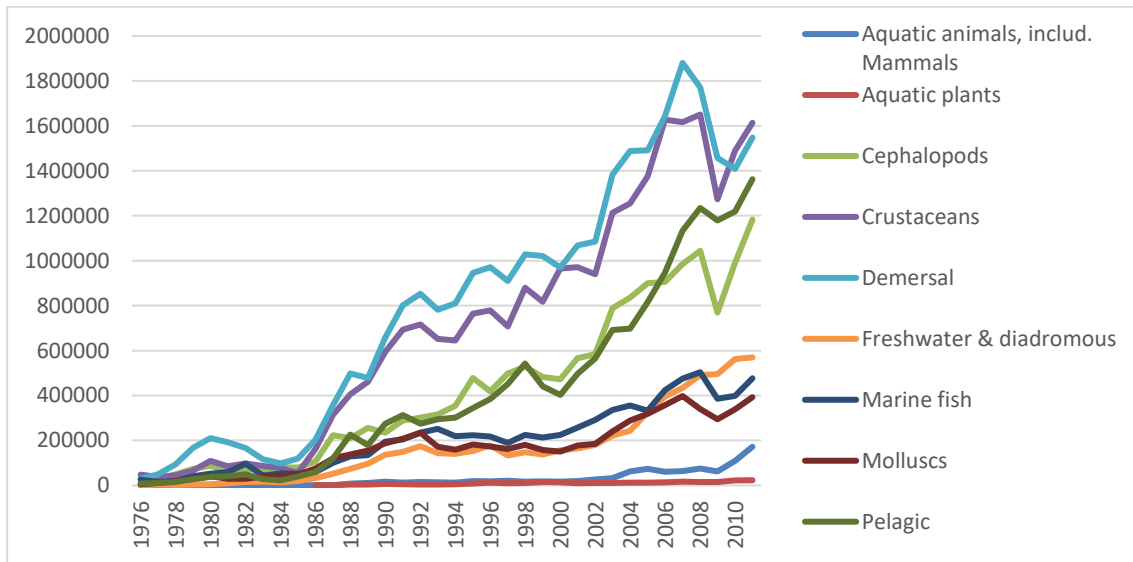


Figure 115, Spanish imports from 1976 to 2011 by FAOSTAT grouped species (in tonnes).

The increasing trends observed in the Spanish imports is parallel to the European ones. However, the freshwater & diadromous fish species occupy the first places instead of the Spanish case, sharing the importance of the rest of species.

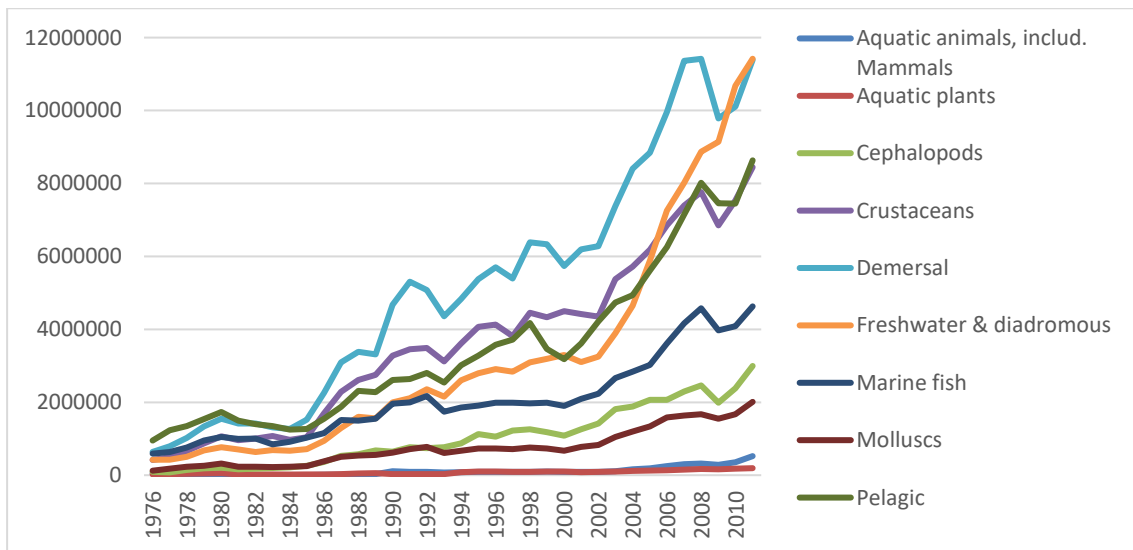


Figure 116, EU28 imports from 1976 to 2011 by FAOSTAT grouped species (in tonnes).

In addition, the positive trend of imports in Spain is not so inclined as that of EU28, which is one of the main markets of the world for fish and seafood products (Figure 117).

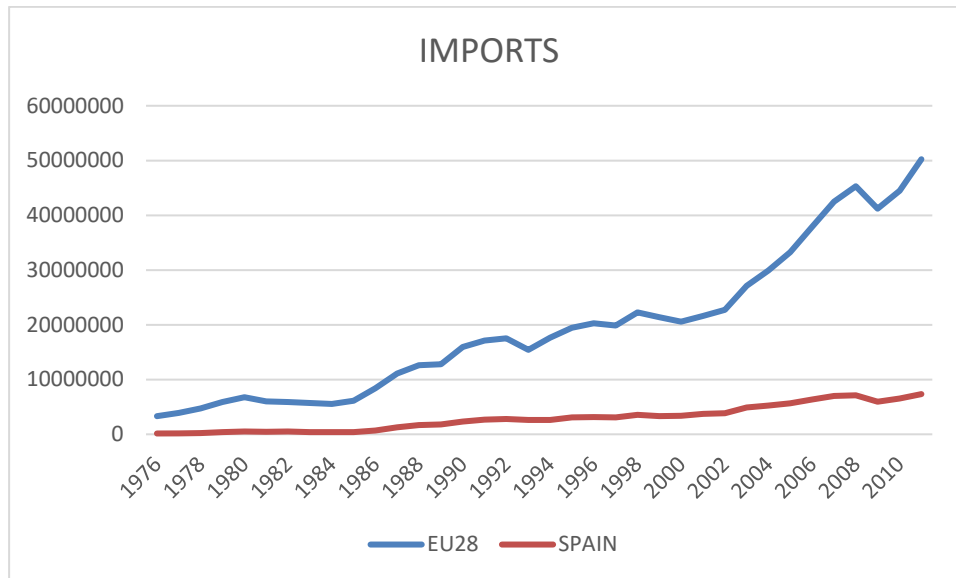


Figure 117, Imports of EU28 and Spain from 1976 to 2011 (in tonnes)

In this context, the contribution of Spain to EU28 imports are clearly focussed on cephalopods, molluscs and crustaceans according to the volume but also to aquatic animals in percentage terms (not in tonnes).

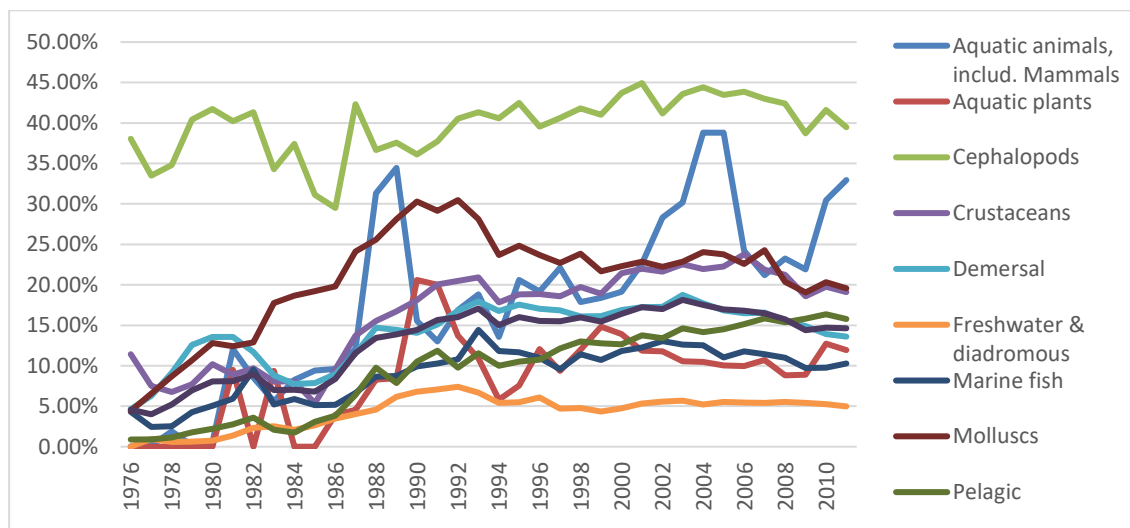


Figure 118, Spanish contributions to the total imports of EU28 from 1976 to 2011



The agro-food sector is the first activity of the manufacturing industry in Europe, representing 14.6% of the total revenue and a value of more than € 1,048,000 mill. in 2014, which means an increment of 3.1% since 2013 (Food and Drinks, 2013).

The Spanish agro-food sector is the fifth in the European ranking, after Germany, France, Italy and UK. The widest geographical coverage is reached by large firms whilst the small-scale is covered by small and medium enterprises (SMEs). In Spain, this sector represents the first industry according to the national industrial survey (Mineco, 2014), in particular, the 20.6% of net sales of products, 18.2% of national employment, 16.8% of investment in tangible assets and, 15.3% of value-added. Regarding the industrial branch of food and drinks, it grew up to € 91,450.3 mill. in 2013 and the processing of fish, a sub-branch of the food industry, had a total of 656 enterprises in 2014. This branch employed 18,448 people in 2013, which means a slight increase of 0.7% in respect of 2012. However, it is not very representative in the total food and drink sector since it is the seventh of thirteen branch in employment terms (Table 7).

The Spanish contribution to the world and European production of fish and seafood has been representative since 1950, being one of the most important sectors for some regions e.g. Galicia (NW Spain). However, its relevance at world scale is decreasing to other productive sectors like other developing countries (Figure 119).

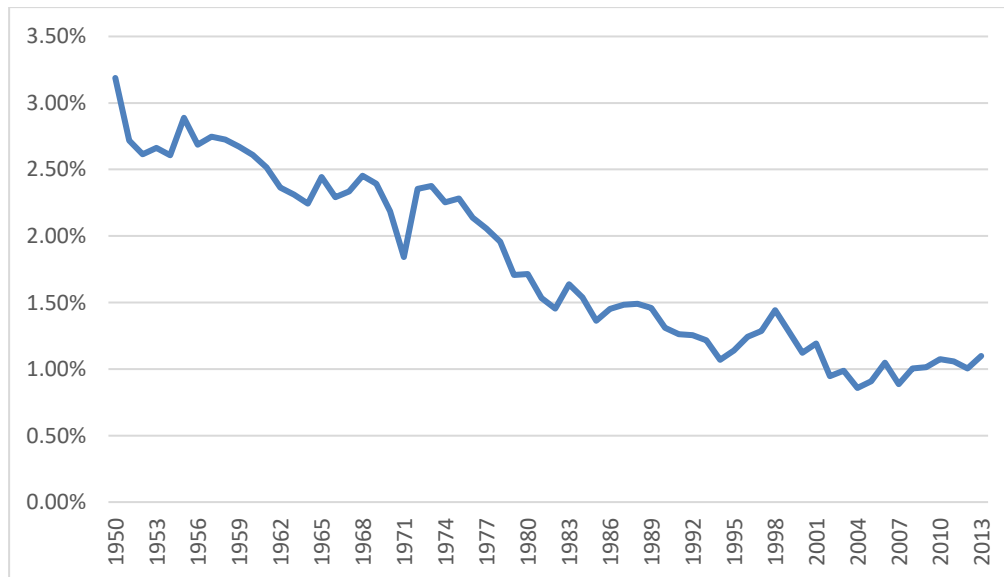


Figure 119, Spanish contribution to the world fishing captures since 1950 (in tonnes).



Nevertheless, the contribution to supply fish and seafood in relation to EU28 countries has been stable at 15% since 1950 and it seems to be increasing since 2004.

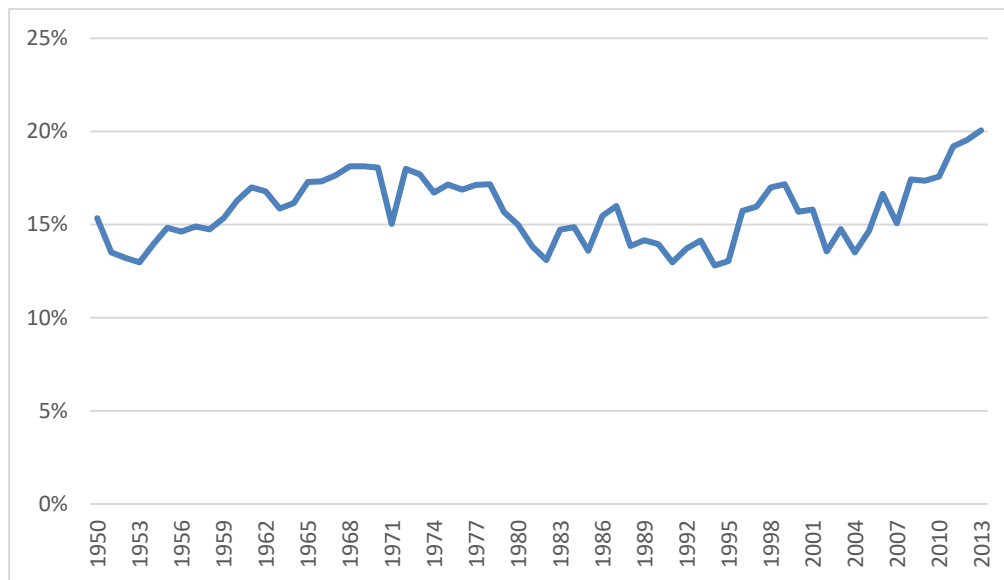


Figure 120, Spanish captures in relation to EU28 countries since 1950 (in tonnes)

The main species are clearly pelagic ones according to the FAOSTAT aggregation. However, pelagic and marine fish has increased and being stable since 90s' (Figure 121).

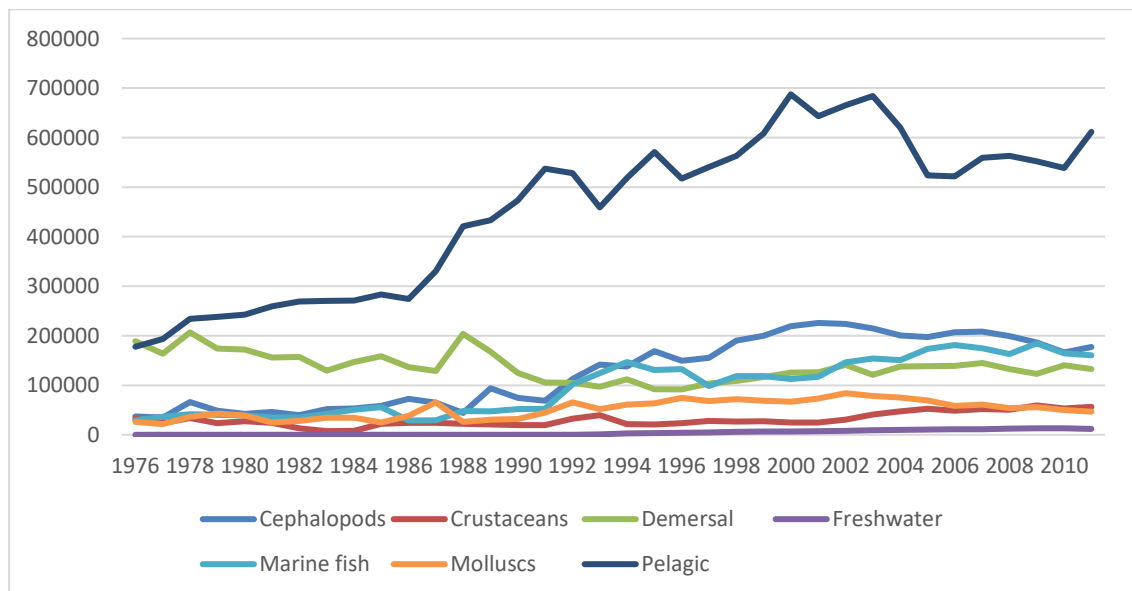


Figure 121, Spanish fisheries production by species from 1976 to 2011 (in tonnes)

In terms of captures from fisheries (not only production), the importance of demersal species has been occupied by pelagic fishes since 1976 (Figure 122). Both represent over the 90% of the Spanish captures in the last decade.

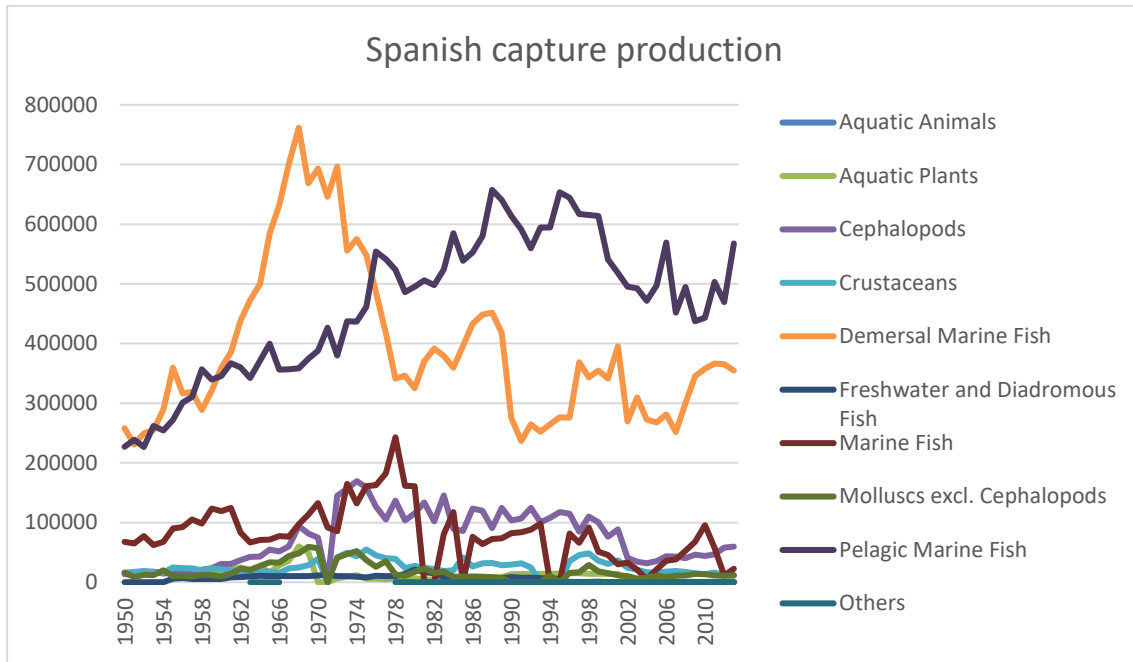


Figure 122, Spanish fisheries captures from 1950 to 2013 (in tonnes)

The extended aquaculture production in Spain has started in Galicia (NW Spain) during the 60s' decade with the mussel and bivalves' production (mainly clams). Then, several management measures have been established that allowed the increase of the overall production of molluscs, moving these activities towards an economic sector. Since 90s', the episodes of toxic 'red-tide' algae have been influencing the overall production molluscs. On the other hand, the freshwater and diadromous fishes (mainly trout) and demersal marine fish (mainly seabream and seabass) started to be produced later, in the 70s' and 90s' respectively. Furthermore, the production of these species has been stagnant due to market conditions and lack of political focus.

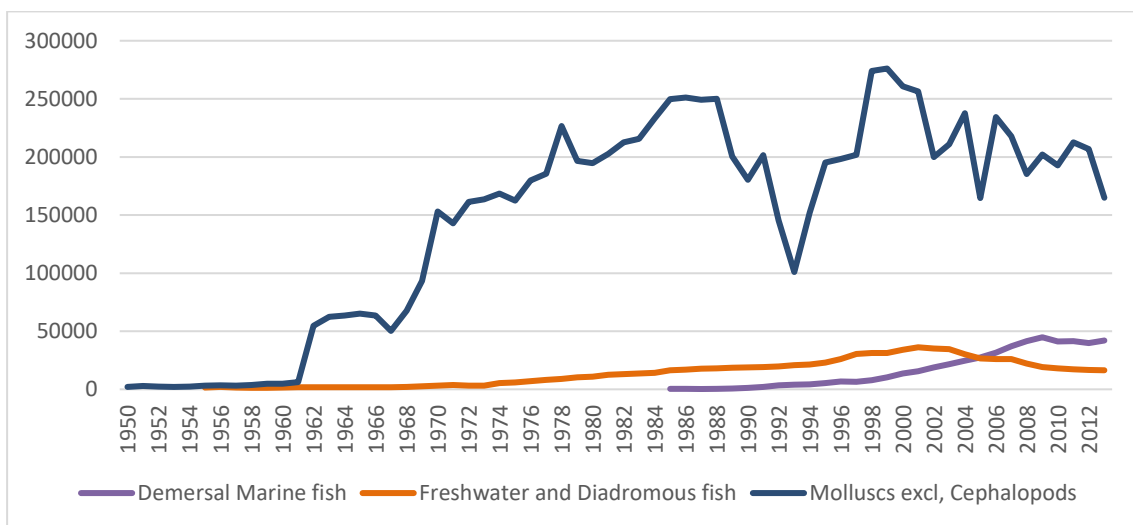


Figure 123, Evolution of the main species produced by aquaculture activities in Spain from 1950 to 2013 (in tonnes)

The contribution of Spain to the total volume of aquaculture products in EU28 is remarkable in terms of molluscs (30%). The demersal fish (mainly seabream and seabass) represents the 20 % in the last 5 years and the trout production seems to be decreasing slightly (Figure 124).

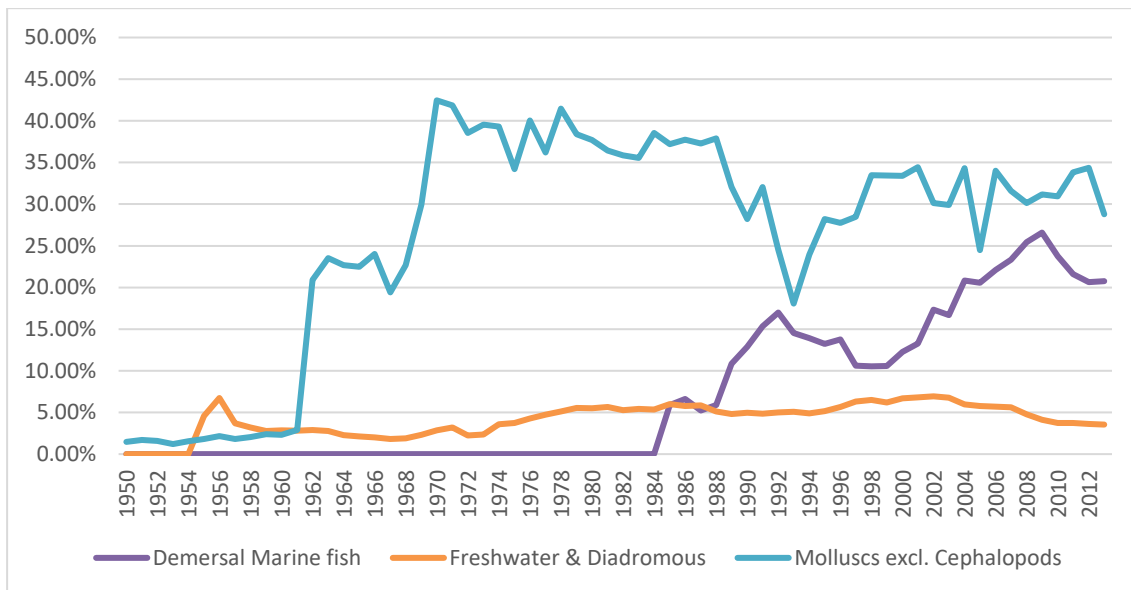


Figure 124, Spanish contribution to EU28 production of aquaculture products since 1950 to 2013 (in tonnes)

On the other hand, the highest value of aquaculture products produced in Spain is for demersal fishes instead of the molluscs, which represents the more produced species in tonnes (Figure 125).

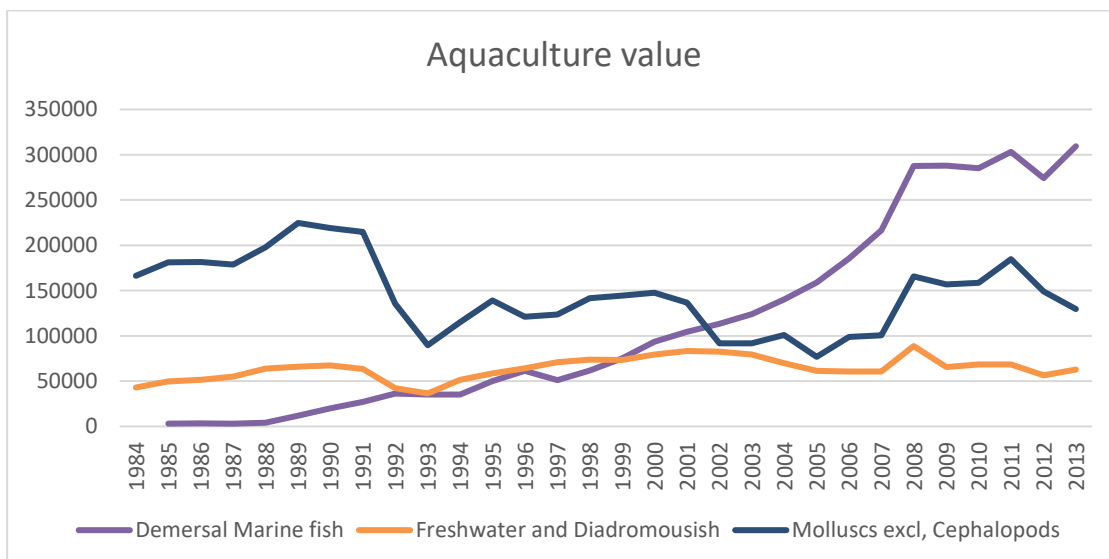


Figure 125, Value of aquaculture products produced by Spain from 1950 to 2013 (in '000 \$)

The contribution of the Spanish aquaculture to the total volume of EU28 production has been pictured in Figure 126, where the demersal species represents the 20% of total.

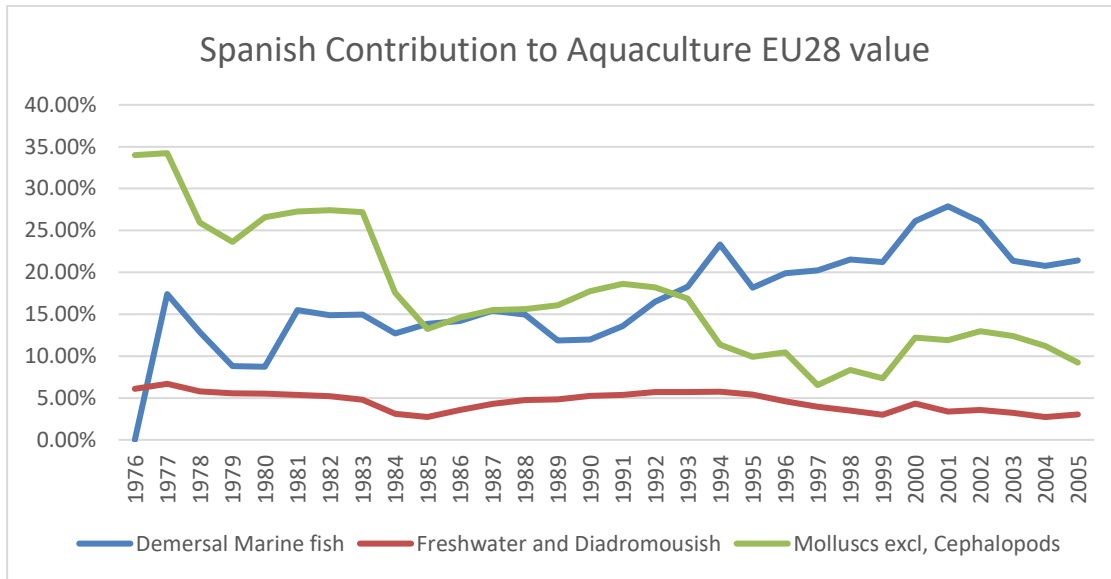


Figure 126, Spanish contribution to the EU28 aquaculture value (in '000 \$)



Traditionally, Spain is one of the largest markets for fish and seafood in Europe (Figure 111 and 124). Spanish consumers greatly appreciate fish and seafood, being the second largest country in annual fish and seafood consumption per capita (43.01 per kg in 2011) around Europe (1<sup>st</sup> Portugal with 61.1 kg per capita). In comparison with the EU28 trends, the Spanish consumption seems to be high in all the relevant species (Figure 127).

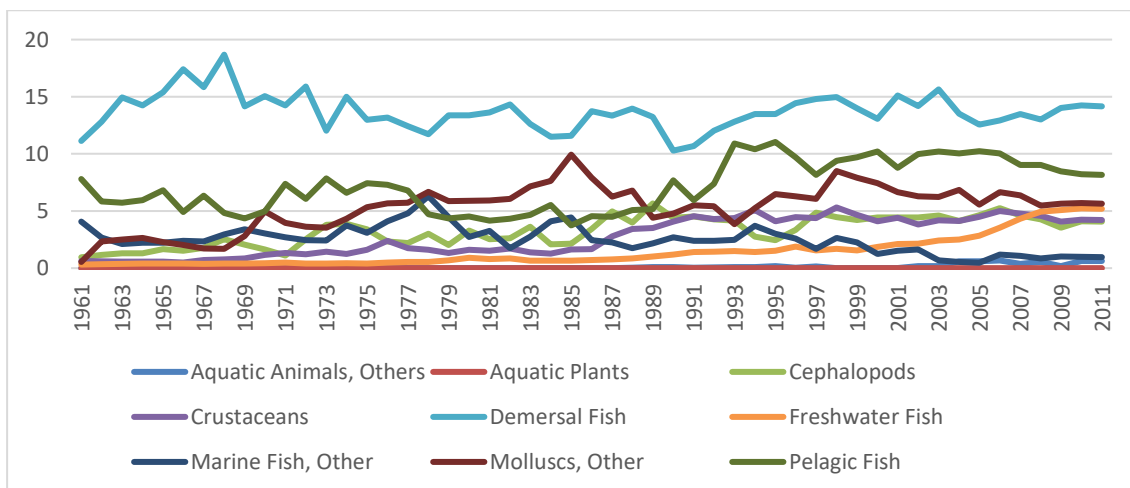


Figure 127, Fish and seafood consumption in Spain since 1961 (kg per capita)

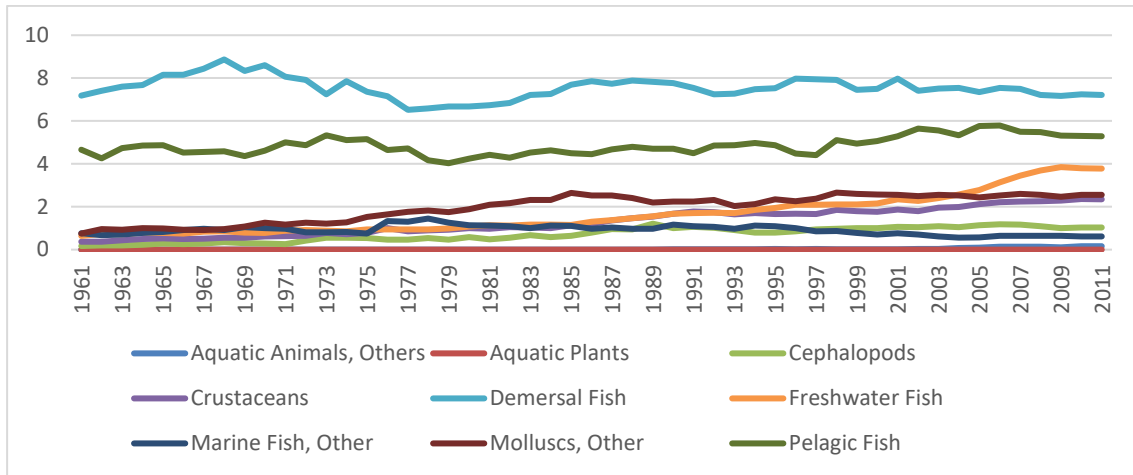


Figure 128, Fish and seafood consumption in EU28 since 1961 (kg per capita)

In general, both trends are increasing yearly (Figure 129)

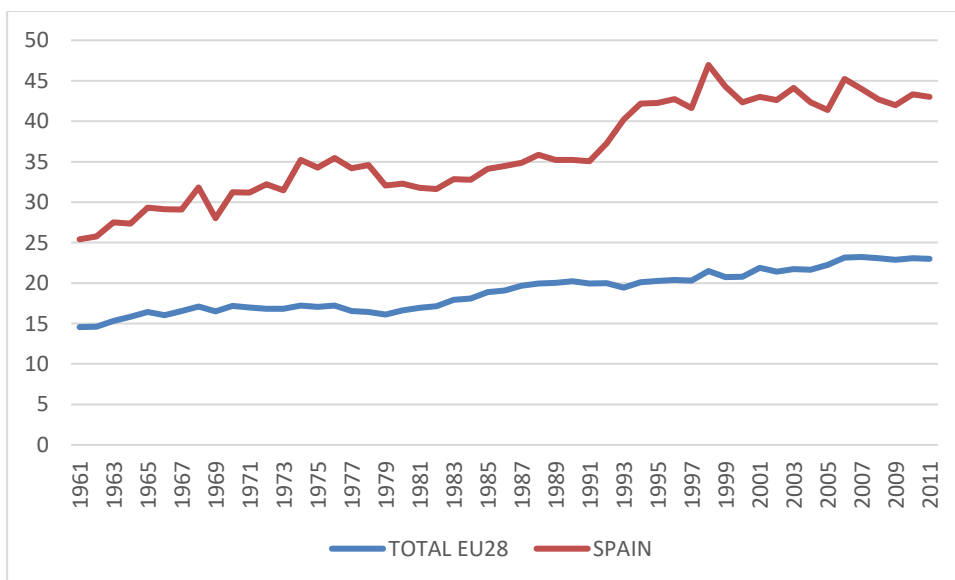


Figure 129, Spanish and EU28 fish and seafood consumption evolution (in kg per capita)



The exports in Spain are linked to the importance of the fishing and aquaculture sectors, being the pelagic, demersal, marine fish and cephalopods species the most important for the Spanish economy (Figure 130).

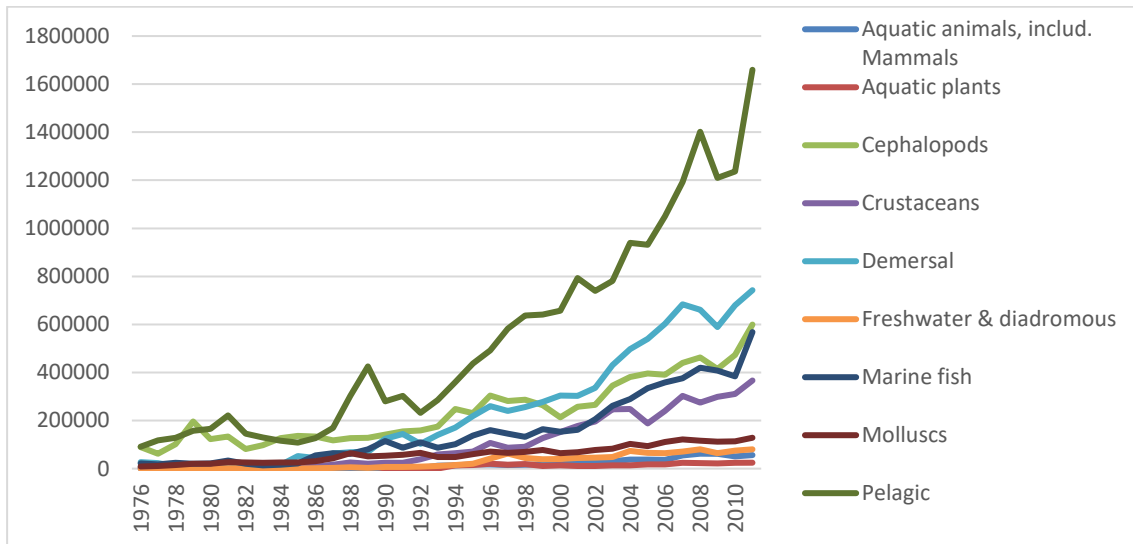


Figure 130, Spanish exports grouped by FAOSTAT products from 1976 to 2011 (in tonnes).

In fact, the cephalopods products represents more than 50% of total EU28 exports due to the relevance of these products to the Spanish fishing vessels. The aquatic plants and animals are ranked high in percentage terms but their production in tonnes is very low (Figure 131).

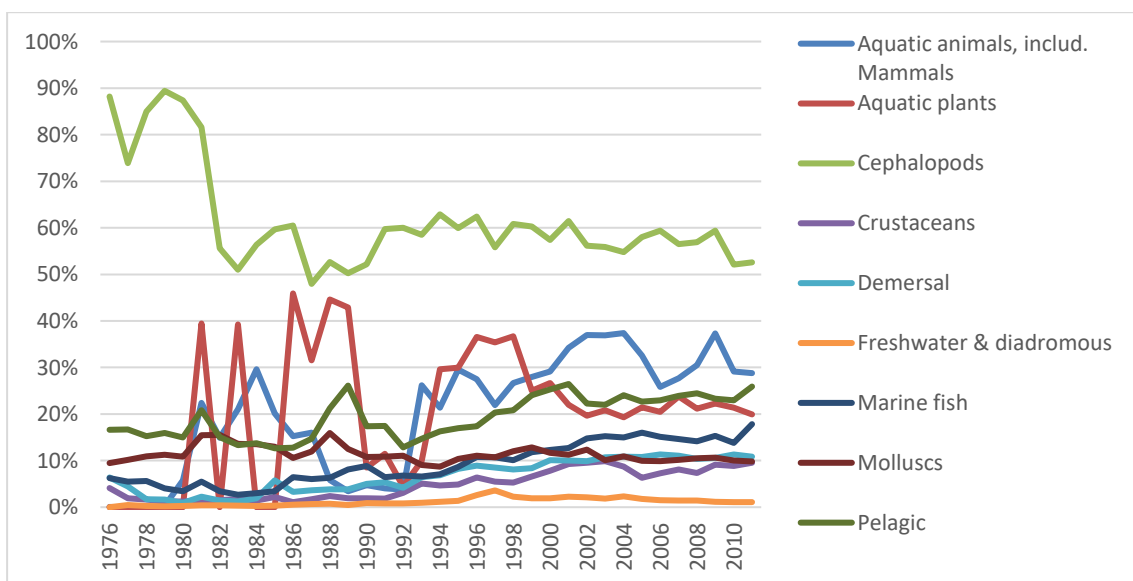


Figure 131, Spanish contribution to the exports of EU28 since 1976 (in tonnes)

In general, the total exports of EU28 and Spain are in constant growth but the trend of EU28 is more drastic than in the Spanish case.

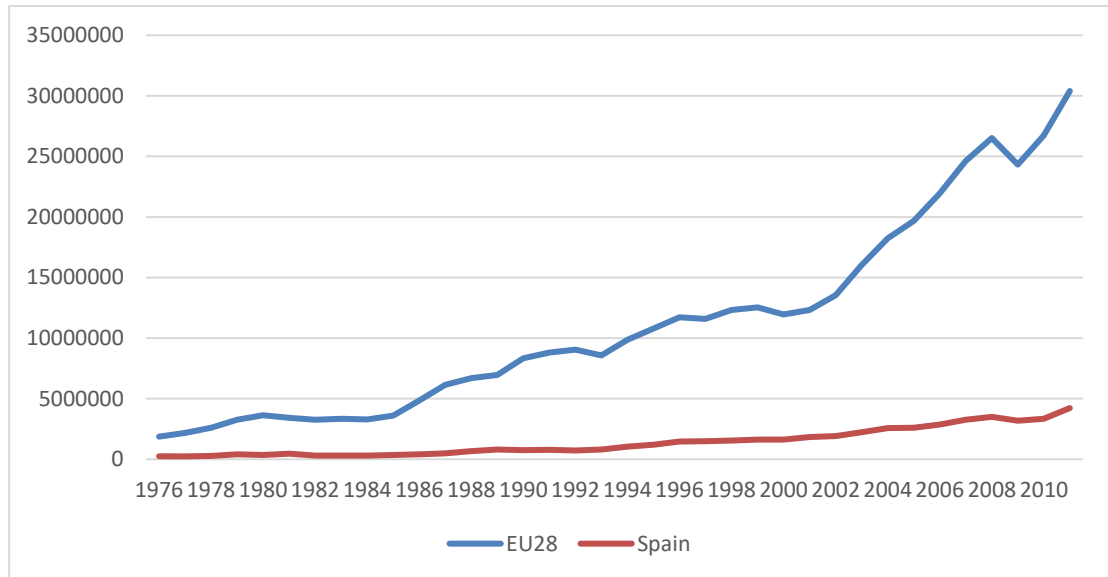


Figure 132, EU28 and Spanish volume of exports from 1976 to 2011 (in tonnes)

## Canada

### Northwest Atlantic Cod Fisheries

Canada is currently a small player in the global market for Atlantic cod (Northwest Atlantic cod). The landed value has remained steady over the last 20 years i.e. since the moratorium (1992) following as a result of the total collapse of the Northwest Atlantic cod fishery, Figure 133. The collapse was due to in large a massive overfishing and a simultaneous removal of other biomass (as bycatch). A massive presence of international fishing fleet up until 1976 can be observed, from when Canada declared an extended exclusive economic zone to 200 miles offshore. However, when the international fleet more or less disappeared, the Canadian (and US) fishing trawlers took their place and the overfishing continued up until the collapse.

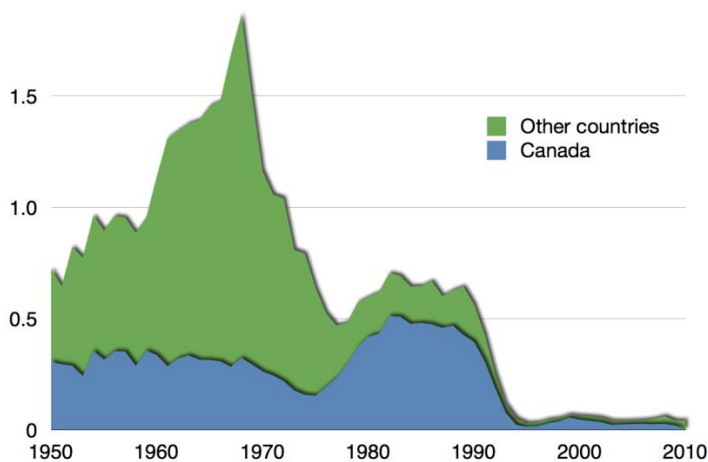


Figure 133, Total capture of Atlantic northwest cod stock in million tonnes with Canadian capture in blue, other nationalities in green, FAO FishStat .

When looking closer at the international fleet being present in the northwest territories, Figure 134, it is seen that EU countries, i.e Spain, Portugal, France and Germany had a major presence in the years before the extension of the economic zone.

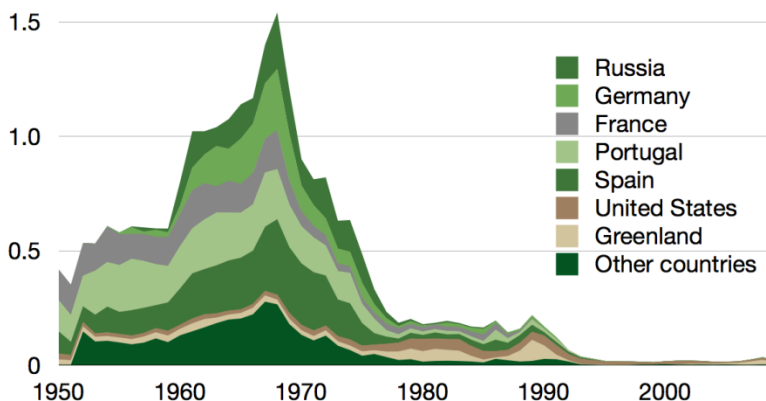


Figure 134, Capture of Atlantic northwest cod stock in million tonnes apart from Canada, FAO FishStat

Recent findings indicate that the cod stocks may be returning, however, the industry is not prepared to handle a significant commercial cod fishery due to a number of limiting factors: the workforce is



aging and there are few new entrants to the industry; current groundfish processing capacity is limited and most plants are using outdated technology; current vessel capacity/capabilities limit when and how cod is harvested; there is more competition from other white fish species (e.g. Tilapia), and other cheaper sources of protein (e.g. chicken).

The issues above must be addressed if Canada is to once again be competitive in the global cod market should Atlantic cod stocks recuperate to commercially sustainable levels.

### Export import balance

From the export and import statistics for cod, hakes and haddock we observe that imports came to level with export for some years after the collapse, while now for the most recent years' exports continue at a stable level while imports drop, Figure 135.

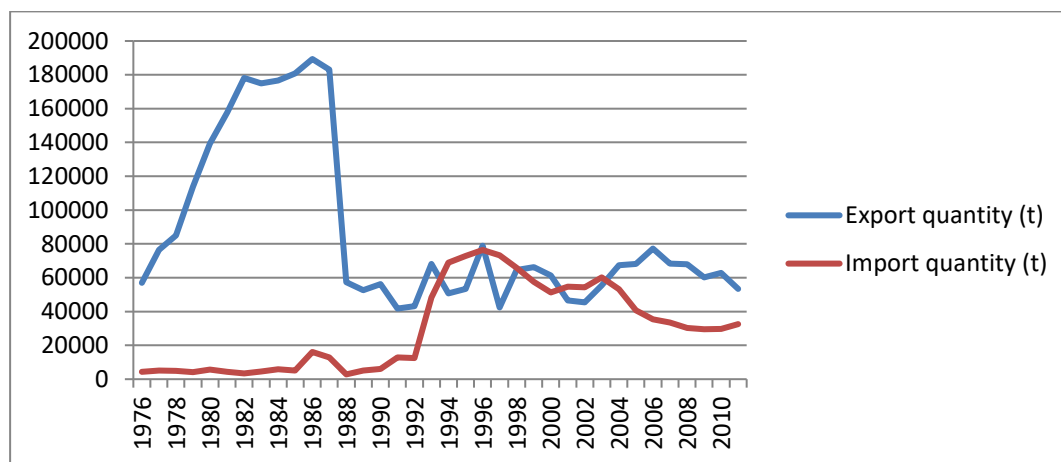


Figure 135, Canadian export and import of cod, hakes and haddocks from 1976 to 2011, FAO FishStat

### Consumption

Canada's per capita consumption of seafood has remained relatively stable since 1988 with an annual average of 8.8 Kg/capita as judged by Statistics Canada, Figure 136. The majority of seafood is consumed from the fresh & frozen state with an annual average of 4.1 Kg/capita which represents 47 % of total seafood consumption in Canada. Processed fish represents 29 %, shellfish at 20%, freshwater fish at 4 %.

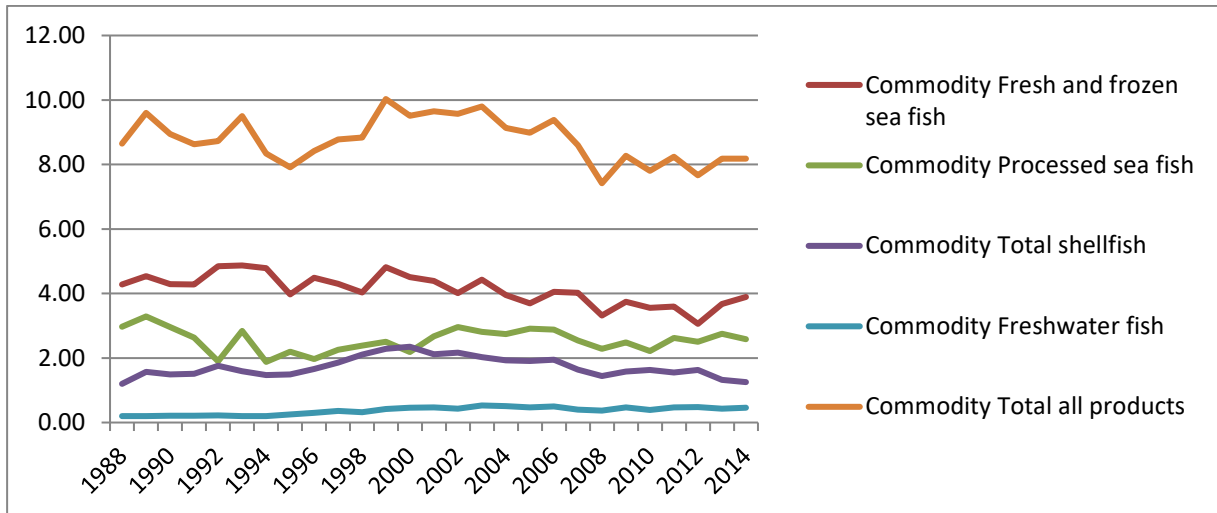


Figure 136, Canadian Annual Seafood consumption, Statistics Canada

Interestingly the FAO statistics tells another story with respect to the level of consumption, Figure 137, with more than the double consumption volume per capita and also a declining trend from 2000. It remains to provide a possible explanation for this observed difference.

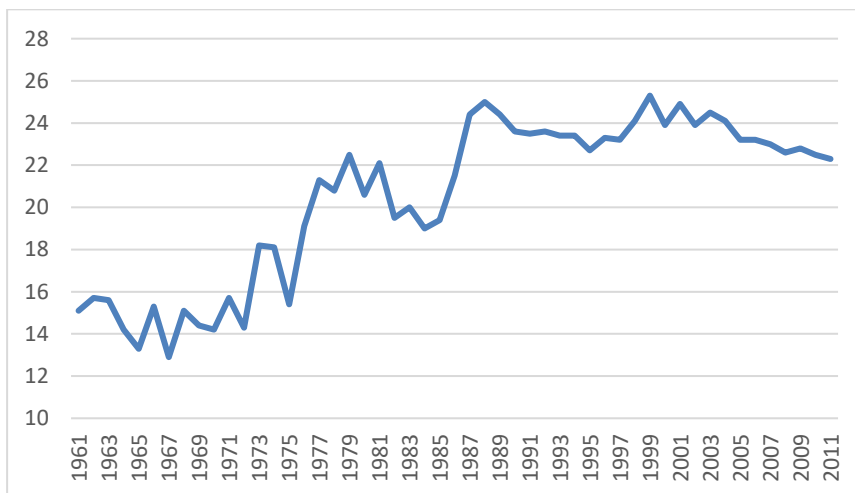


Figure 137, Fish and seafood consumption in Canada per Captiva from 1961 to 2011

## Vietnam fish and seafood production and consumption

### Production

With the long coastline spanning over 3000km, Vietnam has good conditions to develop the fisheries and aquaculture. Since 1985, the value of seafood output has grown by an average of 5 % per year. Vietnam produced about 6.3 million tons of fish and seafood in 2014, and aquaculture accounts for 60% (Figure 138).

Shrimp (tiger prawn and *Penaeus vannamei*) and pangasius catfish are two major species of Vietnam aquaculture; their production volumes reached 660 thousand tons and 1.1 million tons, respectively, in 2014. Tuna (e.g. big eyes and skipjack tuna) is dominant species of the fisheries, production volume is about 19 thousand tons in 2014.

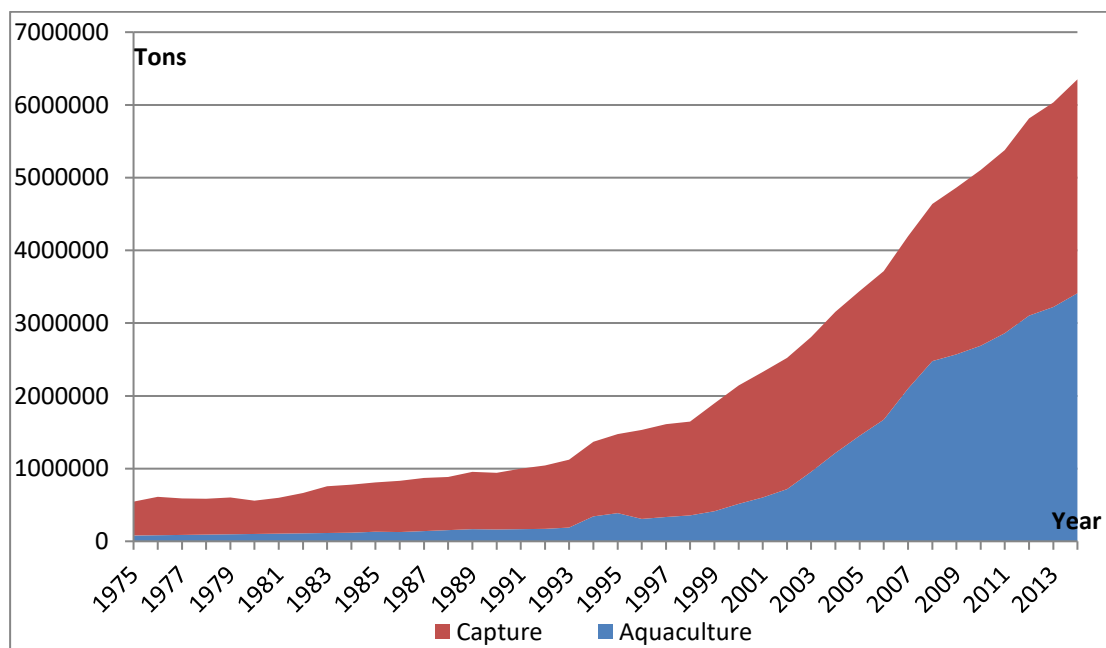


Figure 138, Fisheries and aquaculture production of Vietnam 1975-2014 (FAO 2016)

Viet Nam has high potential to produce a wide range of aquatic products such as catfishes, cobia, abalone, maculated ivory whelk, silver lip pearl oyster, white leg shrimp and barramundi. Total fisheries and aquaculture output can be 6.5-7m tons, of which aquaculture production accounts for 65-70% per year. Total production growth annually is 10 % while exported product accounted contributes over 8% in the recent 10 years. Currently, the safe and clean production with the controlling of aquaculture seed, feed and chemical treatment are standardized.

## Domestic Consumption

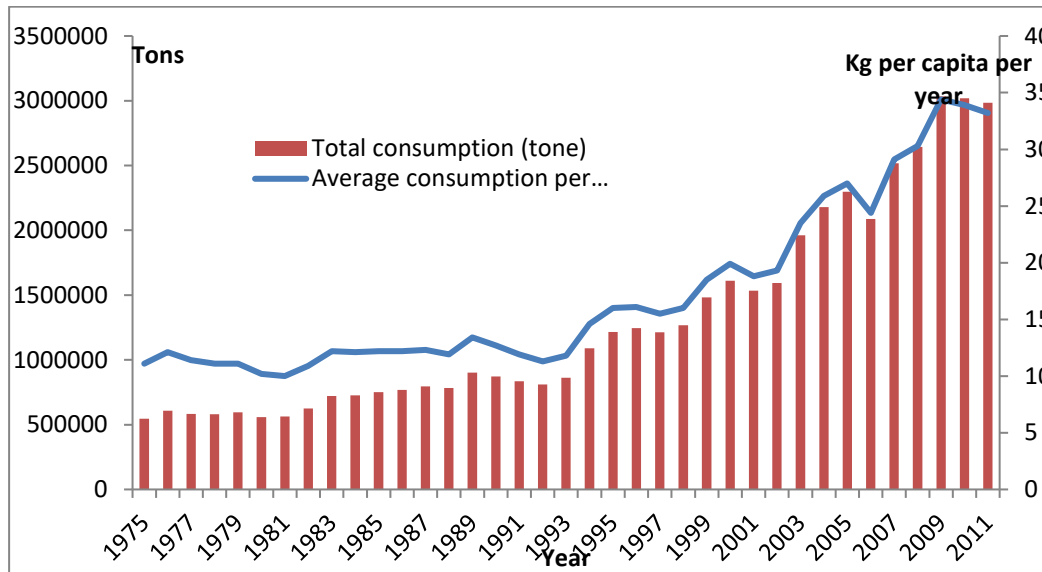


Figure 139, Fish and seafood consumption of Vietnam in 1975-2011 (FAO 2016)

Vietnam is one of Asian countries that fish and seafood are an important part of protein demand. The country consumes nearly 3 million tons fish and other aquatic products per year and the supply are fully domestic. The consumption of seafood and fish per capita is nearly 34kg per year at the moment, Figure 139.

## Export

The history of Vietnamese seafood export officially started in 1986 after the 'Innovation' commitment of the Vietnamese government. Between 1986 and 1998 the value of exports has increased almost eight fold, growing at 20 % per year, showing the increasing importance of the seafood industry. From the turnover of US\$ 776 million in 1997, the seafood exports reached a value of US\$6.8 billion in 2014 and volume of 1.6 million tons, Figure 140. Among exported products, shrimp, pangasius and tuna are the major commodities. Recently, Vietnam has marked as the sixth largest country for exporting food commodities in the World (FAO, 2010a) and was ranked the fifth largest seafood exporters worldwide.

By 2012, the seafood sector employed directly more than 5 million people, accounting 10% of the nation population. There are 567 seafood processing firms, who are licensed and therefore have permission to export their products (VASEP, 2014). The country is now focusing on increasing diversified aquaculture production, protecting fisheries resources and encouraging certified production.

Vietnam currently exports seafood products to over 160 countries and locations. The US, EU, Japan, and China are listed as major export markets of Vietnam. The US, EU and Japan have been standing among the largest importers of the country for many years. Shrimp products contributed 52 % of the exported aquatic quantity overall.

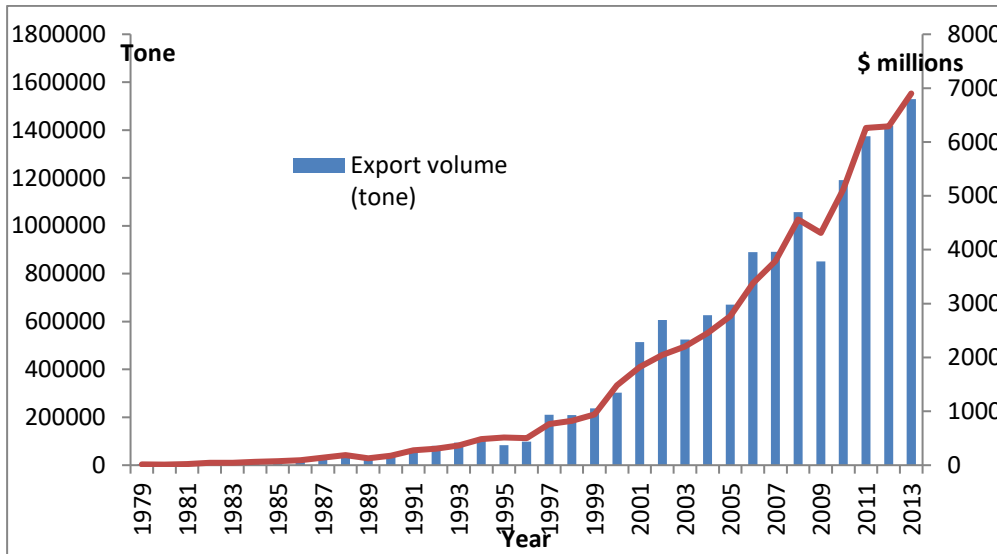


Figure 140, Export volume and value 1979-2013 (FAO 2015)

Farmers have enhanced the quality of aquatic products to meet the high demand of international and local markets. The domestic consumption also closely related to a higher demand of diversified aquatic products. Currently, locating and improving the label and position for exported aquatic products is one of the most important tasks to enlarge the export markets and market share in Vietnam. Higher quality, healthy and clean aquatic products are the increasing demands from export market. In addition, the concern about disease issues also put the country under the pressure to improve the aquaculture manufacturing environment

## Discussion

In this report the development of the European seafood market is analysed in a descriptive way observing major trends with respect to consumption and productions volumes for both fisheries and aquaculture.

The report is mainly based on FAO statistics (FAOStat) that provide data with a relatively long history going back to 1950/1960. The accuracy of FAO statistics has been discussed; however, these data have been gathered in a similar way over the years and for the countries and regions covered, and even though it might not be precise with respect to absolute figures (volume/quantity) it does likely catch the trends and development over time and reflect the relative difference between regions.

For some more recent situations the report has gathered some information from EUMOFA which has another level of precision and resolution. However, this report does not aim at diving into the details, thus it focuses mainly on volumes/quantities like production and consumption, and only briefly touches on prices and value. This also relates to the value and price information of the main information source, FAOStat, being less precise and having a shorter history. The coming studies of PrimeFish within WP2, will include more detailed information on value (prices) for selected case species, as will of course the studies of boom and bust, macro-economic impact and price-transmission.

We observe from the history of seafood going back to the 1950's that fisheries are flattening out and that the growth in seafood production volumes (supplies) mainly stems from aquaculture from the late 1980's. We also observe that the growth in aquaculture mainly stems from Asia and additionally that there has been a growth in fisheries in Asia, while at the same time fisheries in other continents like Europe have decreased.

For Europe there is an increasing trend with respect to the imbalance between import and export, and since around 2010 the import volumes have remained relatively stable, while the value of import i.e. the prices of the imported goods, has increased; i.e. Europe pays more for the imported seafood now than it did five years ago.

Europe is both for its seafood consumption and also for its seafood processing industry dependent on imports. A question can be raised whether Europe might face a challenge and tougher competition for imported seafood resources due to population increases in the continents that Europe imports from and this challenge might be enforced by a shift in these continents due to more urbanization and a larger middle class also affecting the consumption patterns.

Consumption of seafood is increasing on a global level and while the consumption in Europe is showing a relatively stable level from the late 80's the consumption in Asia is steadily increasing. Freshwater fish is the commodity group with the most marked increase since the 80's.

Seafood is still markedly behind meat with respect to consumption despite the globe being covered by 70% of water. Thus one could argue that there is a huge potential for growth in production for seafood and especially with respect to aquaculture, since fisheries are believed to have reached a level where not much growth can be expected. That of course depend on how well one manages the wild fish stocks around the world.

Per capita consumption of seafood has been increasing in Europe, but not markedly the last years, and for the European Union as such it is on average flattening out, that also goes for Spain for the last decade. However, Spain, being one of the important seafood markets in Europe, is at a much higher level than the rest of the European countries. It is interesting to note that France sticks out with a steady increase throughout the period having had a much higher increase than the countries it was similar to in the early 60's, and France might be a good case for studies on how to increase the seafood consumption.

Self-sufficiency ratio is dropping for Europe and for the European union it is getting down to a level where authorities have become worried and initiate measures have been put in action, to counteract the current trend; amongst others, the Horizon2020 call that PrimeFish is financed within.

Fisheries have been flattening out as stated above and for global demersal fisheries there has been a drop in caught volumes from the late 80's. This situation is also reflected for European Union countries that show a marked drop in demersal fisheries over the same period. This situation is mainly driven by collapses of several wild fish stocks like the east Canadian cod stock, and the regulations subsequently put into force not giving the European Union fishery fleet the same access to foreign waters.

Pelagic fisheries show the same development as demersal fisheries, with a peak in the late 80's and a drop from then on. However, we observe that there has been an increase in pelagic landings in Asia and in Africa, but at a lower level. In contrast to demersal fisheries the pelagic industry within EU has been able to keep a high trade quantity and also a high value for products due to increasing prices during the last decade.

Even though there has been a marked increase in aquaculture in all continents, it is Asia that markedly sticks out with the fastest growth and also in growth for more commodity groups than for the other continents. Aquatic plants show a major increase as do freshwater and diadromous fish on a global scale while for Europe freshwater and diadromous and molluscs are most important.

Within freshwater and diadromous fish, salmon plays a major role especially when looking at Americas and Europe, and in particular Chile and Norway stick out as major suppliers. For EU there is an increasing imbalance in the salmon trade and even more so with respect to value than volume. This same imbalance is observed for trout and bass & bream.

Spain is one of the largest European markets for fish and seafood and sticks out with the next highest consumption per capita after Portugal. As for EU as such the consumption is flattening out in the last decade. The Spanish pelagic industry has been able to maintain a relatively high level compared with the rest of Europe; however, with respect to the demersal industry, Spain has experienced the same drop as the rest of EU, but still keeping a considerable size of the industry.

With respect to aquaculture Spain plays and has for a long time played a major role with respect to molluscs and has experienced a marked increase in farmed marine fish i.e. seabream and seabass (B&B), and with respect to value B&B has been playing an increasing role.

When looking at Canada which is taking part in the PrimeFish project primarily due to its demersal (cod) industry, one can observe the dramatic effect of overfishing in the 70's and 80's leading to a complete collapse of the east Canadian cod stock. Several nations also European and EU countries took

part in this fishery until it was regulated, but regulations came too late to be able to avoid the collapse. The east Canadian cod stock has still not regained its former size or strength, and this has had major impacts on rural/remote eastern parts of Canada.

Vietnam is also taking part in PrimeFish and mainly so due to its aquaculture (pangasius) industry which together with shrimp are the two major aquaculture industries of Vietnam. The per capita consumption of seafood in Vietnam has been steadily increasing over the last two decades from around 12 kg/capita/year to 34 kg, likely representative for many Asian countries with respect to the increasing trend. The export of seafood from Vietnam has shown a massive growth from almost zero in the late 80's to currently a high level spread over many continents and countries.

Price of fish has in general, over the period, not kept pace with other consumer goods.

## Conclusions

The European seafood sector - EU in particular - is experiencing an increasing imbalance with respect to seafood and for the last year mostly in the form of value imbalance and not so much with respect to volume.

The European fishing industry has reduced in size since the all-time high in the 70's and 80's and the aquaculture sector has been growing, but it is lagging far behind the growth in Asia and EU countries are also lagging behind the development to that of non-EU European countries.

The self-sufficiency ratio of EU is trending downwards and EU pays in general more for its seafood now in comparison to what it paid one decade ago.

PrimeFish will in the following months attempt to analyse and investigate how EU and Europe can counteract this development and strengthen both the economic resilience and competitiveness of its fishery and aquaculture sectors. Furthermore, how to develop sustainable uses of the European and global water based resources.



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