Review of Fisheries in OECD Countries 2009

POLICIES AND SUMMARY STATISTICS

OECD

2009

Review of Fisheries in OECD Countries 2009

POLICIES AND SUMMARY STATISTICS

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where the governments of 30 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

ISBN 978-92-64-07974-8 (print)
ISBN 978-92-64-07975-5 (PDF)

Series:
ISSN 1027-3107 (print)
ISSN 2072-5280 (online)

Also available in French: *Examen des pêcheries dans les pays de l'OCDE 2009 : Politiques et statistiques de base*

Corrigenda to OECD publications may be found on line at: *www.oecd.org/publishing/corrigenda*.

Foreword

This edition of the Review of Fisheries in OECD Countries: Policies and Summary Statistics *was approved for public release by the Committee for Fisheries in April 2009.*

The Review consists of three parts. Part I contains the "General Survey of Policy Developments in OECD Countries". It is based on material submitted by OECD member countries, as well as other sources of information within and outside the Organisation. The General Survey was written by Anthony Cox, Carl-Christian Schmidt, Ingrid Kelling, Nicole Franz and Sungbum Kim of the Fisheries Policies Division.

Part II contains a special chapter prepared for the Review on Climate Change and Fisheries, focusing on the key policy issues associated with climate change impacts on fish stock productivity and migration as well as managing shared stocks and high seas fisheries. This chapter was written by a consultant, Professor Rögnvaldur Hannesson.

Part III consists of Country Notes which review the fisheries and aquaculture sectors in OECD member countries and non-member economies that are observers to the Committee for Fisheries, highlighting recent policy developments. It should be noted that the summary graphs for each country note are based both on FAO and OECD data and they may not necessarily match due to differences in statistical methodologies.

The Review was edited by Emily Andrews-Chouicha of the Fisheries Policies Division.

Table of Contents

List of Acronyms

CCAMLR	Commission for the Conservation of Antarctic Living Resources
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CDS	Catch Documentation Scheme
COLTO	Coalition of Legal Toothfish Operators
EEZs	Economic Exclusive Zones
FDI	Foreign Direct Investment
FFA	South Pacific Forum Fisheries Agency
FIFG	Financial Instrument for Fisheries Guidance
FMR	Fisheries Management Renewal (Canada)
FTA	Free Trade Agreement
GFCM	General Fisheries Council for the Mediterranean
GFT	Government Financial Transfer
GRT	Gross Registered Tonnage
GT	Gross Tonnage
IATTC	Inter-American Tropical Tuna Commission
IBSFC	International Baltic Sea Fishery Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	International Council for the Exploration of the Sea
IFQ	Individual Fishing Quota
ILO	International Labor Organization of the United Nations
IMO	International Maritime Organization of the United Nations
IOTC	Indian Ocean Tuna Commission
IPOA	International Plan Of Action (FAO)
ITF	International Transport Workers' Federation
IUU	Illegal, Unreported and Unregulated (fishing)
MAC	Marine Aquarium Council
MCS	Monitoring Control and Surveillance
MSC	Marine Stewardship Council
NAFO	Northwest Atlantic Fisheries Organization
NASCO	North Atlantic Salmon Conservation Organization
NBF	National Board of Fisheries (Sweden)
NEAFC	North-East Atlantic Fisheries Commission
NGO	Non Governmental Organization
NMFS	National Marine Fisheries Service (United States)
RFMOs	Regional Fisheries Management Organizations
SEAFO	Southeast Atlantic Fisheries Organization
SSC	Sturgeon Stewardship Council
TAC	Total Allowable Catches

TDS	Trade Documentation Scheme
UNCED	United Nations Conference on Environment and Development
UNCTAD	United Nations Conference on Trade and Development
VMS	Vessel Monitoring System
WCPFC	Western Central Pacific Fisheries Commission
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization

PART I

General Survey 2009

Introduction

This General Survey consists of three sections. Section 1 describes recent trends in the OECD fisheries and aquaculture sector. Section 2 introduces four policy issues that are relevant for fisheries governance in member countries while Section 3 provides an outlook and future policy challenges in the fisheries sector.

Although this edition of the *Review of Fisheries* covers the period of 2006-2007, it is worth highlighting the impacts of the recent financial and economic crisis on fisheries.

Box I.1. **Impacts of the recent financial crisis on fisheries**

More recent developments in the world economic climate have had an impact on the world's fisheries markets. Compared to most meat products, fish and fish products have higher income elasticity in most OECD countries. It is therefore expected that demand for fish and fish products might fall or be re-directed towards low priced species. For example, Danish fish exporters claim that the rather expensive cod products are gradually being replaced by lower priced substitutes like pangasius. In addition, high end markets like the sashimi grade tuna market in Japan are suffering from declining demand. China, the world's main producer and exporter of fish products, is also facing difficulties with its trade partners. Traders in Russia can't access credit to pay for Chinese products and the commodities are being re-directed to the domestic market.

The principal concern is fish exporters' access to export finance and in particular to export insurance. Major exporters are having problems in ensuring that they can get payments for their goods; in the short term this may mean that recourse to export credit/ insurance institutions is needed. In the medium term it is expected that more consolidation in the fish processing industry may take place.

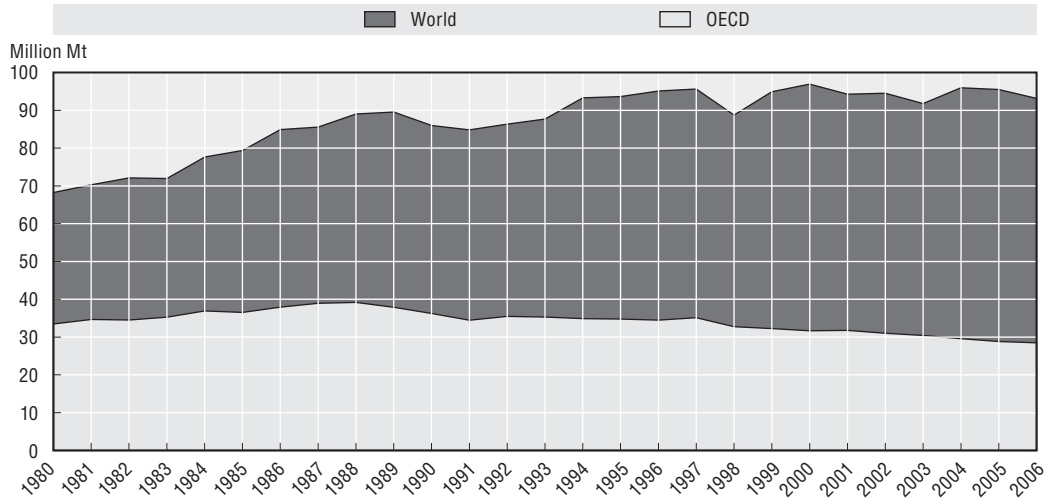
Also of concern is the response by the fishing fleet to the changing markets conditions. Although energy prices have been falling, the lower prices for fish have, in certain cases, triggered fleets to fish harder in order to compensate for falling fish price. It is critical that governments take the necessary steps to ensure that the current economic crisis does not lead to unsustainable fishing.

Recent trends in the OECD fisheries and aquaculture sector[1]

Marine capture fisheries

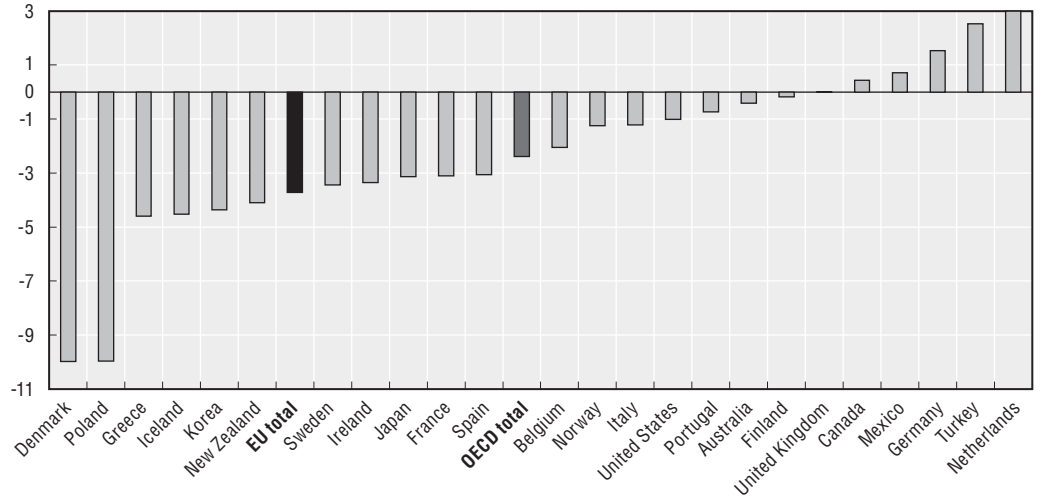
Marine capture fisheries production in OECD countries reached 28.5 million tonnes in 2006, accounting for around 30.6% of the total world marine capture fisheries production (Figure I.1). However, OECD production continued its long-term downward trend which has seen production decline by an average of 2.7% a year over the last decade. In 2006, the value of OECD marine capture production totalled USD 31 billion. Declines in production have mostly occurred in a number of EU countries, Iceland, Korea and New Zealand (Figure I.2). Denmark, Poland, Greece and Iceland suffered the largest decreases in marine capture

Figure I.1. **World and OECD marine capture fisheries production**



Source: FAO.

Figure I.2. **Average annual changes in OECD marine capture fisheries production (volume) (1997-2007)**



Source: OECD based on FAO.

production while Turkey and Germany raised their tonnages by an average of 1% or more per year between 1997 and 2007. Japan, the United States, Norway and Korea are the largest marine capture fisheries producers amongst OECD countries, accounting for 58% of the total OECD production (Figure I.3).

Aquaculture production

Worldwide, the aquaculture sector has grown by an average of 8.2% a year since 1970 while OECD aquaculture production has grown at a slower rate, averaging 1.7% per year between 1996 and 2006. OECD countries accounted for 7% of total world aquaculture production in 2007. Figure I.4 reflects relative production by OECD and non-OECD countries, highlighting the major producers in each.

Figure I.3. **Fish landings in domestic and foreign ports as a percentage of OECD total, 2007**

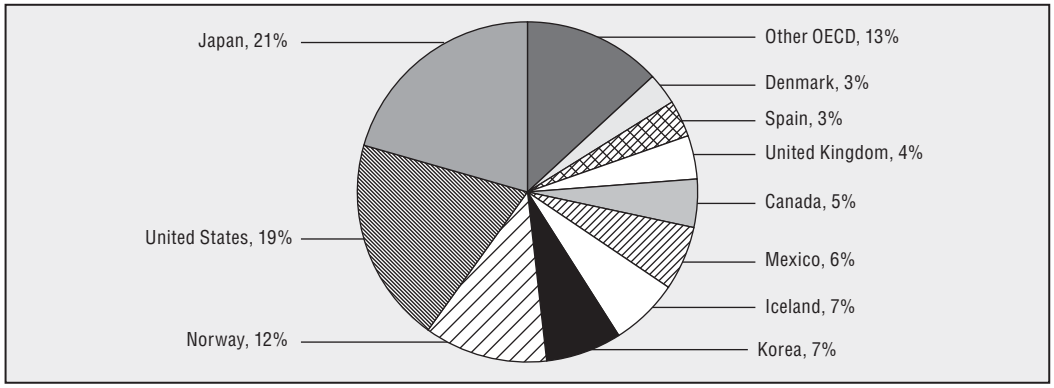
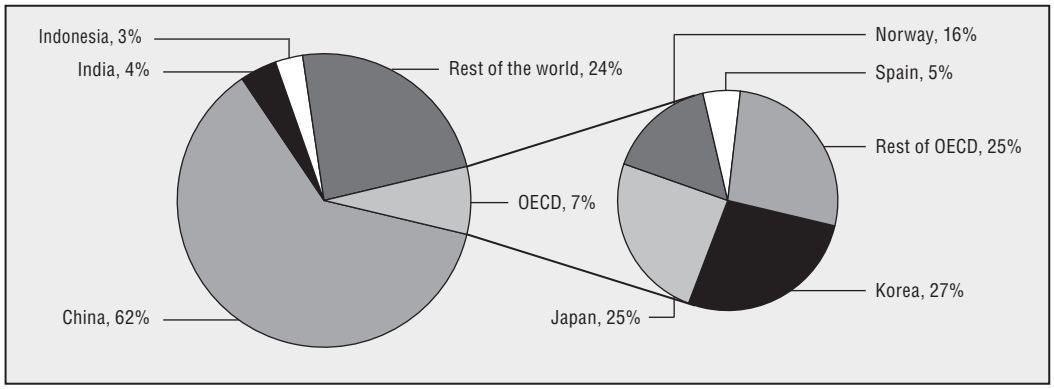


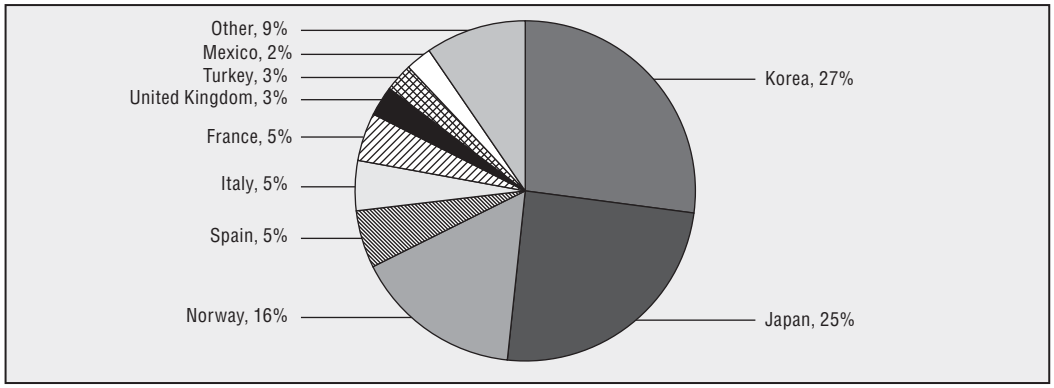
Figure I.4. **Sources of aquaculture production, 2007**



Source: OECD (OECD countries production) and FAO.

Aquaculture contributed 20% to the total OECD fisheries production in 2007 compared to 43% globally. High rates of growth continued in Korea, Norway, Australia and Germany while Japan, France and the Netherlands registered a slight decrease. Just six countries – Korea, Japan, Norway, Spain, Italy and France – accounted for 88% of total aquaculture production in OECD countries in 2007[2] (Figure I.5).

Figure I.5. **Share of aquaculture production in OECD countries, 2007 (by volume)**



The relatively slower rate of OECD aquaculture production growth reflects a number of factors. Lower production costs in non-OECD countries and increasing competition for coastal ocean space make OECD countries relatively less attractive for investment in aquaculture. Aggressive expansion of aquaculture production in a number of non-OECD countries, especially China, has been assisted by the offer of attractive terms and conditions for establishing aquaculture facilities (such as concessional financing and tax holidays) as well as less stringent application of environmental regulations in some cases.

Major species farmed in OECD countries are Atlantic salmon (714 794 tonnes in 2006), oysters (667 639 tonnes), mussels (474 161 tonnes), catfish (265 415 tonnes), rainbow trout (214 206 tonnes), scallops (212 454 tonnes) sea bream (158 414 tonnes) and sea bass (86 927 tonnes).

In the aquaculture sector, technological progress is advancing rapidly. For example, the full life cycle of the bluefin tuna can now be replicated in controlled aquaculture conditions, opening the way for high value farmed tuna production in the near future. Cod production from aquaculture passed 8 000 tonnes in 2005, doubling production from 2004, again underlining the fact that high value species are rapidly finding their way into aquaculture production systems.

Trade

Most OECD countries have increased the value of both their fisheries exports and imports over the past decade (Figures I.6 and I.7). OECD countries exported USD 35.1 billion of fish and fish products while they imported USD 31 billion in 2007. Norway, the United States, Canada, Spain, Denmark and the Netherlands are the major export countries, accounting for 55% of total OECD exports in 2007 (Figure I.8). The major importers in 2007 were the Unites States, Japan, Spain, France, Italy, Germany and the United Kingdom, accounting for 71% of total imports to the OECD (Figure I.9).

Figure I.6. **Average annual growth in fishery product exports from OECD countries, 1997-2007 (by value)**

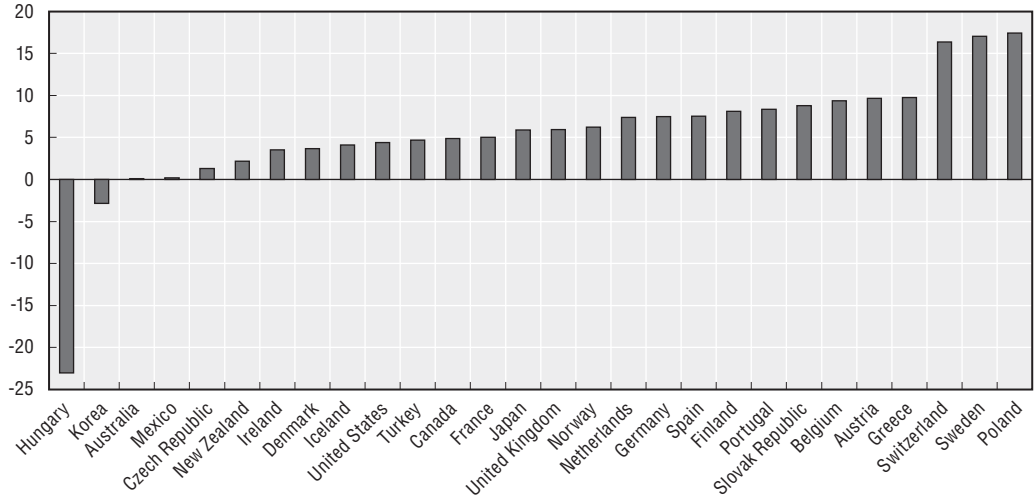


Figure I.7. **Average annual growth in fishery product imports to OECD countries, 1997-2007 (by value)**

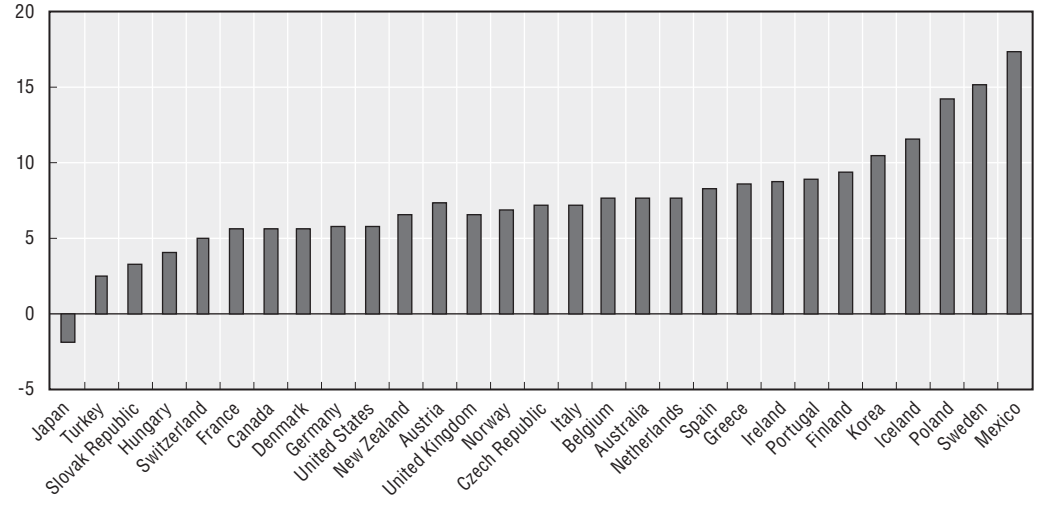


Figure I.8. **Major OECD exporters: country shares of total OECD exports, 2007 (by value)**

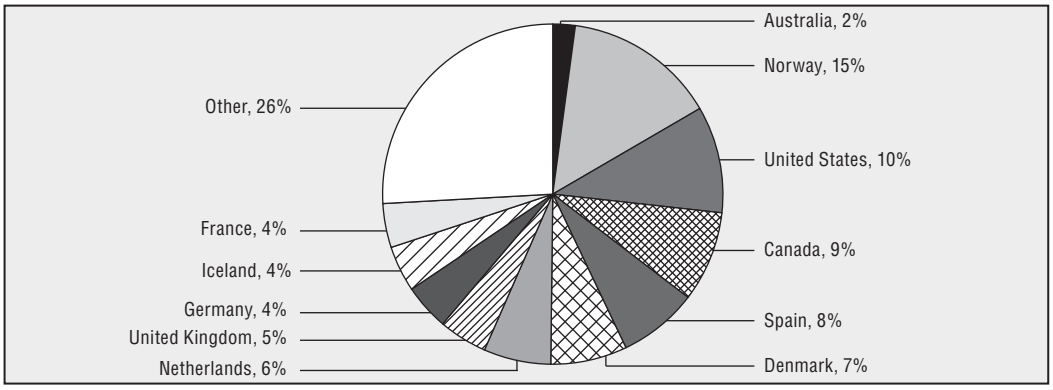
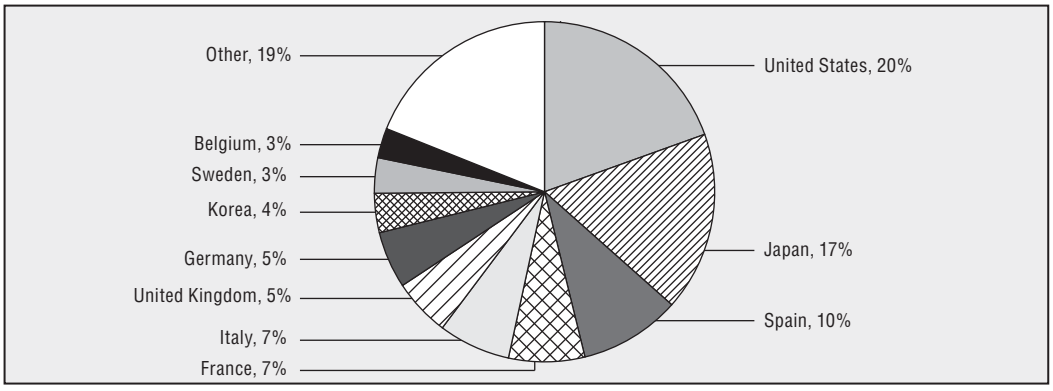


Figure I.9. **Major OECD importers: country shares of total OECD imports, 2007 (by value)**



With respect to OECD imports, more than 50% of the imports originated from non-OECD countries in 2007 (Figure I.10). However, in terms of export destinations, trade among OECD countries is still of primary importance, accounting for 81% in 2007 (Figure I.11).

Figure I.10. **Origins of OECD imports in 2007 (by value)**

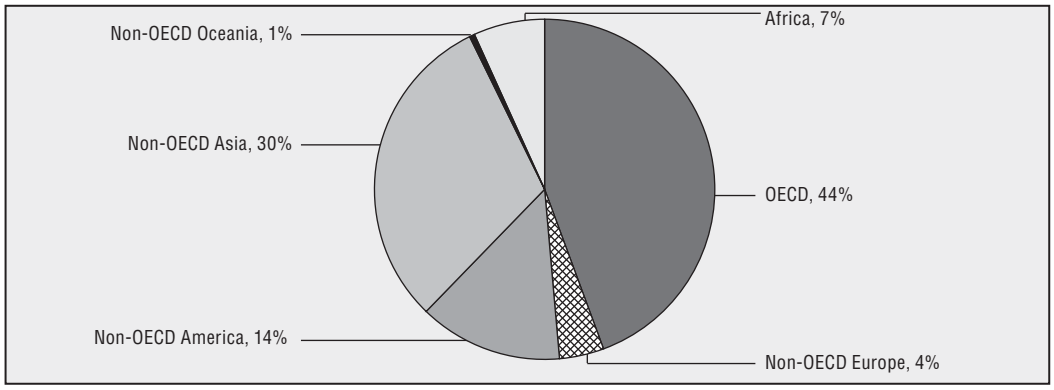
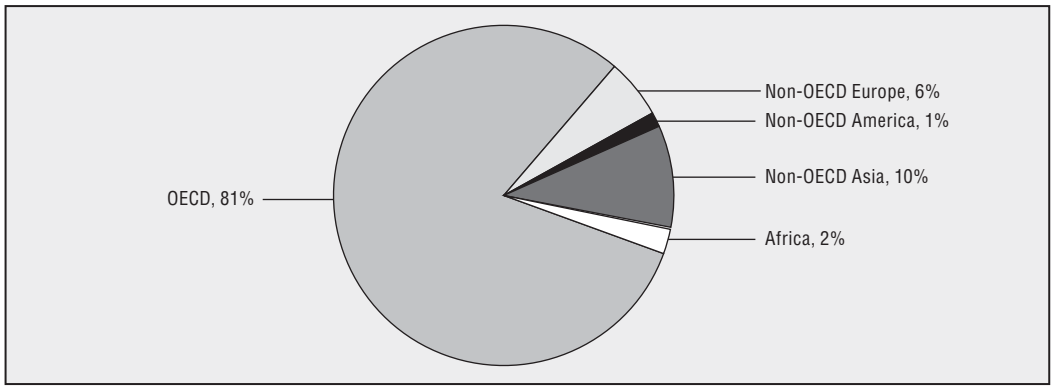


Figure I.11. **Destinations of OECD exports (by value)**



Fishing fleets

Many OECD countries have been actively reducing the size of their fleets through management and decommissioning programs in order to better match fleet capacity with available resources. However, some OECD fleets need additional re-structuring to further decrease overcapacity. The OECD Council Recommendation on the Design and Implementation of Decommissioning Schemes in the Fishing Sector and its underpinning review and analysis of OECD experiences[3] provide a series of key lessons learned from the best practices of OECD and non-OECD countries and present a set of best practice guidelines for governments.

Within the European Union, strict capacity management has been established since the new Common Fisheries Policy came into force in 2003, resulting in a 11.3% decrease in the number of vessels and a 11.2% decrease in total GRT up to 2007.[4] The fleets of Denmark, Germany, Portugal and Sweden have been reduced the most during the period. Such measures are implemented through two key requirements: any entry of capacity has to be compensated by the exit of at least an equivalent capacity, measured both in terms of

Box I.2. **OECD Council Recommendation for decommissioning schemes**

Decommissioning schemes are widely promoted as providing a "win-win" outcome for fisheries with expectations of reductions in capacity, improved profitability and less pressure on stocks. Around USD 430 million was spent on such programs in OECD countries in 2005, accounting for 7% of total government financial transfers to the sector. However, there are concerns that decommissioning schemes often fail to reach their objectives from both an economic and an environmental perspective. So why do they remain so popular with policy makers?

The OECD's Committee for Fisheries has developed a set of best practice guidelines, based on an analysis, that identify the key areas that policy makers need to be aware of if designing decommissioning schemes. The guidelines are intended to assist policy makers ask the right set of questions as they develop programs and will help ensure that decommissioning schemes are efficient and cost-effective in meeting their stated capacity reduction objectives.

In July 2008, the principles and guidelines were adopted by the OECD as a Council Recommendation, reflecting the high level of political importance attached to the issue of ensuring effective fishing capacity adjustment and resource sustainability.

tonnage and power; and fishing vessels scrapped with public aid cannot be replaced. However, the impact of technological creep has eroded many of the gains from these stronger capacity management measures, indicating that further restructuring is required.

Among other OECD countries, Iceland, Norway, New Zealand and Korea have significantly reduced their fishing fleets in recent years. From 2005 to 2007, the number of Icelandic fishing vessels decreased from 1 449 to 1 294 (–10.7%) while the number of Norwegian vessels decreased from 7 722 to 7 041 (–8.8%) and New Zealand's fleet fell from 1 654 units to 1 508 (–8.8%). The number of Korean fishing vessels also decreased from 90 735 to 85 627 (–5.6%).

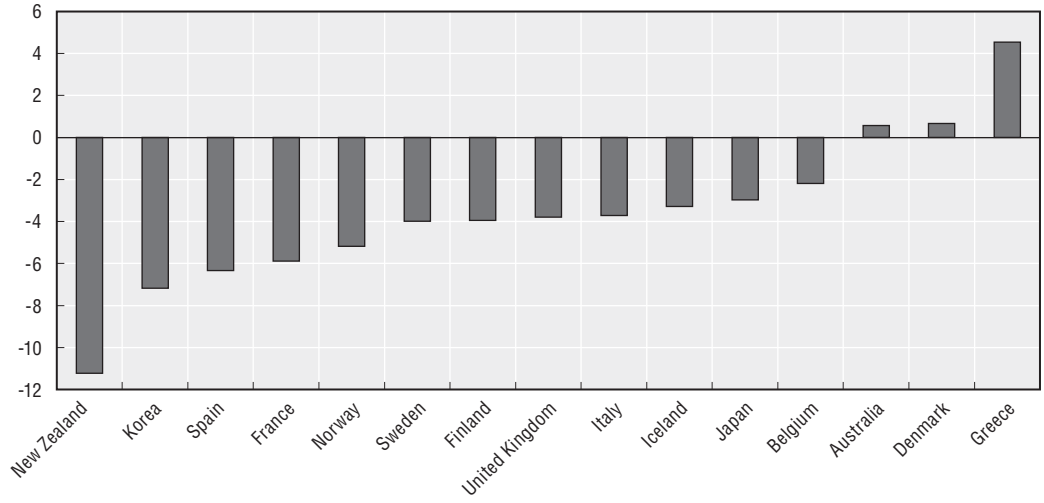
Employment

Data on total employment in the fisheries and aquaculture sector are not collected by every OECD country. Therefore, reliable employment data are only available for a number of OECD countries. According to the available data, the number of workers in the harvesting sector in OECD countries has been steadily falling over the past decade while in contrast, the number of employees in the processing sector has been increasing (Figure I.12). Workers in the harvesting industry still outnumber those in the processing and aquaculture industries. However, there is considerable employment in the aquaculture sector in Korea (45 524), France (21 076) and Mexico (24 998). The employment in the processing sector in Denmark, Germany, the Netherlands, Poland and New Zealand outnumbers that of harvesting and aquaculture sector.

Government financial transfers

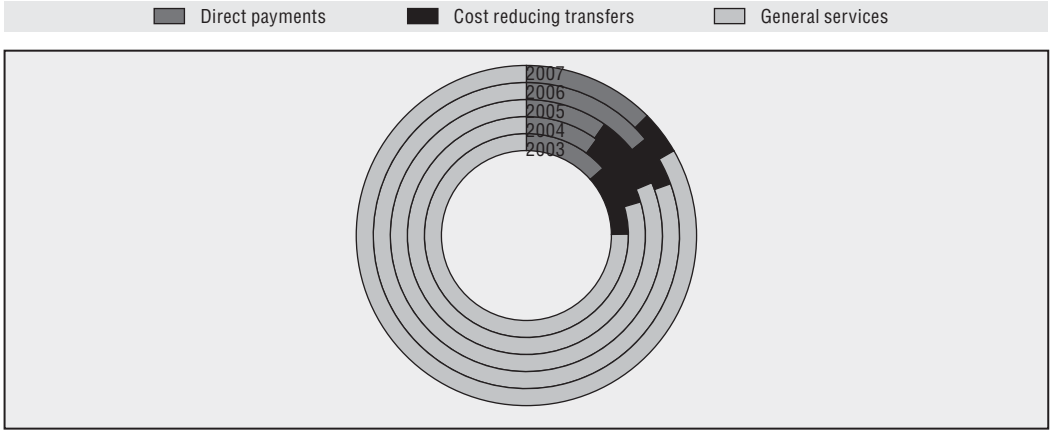
Government financial transfers (GFTs) to the fishing industry in OECD countries have slightly reduced over the last 10 years, from USD 6.8 billion in 1996 to USD 6.4 billion in 2006. GFTs in OECD countries represented around 19% of the value of the total catch from capture fisheries in 2006. The majority of GFTs are categorized as general services, accounting for 75% of the total GFTs in 2006 (Figure I.13). Specifically, OECD governments spent USD 1.6 billion for management and enforcement while USD 736 million were used to conduct fisheries research. Other GFTs under the general services category included

Figure I.12. **Annual rate of change in employment (in percentage) in the harvesting sector, 1996-2006**



harbour construction and maintenance as well as stock enhancement and habitat conservation. However, significant GFTs for general services (USD 2.1 billion out of 5.3 billion) fell into the "programs not specified" category because several countries have not reported details (Table I.1). In the meantime, direct payments represented 19% of total GFTs. USD 185 million were dedicated to decommissioning schemes in 2006 while USD 32 million were used to construct or modernize fishing vessels. Other direct payments included unemployment insurance (USD 223 million) and disaster relief (USD 188 million) (Table I.2). The third category, cost reducing transfers, accounted for 6% of the total GFTs.

Figure I.13. **GFTs in OECD Countries (2003-2007)**



GFTs for individual countries have fluctuated considerably over the last 10 years. Japan, the United States, the European Union, Korea and Canada remain the largest providers of GFTs to the sector, accounting for 92% to the total OECD GFTs. The greatest rates of decline in GFTs are most evident in Japan (–38.8%) and in a number of EU countries (–43.7%)[5] (Figures I.14 and I.15).

Table I.1. **General services of GFTs to marine capture fisheries sector in OECD countries, 2006 (USD million)**

	Total	Research	Management and enforcement	Infras tructure	Stock enhancement/ habitat conservation	Programs not specified	Others
Australia	52	14	25	0	0	13	0
Canada	315	77	195	82	0	0	–39
European Union	377	116	125	75	5	37	19
Denmark	72	9	34	23	0	3	3
Finland	12	5	4	0	0	0	3
France	17	0	0	17	0	0	0
Germany	3	0	0	0	0	0	3
Greece	16	3	1	12	0	0	0
Netherlands	3	0	0	0	0	2	1
Poland	7	3	4	0	0	0	0
Portugal	28	13	15	0	0	0	0
Spain	85	48	0	23	5	0	9
Sweden	32	0	0	0	0	32	0
United Kingdom	102	35	67	0	0	0	0
Iceland	35	19	26	0	0	0	–10
Japan	1 934	0	0	0	0	1 934	0
Korea	554	40	24	284	97	109	0
Mexico	4	2	2	0	0	0	0
New Zealand	38	0	58	0	0	0	–20
Norway	135	46	97	0	0	0	–8
Turkey	136	1	36	40	0	59	0
United States	1 760	426	1 026		47		261
Total	**5 340**	**741**	**1 614**	**481**	**149**	**2 152**	**203**

Note: (–) numbers in the "Others" category implies cost recovery charges.
Source: OECD, country submissions.

Table I.2. **Direct payments of GFTs to marine capture fisheries sector in OECD countries, 2006 (USD million)**

	Total	Decommissioning	Vessel construction/ modernization	Unemployment Insurance	Disaster relief	Others
Canada	223	0	0	223	0	0
European Union	202	101	32			69
Belgium	7	0	0	0	0	7
Denmark	18	18	0	0	0	0
France	20	4	15	0	0	1
Germany	1	0	1	0	0	0
Greece	15	0	15	0	0	0
Ireland	20	15	1	0	0	4
Netherlands	16	16	0	0	0	0
Poland	26	0	0	0	0	26
Portugal	1	0	0	0	0	1
Spain	75	48	0	0	0	27
Sweden	1	0	0	0	0	1
United Kingdom	2	0	0	0	0	2
Japan	13	13	0	0	0	0
Korea	70	70	0	0	0	0
Mexico	5	0	0	0	0	5
Norway	2	1	0	0	0	1
United States	263	0	0	0	188	75
Total	**778**	**185**	**32**	**223**	**188**	**150**

Source: OECD, country submissions.

Figure I.14. **GFTs for selected countries**

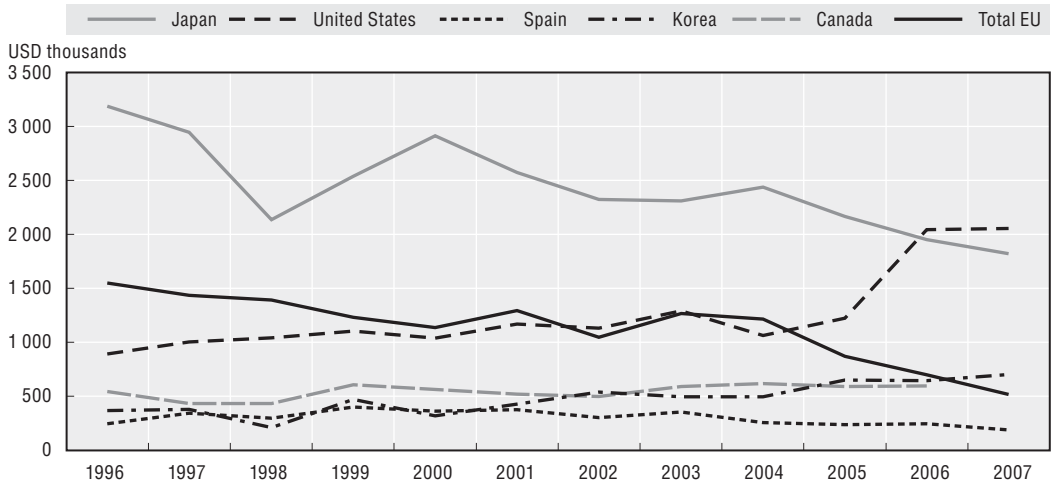
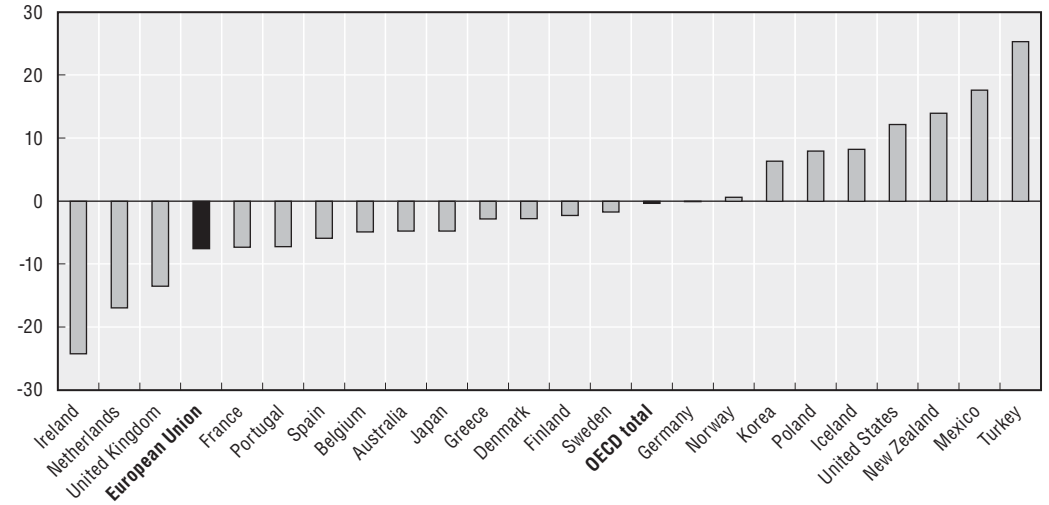


Figure I.15. **Average annual growth of GFTs, 1997-2007**



Recent developments in OECD fisheries policies

This section describes key developments in the fisheries sector that are of particular policy relevance for fisheries governance in OECD countries. The four selected policy issues are: fisheries and policy coherence for development; globalisation and fisheries; ecosystem approach to fisheries management: recent development and issues; and fuel prices and the fishing sector. Each of these areas points to the need for flexible and adaptive fisheries management frameworks that can address a multiplicity of societal, environmental and development issues without compromising both current and future sustainability.

Fisheries and policy coherence for development

In its broadest sense, policy coherence implies an overall state of mutual consistency among different policies, although levels of ambition are reflected in definitions ranging from policies that are "mutually supporting" to "not contradicting" (Hersoug 2006). The main challenge in the field of policy coherence for development (PCD) is to find policy coherence

between international development policies and national trade and sector policies. At the OECD, policy coherence for development has a unique multidisciplinary expertise that enables members to enhance understanding of the development dimensions of policies, particularly in an area such as fisheries. The OECD is well placed in this regard to constructively contribute to an integration of the development dimension into other policy domains thanks to its analytical capacity and horizontal method of working.

In the area of fisheries, neglecting the development dimension of policies will, in time, undermine the pursuit of other objectives, particularly in the areas of economic development, humanitarian and security concerns. Although few economies can boast of a GDP contribution by the fisheries sector higher than 5%, the picture alters when focus is directed to the regional or national level. Fish is a critical component in the diet of many people in developing countries, contributing a large share of total animal protein intake. In addition, more than 30 million people worldwide, almost all of them in developing countries (95%), rely directly on the fisheries sector for their livelihoods, with a further 10 million people dependant on aquaculture. OECD countries import around 60% of fish products from developing countries, meaning that policies affecting developing countries can originate from a number of sources, such as domestic fisheries management in OECD countries, international trade rules, trade liberalisation and aid.

The main challenge for PCD lies at the national level – with national policy making and implementation. The link between PCD and the political economy is a vital factor to consider when promoting policy coherence in the fishing sector. In particular, the following areas are potential sources of policy incoherence:

- The fisheries sector in OECD countries benefits from **domestic support** in the form of government transfers, totalling around USD 6 billion annually. Some of these supports could be distorting the competitiveness of developing country fisheries and its long-term sustainability. Subsidies aimed directly at expanding capacity have declined but many subsidies such as transfers for vessel modernisation continue to inhibit the contraction of fishing capacity in many countries, and have slowed the recovery of fish stocks. The recent rise in fuel prices has meant that subsidy policies could re-emerge.
- Access to OECD markets, accounting for 80% of world trade, may be constrained by **tariff and non-tariff measures**. The average WTO bound tariff rate applied by OECD countries for fish and fish products is 4.5%. However, this low average fails to account for the incidence of tariff peaks and instances of tariff escalation, where the tariffs on imports rise as the degree of processing in an item increases. In this respect, some developing countries may be penalised for adding value to products for export, restraining their own economic development.
- Trade in fish and fisheries products is also subject to **stringent regulatory policies**. These include sanitary and phytosanitary standards (SPS), packaging, traceability and labelling requirements. While such policies generally pursue legitimate public interests, they can also be unnecessarily protectionist. In retail supply chains, private standards may act as a market access barrier in some cases.
- Specific concerns raised by developing countries centre around a **lack of capacity**, including issues such as access to information, predictability and transparency; a lack of involvement in international standard-setting bodies and insufficient funds and knowledge to comply with requirements, particularly non-regulatory standards such as eco-certification.

- Trade liberalisation and improved access for developing countries to OECD markets alone cannot ensure economic growth and poverty reduction. Poor infrastructure and underdeveloped institutions prevent many countries from fully exploiting market access and developing countries therefore need assistance in order to partake more effectively in the rapidly changing world of fisheries. For a long time, **aid** was directed towards the development of an industrial fishing capacity and the construction of harbour infrastructure and processing plants. At the 2002 World Summit on Sustainable Development in Johannesburg, governments agreed that specific actions, such as strengthened donor co-ordination and partnerships between international institutions and bilateral agencies are needed to achieve sustainable fisheries and pro-poor growth. In recent years there has been a reorientation towards institutional support and integrated ecosystems for fisheries resource management. But diminishing aid overall to the fisheries sector makes coherent policies in other sectors even more significant.

In light of these concerns, actions by OECD countries could include:

- Adjusting their fishing capacity and methods to allow for sustainable levels of exploitation, introducing structural adjustment policies to provide transition to alternative activities.
- Rebuilding depleted fish stocks by adopting, implementing and enforcing fisheries management and governance regimes towards this end.
- Increasing developing country market access in general through capacity-building and to the value-added sector in particular through changes in international trading practices.
- Enhancing the transparency of fisheries access agreements with a more fully integrated development dimension.
- Focusing aid on key challenges, such as the development of science-based management systems and improved infrastructure in the post-catch sector.
- Working towards an early finalisation of the Doha round of trade negotiations which specifically includes aspects of relevance to relations with developing countries.

At the same time, developing countries have primary responsibility in ensuring that their policies are sound and support sustainable growth. Good governance, including the rule of law, accountability and transparency, and tackling corruption, are vital to development and play a critical role in the fisheries sector. While capacity building and improved scientific and technical knowledge are areas where development aid is having a remarkably positive impact, there is a continuing need for improved legal frameworks and development of adequate transport and post-catch infrastructure.

Potential incoherence arising from developing country policies includes:

- While women are the dominant actors at the post-harvest, processing and marketing stages, their earnings do not always reflect this fact. Increased recognition in developing countries' regulatory and investment policies of women's contribution to the fishing industry can help stimulate female entrepreneurship and economic growth.
- Developing countries also provide subsidies to the fisheries sector, particularly for fuel and tax reductions on the purchase of gear and equipment. These may be provided without sufficient controls on stock management or enforcement, allowing overexploitation of valuable fish stocks and inefficiencies in the local fishing industry.
- The long-term role of fisheries for sustainable development and growth needs to be taken into account to reconcile export development, food security and resource

preservation objectives. Compromises between different actors, such as small-scale and industrial fishers, have led to serious management problems in some countries.

- Developing countries could benefit from improved monitoring of fishing activities through combining resources, such as regional coalition building, as exemplified by the Southern African Development Community.

Developing countries, for their part could:

- Continue to improve governance, promote transparency, accountability and effective user rights, and tackle corruption.
- Improve scientific and technological knowledge, as well as assessment and sustainable management of fishery resources.
- Incorporate fisheries and aquaculture policies into national development plans to promote coherence across policy domains.
- Build capacity and advanced fishing technologies, develop effective quality and safety certification procedures and improve infrastructure, especially in the post-harvest sector.
- Establish regional co-operation to tackle illegal, unreported and unregulated fishing, through regional co-operation initiatives that pool resources where required.

Globalisation and fisheries

Over the past decades, global markets for fish and fish products have changed considerably. This is a continuous process in which fishers, fish farmers, traders, processors and retailers search for new opportunities linked to a reduction in their production costs as well as profitable investments. New products and production methods, fragmentation and outsourcing of production processes and changing value chains are characteristics of such developments.

In **harvesting**, globalisation is driven by the need to secure access to fish and to ensure a return on capital investments in vessels. In cases where domestic fisheries management frameworks have limited access to domestic resources, access to foreign or high seas resources is one way of deploying capacity, including through access agreements, joint ventures, setting up foreign operating companies, etc. Fishing on the high seas may also be a way to expand activities, for example fishing under and in compliance with a Regional Fisheries Management Organization (RFMO) regime. While fishing outside of domestic EEZs is still a marginal activity (high seas catches contribute less than ten per cent of global catches), many vessels do steam in and out of domestic EEZs in particular in areas where EEZs are contiguous and where stocks are shared. The principal concern for legal harvesting operators when seeking opportunities to globalise is associated with how secure fishing rights to the resources are and, more generally, the degree of stability of management frameworks.

Aquaculture continues to grow in importance for global fisheries markets. This is likely to continue as demand for fish is increasing, due in part to growing populations and rising incomes. Globalisation in aquaculture generally occurs through foreign direct investment in the sector (either directly by aquaculture producers, or by expansion from other parts of the value chain, such as feed processors) and through outsourcing of production processes. Aquaculture companies globalise in order to increase profits, gain from economies of scale and to control inputs such as feed. As for the geographical location of production, differences in production and transport costs are also important parameters.

Globalisation in the **processing** sector is the result of a search by processors for profit, stability and security in raw material supply and quality, while simultaneously seeking opportunities to reduce costs against a backdrop of increasing competition. It takes place along three main paths: first, outsourcing of production; second, expansion of a company's base (such as establishing companies abroad, mergers and acquisitions); and third, the global sourcing of raw material. The regulatory environment in the processing sector is primarily concerned with trade measures, seafood safety standards and traceability, which may pose challenges for developing countries in some cases.

In the **retail** sector, supply structures for the sourcing of fish are shifting to fit the demands of retailers for volume, quality and consistency from suppliers. The retail sector is experiencing both expansion and consolidation, and is a key point of sale for fish. Retailers are vulnerable to issues that may challenge their reputation and are increasingly held accountable for local and global needs and concerns, such as social responsibility, environmental impact and sustainability. Brand value to retailers is extremely important, particularly in markets where retailers are highly concentrated and where brands play a significant role. As a result, it is often the retailers that are the driving force in standard-setting and in the promotion of sustainability labels, sometimes with detrimental effects for developing countries.

Policy challenges raised by the globalisation of the fishing industry

At the OECD it is generally recognised that open economies underpin growth and improvements in material living standards. Globalisation in the fisheries sector contributes to such effect through improved access by consumers to a diverse range of fish on the menu, and, all other things being equal, at a lower price. Concurrently, companies can use resources more efficiently, exploiting comparative advantages and scale effects. However, further efficiencies in the use of fisheries resources, a liberalised trading regime and meeting the risks that can be associated with the globalisation process, will further improve outcomes.

Nevertheless, a number of policy challenges associated with globalisation remain. In the fishing sector, the key to meeting these challenges lies in developing and implementing fisheries management frameworks that can accommodate globalisation, without compromising the sustainability of the resource.

There are potential important benefits of having **fleets** operating internationally, including better use of investments, responding to seasonality in fishing and exploiting comparative advantages. However, for policy makers, challenges exist in the areas of access to resources, domestic fisheries management settings including how overcapacity is dealt with, and high seas governance. At a very general level, the quest for increased access to resources makes the world's fisheries a shared problem that requires global action. In this respect, developing and developed countries need to reassess domestic fisheries management frameworks and the developmental needs of their fisheries sector while strengthening fisheries governance and associated institutions. Policy makers should begin to eliminate fleet overcapacity and subsidies for fleet operations; provide development assistance and capacity building for developing countries, particularly in the area of improvements to governance; and ensure that fisheries access agreements are coherent with other policy domains.

Policy makers also need to ensure that **aquaculture** can benefit from the opportunities globalisation brings, while reducing the potential hazards (mainly environmental externalities) associated with fish farming. This may require regulation and standard setting in a number of areas, including the environment, spatial planning, governance of the industry, food safety and animal health and research. Aquaculture strategies and action plans can make an important contribution in this respect to ensure sustainable production processes, market access and the tradability of products. However, only some countries heavily engaged in aquaculture have developed national plans and more work towards developing and implementing aquaculture plans is required. In developing countries, small-scale producers may require access to finance, capacity-building and technology transfer to be able to meet the requirements of export markets.

Policy challenges related to market access and the capacity of developing countries to meet increasing numbers and stringency of standards to ensure food safety and quality are particularly important for the **processing industry**. Both developed and developing countries are affected by tariff escalation and there is a need for substantial progress in reducing tariff and non-tariff barriers, and ensuring technical assistance and capacity building to developing countries to respond to the proliferation of standards. Finally, as expansion through acquisitions and buy-outs increasingly feature in strategies by large investors, a more transparent and deregulated investment climate would help ensure that the opportunities brought by globalisation are realised.

The key policy challenge in relation to the **retail** sector is how to respond to the proliferation of private standards. In light of the complexity regarding the number of and relationships between standards, policy options include the harmonisation (or equivalence) of standards or the provision of minimum standards (to provide a minimum level playing field), and to ensure truthfulness in marketing. In this respect, the role of public policy may also be capacity assistance to develop country producers in order to help them meet the standards that would allow them to benefit from globalisation.

Reaping the benefits of globalisation across the value chain

A characteristic of the benefits of fisheries globalisation is that they are shared among many: welfare gains benefit consumers, processors, and distributors amongst others, while remaining fairly non-tractable. Conversely, the costs of fisheries globalisation, most often in terms of structural adjustment and overfishing, are fairly easy to identify and tractable, are more local in nature and are focussed on a few easily identifiable groups *e.g.* fishers and fish processing workers. To garner further benefits from globalisation, it is important to ensure sustainable and responsible fishing while concurrently implementing fisheries management models that provide flexibility for fishers and resilience for fishing communities.

The key to setting a future agenda in which fisheries can thrive and benefit from the opportunities that globalisation can offer, is a more resilient national and international governance framework for fisheries management, trade, investment and service provision, and for public health issues. Against the limited public resources available, prioritisation of policy action and international co-operation in the following areas are crucial:

- As globalisation advances, the international governance architecture for fisheries and aquaculture products faces challenges; a fresh look at the present governance frameworks combined with increased speed of national implementation of already existing provisions is needed. This concerns, in particular, high seas governance and IUU fishing. At the same

time, as national fisheries sectors adapt to new market realities, structural adjustment policies that bring into play a broader range of policy areas than just fisheries will be needed. This includes, for example, retirement, social policies, education and re-training that can effectively assist fisheries employment to new occupations.

- In light of increasing demand for fish and fish products, countries should actively develop and implement national aquaculture plans. Such plans can benefit the further development of aquaculture in a sustainable way and provide a more vigorous contribution to globalisation.
- Developing countries are an increasingly important factor in the internationalisation of fisheries markets. Transfer of technology and development assistance (in particular management knowledge) from developed to developing countries is "help to self-help", as OECD markets will increasingly become dependent on supplies of fish and fish products from outside sources.
- The increasing integration of markets, combined with the free flow of fish and fish products across international borders, may spread new pathogens and diseases. HACCP and traceability systems provide the best guard against such risks. Private companies, in particular in processing and retailing, which have a major stake in ensuring that their reputation is not compromised, have undertaken a major effort in ensuring that these risks are contained. Concurrently, there is a need for more international co-operation to ensure that private standards are not an unnecessary *de facto* market access barrier.
- As globalisation provides opportunities to relocate fleets and processing facilities or outsource processing to other countries, there is a potential for some to seek shelter in countries with low or no environmental and social standards, including a lack of respect for international fisheries commitments. It is important to recognise that globalisation is not the root cause of poor standards; it is the standards themselves that may not reflect international expectations and the ability and willingness of national governments to enforce those standards. Acknowledging that some fishing companies will seek to profit from countries offering low standards and that a global solution may be difficult to reach, more concerted and collaborative international action may be required to coerce certain countries into implementing and respecting international labour, social and environmental standards.

Growth through more liberal trading, investments and service regimes is important for overall welfare. It can be further sustained by sustainable and responsible fisheries. Global interdependence is constantly on the move and hence new challenges and opportunities will regularly arise. For fisheries policy makers, staying ahead of this game is an important challenge.

Ecosystem approach to fisheries management: recent developments and issues

Development of EAF concept and guidelines

The concept of an Ecosystem Approach to Fisheries is not new, but has been developed through a number of existing conventions, conferences and agreements, starting with the 1982 United Nations Convention on the Law of the Sea (UNCLOS), which provided a legal framework for the management of marine living resources. UNCLOS has played a significant role in stimulating international efforts to manage the resources in a sustainable manner. Agenda 21 of the 1992 United Nations Conference on Environment and Development also takes an ecosystem approach to ocean management. Furthermore,

EAF principles have been embodied in the Code of Conduct for Responsible Fisheries adopted by the Food and Agriculture Organization (FAO) in 1995 (FAO 2003).

The EAF concept was more explicitly advanced in the Reykjavik Declaration on "Responsible Fisheries in the Marine Ecosystem", issued in October 2001. The declaration requests that the FAO prepare guidelines for best practices to introduce ecosystem considerations into fisheries management. In response, the FAO held an Expert Consultation on Ecosystem-based Fisheries Management in September 2002. The Consultation decided to adopt the term Ecosystem Approach to Fisheries instead of other terms such as Ecosystem-Based Fisheries Management (EBFM[6]), in order to include a broader range of ocean activities (FAO 2002). In addition, the Plan of Implementation of the World Summit on Sustainable Development (WSSD) in 2002, acknowledging the Reykjavik Declaration, encouraged nations to apply the ecosystem approach to fisheries management by 2010.

The FAO published technical guidelines (No. 4, Supplement 2) in 2003 as one of the organisation's Technical Guidelines for Responsible Fisheries series. In the guidelines, the FAO describes EAF as striving to balance diverse societal objectives by taking into account the knowledge and uncertainties regarding biotic, abiotic and human components of ecosystems and their interactions, and applying an integrated approach to fisheries within ecologically meaningful boundaries. The purpose of EAF is to plan, develop and manage fisheries in a manner that addresses the multiplicity of societal needs and desires, without jeopardizing the options for future generations to benefit from a full range of goods and services provided by marine ecosystems (FAO, 2003).

It is important to note that there are different views on how to understand the role of EAF in the broader context of ocean governance. Some argue that an ecosystem approach to fisheries management can be a first step toward a "true" ecosystem approach (EA) to marine resource management or Ecosystem-based Management (EBM). This view considers EAF or EBFM as a component of EBM. In this regard, EAF is necessary but often not sufficient for marine resource management as a whole. However, managing individual sectors, fisheries for example, is still useful because managing the whole ecosystem cannot always be achieved. Others consider EBM as a prerequisite to EAF or EBFM, emphasizing the objectives of fisheries management cannot be achievable without EBM. However, even in this case, there may be instances where fisheries are dominant and therefore big improvements can be made through EAF or EBFM alone (MEAM 2009). In summary, these arguments highlight the importance of the approach to multi-species management rather than single-species management and multiple marine resource management rather than individual sector management.

National, regional and international efforts to implement EAF

EAF has broadly been accepted as a reference framework for fisheries management, although the principles and operational implications may not be fully grasped at a grass-roots level (FAO, 2007a). In fact, intensive efforts have been made in recent years to promote the implementation of EAF. In the following section, notable examples of efforts at the national, regional and international level are introduced.

At the national level

In the United States, an Ecosystem Principles Advisory Panel submitted a report to Congress in 1999, recommending the US government to apply ecosystem principles, goals and policies to fisheries management and to develop Fisheries Ecosystem Plans (FEPs).

Moreover, Strategic Guidance for Implementing an Ecosystem-based Approach to Fisheries Management was issued by the Ecosystem Approach Task Force in 2003. In response to these recommendation and guidance, several FEPs have been implemented, including the Chesapeake Bay Fisheries Ecosystem Plan, in place since 2000. Other examples include the South Atlantic Fishery Ecosystem Plan and the Aleutian Islands Fishery Ecosystem Plan. Five draft Western Pacific Fishery Ecosystem Plans have been completed while pilot projects in New England, the Mid-Atlantic and the Gulf of Mexico are on-going.

Australia has been one of the leading nations making good progress in implementing many elements of the ecosystem approach in managing fisheries. In December 2005, the Australian government launched "Securing our fishing future", which explicitly linked to a transition toward ecosystem-based fisheries management. Specific elements that have been integrated include: implementing formal harvest strategies for target and by-product stocks in every fishery; undertaking ecological risk assessments and developing a risk management response; implementing large scale spatial management; enhancement of fishery data collection; and enhancing liaison and communication capacity (Nordic Council of Ministers *et al.*, 2006).

In the United Kingdom, the Department of Environment, Food and Rural Affairs (DEFRA) is funding a pilot study of EAF in the Celtic Sea and western Channel. This project is aimed at developing and testing a management system for implementing EAF. This five year project, which stated in June 2007, is being carried out by the Centre for Environment, Fisheries and Aquaculture Science and the Universities of Wales, Newcastle, Exeter and York. DEFRA plans to apply lessons learned from the pilot project to other areas.

Norway has also adopted ecosystem approaches to ocean management and established a management plan for the Barents Sea, which is in the implementation stage (Nordic Council of Ministers *et al.*, 2006). Norway is also at present establishing a management plan for the Norwegian Sea. Furthermore, Norway has adopted a new Act relating to the management of wild living marine resources as from 1 January 2009. The purpose of the Act is, among other things, to ensure sustainable and economically profitable management of wild living marine resources and genetic material derived from them. The Act also states that special importance shall be given to a precautionary approach in accordance with international agreements and guidelines and an ecosystem approach that takes into account habitats and biodiversity, when managing living marine resources. The Institute of Marine Research has been reorganised to take this into account. In addition, the Act introduces a new principle for sustainable management in the legislation relating to living marine resources in Norway. Section 7, Paragraph 1 of the Act thus states that "The Ministry shall evaluate which types of management measures are necessary to ensure sustainable management of wild living marine resources". The Act puts an obligation on the Ministry to evaluate the living marine resources on a regular basis and to adopt relevant management measures.

In Canada, the *Oceans Act* (1997) provides a legislative basis for ecosystem management and the precautionary approach, while the Oceans Strategy in 2002 and the Ocean Action Plan in 2005 describe details of an ecosystem approach to the management of human activities in the oceans. Specifically, the *Oceans Act* has enabled integrated management, through which Canada has developed a network of five Large Ocean Management Areas (LOMAs). For each LOMA, an Ecosystem Overview and Assessment report has been prepared with the goal of producing ecosystem objectives. In addition,

Canada is developing a Resource Management Sustainable Development Framework that will address the need to factor in ecosystem considerations when managing fisheries, as part the country's Fisheries Renewal agenda. In 2007, Canada published a science framework for applying the ecosystem approach to integrated management for fisheries, oceans, aquaculture and species at risk management.

At the regional level

EAF has been implemented at the regional level as well. One example is the Benguela Current Large Marine Ecosystem (BCLME) project, which started in 2004 through collaboration between the management agencies of three countries in the region (Angola, Namibia and South Africa) and the FAO. The main objective of the project was to investigate the feasibility of EAF in the region by examining the existing issues, problems and needs related to EAF and considering different policy options to achieve sustainable resource management (FAO, 2007a). In addition, the formation of the Benguela Current Commission (BCC) in 2006 has facilitated the co-ordinated efforts of the countries involved to address broad issues such as recovery of depleted stocks, restoration of degraded habitats and control of coastal pollution. Further development and implementation will continue over the next five years, supported by the BCC. The Commission will extend its focus beyond fisheries management and therefore implement EAF plans in broader context of an ecosystem approach to ocean governance (MEAM, 2009).

RFMOs are expected to play an important role in managing fishery resources beyond national jurisdictions. An FAO delegate pointed out in a UN meeting in 2006 that several RFMOs have adopted not only the concept of EAF (6 bodies) but also specific management measures such as bycatch reduction measures (6 bodies) and habitat protection and Marine Protected Areas (2 bodies) (UN, 2006).

One notable example is the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), which has been pioneering and leading the way, especially when it comes to assessing performance and reviewing fisheries management outcomes against ecosystem-based objectives (Grieve and Short, 2007). In addition, the Convention embraces the precautionary approach and the need to consider ecological links between species as part of the management plans. Further, an adaptive management system for Antarctic marine living resources has been developed based on small scale management units. However, the experience of the CCAMLR also reveals that implementing EAF is a long process and it requires substantive discussions and agreements on the management systems and measures among member countries (MEAM, 2009).

The European Commission is also working towards implementation of EAF through various instruments in the region. The Marine Strategy Directive of the Commission recognizes EAF as one of the most important issues in the European context (Cochrane, 2007). Another effort can be found from the Regional Advisory Councils (RACs) established by the Commission. For example, the North Sea Regional Advisory Council, the first RAC established in 2004, has incorporated an ecosystem based approach and precautionary principles into its advice (Hawkins, 2007). In addition, the European Parliament adopted a report on the Commission communication "The role of the Common Fisheries Policy in implementing an ecosystem approach to marine management" in January 2009. The report recognizes that an EAF provides the best basis for a global management and decision-making system which takes into account all of the

stakeholders and elements concerned, their requirements and needs, as well as future effects on the system and its interaction. It further emphasises the need for the ecosystem approach to fisheries management to lead to a dynamic and flexible system of management, mutual learning and research (European Parliament, 2009).

At the international level

The FAO held an Expert Consultation on the Economic, Social and Institutional Considerations of Applying the Ecosystem Approach to Fisheries Management in June 2006. Participants of the meeting recommended that the FAO publish technical guidelines on economic, social and institutional aspects of EAF, and provided substantial guidance on the background paper prepared by the FAO Secretariat. These efforts have been incorporated into a FAO technical paper,[7] published in 2008. The paper describes the importance of understanding human dimensions, *i.e.* political, cultural, social, economic and institutional aspects, in the process of EAF implementation. It also provides guidelines to facilitate the implementation of EAF, which includes setting appropriate boundaries, scale and scope; assessing impacts resulting from EAF management with regard to potential costs and benefits from social, economic, ecological and management perspectives; utilizing incentive mechanisms; and exploring external financing (Young *et al.*, 2008).

The United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea, at its 7th meeting in June 2006, discussed "ecosystem approaches and oceans" issues as a major theme. The meeting was composed of four sections: Demystifying the concept and understanding its implications; Moving to implementation: Implications for enabling elements; Lessons learned from implementation of the ecosystem approach at the national level in developed and developing States; and International co-operation to implement ecosystem approaches at the regional and global levels. The summary record was submitted to the UN General Assembly providing results of findings of the meeting on various current issues that should be addressed by the international community (UN, 2006).

The Bergen Conference on Implementing the Ecosystem Approach to Fisheries, organized by the Nordic Council of Ministers in co-operation with the governments of Iceland and Norway and the FAO, was held in September 2006. The aims of the conference were: to review concepts and address implementation issues related to applying the EAF; to exchange experiences made and constraints encountered so far; and to identify strategies and best practices that will facilitate further implementation in practical fisheries management (Nordic Council of Ministers *et al.*, 2006). The conference discussed concepts, strategies, knowledge base and tools for managing fisheries as part of the ecosystem approach. Experiences and lessons were shared through case study presentations.

Ecosystem management was one of the major themes at the 14th Biennial International Institute of Fisheries Economics and Trade (IIFET) conference held in Vietnam in July 2008. It was observed in the conference that many countries had adopted EAF as an explicit goal of their fisheries policies and strategies but only a few had been able to put the concept and principles of EAF into practice (*Fishing News International*, November 2008).

It is worth noting that NGOs have been involved in facilitating the implementation of EAF. In 2002, the World Wildlife Fund (WWF) published policy proposals for ecosystem-based management in marine capture fisheries.[8] The proposals describe four principles,

six elements for successful implementation, and twelve operational components, or steps, for the implementation stage, which are useful for those involved in ecosystem-based management in fisheries.

WWF also published the result of 12 case studies from its marine eco-region projects in 2007.[9] Lessons learned from these case studies include the need to develop outcome oriented objectives for management activities; to delineate boundaries for the management system including ecologically defined spatial boundaries and relevant ecological and socio-economic factors influencing the productivity of the resource and integrity of the ecosystem; and to involve stakeholders in all aspects of management (Grieve and Short, 2007).

Policy challenges in implementing EAF: eight issues to tackle

This section draws a number of policy challenges that have been discussed in various meetings and publications mentioned above, particularly from social, economic and institutional perspectives.

The main questions here are whether the concept of EAF has been put into practice, whether the efforts have been successful, and what the obstacles to implement EAF are. These questions can be broken down and analyzed by using a political economy of reform framework. From a political economy point of view, there are several factors to encourage implementation of EAF, including recognition of shortcomings of single-species management approach and international commitments and agreements such as the Reykjavik Declaration, the WSSD request, FAO guidelines, etc. However, there are other obstacles and constraints for implementing EAF because the implementation inevitably involves redistribution of costs among different groups and therefore resistance from those who bear the costs may be expected. In the following section, some examples of the key policy challenges are discussed.

Implementation: Review of existing literature and reports from national, regional and international organisations reveals that EAF has been adopted as an appropriate and necessary framework for fisheries management by many national governments and international organisations; however, there have been only a limited number of programs or national policies where the concept and principle of EAF has clearly been embedded. Many experts claim that actual implementation of EAF is harder than simply expressing intentions to adopt the ecosystem approach to fisheries management.

Clearer definition: Despite international efforts to clarify the concept of EAF, different concepts and terms are used in different contexts, contributing to a lack of clarity and confusion. Therefore, provision of clearer definitions and explanations of terminology have been identified as an essential step to avoid misunderstandings in practice (Nordic Council of Ministers *et al.*, 2006). However, it is generally accepted that the lack of a clear definition should not be a critical obstacle to EAF implementation.

Principles vs. operational objectives: A group of experts comments that although implementation of EAF is underway in many countries and regions, attempts to make these concepts operational based on clearly specified ecosystem guidelines and standards, are still in an early stage (Marasco *et al.*, 2007). Therefore, there is a need to subdivide higher-level concepts and principles into operational objectives, to develop indicators and reference points, to develop decision rules on applying management measures and to monitor and evaluate performances (Parson, 2005).

Uncertainty and lack of data: The current knowledge on individual environmental and ecological factors and interactions between human activities and ecosystem elements is limited. This has been considered an obstacle for the implementation of EAF. However, EAF can be implemented even if little information is available. Lack of information cannot be an excuse since an ecosystem approach is neither inconsistent with nor a replacement for current fisheries management. This means that an ecosystem approach should be adopted as an incremental extension of current fisheries management approaches. What is necessary when dealing with uncertainty is a precaution because poor knowledge entails limited ability to predict the impacts of management measures (UN 2006; Nordic Council of Ministers *et al.,* 2006; Marasco *et al.,* 2007; Pitcher *et al.,* 2008). Therefore, more research is needed through standardized data collection methods while better co-ordination and use of current knowledge and resources in different sectors are required.

Costs and benefits: Among economic elements of EAF, assessment and distribution of costs and benefits should be taken into account in applying EAF, since the implementation of the ecosystem approach inherently leads to the redistribution of costs and benefits. The FAO technical paper presents a list of ecological, management, economic and social costs and benefits with various methodologies to measure them. With respect to the distribution of costs and benefits between fishers and between fishers and society, it is important to note that distributional impacts can occur not only across stakeholder groups at a given point in time, but also across time (*e.g.* between generations) and across scales (Young *et al.,* 2008).

Stakeholder participation: Stakeholder participation should be ensured from an early stage. However, it is not always easy to identify stakeholders – not only within the fisheries sector but also across different sectors – and to figure out their needs and interests. It is even more difficult to reconcile conflicting stakeholder interests. Nonetheless, stakeholder involvement should be strengthened since it is important to implement fisheries management measures effectively and at lower cost, as well as to increase stakeholder compliance. Therefore, there is a need to develop new approaches to facilitate stakeholder participation, such as an integrated advisory process (UN 2006; Nordic Council of Ministers *et al., 2006*).

Capacity building: There is a need for capacity building through awareness programs and direct technical assistance to help developing countries build their national capabilities to achieve ecosystem management (Pitcher *et al*., 2008).

Institutional frameworks: Implementation of EAF may require changes in institutional frameworks, including rules and regulations governing fisheries and organisational arrangements involved in ecosystem management. In addition, EAF calls for close co-ordination, consultation, co-operation and joint decision-making between fisheries management agencies and agencies managing other sectors that are related to fisheries, as well as between different fisheries in the same geographical region (FAO, 2005). However, it has been pointed out that some co-ordination and co-operation is unsuccessful in many countries and this is an impediment to EAF implementation.

Fuel prices and the fishing sector

Fuel prices rose significantly between 2005 and mid-2008 (Figure I.16) with the crude oil price increasing by around 200%. The price rose particularly sharply in 2008, reaching a peak in July before declining rapidly in the following months. The cost of marine diesel rose

and fell in line with the crude oil price[10] and had a significant impact on the operating costs of certain segments of the fishing fleets in both OECD and non-OECD countries. High fuel prices led to widespread protests by fishers in many countries in mid-2008, with marches, strikes, blockages of ports, and civil unrest. The protests attracted a great deal of media attention and generated considerable pressure on governments to develop policy responses to alleviate the adverse effects on the industry.

While oil prices have declined in recent months from the high levels seen in mid-2008, it is likely that oil prices will once again increase to high levels in the future. It is, therefore, important to ensure that the fishing sector faces a policy environment that allows it to respond and adapt to changed economic conditions, both with respect to fuel prices as well as to broader economic conditions. This section reviews the impacts of fuel price rises on the sector and the policy responses by OECD governments, and examines the policy insights to be learned with respect to two key issues that affect the industry's ability to absorb such price shocks: the scope for increasing fuel efficiency; and the ability to pass on cost increases to processors, retailers and consumers.

The impact of fuel prices

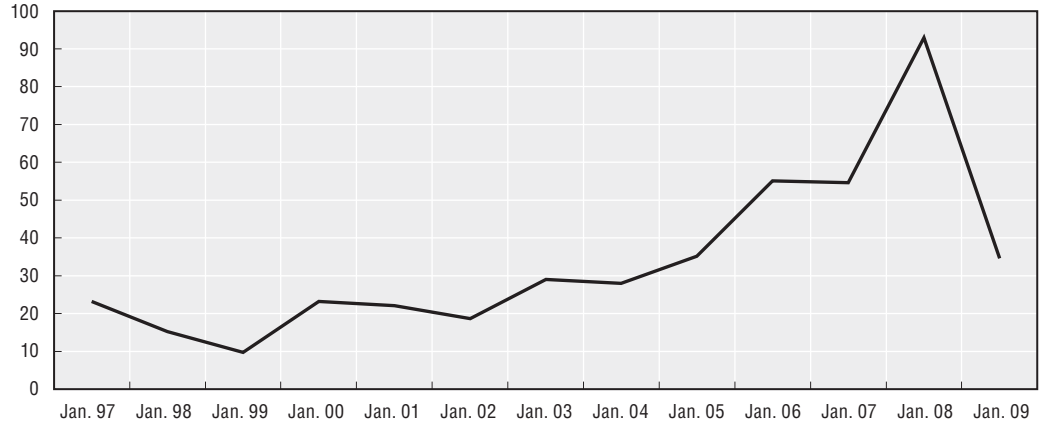
The impact of fuel prices on the cost of fishing varies significantly according to the type of gear used, target species, age of the vessel and engine, and skipper behaviour. Vessels using towed gears (such as beam trawlers) tend to have engines with large engine power and are heavy users of fuel. Such vessels drag gear along the ocean floor, further reducing energy efficiency and increasing fuel costs. Trawlers targeting pelagic species and shrimp also tend to be heavy users of fuel due to the distances they have to travel in search of their catch and their use of towed gear. In contrast, the fuel intensity of vessels using passive gears (such as traps, gillnets, and long-lines) is significantly less given the nature of their fishing operations. For example, data from the French fleet indicate that *chalutiers de fond exclusifs* (16-24 m) typically consume around 1 600 litres of fuel per day at sea, while trawlers (16-24 m) consume around 700 litres per day and *dragueurs polyvalents* (< 12 m) consume around 85 litres per day (Planchot and Daures, 2008).

The intensity of fuel use by different segments of the fleet is reflected in the relative importance of fuel costs in the total operating costs of fishing vessels. For example, Iceland's coastal vessels less than 10m in length have fuel costs that measure 3% of operating costs. For the UK's North Sea beam trawlers (over 300 kW), fuel costs amount to 78%, demonstrating that the relative importance of fuel costs varies considerably between countries, vessels and types of fishing.

The impact of increasing fuel prices will therefore also vary considerably, both between fleet segments and between countries. Detailed data on costs and earnings are not available at this stage to evaluate the effect on the economic performance of vessels in 2008. However, there is anecdotal evidence that a number of fleets are staying in port rather than putting out to sea as the increased fuel costs outweigh the expected revenue from fishing. In addition, fishermen are paid on a share basis in many countries, usually a percentage of the value of landings after costs of fuel have been subtracted. So when the fuel price rises, part of the cost burden is born by the crews in the form of decreased income (if the price of fish does not rise commensurately).

In general, the economic profitability of many segments of the fishing fleets across OECD countries has been poor for a number of years due to the accumulated effects of

Figure I.16. **Weekly average crude oil prices (USD/barrel)**



a) Weekly all countries spot price FOB, weighted by estimated export volume.
Source: US Energy Information Agency (2008).

excessive fishing effort and overcapacity. The economic impact of price shocks (as well as fluctuations in environmental conditions) will be greater on those fleets that are already under economic pressure due to overcapacity and overfishing. This indicates a lack of flexibility and resilience in such fleets and signals a need to restructure the particular fleet segment or change the fisheries' management arrangements to address fundamental problems of overcapacity and overfishing. In addition, market prices for fish have generally not risen to cover increasing costs in recent years due to a range of factors (discussed further below).

Policy responses

The policy responses of OECD governments to the fuel price increases focused on either "business as usual" or accelerating much-needed structural reform in order to develop a more robust and flexible fishing sector. Many governments viewed fuel price increases as a normal part of the business conditions that affected all segments of the economy, not just the fishing sector. For example, Norway, New Zealand, Canada, Australia, the United States and Iceland made no policy changes and provided no special assistance to the sector in response to the fuel price increase in 2008. For these governments, the fishing sector was expected to respond to the economic fluctuations as appropriate. In general, fishing companies in these countries were able to avail themselves of the normal policy measures available to businesses in general in times of economic downturn (such as business planning advice, unemployment benefits, etc.).

In addition, many governments pointed out that the fishing sectors in OECD countries (and in many non-OECD countries) already receive a fuel subsidy in the form a tax exemption on diesel used in fishing operations.[11] Such exemptions mean that the sector does not face the same price for diesel as that faced by most other sectors in the economy. The value of the exemption is difficult to calculate as it relies on estimating the demand responsiveness of different segments of the industry. However, a recent study has estimated the value of the fuel tax exemption for the OECD countries to be around USD 2.4 billion a year, and for the global fishing fleet to be around USD 6.4 billion a year (Sumaila *et al.*, 2006).

In some other OECD countries, governments responded with assistance packages for the fishing sector, primarily aimed at helping the industry to undertake restructuring in

the face of the changed economic conditions. The type and targeting of assistance varied from country to country, with some providing broad financial support to all segments of the industry, while others tailored their assistance to meet specific objectives and criteria. A number of countries provided or extended temporary aid to deal with short term economic hardship.

The most broad-ranging policy response was put in place in the European Union. In July 2008, the European Union responded to the fuel price issue by agreeing to a package of measures focused on promoting the restructuring of those segments of the European fishing fleet which are most affected by fuel price increases and providing short-term support to fishers who undertake restructuring (European Commission 2008b, 2008c). The package also aimed at reducing fuel dependency in the sector and enhancing market measures to help fishers raise the first-hand sale value of their fish. The objectives and structure of the package reflected concerns that the economic viability of many segments of the EU fisheries sector, and hence their ability to absorb economic shocks such as fuel price increases, is jeopardised by overcapacity and excessive fishing effort (European Commission, 2008a). The package therefore focused on achieving fundamental structural reform in the most economically vulnerable fleet segments.

The package of measures included:

- Emergency measures, consisting of temporary cessation aid to cover the crew costs and fixed costs of vessels where there is an explicit commitment to undertake restructuring within six months;
- A range of restructuring measures under one or more national Fleet Adaptation Schemes focused on the fleet segments that are relatively more fuel-intensive, including increased aid for permanent and temporary cessation, increased aid for modernisation schemes for gear and engine replacement, and greater flexibility in decommissioning assistance;
- Additional horizontal measures including allowing increased public assistance under the European Fisheries Fund (EFF) for fuel-saving equipment, energy audits, restructuring plans, early retirement, and pilot projects on fuel-saving technologies;
- Market measures under the EFF and the Common Organisation of the Market to increase the value of fish at first sale, including the setting up of a price monitoring system and additional financing for stakeholder-led initiatives; and
- Measures designed to facilitate the use of the EFF by the national administrations, to improve the ability of member states to take fast and targeted action.

The total value of the emergency assistance needed by the sector was estimated to be in the area of EUR 2 billion. Much of the funding (EUR 1.4 billion) would come from the current budget of the EFF operational programs, which will be re-programmed in order to transfer allocation from the other priority axes towards the specific “fleet” axis. The European Commission also expressed its readiness to consider making additional funds available for the restructuring process under certain conditions. However, no additional funds have been allocated in 2008 or 2009. In addition, the Commission is examining possible changes to the de minimus rules for the fisheries sector and social aid in the form of decreased social security contributions. In particular, the European Commission has proposed to analyse whether an increase in the amount of de minimus aid that can be provided by EU member states from EUR 30 000 per firm over three years to EUR 30 000 per vessel, with an overall cap of EUR 100 000 per enterprise would be justified. (European Commission, 2008a).

In addition to the EU-wide policy package, the French Government implemented a sustainable fisheries plan worth EUR 310 million of national funds over two years to support the fishing industry and, in particular, to help offset increased fuel costs.

The Scottish government provided GBP 29 million in funding over the next three years to help the Scottish fishing industry adjust to higher fuel costs (Scottish Government, 2008). The funds will be used to: introduce innovative fuel efficiency measures to cut fishing vessels' fuel consumption and running costs; improve the marketing of Scottish seafood; and reduce some non-fuel costs (such as e-logbooks) and address the issue of discards. The money for the initiative is coming from the European Fisheries Fund (GBP 19 million) and the Scottish Government (GBP 8 million).

Korea introduced an economy-wide assistance package valued at KRW 10.5 trillion (USD 9.8 billion) aimed at low-income earners and self-employed small business owners as a response to the increasing fuel price. The package of measures included increased expenditure of KRW 254 billion (USD 254 million) on decommissioning of fishing vessels affected by the rising oil price. Under the scheme, an additional 1 900 vessels will be scrapped over the next few years (including 1 500 coastal vessels and 400 offshore vessels).

In some countries, state (rather than federal) governments are providing assistance. In the United States, the state government of Massachusetts has announced a USD 13.4 million relief package for the state's fishing industry in response to the high fuel prices (*WorldFish Report*, 2008b). The assistance will be available for fish permit holders to pay for the upkeep of commercial fishing vessels across the state. In Australia, the Queensland state government provided AUD 8 million (USD 7.5 million) in assistance to the sector to assist with rising fuel prices (*Intrafish*, 12 June 2008).

Increasing fuel efficiency in the fishing sector

One of the keys to reducing the vulnerability of the fishing sector to high fuel prices is to increase the fuel efficiency of fishing operations. Fishing is a major user of fuel with the global fishing industry estimated to consume approximately 50 billion litres of oil a year, accounting for around 1.2% of global oil consumption (Tyedmers *et al.,* 2005). Increased fuel efficiency in the sector is driven by three factors: technological change, behavioural change, and prices.

First, there is an increasing investment in research on technological innovations to increase fuel efficiency. For example, the development and extended use of more fuel efficient engines is a key step towards improving fuel efficiency. The use of propulsion systems incorporating high efficiency nozzles and optimised propeller blades has been trialled and introduced on a number of vessels. Similarly the development of new gears and techniques, particularly for beam and bottom trawlers, can significantly reduce operating costs. The use of outrigger trawls to replace beam trawls can result in fuel savings of 40-70%, while changes towards more hydrodynamic beam shapes can lead to fuel savings of 10-15%. Similarly, the use of by catch reduction panels can lead to fuel savings of 20%, as well as having a reduced impact on the benthos and a cleaner catch that is less costly to sort and process on deck. Research on the use of very large diamond mesh trawls for pelagic trawlers to reduce gear drag indicates that fuel savings of up to 30% can be achieved. The use of bio-diesel has been trialled in several Scottish fishing vessels, while a purse seiner incorporating computer-operated sails is due to be launched in Norway.

Second, behavioural change often works in partnership with technological change to increase the scope for improving fuel efficiency. Slower steaming speeds can lead to significant fuel savings: engines are usually at their most efficient when operating at 80% of the full throttle revolutions per minute and burn 70% of the fuel and achieve 90% of the speed compared to steaming at full throttle (*Seafish*, 2008). Similarly, slower trawling speeds reduce gear drag and improve fuel efficiency with little or no impact on the efficiency of the catch. The focus of vessel skippers on fuel costs can be increased by the use of fuel consumption meters which will help monitor fuel usage and the conduct of energy audits on-board vessels. In addition, improved engine, vessel and hull maintenance and monitoring can improve fuel efficiency.

Third, higher fuel prices also provide a strong incentive for fishers to undertake measures to increase fuel efficiency, when not negated by subsidies. Indeed, this is demonstrated by response to the recent high fuel prices which has seen increased efforts to improve technology and change skipper behaviour in those parts of the fishing industry that are particularly vulnerable to fluctuations in oil prices.

It is unclear at this stage if the rapid decline in fuel prices has stalled the pressure for improving the fuel efficiency in the fishing sector. Much depends on the expectations of individual fishing operators about the future path of fuel prices and the impact of the various restructuring and fuel efficiency plans put in place by the various governments. The global economic crisis and the resulting impact on fish prices and trade may also reduce the willingness and ability of fishers to undertake significant changes to become more flexible and adaptive to future fuel price increases. Incentives generated by fisheries management systems, including both market-based and community-based co-management systems, can play an important role in inducing changes towards energy efficiency.

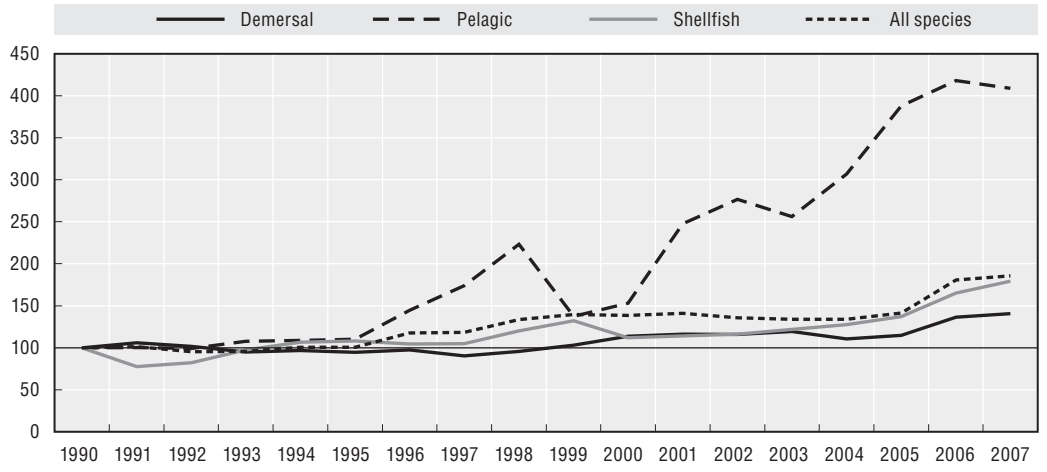
Challenges in the market for fish

A second key factor affecting the economic situation facing fishers is the extent to which cost increases can be passed on to processors, retailers and consumers. Combined with increasing cost prices, this can lead to a "double squeeze" on the economic profitability of many fishing operations. It is generally considered that the fragmented nature of the fishing industry, the lack of vertical integration between fishers and the rest of the value chain, and the substantial buying power of major processors and marketing chains, combine to prevent fishers from passing their increased costs down the value chain in many cases. In addition, the ready availability of substitutes such as chicken, pork and beef tends to place an effective ceiling on any price increases for fish products.

These factors have resulted in relatively stagnant prices for many fish products over recent years, although this has not been the case for all fish products. Some segments of the seafood market have been experiencing a strong growth in prices. In the UK, for example, the price of pelagic fish (particularly mackerel and pilchards) has increased significantly since 1990 while the prices of demersal and shellfish species have experienced more modest growth (although there is significant variation between individual species within these broad categories) (Figure I.17). In another example, there has been a 16% increase in Alaska pollack prices in Europe in the first half of 2008, due largely to decreasing catch quotas and higher fuel costs (*Globefish,* July 2008).

In general, however, fishers are price-takers and can do little to influence the prices they receive. Furthermore, the market for fish products is highly heterogeneous and segmented, so

Figure I.17. **United Kingdom fish price indexes**



Source: Seafish Industry Authority.

that prices often respond to local market and resource conditions as much as to international market developments. As a result, changes in catch quotas, local overfishing, and the seasonal nature of fishing can all have an influence on market conditions in the various markets for fish products. Within these broader market constraints, there is some scope for fishers to undertake initiatives to improve market prices through, for example, improved marketing, development of niche markets, value-added processing, and improved handling.

Policy outlook

While a great deal of progress has been made in a number of policy areas in the OECD fisheries sector, a number of challenges remain. Many of these are interlinked and may, where robust and resilient management frameworks are in place, be important opportunities for the fishing industry. For example, the recent fuel crisis provided an opportunity for some OECD member countries to accelerate restructuring in some fleets in order to better match capacity to available resources. The pressures of globalisation are also a driver to move towards more responsive management and governance frameworks, such as those set out in an ecosystem approach to fisheries. Globalisation is also increasing linkages between OECD and non-OECD countries in fisheries procurement and trade while the impact of this is increasingly featuring in international discourse seeking coherence across a broad range of sectors.

Looking to the future, a number of issues feature prominently on the policy horizon. The most important issues are: establishment of conservation and management measures based on scientific advice; continued responses to IUU fishing; rebuilding depleted fish stocks; certification and standards for fisheries and aquaculture; increasing aquaculture production; and the impact of climate change on fisheries. Critical success factors in delivering responsible and sustainable fisheries include the further development of policy in these areas alongside the full and consistent implementation of existing frameworks.

First of all, the establishment of conservation and management measures based on scientific advice is crucial for the development of sustainable fisheries. However, even if best scientific advice is used, it still remains that managing fisheries is also about managing people and their incentives to fish.

Against this perspective, it is clear that continued efforts are required to further combat IUU fishing as, in essence, IUU fishing, whether in national or international waters, seriously undermines the sustainability of fisheries resources. Much has been accomplished in recent years, but efforts currently underway on the development of additional policy tools will help to more effectively address IUU fishing.[12] In particular, work on port state controls and flag state controls will be essential to close existing policy gaps. In 2007, the FAO published a Model Scheme on Port State Measures to Combat Illegal, Unreported and Unregulated Fishing, to facilitate the implementation of action by port States to prevent, deter and eliminate such activities. It targets issues relating to the inspection of vessels while they are in port, actions to be taken when an inspector finds there is reasonable evidence for believing that a foreign fishing vessel has engaged in, or supported IUU fishing activities, and information that the port State should provide to the flag State. Alongside this, in a number of countries IUU fishing in domestic waters by national vessels has also been more actively addressed.

The European Council has adopted a Regulation to prevent, deter and eliminate illegal, unreported and unregulated fishing that will enter into force on 1 January 2010. The Regulation aims to prevent, deter and eliminate all trade of fishery products into the European Community deriving from IUU fishing in all waters, and the involvement of Community nationals in IUU activities conducted under any flag. Alongside this, the European Commission is proposing a substantial reform of the control system of the Common Fisheries Policy, including harmonised inspection procedures and improved standards to ensure uniformity in the implementation of control policy at member state level.

Also, the task of rebuilding depleted fish stocks to meet the 2015 WSSD target poses a significant challenge for OECD (and non-OECD) countries. FAO data on the state of fish stocks encapsulates the problem: 19% of the world's fish stocks are overexploited, 8% are depleted and 1% is recovering from depletion (FAO, 2009). The collapse of several high profile stocks and the limited success of some rebuilding have raised concerns that in many cases such plans might be much more difficult and longer-term than originally anticipated. For example, the northwest Atlantic cod has only very recently begun to show slight signs of recovery despite having been under a commercial fishing moratorium since 1992. However, the economic benefits of rebuilding fish stocks could be significant: Sumalia and Suatoni (2006) estimate that the potential economic benefit from rebuilding 17 different overfished stocks in the United States amounts to around USD 567 million, or approximately three times the estimated net present value of the fisheries without rebuilding.

Progress to date on rebuilding stocks has been patchy and a more concerted effort is necessary to help governments develop and implement stock rebuilding programs. Convincing policy makers and fisheries stakeholders that it would be wise to undertake stock rebuilding is only a first step. Policy makers also need to know how to go about it in a cost efficient and effective way. In particular, rebuilding programs should be integrated with the broader fisheries management regime for the fisheries in question so that lessons learned during the depletion and rebuilding program can contribute to improving fisheries management. Rebuilding programs should not be seen in isolation from other policy areas and a coherent package of policy responses that addresses economic, social and environmental issues may be warranted.

Another important issue that is rapidly moving to centre stage relates to the role of ecolabelling and certification in the fisheries sector. Globalisation of the fisheries value chain is creating an increasingly multifaceted trading environment involving a large number of interactions and possibly standards as well. As OECD based enterprises outsource processing activities and source from increasing numbers of sources, the supply chains become more complex, reflecting the need for more sophisticated logistics and traceability schemes. Little work has so far been undertaken on the economic consequences of certification, on how different standards and methods of certification, including requirements for traceability may influence the market for fish and fish products, and how different actors and stakeholders in the sector interact.

Certification takes places against a standard. At one end of the spectrum is self-certification and at the other is third-party independent certification. Similarly, there is a wide variation on the cost of certification. Fishing companies and governments share objectives and incentives in the area of hygiene and sanitary standards in providing consumer protection. For sustainability standards, the picture is more blurred. The growing numbers of private and public standards as well as schemes for sustainability, run the risk of presenting a confused picture to consumers, producers and governments alike. Such labelling schemes may prove particularly difficult for developing countries, whose exports to OECD markets are of essential importance to the overall supply of fish and fish products. The key challenge for OECD governments is to determine the most appropriate role for regulatory policy and identify the most effective policy tools to meet policy objectives.

Finally, aquaculture is a significant industry in many OECD countries, and with global demand for fish rising alongside limited possibilities of increasing production from capture fisheries, the aquaculture sector is seen as an increasingly important supplier of healthy, high quality seafood. There are strong expectations that the aquaculture sector will continue to grow at a rapid pace and many countries are investing heavily in the sector expecting that future demand for high quality seafood will be met by farmed fish. However, aquaculture has economic, environmental and social implications that may be poorly evaluated or inadequately addressed within current policy frameworks. governments are becoming increasingly involved in monitoring the aquaculture industry and its effects on the environment and public safety, resulting in the extension of regulatory measures to ensure good governance of the sector. The future development of the aquaculture industry is also partly linked to issues regarding access to and the use of resources; new technologies to improve economic efficiency; frameworks regulating industrial fisheries; and trade.

Despite the obvious success of the aquaculture industry to date, the potential development of the industry is linked to the ability of policy makers to provide a conducive policy landscape for sustainable and profitable operations. The aquaculture sector will face new challenges that require sustained commitment by policy makers.

A longer term issue is that of climate change and the fisheries and aquaculture sector. Fisheries ecosystems and fishing-based livelihoods are subject to a range of climate-related environmental variability, ranging from extreme weather events, floods and droughts, to changes in aquatic ecosystem structure and productivity, and changing patterns in, and abundance of, fish stocks. In order for policy makers to ensure sustainable resource management in the future, policies and practices will need to be adjusted to take account of changes to productivity and distribution of fisheries resources as a result of climate-related environmental variability. While climate change is only one of the many

threats to sustainable fisheries in the future, it has until recently received less attention in international fisheries policy debates, especially with respect to economic implications of climate change impacts on fisheries. Increasingly, fisheries policy makers are becoming more aware of the need to anticipate and incorporate climate-related changes into local, national and international coping responses.

In the meantime, the current financial crisis is likely to continue to have an impact on the fishing industry. As slower (and perhaps negative) economic growth continues and spreads, the domestic pressure for governments to attempt to insulate their economies using protectionist measures will increase. Such action would exacerbate global economic difficulties, increase price variability on world markets and reduce trading opportunities. While the outcome of various efforts by OECD member countries to address issues of liquidity, solvency and recapitalisation is still unknown, the financial crisis may have a number of effects on fisheries. The crisis will reduce the availability of loans – lenders will want more equity and collateral before approving loans. This will not only affect harvesters but also processors, traders and retailers who rely on credit in an industry that is perceived to be risky. It will also increase the cost of borrowing through higher interest rates and at the same time reduce the level of foreign direct investment, which is crucial to the development of emerging economies. The financial turmoil is also likely to result in calls for increased levels of government support in a number of industries, including in fisheries.

Should the crisis be of a longer term nature, it will indirectly put downward pressure on food prices, including seafood. While this may be beneficial for consumers and reduce input costs for producers, it sends a signal to decrease production, for example in aquaculture, which may lead to future shortages in supply. It will also put pressure on government budgets (through reduced tax revenue and higher borrowing costs), which may lead to a reduction in expenditure on fisheries including on general services such as management, surveillance and research all of which are key to sustainable fisheries management. Such potential developments may require on-going monitoring.

Meanwhile the present financial and economic crisis is a window of opportunity to ensure that, once the economy start expanding again, the departure will be on a more solid basis of sustainable fisheries practices. While it may not be a paradigm shift insofar the ingredients of sustainable and responsible fisheries management are known, the start of a new more sustainable and "green" era may be an outcome policy makers may wish to actively pursue. This would benefit the fishing industry and consumers alike.

Notes

1. Please note that this section describes recent trends and developments in the OECD fisheries and aquaculture sector up to 2007 although some statistics are still missing. The Secretariat has made best efforts to analyze recent trends based on available data.
2. The United States is not included among the major producers because the data for 2007 are not available. The United States was the fourth aquaculture producer in OECD countries in 2006.
3. OECD has recently published *Reducing Fishing Capacity: Best Practices for Decommissioning Schemes*, which was a result of the Committee for Fisheries' work on political economy of fisheries policies reform.
4. *Source:* Eurostat; includes: EU15 countries.
5. It should be noted that in the case of EU, the reduction was calculated between 1996 and 2005, instead of 2006, because the GFT data for all EU countries in 2006 were not available.

6. US National Research Council (1998) defined EBFM as an approach that takes major ecosystem components and services into account in managing fisheries. Its goal is to rebuild and sustain populations, species, biological communities and marine ecosystems at high levels of productivity and biological diversity, so as not to jeopardize a wide range of marine goods and services. It is not the purpose of this paper to discuss in detail the difference between EAF and EBFM. However, it has been pointed out that the difference between approaching fisheries management with ecosystems in mind (EAF) and basing fisheries management on ecosystems (EBFM) is a subtle but important. Nevertheless, this paper adopts the term EAF while the term EBFM is also used if necessary.
7. FAO (2008), "Human dimensions of the ecosystem approach to fisheries: an overview of context, concepts, tools and methods", *FAO Fisheries Technical Paper 489*, FAO, Rome.
8. Ward, T. *et al* (2002), *Policy Proposals and Operational Guidance for Ecosystem-based Management of Marine Capture Fisheries*, WWF-Australia, Sydney.
9. Grieve, Chris and Katherine Short (2007), Implementation of Ecosystem-Based Management in Marine Capture Fisheries.
10. Note that the price of marine diesel used by most fishing vessels is typically around 60% of the cost of crude oil, depending on the supply and demand factors in the oil production chain.
11. Fuel tax exemptions are also often available to other primary production sectors such as agriculture, forestry and mining.
12. Illegal fishing refers to activities: *i)* conducted by national or foreign vessels in waters under the jurisdiction of a State, without the permission of that State, or in contravention of its laws and regulations; *ii)* conducted by vessels flying the flag of States that are parties to a relevant regional fisheries management organisation but operate in contravention of the conservation and management measures adopted by that organisation and by which the States are bound, or relevant provisions of the applicable international law; or *iii)* in violation of national laws or international obligations, including those undertaken by co-operating States to a relevant regional fisheries management organisation. Unreported fishing refers to fishing activities: *i)* which have not been reported, or have been misreported, to the relevant national authority, in contravention of national laws and regulations; or *ii)* undertaken in the area of competence of a relevant regional fisheries management organisation which have not been reported or have been misreported, in contravention of the reporting procedures of that organisation. Unregulated fishing refers to fishing activities: *i)* in the area of application of a relevant regional fisheries management organisation that are conducted by vessels without nationality, or by those flying the flag of a State not party to that organisation, or by a fishing entity, in a manner that is not consistent with or contravenes the conservation and management measures of that organisation; or *ii)* in areas or for fish stocks in relation to which there are no applicable conservation or management measures and where such fishing activities are conducted in a manner inconsistent with State responsibilities for the conservation of living marine resources under international law (FAO, International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing 2001).

Further reading

Cochrane, Kevern (2007), "A Global Challenge: Implementing the Ecosystem-Based Approach to Fisheries Management", *El Anzuelo* Vol. 18, IEEP, London.

European Commission (2008a), "Communication from the Commission to the European Parliament and to the Council on promoting the adaptation of the European fishing fleets to the economic consequences of high fuel prices", COM(2008) 453 Final, Brussels, 8 July.

European Commission (2008b), "EU package to tackle the fuel crisis in the fuel sector", EU Press Release 08/53, 8 July.

European Commission (2008c), "Fisheries: Council agreement on measures to address economic crisis in the sector", EU Press Release 08/56, 16 July.

European Parliament (2009), European Parliament resolution of 13 January 2009 on the CFP and the ecosystem approach to fisheries management (2008/2178(INI).

FAO (2001), *The Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem*, FAO, Rome.

FAO (2002), "Report of the Expert Consultation on Ecosystem-based Fisheries Management", Reykjavik, Iceland, 16-19 September 2002, *FAO Fisheries Report, No. 690*, FAO, Rome.

FAO (2003), "The Ecosystem Approach to Fisheries", *FAO Technical Guidelines for Responsible Fisheries*, No. 4, Suppl. 2, FAO, Rome.

FAO (2005), *Putting into Practice the Ecosystem Approach to Fisheries,* FAO, Rome.

FAO (2007a), "Ecosystem Approaches for Fisheries Management in the Benguela Current Large Marine Ecosystem", *FAO Fisheries Circular No. 1026*, FAO, Rome.

FAO (2007b), *The State of World Fisheries and Aquaculture 2006*, FAO, Rome.

FAO (2009), *The State of World Fisheries and Aquaculture 2008*, FAO, Rome.

Fishing News International, November 2008.

Grieve, Chris and Katherine Short (2007*), Implementation of Ecosystem-Based Management in Marine Capture fisheries*, WWF International, Gland.

Hawkins, T. (2007), "A Global Challenge: Implementing the Ecosystem-Based Approach to Fisheries Management", *El Anzuelo* Vol. 18, IEEP, London.

Marasco, R. J., *et al.* (2007), "Ecosystem-based fisheries management: some practical suggestions", *Can. J. Fish. Aqua. Sc.,* 64: 928-939.

Marine Ecosystems and Management (2009), *Managing Ecosystems, Managing Fisheries: How do EBM and EBFM Relate?*, MEAM newsletter Vol. 2, No. 2, 2009.

Nordic Council of Ministers *et al.* (2006), "Report of the Bergen Conference on Implementing the Ecosystem Approach to Fisheries", 26-28 September 2006, Bergen, Norway, *http://cieaf.imr.no/__data/page/6218/CIEAF_Conference_Report_230207.pdf*.

OECD (2003), *Sources of Growth in OECD Countries*, OECD, Paris.

OECD (2006a), *Fishing for Coherence: Fisheries and Development Policies*, OECD, Paris.

OECD (2006b), *Fishing for Coherence: Proceedings of the Workshop on Policy Coherence for Development in Fisheries*, OECD, Paris.

OECD (2006c), *Financial Support to Fisheries: Implications for Sustainable Development*, OECD, Paris.

OECD/FAO (2007), *Globalisation and Fisheries: Proceedings of an OECD-FAO Workshop*, OECD, Paris.

OECD (2008), *Fishing for Coherence in West Africa: Policy Coherence in the Fisheries Sector in Seven West African Countries*, OECD, Paris.

Parsons, S. (2005), "Ecosystem Considerations in Fisheries Management: Theory and Practice", International Journal of Marine and Coastal Law, Vol. 20, No. 3-4.

Pitcher, T.J., *et al.* (2007), "An Evaluation of Progress in Implementing Ecosystem-Based Management of Fisheries in 33 Countries", *Ecological Economics*, doi:10.1016/j.marpol.2008.06.002.

Planchot, M. and F. Daures (2008), "Le secteur francais des pêches maritimes face à l'augmentation du prix du gasoil", Note de synthèse, IFREMER, July.

Scottish Government (2008), "Fishing Fuel Plan", News Release, 8 August, available at *www.scotland, gov.uk/news/releases/2008/08/08132505*, accessed 17 September 2008.

Seafish (2008), *The Seafish Guide to Improving Fuel Efficiency*, Seafish Industry Authority UK, August, available at *http://sin.seafish.org* .

STECF (2006), *Economic Performance of Selected European Fishing Fleets, Annual Report 2005*, European Commission, Brussels.

Sumaila, U.R., R. Watson, P. Tyedmers and D. Pauly (2006), "Fuel subsidies to fisheries globally: magnitude and impacts on resource sustainability", in U.R. Sumaila and D. Pauly (eds.), *Catching More bait: A Bottom-up Re-estimation of Global Fisheries Subsidies*, Fisheries Centre Research Reports 14(6), University of British Colum bia, Vancouver, pp. 38-48.

Sumaila, U.R. and E. Suatoni (2006), *Economic Benefits of Rebuilding US Ocean Fish Populations*, Fisheries Centre Working Paper No. 2006-04, University of British Columbia, Vancouver, B.C., available at *www.fisheries.ubc.ca/publications/working/index.php*.

Tyedmers, P.H., R. Watson and D. Pauly (2005), "Fuelling Global Fishing Fleets", *Ambio*, Vol. 34, No. 8, pp. 635-8.

UN (2006), "Report on the work of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea at its seventh meeting", *United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea*, paper submitted to the United Nations General Assembly, No. A/61/156.

US Energy Information Agency (2008), "World Crude Oil Prices", available at *http://tonto.eia.doe.gov/dnav/pet/hist/wtotworldw.htm*, accessed 11 September 2008.

Vieira, S. and L. Hohen (2007), *Australian Fisheries Survey Report 2007 : Results for Selected Fisheries, 2004-05and 2005-06*, ABARE report Prepared for the Fisheries Resources Research Fund, Canberra, October.

Vieira, S., R. Wood and D. Galeano (2007), *Australian Fisheries Survey Report 2006: Results for Selected Fisheries, 2003-04 and 2004-05*, ABARE report Prepared for the Fisheries Resources Research Fund, Canberra, June.

Ward, T. *et al.* (2002), *Policy Proposals and Operational Guideline for Ecosystem-based Management of Marine Capture Fisheries*, WWF-Australia, Sydney.

WorldFish Report (2008a), "[euro] 110 m French aid", *WorldFish Report*, 19 June, p. BB/3.

WorldFish Report (2008b), "US state aid of $13 m not enough says industry", *WorldFish Report*, 3 July, p. FS/6.

Young, C. De, *et al.* (2008), "Human Dimensions of the Ecosystem Approach to Fisheries: An Overview of Context, Concepts, Tools and Methods", *FAO Fisheries Technical Paper No. 489*, FAO, Rome.

ANNEX I.A1

Statistical Summary Tables to the General Survey, 2009

Table I.A1.1. **National unit per US dollar (USD)**

	Monetary unit	2005	2006	2007	2008
Argentina	Argentine peso	2.92	2.90	3.09	3.14
Australia	Australian dollar	1.31	1.33	1.20	1.19
Belgium	Euro	0.81	0.80	0.73	0.68
Canada	Canadian dollar	1.21	1.13	1.07	1.07
Chinese Taipei[1]	Taiwanese dollar	34.42	31.71	32.85	31.53
Czech Republic	Czech koruna	23.96	22.59	20.29	17.07
Denmark	Danish krone	6.00	5.94	5.44	5.10
Finland	Euro	0.81	0.80	0.73	0.68
France	Euro	0.81	0.80	0.73	0.68
Germany	Euro	0.81	0.80	0.73	0.68
Greece	Euro	0.81	0.80	0.73	0.68
Iceland	Icelandic krona	62.88	69.90	64.08	88.47
Ireland	Euro	0.81	0.80	0.73	0.68
Italy	Euro	0.81	0.80	0.73	0.68
Japan	Yen	110.10	116.35	117.76	103.36
Korea	Won	1 024.23	951.82	929.46	1 102.05
Mexico	Peso	10.89	10.90	10.93	11.13
Netherlands	Euro	0.81	0.80	0.73	0.68
New Zealand	New Zealand dollar	1.42	1.54	1.36	1.42
Norway	Norwegian krone	6.44	6.42	5.86	5.64
Poland	Zloty	6.23	3.10	2.77	2.41
Portugal	Euro	0.81	0.80	0.73	0.68
Russian Federation	Ruble	28.81	28.28	25.58	24.85
Slovak Republic	Slovak koruna	31.04	29.65	24.68	21.36
Spain	Euro	0.81	0.80	0.73	0.68
Sweden	Swedish krona	7.47	7.37	6.76	6.59
Thailand	Baht	40.22	40.22	34.51	33.31
Turkey	Lira	1.34	1.43	1.30	1.30
United Kingdom	Pound	0.55	0.54	0.50	0.54
United States	US dollar	1.00	1.00	1.00	1.00

1. *www.x-rates.com*.

Source: OECD.STAT.

Table I.A1.2. **OECD fishing fleet, 2006 and 2007**

	Total vessels				Vessels without engines				Vessels with engines			
	2006		2007		2006		2007		2006		2007	
	Number	GRT/GT	Number	GRT/GT	Number	GRT/GT	Number	GRT/GT	Number	GRT/GT	Number	GRT/GT
Australia	494	. .	381	. .	0	0	0	0	494	. .	381	. .
Canada	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
European Union	80 052	1 732 792	80 533	1 771 880	5 512	3 996	5 375	3 847	74 540	1 728 796	75 158	1 768 033
Belgium	107	20 035	102	19 292	0	0	0	0	107	20 035	102	19 292
Czech Republic	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Denmark	3 136	85 731	2 963	76 526	75	60	76	62	3 061	85 671	2 887	76 464
Finland	3 196	16 413	3 162	15 425	0	0	0	0	3 196	16 413	3 162	15 425
France	7 671	208 493	7 631	210 754	0	0	0	0	7 671	208 493	7 631	210 754
Germany	. .	. .	1 873	69 081	. .	. .	0	0	. .	. .	1 873	69 081
Greece	17 854	92 527	17 580	90 641	318	165	306	154	17 536	92 362	17 274	90 487
Ireland	1 932	80 634	1 935	70 829	6	5	6	5	1 926	80 629	1 929	70 824
Italy	13 955	192 396	13 604	195 099	1 696	1 720	1 664	1 694	12 259	190 676	11 940	193 405
Netherlands	894	158 920	903	164 289	0	0	0	0	894	158 920	903	164 289
Poland	881	31 593	870	31 212	34	27	32	24	847	31 566	838	31 188
Portugal[...]	8 717	106 917	8 632	106 699	1 591	845	1 556	825	7 126	106 072	7 076	105 874
Slovak Republic	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Spain	13 400	480 778	13 008	468 946	1 782	1 165	1 726	1 074	11 618	479 613	11 282	467 872
Sweden	1 551	43 768	1 504	42 929	0	0	0	0	1 551	43 768	1 504	42 929
United Kingdom	6 758	214 587	6 766	210 158	10	9	9	9	6 748	214 578	6 757	210 149
Iceland	1 344	167 842	1 294	160 808	0	0	0	0	1 344	167 842	1 294	160 808
Japan	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Korea	86 113	673 719	85 627	663 869	2 755	2 420	2 831	2 350	83 358	671 299	82 796	661 519
Mexico	106 225	240 856	106 181	240 856	102 807	16 166	102 807	18 462	3 418	224 690	3 374	222 394
New Zealand	1 582	154 095	1 508	138 475	9	5	6	1	1 573	154 090	1 502	138 474
Norway	7 301	363 895	7 041	354 907	0	0	0	0	7 301	363 895	7 041	354 907
Turkey	18 790	189 777	18 343	187 101	97	181	90	167	18 693	189 596	18 253	186 934
United States	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
OECD total	**301 901**	**3 522 976**	**300 908**	**3 517 895**	**111 180**	**22 768**	**111 109**	**24 827**	**190 721**	**3 500 208**	**189 799**	**3 493 068**
Argentina	1 100	. .	1 098	. .	. .	. .	443	. .	. .	. .	655	198 672
Chinese Taipei	26 216	766 385	25 622	687 884	998	172	940	151	25 218	766 213	24 682	687 733
Russian Federation	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	
Thailand	12 552	407 913	12 552	407 913	0	0	0	0	12 552	407 913	12 552	407 913

..: Not available.
Source: OECD.STAT.

Table I.A1.3. **Employment in fisheries, 2006-2007**

	2006				2007			
	Harvest sector	Aquaculture	Processing	Total	Harvest sector	Aquaculture	Processing	Total
Australia	9 735	3 628	2 001	15 364	. .	. .	. .	. .
Canada	. .	. .	. .	. .	. .	. .	. .	. .
European Union	168 303	46 145	43 921	258 369	159 009	44 780	27 815	231 604
Belgium	481	. .	. .	481	690	. .	. .	690
Czech Republic	. .	1 714	140	1 854	. .	1 714	140	1 854
Denmark	2 897	553	5 148	8 598	. .	. .	. .	. .
Finland	2 766	494	824	4 084	2 628	. .	. .	2 628
France	20 869	21 076	. .	41 945	20 319	21 200	. .	41 519
Germany	2 133	. .	8 524	10 657	2 067	. .	8 155	10 222
Greece	30 040	6 653	2 918	39 611	29 637	6 734	3 020	39 391
Ireland	4 226	2 058	2 867	9 151	4 461	1 998	. .	6 459
Italy	31 302	. .	. .	31 302	30 214	. .	. .	30 214
Netherlands	1 938	260	6 000	8 198	. .	. .	. .	. .
Poland	4 340	5 000	17 500	26 840	4 309	4 202	16 500	25 011
Portugal	17 261	. .	. .	17 261	17 021	. .	. .	17 021
Slovak Republic	. .	313	. .	313	. .	1 079	. .	1 079
Spain	35 236	8 024	. .	43 260	33 069	7 853	. .	40 922
Sweden	1 880	. .	. .	1 880	1 865	. .	. .	1 865
United Kingdom	12 934	. .	. .	12 934	12 729	. .	. .	12 729
Iceland	4 300	. .	4 100	8 400	4 500	. .	2 800	7 300
Japan	212 470	. .	. .	212 470	204 330	. .	. .	204 330
Korea	90 954	45 524	. .	136 478	86 201	44 951	. .	131 152
Mexico	257 940	24 998	19 402	302 340	*253 238*	*30 418*	*19 464*	*303 120*
New Zealand	1 495	770	5 770	8 035	1 476	750	6 490	8 716
Norway	13 735	4 459	. .	18 194	13 336	4 745	. .	18 081
Turkey	110 230	6 143	6 775	123 148	136 782	6 400	9 739	152 921
United States	. .	. .	40 823	40 823	. .	. .	. .	. .
OECD total	**869 162**	**131 667**	**122 792**	**1 123 621**	**858 872**	**132 044**	**66 308**	**1 057 224**
Argentina	16 917	. .	. .	16 917	16 554	. .	. .	16 554
Chinese Taipei	245 113	108 982	. .	354 095	237 705	98 477	. .	336 182
Russian Federation	. .	. .	. .	. .	. .	. .	. .	. .
Thailand	. .	. .	. .	. .	. .	. .	. .	. .
Total	**1 131 192**	**240 649**	**122 792**	**1 494 633**	**1 113 131**	**230 521**	**66 308**	**1 409 960**

Note: In italics, preliminary data.
..: Not available.
Source: OECD.STAT.

Table I.A1.4. **Government financial transfers to marine capture fisheries sector, 2005**

	Direct payments (A)	Cost reducing transfers (B)	General services (C)	Total transfers (D)	Total landed value (TL)	(A + B)/TL	(A + B + C = D)/ TL
	USD million	USD million	USD million	USD million	USD million	%	%
Australia	0	0	46	46	1 136	0	4
Canada	228	34	258	521	1 723	15	30
European Union	273	161	437	872	8 606	5	10
Belgium	1	0	0	1	107	1	1
Denmark	3	0	51	54	470	1	12
Finland	2	5	18	25	17	41	146
France	19	5	77	101	1 279	2	8
Germany	4	2	12	17	253	2	7
Greece	33	28	15	76	393	15	19
Ireland	10	0	0	10	397	3	3
Italy	65	0	54	119	1 726	4	7
Netherlands	9	0	3	11	558	2	2
Poland	47	0	4	51	. .	. .	. .
Portugal	1	0	32	33	313	0	10
Spain	77	106	65	247	1 961	9	13
Sweden	3	5	28	37	117	7	31
United Kingdom	0	10	80	90	1 015	1	9
Iceland	0	20	29	49	1 055	2	5
Japan	15	11	2 140	2 165	10 076	0	21
Korea	43	57	543	642	3 770	3	17
Mexico	5	73	6	85	951	8	9
New Zealand[1]	0	0	37	37	. .	. .	. .
Norway	7	6	122	135	1 815	1	7
Turkey	0	0	101	101	1 091	0	9
United States[1]	93	3	1 127	1 223	3 990	2	31
OECD total	**664**	**365**	**4 848**	**5 876**	**34 213**	**3**	**17**
Argentina	. .	. .	. .	. .	. .	. .	. .
Chinese Taipei	28	2	8	38	1 949	2	2
Russian Federation	. .	. .	. .	. .	. .	. .	. .
Thailand	. .	. .	. .	. .	. .	. .	. .
Total	**693**	**368**	**4 855**	**5 914**	**36 162**	**. .**	**. .**

..: Not available.

1. Includes an estimate of market price support (that is, transfers from consumers to producers).

Source: OECD.STAT.

Table I.A1.5. **Government financial transfers to marine capture fisheries sector, 2006**

	Direct payments (A)	Cost reducing transfers (B)	General services (C)	Total transfers (D)	Total landed value (TL)	(A + B)/TL	(A + B + C)/TL
	USD million	USD million	USD million	USD million	USD million	%	%
Australia	0	0	52	52	1 077	0	5
Canada	223	58	315	596	1 661	17	36
European Union	202	120	377	700	8 969	4	8
Belgium	7	0	0	7	113	6	6
Denmark	18	0	72	90	512	4	18
Finland	0	5	12	17	23	22	75
France	20	0	16	37	1 304	2	3
Germany	1	1	3	5	267	1	2
Greece	15	27	16	58	439	10	13
Ireland	20	0	0	20	628	3	3
Italy	. .	…	. .	. .	1 877	. .	. .
Netherlands	16	0	3	19	586	3	3
Poland	26	0	7	34	76	34	44
Portugal	1	0	28	29	304	0	10
Spain	75	86	85	246	1 957	8	13
Sweden	1	1	32	35	137	2	25
United Kingdom	2	0	102	104	747	0	14
Iceland	0	17	35	52	1 040	2	5
Japan	13	3	1 934	1 950	9 462	0	21
Korea	70	20	554	644	2 717	3	24
Mexico	5	80	4	89	1 069	8	8
New Zealand	0	0	38	38	. .	. .	. .
Norway	2	7	135	143	1 824	0	8
Turkey	0	0	136	136	715	0	19
United States	263	20	1 760	2 043	4 055	7	50
OECD total	**778**	**326**	**5 340**	**6 444**	**32 588**	**3**	**20**
Argentina	. .	. .	4	4	. .	. .	. .
Chinese Taipei	71	3	14	87	1 804	4	5
Russian Federation	. .	. .	. .	. .	. .	. .	. .
Thailand	. .	. .	. .	. .	. .	. .	. .
Total	**848**	**329**	**5 359**	**6 535**	**35 357**	**. .**	**. .**

..: Not available.
Source: OECD.STAT.

Table I.A1.6. **Government financial transfers to marine capture fisheries sector, 2007**

	Direct payments (A)	Cost reducing transfers (B)	General services (C)	Total transfers (D)	Total landed value (TL)	(A + B)/TL	(A + B + C)/TL
	USD million	USD million	USD million	USD million	USD million	%	%
Australia	0	0	60	60	1 191	0	5
Canada	. .	. .	. .	. .	1 755	. .	. .
European Union	160	76	219	517	10 319	2	5
Belgium	3	0	0	3	123	2	2
Denmark	4		58	62	491	1	13
Finland	0	8	13	21	27	29	78
France	25		10	35	1 402	2	3
Germany	0	0	6	6	302	0	2
Greece	22		14	35	467	5	8
Ireland	6	0	0	6	1 031	1	1
Italy	. .	. .	. .	. .	1 807	. .	. .
Netherlands	0	0	6	6	661	0	1
Poland	9	1	11	20	77	12	27
Portugal	1	0	30	31	375		8
Spain	71	61	56	188	2 245	6	8
Sweden	5	1	39	46	160	4	28
United Kingdom	. .	. .	. .	. .	1 150	. .	. .
Iceland	0	17	51	68	1 269	1	5
Japan	13	3	1 808	1 824	. .	. .	. .
Korea	142	22	539	703	3 124	5	23
Mexico	0	85	0	85	1 083	8	8
New Zealand	0	0	41	41	. .	. .	. .
Norway	2	7	160	169	2 056	0	8
Turkey	0	0	145	145	919	0	16
United States	245	20	1 788	2 053	4 151	6	49
OECD total	**562**	**231**	**4 811**	**5 665**	**25 867**	**3**	**22**
Argentina	. .	. .	3	3	. .		. .
Chinese Taipei	33	2	17	52	1 975	2	3
Russian Federation	. .	. .	. .	. .	. .	. .	. .
Thailand	. .	. .	. .	. .	. .	. .	. .
Total	**595**	**233**	**4 831**	**5 720**	**27 842**	**. .**	**. .**

..: Not available.
Source: OECD.STAT.

Table I.A1.7. **Capture fish production, 2005-2007**

	Total volume (000 tonnes)			Total value (USD million)			Unit value (USD/kg)		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Australia	237	197	186	1 136	1 077	1 191	4.80	5.47	6.41
Canada	1 082	1 070	983	1 723	1 660	1 755	1.59	1.55	1.78
European Union	5 002	4 822	4 779	7 744	8 963	10 242	1.55	1.86	2.20
Belgium	22	20	22	107	113	123	4.97	5.59	5.66
Czech Republic	. .	. .	. .	. .	. .	. .	. .	. .	. .
Denmark	899	857	645	470	512	491	0.52	0.60	0.76
Finland	77	102	117	17	23	27	0.22	0.22	0.23
France	606	602	474	1 279	1 304	1 402	2.11	2.17	2.96
Germany	246	259	262	253	267	302	1.03	1.03	1.16
Greece	92	94	95	393	433	467	4.27	4.33	4.72
Ireland	302	275	219	397	628	1 031	1.31	2.28	4.71
Italy	268	286	267	1 726	1 877	1 807	6.43	6.56	6.77
Netherlands	547	469	464	558	586	661	1.02	1.25	1.43
Poland	136	126	133	60	76	77	0.44	0.60	0.58
Portugal	172	181	196	313	304	375	1.82	1.68	1.92
Slovak Republic	. .	. .	. .	. .	. .	. .	. .	. .	. .
Spain	717	677	752	1 961	1 957	2 245	2.74	2.89	2.99
Sweden	248	262	246	117	137	160	0.47	0.52	0.65
United Kingdom	670	614	888	1 015	747	1 150	1.51	1.22	1.30
Iceland	1 441	1 018	1 399	1 055	1 040	1 269	0.73	1.02	0.91
Japan	4 512	*4 511*	*4 417*	10 076	*9 462*	. .	2.23	*2.10*	. .
Korea	1 829	1 311	1 550	3 770	2 717	3 124	2.06	2.07	2.02
Mexico	1 203	1 244	*1 312*	951	1 069	*1 083*	0.79	0.86	0.83
New Zealand	633	468	427	. .	. .	. .	. .	. .	. .
Norway	2 546	2 402	2 520	1 815	1 824	2 056	0.71	0.76	0.82
Turkey	523	504	589	1 091	715	919	2.09	1.42	1.56
United States	4 463	4 374	4 259	3 990	4 055	4 151	0.89	0.93	0.97
OECD total	**23 472**	**21 920**	**22 420**	**33 351**	**32 657**	**25 867**	**1.42**	**1.49**	**1.15**
Argentina	862	1 069	916	. .	. .	. .	. .	. .	. .
Chinese Taipei	1 007	968	1 174	1 949	1 804	1 975	1.94	1.86	1.68
Russian Federation	. .	. .	. .	. .	. .	. .	. .	. .	. .
Thailand	1 702	*1 723*	*1 710*	932	*965*	*1 126*	0.55	*0.56*	*0.66*
TOTAL	**27 042**	**25 681**	**26 220**	**36 232**	**35 426**	**28 968**	**1.34**	**1.38**	**1.10**

Note: Total national landings, including fish, crustaceans, molluscs and algae. In italics, preliminary data.
..: Not available.
Source: OECD.STAT.

Table I.A1.8. **Aquaculture production, 2005-2007**

	Total volume ('000 tonnes)			Total value (USD million)			Unit value (USD/kg)		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Australia	47	54	60	483	560	661	10.36	10.35	11.08
Canada	154	171	. .	583	796	. .	3.78	4.66	. .
European Union	1 306	1 336	1 238	3 141	3 335	3 006	2.40	2.50	2.43
Belgium	. .	. .	. .	0	0	. .	. .	. .	. .
Czech Republic	20	20	20	38	51	57	1.87	2.49	2.77
Denmark	40	38	40	127	138	146	3.21	3.66	3.64
Finland	14	13	13	55	55	58	3.82	4.30	4.48
France	238	238	238	633	644	759	2.66	2.71	3.19
Germany	46	45	52	217	198	230	4.73	4.42	4.43
Greece	110	113	110	454	480	. .	4.14	4.25	. .
Ireland	63	87	48	134	152	140	2.12	1.74	2.90
Italy	234	242	247	698	789	897	2.98	3.26	3.63
Netherlands	70	42	. .	129	122	0	1.86	2.89	. .
Poland	38	36	36	90	92	110	2.38	2.60	3.10
Portugal	7	8	. .	42	54	0	6.31	6.84	. .
Slovak Republic	1	1	1	. .	. .	. .	. .	. .	. .
Spain	273	295	285	502	530	608	1.84	1.80	2.13
Sweden	7	9	. .	21	28	. .	3.11	3.26	. .
United Kingdom[1]	145	149	148	. .	. .	. .	. .	. .	. .
Iceland	8	10	5	. .	. .	. .	. .	. .	. .
Japan	1 254	1 224	1 279	4 274	4 153	. .	3.41	3.39	. .
Korea	1 087	1 280	1 408	1 437	1 695	1 928	1.36	1.32	1.37
Mexico	102	123	128	388	411	435	3.81	3.35	3.39
New Zealand	105	108	112	210	225	246	1.99	2.09	2.19
Norway	662	712	830	2 135	2 745	2 967	3.23	3.85	3.57
Turkey	118	129	140	526	536	646	4.44	4.16	4.62
United States	358	360	. .	1 092	1 244	. .	3.05	3.45	. .
OECD total	**5 201**	**5 507**	**5 200**	**14 269**	**15 699**	**9 889**	**2.74**	**2.85**	**1.90**
Argentina	2	3	3	. .	. .	. .	. .	. .	. .
Chinese Taipei	307	316	320	987	904	997	3.21	2.86	3.12
Russian Federation	. .	. .	. .	. .	. .	. .	. .	. .	. .
Thailand	1 304	1 387	1 388	1 739	2 413	2 216	1.33	1.74	1.60
TOTAL	**6 814**	**7 213**	**7 021**	**16 995**	**19 016**	**13 102**	**2.49**	**2.64**	**1.87**

..: Not available.
1. only Scotland.
Source: OECD.STAT.

Table I.A1.9. **OECD imports of food fish by major product groups and major world regions, 2006 (kg)**

Tonnes	All fish	%	Fish, fresh, frozen, incl. fillets	%	Fish, dried, smoked	%	Crustaceans and molluscs	%	Prepared and preserved	%
Importers										
EU[1]	8 062 772 148	49	4 466 038 867	48	293 172 328	75	1 788 216 099	49	1 515 344 853	49
Japan	3 724 800 300	23	2 449 874 312	26	26 289 843	7	638 515 331	17	610 120 814	20
United States	2 315 883 407	14	968 451 075	10	33 614 621	9	708 411 143	19	605 406 568	20
OECD total	**16 417 126 673**	**100**	**9 296 021 525**	**100**	**388 409 191**	**100**	**3 658 654 946**	**100**	**3 074 041 011**	**100**
Origins										
OECD	6 965 641 093	42	4 675 847 435	50	283 761 720	73	1 061 043 056	29	944 988 882	31
Non-OECD[2]	9 451 485 580	58	4 620 174 090	50	104 647 471	27	2 597 611 890	71	2 129 052 129	69
America	1 944 596 920	21	941 178 322	20	24 289 332	23	687 866 919	26	291 262 348	14
Asia	5 498 417 921	58	2 508 184 831	54	45 414 649	43	1 477 558 651	57	1 467 259 790	69
Europe	924 400 287	10	681 284 480	15	31 207 625	30	179 780 683	7	32 127 499	2
Oceania	108 485 507	1	71 559 916	2	28 698	0	2 072 950	0	34 823 943	2
Africa	1 093 825 575	12	538 379 231	12	4 565 167	4	244 111 472	9	306 769 706	14

1. EU = EU member countries which are OECD members: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Slovak Republic, Spain, Sweden, UK.
2. The total of the imports from the five non-OECD zones may not correspond to the global figure for non-OECD as a whole, since the latter also includes values from non-specified origin.

Note: Fish, fresh, frozen, including fillets = HS Codes 302, 303, and 304. Fish, dried, smoked = HS code 305. Crustaceans and molluscs = HS codes 306 + 307. Prepared and preserved = HS codes 1604 + 1605.
Source: OECD, *International Trade Statistics Database*, 2009.

Table I.A1.10. **OECD exports of food fish by major product groups and major world regions, 2006 (kg)**

Tonnes	All fish	%	Fish, fresh, frozen, incl. fillets	%	Fish, dried, smoked	%	Crustaceans and molluscs	%	Prepared and preserved	%
Exporters										
EU[1]	5 053 048 128	47	3 285 587 767	44	167 779 660	39	816 835 322	53	782 845 380	65
Japan	530 217 834	5	399 130 009	5	3 059 101	1	31 690 098	2	96 338 626	8
United States	1 340 045 718	13	1 047 359 781	14	34 322 585	8	140 538 851	9	117 824 501	10
OECD total	**10 719 398 452**	**100**	**7 547 644 385**	**100**	**435 701 038**	**100**	**1 538 167 422**	**100**	**1 197 885 607**	**100**
Destination										
OECD	7 381 892 345	69	4 840 142 133	64	316 135 865	73	1 192 787 179	78	1 032 827 168	86
Non-OECD[2]	3 338 933 944	31	2 707 502 253	36	119 565 172	27	345 380 243	22	166 486 276	14
America	259 026 870	8	160 909 548	6	58 752 257	49	27 122 494	8	12 242 571	7
Asia	1 306 438 630	39	953 714 239	35	19 483 430	16	234 919 342	68	98 321 619	59
Europe	1 074 021 446	32	978 950 241	36	4 916 754	4	60 339 181	17	29 815 270	18
Oceania	22 734 503	1	17 692 538	1	112 859	0	1 665 428	0	3 263 677	2
Africa	661 880 199	20	585 281 814	22	35 234 082	29	22 937 481	7	18 426 822	11

1. EU = EU member countries which are OECD members: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Slovak Republic, Spain, Sweden, UK.
2. The total of the exports to the three OECD zones may not correspond to the global figure for non-OECD as a whole, since the latter also includes values from non-specified origins.

Note: Fish, fresh, frozen, including fillets = HS Codes 302, 303, and 304. Fish, dried, smoked = HS code 305.Crustaceans and molluscs = HS codes 306 + 307. Prepared and preserved = HS codes 1604 + 1605.
Source: OECD, *International Trade Statistics Database*, 2009.

Table I.A1.11. **Imports of fish, crustaceans, molluscs and products thereof by OECD countries according to origin,[1] 2006**

Importing country

USD million	Australia	Canada	Iceland	Japan	Korea	Mexico	New Zealand	Norway	Switzerland	Turkey	United States	**Total EU**
Origin												
Australia	3	3	. .	307	1	. .	6	. .	1	. .	96	**44**
Canada	21	11	9	439	50	15	7	26	8	. .	2 215	**526**
Iceland	1	10	. .	115	10	1	. .	86	6	2	152	**1 361**
Japan	13	18	. .		181	2	2	2	4	. .	210	**45**
Korea	5	7	. .	551	. .	14	2	. .	. .	. .	84	**85**
Mexico	. .	9	. .	85	7	. .	. .	2	. .	. .	486	**34**
New Zealand	130	10	. .	103	18	1	3	1	4	. .	151	**173**
Norway	14	29	26	384	42	11	. .	. .	. .	28	171	**4 038**
Switzerland	1	. .	. .	. .	. .	5	. .	2	. .	. .	. .	**5**
Turkey	. .	1	. .	66	9		. .		2	. .	3	**197**
United States	26	657	1	1 287	143	56	4	63	11	1	. .	**941**
European Union	41	44	9	370	76	1	. .	272	307	6	257	**13 398**
Austria	. .	. .	. .	. .	. .	. .	. .	. .	1	. .	. .	**6**
Belgium	. .	. .	. .	. .	. .	. .	. .	2	6	. .	. .	**531**
Czech Republic	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	**14**
Denmark	19	7	5	66	9	. .	. .	158	69	. .	7	**2 369**
Finland	. .	. .	. .	2	. .	. .	. .	1	. .	. .	. .	**. .**
France	1	3	. .	27	11	1	. .	8	55	4	20	**1 307**
Germany	2	2	1	9	. .	. .	. .	8	55	. .	7	**1 414**
Greece	1	2	. .	18	1	. .	. .	. .	2	1	10	**372**
Hungary	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	**5**
Ireland	1	2	. .	7	11	. .	. .	17	3	. .	10	**436**
Italy	5	5	. .	67	8	. .	. .	1	28	. .	9	**524**
Luxembourg	. .	. .	. .	. .		. .	. .		1	. .	. .	**12**
Netherlands	1	1	. .	25	1	. .	. .	7	38	. .	36	**1 887**
Poland	2	2	1	5		. .	. .	5	8	. .	14	**601**
Portugal	1	5	. .	1	3	. .	. .	1	5	. .	10	**432**
Slovak Republic	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	**8**
Spain	1	5	. .	125	9	. .	. .	1	14	. .	50	**1 424**
Sweden	1	2	. .	1	. .	. .	. .	21	2	. .	2	**574**
United Kingdom	4	9	1	14	23	. .	. .	44	21	1	82	**1 484**
Non-OECD America	47	196	3	1 458	157	106	7	157	10	43	2 893	**4 479**
Non-OECD Asia	541	752	3	6 764	1 447	199	55	57	106	3	6 661	**4 759**
Non-OECD Oceania	10	5	. .	146	1	9	3	. .	. .	. .	102	**70**
Africa	75	7	1	444	38	2	1	19	13	20	165	**3 958**
World	901	1 797	79	13 707	2 555	438	92	834	523	100	14 050	**34 957**

..: Not available.

1. Comprises HS codes 0302-0307, 121220, 1504, 1604, 1605 and 230120.

Source: OECD, *International Trade Statistics Database*, 2006.

Table I.A1.11. **Imports of fish, crustaceans, molluscs and products thereof by OECD countries according to origin,[1] 2006** *(cont.)*

Importing country

USD million	Austria	Belgium	Czech Republic	Hungary	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Luxembourg	Netherlands	Poland	Slovak Republic	Portugal	Spain	Sweden	United Kingdom	**Total OECD**
Origin																				
Australia	3	. .	. .	. .	. .	. .	13	1	4	. .	4	. .	. .	. .	. .	. .	15	. .	5	**463**
Canada	1	52	1	. .	131	4	76	39	3	3	26	. .	12	2	. .	2	39	14	123	**3 327**
Iceland	1	88	1	. .	70	8	113	85	20	10	. .	. .	123	33	. .	33	196	10	571	**1 744**
Japan	1	2	. .	. .	. .	. .	24	6	. .	. .	1	. .	6	. .	. .	. .	3	. .	3	**478**
Korea	. .	4	. .	. .	1	. .	3	2	. .	. .	14	. .	1	. .	. .	. .	54	1	4	**750**
Mexico	. .	1	. .	. .	1	. .	3	1	. .	. .	15	. .	1	. .	. .	. .	13	. .	. .	**623**
New Zealand	1	6	. .	. .	12	. .	28	17	8	1	12	. .	1	3	1	3	64	5	11	**594**
Norway	10	2	8	. .	425	105	504	383	7	2	1	. .	50	305	1	305	115	1 560	256	**4 743**
Switzerland	. .	. .	. .	. .	. .	. .	. .	5	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	**13**
Turkey	1	5	2	1	1	. .	15	10	31	. .	58	. .	28	5	. .	5	32	2	1	**277**
United States	2	42	5		56	1	235	190	5	1	63	. .	46	22	2	22	94	11	143	**3 191**
European Union	250	1 004	76	50	536	100	1 976	1 503	296	164	2 752	80	877	191	27	191	2 044	306	978	**14 780**
Austria	. .	. .	1	1	1	. .	1	2	. .	. .	. .	. .	1	. .	. .	. .	. .	. .	. .	**. .**
Belgium	3	. .	1	. .	10	. .	133	57	8	. .	31	31	150	. .	. .	. .	79	3	24	**539**
Czech Republic	. .	. .	. .	3	. .	. .	2	1	. .	. .	. .	. .	. .	. .	8	. .	. .	. .	. .	**14**
Denmark	31	110	11	6	. .	37	249	414	59	7	433	3	142	65	3	65	201	195	338	**2 709**
Finland	. .	. .	. .	. .	2	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	**2**
France	10	185	6	6	28	4	28	89	14	3	351	24	53	5	1	5	388	13	95	**1 437**
Germany	143	109	15	11	164	10	134		37	12	152	5	300	28	4	28	54	28	182	**1 499**
Greece	2	2	. .	. .	1	. .	62	18	. .	1	172	. .	6	2	. .	2	72	. .	35	**407**
Hungary	. .	. .	. .	. .	. .	. .	4	. .	1	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	**5**
Ireland	1	5	3	. .	16	1	119	25	1	8	29	. .	36	8	3	8	93	5	74	**487**
Italy	17	12	4	3	14	1	68	55	46	. .	. .	. .	11	1	1	1	280	1	9	**647**
Luxembourg	. .	4	. .	. .	2	. .	3	1	. .	. .	. .	. .	2	. .	. .	. .	. .	. .	. .	**13**
Netherlands	26	437	6	5	56	3	236	317	52	5	395	10	. .	29	. .	29	241	40	. .	**1 996**
Poland	1	11	21	10	44	. .	64	342	. .	1	17	. .	7	. .	4	. .	2	10	68	**638**
Portugal	5	5	. .	. .	9	. .	63	3	2	1	54	4	3	. .	. .	. .	253	1	30	**459**
Slovak Republic	3	. .	1	2	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	1	. .	. .	. .	. .	**8**
Spain	3	19	7	3	14	3	319	68	50	. .	857	1	16	9	2	9	. .	3	40	**1 629**
Sweden	2	25	1	1	116	43	40	19	19	1	120		16	22	. .	22	46	. .	80	**602**
United Kingdom	3	79	1	. .	59	1	451	92	7	126	141	2	136	22	. .	22	335	7	1	**1 684**
Non-OECD America	7	117	9	5	489	1	661	488	30	5	555	. .	45	50	4	50	1 686	7	270	**9 557**
Non-OECD Asia	25	446	34	4	147	23	558	772	60	8	525	1	347	161	11	161	660	88	727	**21 348**
Non-OECD Oceania	7	1	. .	. .	3	. .	11	13	1	. .	15	. .	2	. .	. .	. .	. .	1	15	**345**
Africa	10	119	3	1	8	2	711	173	100	5	647	1	153	10	1	10	1 715	2	287	**4 742**
World	308	1 900	151	64	2 063	258	5 061	3 877	590	200	4 707	84	1 732	841	56	841	6 498	2 025	3 701	**70 034**

..: Not available.

1. Comprises codes SH 0302-0307, 121220, 1504, 1604 1605 and 230120.

Source: OECD, *International Trade Statistics Database*, 2006.

Table I.A1.12. **Exports of fish, crustaceans, molluscs and products thereof by OECD countries according to destination,[1] 2006**

	Exporting country											
USD million	Australia	Canada	Iceland	Japan	Korea	Mexico	New Zealand	Norway	Switzerland	Turkey	United States	**Total EU**
Destination												
Australia	. .	14	1	8	4	. .	142	11	1	. .	48	**44**
Canada	3	. .	8	11	5	4	8	21	. .	. .	837	**32**
Iceland	. .	8	. .	. .	. .	. .	. .	22	. .	. .	1	**40**
Japan	260	302	59	. .	558	57	93	296	. .	45	969	**299**
Korea	1	41	11	188	. .	5	40	40	. .	6	414	**43**
Mexico	. .	3	. .	. .	7	. .	1	10	. .	. .	86	**11**
New Zealand	16	5	. .	19	39	. .	. .	. .	. .	. .	4	
Norway		9	90	1	2	2	. .	. .	. .	. .	28	**307**
Switzerland	1	5	6	4	. .	. .	2	34	. .	. .	13	**328**
Turkey	. .	. .	. .	. .	1	1	. .	39	. .	. .	2	**15**
United States	87	2 253	136	181	79	498	136	150	. .	. .	. .	**220**
European Union	42	478	1 277	30	51	33	156	3 427	6	127	1 038	**15 962**
Austria	. .	. .	. .	. .	. .	. .	. .	5	. .	1	. .	**291**
Belgium	. .	43	63	2	3	. .	8	50	. .	. .	41	**912**
Czech Republic	. .	. .	. .	. .	. .	. .	. .	4	. .	. .	. .	**88**
Denmark	. .	110	71	. .	. .	1	2	520	. .	1	22	**509**
Finland	. .	3	6	. .	. .	. .	. .	109	. .	. .	1	**126**
France	12	57	103	17	2	2	21	605	1	12	164	**2 770**
Germany	1	37	93	. .	2	. .	23	202	3	6	266	**2 006**
Greece	6	3	30	. .	. .	1	8	32	. .	23	5	**284**
Hungary	. .	. .	. .	. .	. .	. .	. .	1	. .	. .	. .	**52**
Ireland	. .	2	7	. .	. .	. .	1	3	. .	. .	1	**227**
Italy	3	22	24	1	12	14	11	222	1	40	65	**2 699**
Luxembourg	. .	. .	. .	. .	. .	. .	. .	1	. .	. .	. .	**78**
Netherlands	. .	28	125	8	2	1	3	195	. .	20	180	**1 045**
Poland	. .	2	22	. .	. .	. .	. .	280	. .	. .	14	**463**
Portugal	1	13	73		1	1	5	282	. .	. .	58	**993**
Slovak Republic	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	**34**
Spain	14	35	202	1	28	14	60	230	. .	24	97	**1 914**
Sweden	. .	14	9	. .	1	. .	4	263	. .	. .	7	**349**
United Kingdom	6	108	449	1	2	. .	10	423	2	. .	119	**1 123**
Non-OECD America	. .	46	3	12	4	8	1	216	. .	. .	86	**252**
Non-OECD Asia	483	405	50	798	179	97	234	316	4	. .	671	**460**
Non-OECD Oceania	3	1		38	2	. .	11	. .	. .	. .	7	**7**
Africa	1	5	55	53	6	. .	22	79	. .	. .	35	**586**
World	905	3 665	1 807	1 355	952	706	869	5 493	14	184	4 376	**19 387**

..: Not available.

1. Comprises HS codes 0302-0307, 121220, 1504, 1604, 1605 and 230120.

Source: OECD, *International Trade Statistics Database*, 2009.

Table I.A1.12. **Exports of fish, crustaceans, molluscs and products thereof by OECD countries according to destination,[1] 2006** *(cont.)*

Exporting country

USD million	Austria	Belgium	Czech Republic	Hungary	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Luxemburg	Netherlands	Poland	Portugal	Slovak Republic	Spain	Sweden	United Kingdom	**Total OECD**
Destination																				
Australia	. .	. .	. .	. .	21	. .	1	2	1	1	4	. .	4	2	2	. .	1	1	4	**273**
Canada	1	. .	. .	. .	3	. .	2	1	2	. .	4	. .	1	1	8	. .	3	1	7	**931**
Iceland	. .	. .	. .	. .	9	. .	. .	23	. .	. .	. .	. .	1	5	. .	. .	. .	. .	1	**71**
Japan	. .	. .	. .	. .	58	1	22	7	16	7	39	. .	30	6	1	. .	101	. .	9	**2 937**
Korea	. .	. .	. .	. .	9	. .	2	1	. .	4	. .	. .	2	1	1	. .	5	. .	19	**788**
Mexico	. .	. .	. .	. .	. .	. .	1	. .	. .	. .	. .	. .	. .	. .	. .	. .	10	. .	. .	**119**
New Zealand	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	**81**
Norway	. .	1	. .	. .	188	1	10	58	. .	. .	. .	. .	7	4	. .	. .	. .	21	18	**439**
Switzerland	. .	1	. .	. .	58	. .	37	55	2	1	23	1	122	8	5	. .	11	2	1	**393**
Turkey	. .	. .	. .	. .	2	. .	3	1	6	. .	. .	. .	1	. .	. .	. .	2	. .	1	**58**
United States	. .	. .	. .	. .	12	. .	12	7	9	5	9	. .	34	13	10	. .	36	3	69	**3 742**
European Union	9	1 102	26	5	2 509	7	1 331	1 676	461	403	509	13	1 810	707	442	7	2 173	1 468	1 307	**22 628**
Austria	. .	6	. .	. .	45	. .	10	166	2	1	20	. .	22	2	5	. .	3	6	3	**297**
Belgium	. .	. .	. .	. .	83	. .	179	108	2	5	12	4	392	12	6	. .	19	25	65	**1 121**
Czech Republic	1	1	. .	. .	14	. .	4	22	. .	3	5	. .	6	21	. .	5	6	3	. .	**92**
Denmark	. .	13	. .	. .	. .	. .	31	168	1	11	1	. .	21	71	3	. .	13	136	40	**1 236**
Finland	. .	1	. .	. .	45	. .	4	8	. .	. .	1	. .	4	1		. .	2	61	1	**245**
France	. .	409	2	5	313	. .	. .	319	66	106	58	5	276	51	79	. .	353	309	419	**3 765**
Germany	5	113	2	. .	578	. .	133		24	34	70	2	355	396	4	. .	79	95	115	**2 640**
Greece	. .	7	. .	. .	64	. .	13	35	. .	1	48	. .	18	. .	2	. .	66	22	8	**392**
Hungary	1	1	3	. .	7	. .	6	9	. .	. .	4	. .	3	11	. .	2	5	1	. .	**53**
Ireland	. .	1	. .	. .	9	. .	11	11	3	. .	. .	. .	5	1	. .	. .	2	2	182	**240**
Italy	3	28	. .	. .	393	. .	385	137	217	27	. .	. .	297	18	52	. .	856	133	152	**3 113**
Luxembourg	. .	32	. .	. .	1	. .	25	5	. .	. .	. .	. .	7	. .	3	. .	1	1	2	**80**
Netherlands	. .	315	. .	. .	193	. .	48	341	19	21	9	1	. .	19	3	. .	19	56	. .	**1 606**
Poland	. .	2	2	. .	118	. .	6	62	. .	6	1	. .	27	. .	. .	. .	9	212	18	**781**
Portugal	. .	8	. .	. .	8	. .	40	23	20	2	1	. .	46	. .	. .	. .	681	141	22	**1 427**
Slovak Republic	. .	. .	18	. .	2	. .		6	. .	1	. .	. .	2	4	. .	. .	1	. .	. .	**34**
Spain	. .	95	. .	. .	152	. .	323	75	70	78	266	1	188	3	268	. .		118	277	**2 618**
Sweden	. .	6	. .	. .	224	7	14	24	. .	6	. .	. .	44	15	1	. .	5		4	**646**
United Kingdom	. .	65	. .	. .	259	. .	100	156	37	100	13	. .	96	82	17	. .	52	146	. .	**2 241**
Non-OECD America	2	1	. .	. .	11	. .	28	2	. .	1	1	. .	5	3	37	. .	49	. .	113	**626**
Non-OECD Asia	. .	1	. .	. .	152	. .	23	14	. .	9	7	. .	90	4	7	. .	105	1	48	**3 697**
Non-OECD Oceania	3	. .	. .	. .	. .	. .	5	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	**69**
Africa	4	11	. .	. .	8	. .	81	13	1	12	11	. .	240	1	23	. .	170	. .	11	**842**
World	12	1 126	27	8	3 227	26	1 581	1 924	524	448	683	15	2 401	780	538	7	2 792	1 543	1 726	**39 714**

..: Not available.

1. Comprises HS codes 0302-0307, 121220, 1504, 1604, 1605 and 230120.

Source: OECD, *International Trade Statistics Database*, 2009.

Table I.A1.13. **OECD imports of food fish by major product groups and major world regions, 2007 (kg)**

Tonnes	All fish	%	Fish, fresh, frozen, incl. fillets	%	Fish, dried, smoked	%	Crustaceans and molluscs	%	Prepared and preserved	%
Importers										
EU[1]	7 981 667 857	45	4 313 702 651	54	301 320 576	78	1 782 366 047	50	1 584 278 583	54
Japan	2 341 342 554	16	1 385 285 212	17	18 942 515	5	532 889 674	15	404 225 153	14
United States	2 295 190 159	15	1 006 218 907	13	34 620 145	9	696 694 535	20	557 656 572	19
OECD total	**14 819 553 022**	**100**	**7 981 046 454**	**100**	**384 865 930**	**100**	**3 538 467 768**	**100**	**2 915 172 871**	**100**
Origins										
OECD	6 417 854 861	43	4 096 421 099	51	284 413 188	74	1 059 394 397	30	977 626 177	34
Non-OECD[2]	8 401 698 161	57	3 884 625 355	49	100 452 742	26	2 479 073 371	70	1 937 546 694	66
America	1 774 891 455	21	772 246 352	20	23 032 971	23	687 243 777	28	292 368 356	15
Asia	4 810 162 721	57	2 076 015 280	53	45 995 972	46	1 397 171 737	56	1 290 979 731	67
Europe	882 667 862	11	647 589 501	17	28 320 415	28	174 639 595	7	32 118 351	2
Oceania	88 664 276	1	50 234 875	1	7 783	0	1 998 533	0	36 423 086	2
Africa	944 324 530	11	439 664 981	11	3 823 100	4	213 921 613	9	286 914 837	15

1. EU = EU member countries which are OECD members: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Slovak Republic, Spain, Sweden, UK.
2. The total of the exports to the three OECD zones may not correspond to the global figure for non-OECD as a whole, since the latter also includes values from non-specified origins.

Note: Fish, fresh, frozen, including fillets = HS Codes 302, 303, and 304. Fish, dried, smoked = HS code 305. Crustaceans and mollusks = HS codes 306 + 307. Prepared and preserved = HS codes 1604 + 1605.
Source: OECD, *International Trade Statistics Database*, 2009.

Table I.A1.14. **OECD exports of food fish by major product groups and major world regions, 2007 (kg)**

Tonnes	All fish	%	Fish, fresh, frozen, incl. fillets	%	Fish, dried, smoked	%	Crustaceans and molluscs	%	Prepared and preserved	%
Exporters										
EU[1]	4 823 988 502	46	2 886 890 646	40	230 168 574	54	844 309 267	53	862 620 014	74
Japan	581 910 606	6	515 891 195	7	822 259	0	39 802 614	2	25 394 538	2
United States	1 297 003 602	12	1 035 326 973	14	27 093 202	6	126 857 223	8	107 726 204	9
OECD total	**10 487 299 615**	**100**	**7 285 865 923**	**100**	**428 811 328**	**100**	**1 601 608 680**	**100**	**1 171 013 684**	**100**
Destination										
OECD	6 908 376 902	66	4 347 918 201	60	308 767 483	72	1 187 672 129	74	1 064 019 088	91
Non-OECD[2]	3 578 922 713	34	2 937 947 721	40	120 043 845	28	413 936 551	26	106 994 596	9
America	200 162 393	6	92 864 259	3	60 770 831	51	37 944 608	9	8 582 694	8
Asia	1 383 105 171	39	1 057 907 617	36	12 575 867	10	269 804 939	65	42 816 748	40
Europe	1 282 325 432	36	1 163 054 916	40	4 217 744	4	81 626 603	20	33 426 169	31
Oceania	43 037 105	1	37 977 587	1	110 150	0	1 700 880	0	3 248 489	3
Africa	657 800 801	18	578 081 547	20	40 918 736	34	23 575 454	6	15 225 063	14

1. EU = EU member countries which are OECD members: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Slovak Republic, Spain, Sweden, UK.
2. The total of the exports to the three OECD zones may not correspond to the global figure for non-OECD as a whole, since the latter also includes values from non-specified origins.

Note: Fish, fresh, frozen, including fillets = HS Codes 302, 303, and 304. Fish, dried, smoked = HS code 305. Crustaceans and molluscs = HS codes 306 + 307. Prepared and preserved = HS codes 1604 + 1605.
Source: OECD, *International Trade Statistics Database*, 2009.

Table I.A1.15. **Imports of fish, crustaceans, molluscs and products thereof by OECD countries according to origin,[1] 2007**

Importing country

USD million	Australia	Canada	Iceland	Japan	Korea	Mexico	New Zealand	Norway	Switzerland	Turkey	United States	**Total EU**
Origin												
Australia	2	4	. .	295	1	. .	7	. .	2	. .	99	**27**
Canada	17	9	18	418	52	12	8	39	11	. .	2 235	**639**
Iceland	1	15	. .	118	16	1	. .	120	6	1	130	**1 495**
Japan	12	21	. .		227	4	3	2	2	. .	236	**38**
Korea	6	8	1	512		2	1	5	. .	. .	87	**136**
Mexico		7	. .	105	7	. .	. .	. .	. .	. .	537	**66**
New Zealand	168	10	. .	109	18	3	1	1	3	. .	141	**174**
Norway	22	34	24	442	62	16	. .	. .	33	35	202	**4 219**
Switzerland	. .	. .	. .	. .	. .	9	1	. .	. .	. .	. .	**8**
Turkey	. .	1	. .	86	10	. .	. .	1	1	. .	5	**261**
United States	29	696	1	1 184	134	77	6	102	13	1	. .	**1 183**
European Union	42	41	9	379	73	11		319	356	2	305	**16 021**
Austria	. .	. .	. .	. .	. .	. .	. .	. .	1	. .	. .	**7**
Belgium	. .	. .	. .	. .	. .	. .	. .	1	6	. .	. .	**585**
Czech Republic	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	**15**
Denmark	17	5	6	54	6	. .	. .	203	74	. .	5	**2 327**
Finland	. .	. .	. .	1	. .	. .	. .	1	. .	. .	. .	**23**
France	2	3	1	30	15	1	. .	9	62	. .	19	**1 504**
Germany	3	2	. .	14	1	. .	. .	16	69	. .	7	**1 686**
Greece	1	3	. .	13	2	. .	. .	. .	2	1	13	**480**
Hungary	. .	. .	. .	. .	. .	. .	. .	. .	1	. .	. .	**10**
Ireland	1	2	. .	9	9	. .	. .	10	3	. .	10	**465**
Italy	5	4	. .	76	10	. .	. .	1	29	. .	8	**532**
Luxembourg	. .	. .	. .	. .	. .	. .	. .			. .	. .	**10**
Netherlands	2	2	1	29	1	1	. .	3	67	. .	49	**2 319**
Poland	4	2	1	9	. .	. .	. .	8	12	. .	20	**758**
Portugal	2	6	. .	4	2	. .	. .	1	5	. .	10	**502**
Slovak Republic	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	**10**
Spain	2	4	. .	124	6	9	. .	5	13	1	45	**2 363**
Sweden	. .	. .	. .	1	. .	. .	. .	31	2	. .	3	**787**
United Kingdom	4	8	1	16	21	. .	. .	32	12	1	116	**1 638**
Non-OECD America	53	230	5	1 404	162	128	7	227	11	50	2 957	**4 617**
Non-OECD Asia	609	845	4	6 126	1 536	262	64	70	123	3	6 793	**5 513**
Non-OECD Oceania	13	3	. .	129	2	12	3	. .	. .	. .	103	**89**
Africa	77	8	. .	482	45	2	1	15	17	21	167	**4 475**
World	1 025	1 976	99	12 951	2 811	539	104	1 095	588	108	14 437	**39 735**

..: Not available.

1. Comprises HS codes 0302-0307, 121220, 1504, 1604, 1605 and 230120.

Source: OECD, *International Trade Statistics Database*, 2009.

Table I.A1.15. **Imports of fish, crustaceans, molluscs and products thereof by OECD countries according to origin,[1] 2007** *(cont.)*

Importing country

USD million	Austria	Belgium	Czech Republic	Hungary	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Luxemburg	Netherlands	Poland	Portugal	Slovak Republic	Spain	Sweden	United Kingdom	**Total OECD**
Origin																				
Australia	. .	. .	. .	. .	. .	. .	9	2	2	. .	2	. .	. .	. .	. .	. .	6	. .	7	**438**
Canada	2	49	1	. .	177	5	89	44	3	3	26	. .	13	2	18	. .	42	20	145	**3 458**
Iceland	1	96	2	. .	106	14	94	72	13	12	. .	. .	144	32	46	. .	186	12	663	**1 902**
Japan	. .	. .	. .	. .	. .	. .	16	4	1	. .	2	. .	10	. .	. .	. .	3	. .	3	**544**
Korea	. .	13	. .	. .	1	. .	6	6	. .	. .	27	. .	4	1	4	. .	71	1	3	**758**
Mexico	. .	. .	. .	. .	. .	. .	7	1	4	. .	26	. .	. .	. .	. .	. .	28	. .	1	**723**
New Zealand	1	6	. .	. .	13	. .	25	15	10	1	11	. .	2	4	3	. .	65	5	13	**629**
Norway	11	1	8	. .	397	134	546	354	14	1	3	. .	82	340	58	1	124	1 905	240	**5 089**
Switzerland	. .	. .	. .	. .	. .	. .	1	5	. .	. .	. .	. .	2	. .	. .	. .	. .	. .		**18**
Turkey	1	4	3	1	1	. .	20	21	49	. .	56	. .	46	7	. .	. .	47	2	2	**365**
United States	15	32	7	. .	55	2	228	268	8	3	74	. .	48	24	98	2	136	15	171	**3 428**
European Union	323	1 110	90	56	519	104	2 095	1 598	367	202	2 920	90	970	236	1 278	32	2 340	385	1 305	**17 558**
Austria	. .	. .	1	1	1	. .	. .	3	. .	. .	1	. .	. .	. .	. .	. .	. .	. .	. .	**7**
Belgium	4	. .	1	1	8	. .	137	54	16	1	25	34	192	. .	10	. .	76	3	24	**591**
Czech Republic	1	. .	. .	3	. .	. .	2	2	. .	. .	. .	. .	. .	1	. .	8	. .	. .	. .	**15**
Denmark	37	103	13	6	. .	36	225	398	66	6	408	4	152	73	41	2	211	226	320	**2 697**
Finland	. .	. .	. .	. .	5	. .	. .	1	. .	. .	. .	. .	. .	1	. .	. .	. .	17	. .	**24**
France	12	197	6	4	23	5	23	80	20	8	366	28	51	6	47	1	469	23	136	**1 647**
Germany	188	127	19	13	150	13	145		62	18	183	5	348	50	23	3	60	29	250	**1 799**
Greece	3	3	2	. .	1	. .	71	17	. .	1	224	1	6	1	25	. .	88	. .	39	**514**
Hungary	. .	. .	1	. .		. .	8	. .	1	. .	. .	. .	. .	. .	. .	. .	. .	. .	1	**10**
Ireland	1	7	2	. .	17	. .	128	26	1	12	31	. .	19	9	2	1	98	5	108	**508**
Italy	23	17	6	3	15	. .	64	53	48	. .	. .	1	15	2	10	1	261	1	13	**665**
Luxembourg		5	. .	. .	1	. .	4	. .	. .	. .	1	. .	1	. .	. .	. .	. .	. .	. .	**11**
Netherlands	36	497	6	5	65	4	263	349	53	5	396	11	. .	35	128	. .	276	43	147	**2 475**
Poland	4	12	23	11	37	1	85	452	. .	1	16	. .	4	. .	. .	5	6	16	84	**814**
Portugal	5	5	. .	. .	8	. .	75	5	3	. .	57	4	3	. .	. .	. .	292	1	44	**531**
Slovak Republic	. .	. .	1	3	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	6	. .	. .	. .	**10**
Spain	4	22	9	6	8	3	362	64	67	1	922	1	17	11	812	4	. .	7	45	**2 569**
Sweden	2	35	1	1	120	42	44	20	20		128	. .	19	24	160	1	77	. .	93	**823**
United Kingdom	4	81	1	1	62	1	459	75	10	149	162	2	144	24	21		428	15	. .	**1 847**
Non-OECD America	8	115	9	4	544	4	678	556	44	3	590	. .	50	45	47	2	1 747	7	166	**9 851**
Non-OECD Asia	40	517	45	4	155	31	633	928	84	14	619	1	389	224	85	14	776	121	832	**21 950**
Non-OECD Oceania		3	. .	. .	2	. .	16	20	1	1	17	. .	7	2	. .	. .	5	. .	16	**353**
Africa	3	122	3	1	8	2	764	155	116	8	740	1	200	10	148	1	1 887	3	304	**5 308**
World	402	2 097	181	70	2 162	315	5 383	4 216	738	249	5 121	94	2 000	996	1 844	61	7 182	2 486	4 137	**75 469**

..: Not available.

1. Comprises HS codes 0302-0307, 121220, 1504, 1604, 1605 and 230120.

Source: OECD, *International Trade Statistics Database*, 2009.

Table I.A1.16. **Exports of fish, crustaceans, molluscs and products thereof by OECD countries according to destination,[1] 2007**

Importing country

USD million	Australia	Canada	Iceland	Japan	Korea	Mexico	New Zealand	Norway	Switzerland	Turkey	United States	**Total EU**
Destination												
Australia	. .	7	1	9	4	. .	177	18	. .	. .	42	**43**
Canada	3	. .	9	14	5	2	8	23	. .	. .	894	**39**
Iceland	. .	13	. .	. .	1	. .	. .	15	. .	. .	1	**34**
Japan	272	278	63	. .	481	76	89	296	. .	41	798	**292**
Korea	1	37	16	227	. .	5	34	50	. .	9	357	**39**
Mexico	. .	. .	. .	1	6	. .	2	15	1	. .	74	**11**
New Zealand	13	4	1	19	68	. .	. .	1	. .	. .	6	
Norway	. .	17	110	1	1	. .	. .	. .	. .	. .	39	**361**
Switzerland	2	5	8	1	. .	. .	1	32	. .	. .	7	**371**
Turkey	. .	. .	1	. .	. .	1	. .	50	. .	. .	2	**17**
United States	91	2 290	123	215	81	562	118	170	. .	. .	. .	**286**
European Union	24	518	1 466	28	103	60	150	3 809	6	151	1 082	**17 665**
Austria	. .	. .	. .	. .	. .	. .	. .	6	. .	. .	. .	**318**
Belgium	. .	34	66	3	3	. .	8	51	. .	1	30	**987**
Czech Republic	. .	. .	. .	. .	. .	. .	. .	7	. .	. .	. .	**114**
Denmark	1	122	105	. .	1	. .	3	558	1	. .	20	**526**
Finland	. .	4	14	1	. .	. .		126	. .	. .	. .	**144**
France	8	65	96	9	2	9	18	653	1	13	169	**2 828**
Germany	2	39	90	1	3	1	21	207	2	7	241	**2 197**
Greece	4	3	29	1	. .	5	8	46	. .	39	9	**326**
Hungary	. .	. .	. .	. .	. .	. .	. .	1	. .	. .	. .	**78**
Ireland	. .	3	8	. .	. .	. .	1	4	. .	. .	2	**287**
Italy	1	21	22	1	25	19	9	225	1	35	80	**2 935**
Luxembourg	. .	. .	. .	. .	. .	. .	. .	2	. .	. .	. .	**88**
Netherlands	. .	29	144	9	2	1	4	247	. .	25	175	**1 234**
Poland	. .	2	20	. .	1	. .	. .	316	. .	. .	12	**480**
Portugal	. .	17	113	. .	5	. .	4	388	. .	. .	63	**1 204**
Slovak Republic	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	**37**
Spain	5	36	201	2	58	25	57	247	. .	31	137	**2 103**
Sweden	. .	20	11	. .	1	. .	5	285	. .	. .	11	**394**
United Kingdom	5	124	545	1	2	1	13	440	2	1	132	**1 386**
Non-OECD America		47	5	13	10	26	1	252	. .	. .	107	**143**
Non-OECD Asia	494	361	42	947	307	93	265	382	4	. .	791	**515**
Non-OECD Oceania	3	1		50	2	. .	11	. .	. .	. .	12	**7**
Africa	1	3	59	59	11	. .	41	110	1	. .	31	**708**
World	910	3 694	2 030	1 603	1 099	826	924	6 241	15	202	4 410	**21 516**

..: Not available.

1. Comprises HS codes 0302-0307, 121220, 1504, 1604, 1605 and 230120.

Source: OECD, *International Trade Statistics Database*, 2009.

Table I.A1.16. **Exports of fish, crustaceans, molluscs and products thereof by OECD countries according to destination,[1] 2007** *(cont.)*

Exporting country

USD million	Austria	Belgium	Czech Republic	Hungary	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Luxemburg	Netherlands	Poland	Portugal	Slovak Republic	Spain	Sweden	United Kingdom	**Total OECD**
Destination																				
Australia	..	..	..	..	17	..	1	3	1	2	4	..	3	4	2	..	2	1	4	**301**
Canada	..	..	..	..	4	..	4	1	2	..	4	..	4	2	8	..	2	1	8	**997**
Iceland	..	..	..	..	8	..	..	17	..	..	..	..	2	7	..	..	..	..	1	**63**
Japan	..	..	..	..	45	1	17	8	10	5	31	..	33	8	3	..	124	..	8	**2 688**
Korea	..	..	..	..	8	..	1	1	..	7	..	..	1	..	..	..	4	..	18	**774**
Mexico	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	9	..	..	**111**
New Zealand	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**111**
Norway	..	2	..	..	237	1	11	55	..	..	1	..	6	6	..	..	4	30	8	**529**
Switzerland	..	1	..	..	72	..	49	65	2	1	26	..	122	11	5	..	12	2	3	**428**
Turkey	..	..	..	..	1	..	6	1	5	..	..	..	2	..	..	..	2	..	1	**71**
United States	..	1	..	..	14	..	16	11	11	7	8	..	49	18	11	..	34	4	104	**3 937**
European Union	15	1 142	31	..	2 532	18	1 529	1 853	532	429	521	14	2 079	832	519	5	2 491	1 525	1 596	**25 061**
Austria	..	5	2	..	45	..	12	186	3	1	25	..	19	1	5	..	3	6	5	**324**
Belgium	..	..	..	..	80	..	196	106	2	7	15	4	458	14	5	..	20	18	61	**1 181**
Czech Republic	1	1	..	..	15	..	5	28	2	2	7	..	10	28	..	3	7	6	1	**121**
Denmark	..	16	..	..	..	1	29	160	1	17	1	..	23	47	2	..	12	173	45	**1 335**
Finland	..	1	..	..	52	..	3	11	..	..	..	..	5	2	..	..	3	65	1	**289**
France	..	370	2	..	275	1	..	335	75	117	57	6	318	58	80	..	409	278	446	**3 872**
Germany	9	111	2	..	598	1	152		24	32	73	2	379	488	4	..	89	96	137	**2 809**
Greece	..	8	..	..	62	..	18	42	..	2	57	..	24	..	4	..	74	25	10	**468**
Hungary	2	1	3	..	5	..	4	12	..	..	4	..	3	15	..	3	24	1		**79**
Ireland	..	1	..	..	12	..	14	13	4	..	1	..	7	2	2	..	3	2	226	**305**
Italy	2	23	..	..	392	..	421	146	258	27	..	1	365	27	58	..	951	95	168	**3 375**
Luxembourg	..	36	..	..	2	..	29	5	..	..	..	..	9	..	4	..	1	1	1	**90**
Netherlands	1	382	..	..	195	..	50	353	18	13	10	1	..	17	4	..	22	48	119	**1 870**
Poland	..	3	1	..	99	..	7	96	..	5	2	..	43	..	..	..	9	202	14	**831**
Portugal	..	8	..	..	19	..	36	24	22	2	1	..	43	..	..	..	800	225	24	**1 794**
Slovak Republic	1	..	20	..	3	..	..	5	..	1	..	..	..	4	..	..	2	1	1	**37**
Spain	..	79	..	..	164	..	388	85	84	86	252	1	199	3	308	..		123	331	**2 903**
Sweden	..	7	..	..	244	16	20	20	..	6	..	..	48	21	1	..	6		7	**728**
United Kingdom	..	91	..	..	269	..	144	225	40	112	18	..	126	104	43	..	56	159	..	**2 650**
Non-OECD America	..	1	..	..	12	..	6	3	..	..	2	..	6	1	48	..	61	..	4	**603**
Non-OECD Asia	..	1	..	..	147	..	34	13	1	5	6	..	94	9	6	..	136	1	61	**4 202**
Non-OECD Oceania	..	..	..	..	..	..	5	..	..	..	1	..	..	..	..	..	1	..	..	**86**
Africa	..	15	..	..	10	..	95	13	1	27	18	..	249	2	31	..	223	..	25	**1 024**
World	21	1 175	35	1	3 328	45	1 810	2 097	603	488	726	15	2 739	934	636	6	3 249	1 628	1 980	**43 469**

..: Not available.

1. Comprises HS codes 0302-0307, 121220, 1504, 1604, 1605 and 230120.

Source: OECD, *International Trade Statistics Database*, 2009.

PART II

Climate Change, Adaptation and the Fisheries Sector

Executive Summary

This chapter highlights a number of key issues. First, it outlines with what might be expected, drawing on the *Fourth Assessment Report* of the Inter-governmental Panel on Climate Change (IPCC), the Arctic Climate Impact Assessment (ACIA), and past experience. Secondly, the chapter considers implications of changes in fish stock productivity and, finally, considers the consequences of changed stock migration or habitat location and what this means for stocks shared between two or more countries and those partly or wholly found on the high seas.

One thing is certain: there will be changes in the ocean climate, as there have been in the past. However, global warming will add two complications. First, it will add a trend, around which ocean climate will fluctuate. Second, because of that trend, it is more likely than it used to be that changes in ecosystems will be irreversible.

This will have implications for fisheries management which depends on whether the effects of climate change occur gradually or not, and whether they can be predicted or not. If these effects take place in small, incremental steps they would not seem to be very problematic; adjustment could be made in similarly small, incremental steps. In the meantime, the effects of climate change on fisheries cannot be predicted with much confidence and will sometimes occur suddenly.

Global warming is unlikely to pose fundamentally new problems for fisheries management, but the present focus on it serves the good purpose of emphasizing how dependent fisheries are and have always been on the variability in ocean climate and serves to strengthen further the arguments for good management.

Introduction: The issues

What are the key issues for fisheries arising from climate change? Most people probably associate climate change with global warming; that certainly is one of the most controversial issues of our times. Global warming will affect not just the atmosphere but the oceans as well, but how much, how rapidly, and even, for some areas, in what direction is unclear. In fact, even if the global average temperature is rising, it will not necessarily rise uniformly in every location, and what evidence there is indicates that some areas, such as the Arctic and sub-Arctic, are warming more rapidly than others. Some areas might even become cooler. This is also likely to be the case in the world's oceans; climate change will manifest itself in changing ocean currents, and some areas might even get colder because of diversion or changing intensity of currents.

But climate change need not be due to global warming. In fact, the climate has always varied on long and short time scales and will undoubtedly continue to do so whether or not man-made global warming is occurring. Since global warming will occur as a trend around which there will be variations, perhaps substantial, many of the issues associated with it are much the same as the issues raised by climate variability in the past. Conversely, whatever lessons can be learned from climate variability in the past should definitely be of interest for the issues raised by global warming. Hence this document shall devote considerable attention to some climate variations that have happened in the not too distant past (within a time horizon of a hundred years or so). How did they affect fisheries? How did the industry and society in which it was embedded respond?

What are the issues? The fishing industry is a bit special, being essentially an advanced form of hunting.[1] It does not attempt to control nature, except indirectly through how it exploits the fish stocks. There are, with few exceptions (salmon hatcheries), no measures applied to enhance the productivity of the oceans, analogous to seeding, fertilization, or plowing and harrowing; the fisheries take what nature gives them, and nature responds in a niggardly way if the fisheries take too much. The productivity of the oceans depends on ocean climate; the upwelling of nutritional materials from the deep sea that occurs in certain areas depends on currents, which in turn depend on winds, and currents carry plankton to certain areas so the fish can thrive. The strength and even location of ocean currents can vary substantially over time, which in turn gives rise to fluctuations in the productivity of fish stocks, as well as in their migrations and location. This variability is further affected by predator-prey dynamics; a dearth of suitable prey fish due to changes in productivity lower down in the food chain will affect the growth of their predators, and abundance and migration of predators will affect the abundance of their prey.

Hence the fishing industry is a primary example of an industry that is subject to the vagaries of nature and so must adjust to nature and her variability; there is little or nothing that the industry can do to affect the natural processes. The first issue to arise, then, is can changes be predicted in an ocean climate? Unfortunately it is unclear whether or not this is possible, at least in a sufficiently precise and timely fashion to be of much help for the

industry in the short term. The synthesis overviews of climate change predictions, such as those produced by the Intergovernmental Panel on Climate Change (IPCC), make few predictions on a spatial or temporal scale that would be useful for fisheries management. Other work on regional scales has the potential to produce more useful predictions, and these predictions are likely to improve as the methods are developed further. The fact remains, however, that there is substantial uncertainty in these models and their predictions, and their ability to predict non-linear or threshold responses might be particularly limited.

Whether or not predictions in a sufficiently precise and timely fashion can meaningfully affect management, raises the question of whether predictions are really needed. If changes occur gradually it may be true that all that is necessary is to adjust gradually; and the necessary information will be revealed as it is required. This is not true if changes in fish migrations or productivity occur suddenly and on a major scale as certain "threshold values" of environmental variables are exceeded.[2] Such changes may be difficult to predict, and all the more so since they might occur even if the underlying change in ocean circulation and temperature is gradual; ocean conditions might suddenly reach a point where certain fish stocks can no longer survive, or radically change their migratory habits. The only certainty on what to expect would be if: 1) similar things had occurred in the past; and/or 2) if one had a strong understanding of the mechanisms and interactions underlying climate change and its impacts on oceans and ecosystems.

Then, being able to predict changes or not, what changes could be expected? It is useful to distinguish between two main types of changes that could occur, *i*) changes in the productivity of the ocean in a given location, and *ii*) changes in fish migrations or the location of their habitats. Changes in productivity could go both ways; less intensive upwelling in the areas where this occurs would adversely affect the productivity in these areas. This is what occurs during the famous El Niño events when warm waters are carried towards the west coast of South America and the upwelling diminishes, adversely affecting the anchovy stocks in the area and the fisheries of Peru and Chile (see Appendix). Conversely, the blooming of plankton could increase and so could the intensity of currents carrying plankton to certain areas; this is what happened in the warm period in the 1920s and 1930s in the northeast Atlantic, to be further discussed below. How fish stocks will be affected is a more complicated issue, depending on predator-prey interactions. As to the industry and society, changes in productivity of fish stocks may necessitate investment in new equipment or finding new markets, or cause obsolescence of real and human capital and loss of markets.

Changes in fish stock productivity, if they occur uniformly in a given area, would affect all countries sharing the stocks involved in a similar way. Changes that affect fish stock migrations or displace their habitat may on the other hand affect different countries differently. Some might be disadvantaged while others might gain. This could cause problems when fish stocks migrate between the exclusive economic zones (EEZs) of different countries. The countries involved might be affected differently, and so they would be if the habitat of a given fish stock is largely or wholly displaced from one country's EEZ to another's. This could upset existing agreements on sharing fish stocks.

These are the key issues to be further discussed below. First, one should begin with what might be expected, drawing on the *Fourth Assessment Report* of the Inter-governmental Panel on Climate Change (IPCC), the Arctic Climate Impact Assessment (ACIA), and past experience. Secondly, one could move on to consider implications of changes in fish stock

productivity, such as would not involve changes in migration and stock habitat. Thereafter one could consider the consequences of changed stock migration or habitat location and what this means for stocks shared between two or more countries and those partly or wholly found on the high seas. After a concluding section on policy implications there is an Appendix where there is a brief discussion of climate changes that have occurred in the north Atlantic and the eastern Pacific and their implications for the fisheries in these areas. These experiences are useful to keep in mind when dealing with the consequences of future climate change, and they have also been useful in other parts of this chapter.

What can one expect?

Climate change has been a high profile international issue for about twenty years. For some time the average global temperature has been increasing, and most climate scientists have concluded that this is mainly due to emissions of greenhouse gases, particularly carbon dioxide. Since there is no way emissions of these gases could, in the medium term, be reduced to a level that would stabilize their concentrations in the atmosphere the global temperature is likely to rise further, although by how much is highly uncertain.

Global warming will affect not just the atmosphere but also the oceans. Emissions of greenhouse gases, in particular carbon dioxide, will affect the oceans in at least three ways: *i)* warmer atmosphere will warm up the oceans; *ii)* some of the carbon dioxide will be absorbed by the ocean (but some might in fact be released from the ocean to the atmosphere), which could affect ecosystems through acidification; *iii)* increased melting of glaciers in the Arctic will release fresh water to the ocean, affecting its salinity, level and possibly its circulation. In addition, if global warming affects wind patterns and strength, this in turn will affect ocean currents. This could have two effects. First, changes in ocean currents would affect the distribution of plankton and hence migrations of fish stocks and location of their habitats. Second, changes in the winds that cause upwelling of nutritional material from the deep sea could affect the upwelling and hence the growth of fish stocks that depend on it. Some of the richest fisheries in the world exploit species that depend on upwelling (sardines and anchovy off southern Africa, California, Morocco and Peru and Chile).

These are complex effects and their magnitude and time profile highly uncertain. It is no wonder, therefore, that the voluminous *Fourth Assessment Report* of the IPCC has very little to say, at least very little that is definitive, about how world fisheries will be affected. It notes that changes in salinity, circulation and ice coverage that already have happened and may be expected to continue will affect primary production, fish growth and fish migration. In some cases the effects have been positive, but in others negative.[3] The most definitive conclusions concern coral reefs and coastal areas, both of which are likely to be negatively affected.[4] Bleaching of coral reefs is likely to increase, both because of rising temperature and because of acidification of the ocean due to absorption of carbon dioxide. Acidification has wider implications, as it adversely affects animals with a hard shell, which would threaten ecosystems where such organisms play a pivotal role.[5]

More definitive predictions, but still fairly vague, were made in the Arctic Climate Impact Assessment (ACIA).[6] This was the result of work done by a group of scientists asked to assess the effects of global warming on the Arctic and sub-Arctic region. This assessment was based on a number of climate scenarios and models used in the *Third Impact Assessment Report* of the IPCC, but ACIA went into much greater detail about how the

said region and its various parts might be affected. Fish stocks were predicted to move further north because of rising ocean temperature and melting of Arctic ice. These movements would not necessarily be displacements but also expansions, with new areas colonized by certain stocks, which thus would increase in abundance. The most northerly species (capelin and Greenland halibut, for example) would probably decline in abundance, while more southerly ones (cod, pollock, herring, and some flatfish) would probably increase. The melting of sea ice was expected to increase primary production by opening up new areas for the inflow of sunlight. This was expected to increase fish production, but it was pointed out that the latter would depend critically on fish larvae being carried by currents to the blooming of zooplankton at the right time.[7] Overall, predictions were positive rather than negative, which agrees with the experience from the warm period in the northeast Atlantic in the 1920s and 1930s. The ACIA report also dealt with possible economic effects of this, a subject that will be discussed in the following section.[8]

Given the rather uncertain predictions of the consequences of climate change for fisheries, changes in fish stock growth and migration will be dealt with in quite general terms. While in a number of cases it seems reasonably clear in what direction the growth and migrations of certain stocks will be affected, the speed and magnitude of these changes are much less clear. It is also unclear if these changes will be gradual, in response to a gradual increase in global average temperature, or whether they will be released when certain threshold values of environmental variables such as temperature and salinity will be hit, displacing stocks from their previous habitats or inciting them to change their migrations.

Global warming occurring as a trend, but with swings, perhaps substantial ones, around the trend seems to be what is happening. Even if some of the warmest years ever recorded have occurred fairly recently, the warming seems to have come to a halt lately. On a longer time scale, the 1960s and 1970s were a cool period in northwest Europe, compared to the 1920s and 1930s and the last two decades. Even with global warming, all areas will not warm to the same extent; it appears that the Arctic and sub-Arctic are warming much more rapidly than the rest of the world.

As regards ocean climate, this is an even more appropriate description. The temperature in a specific area is highly dependent on ocean currents and can vary substantially from year to year or decade to decade, depending on the strength and direction of these currents (examples of this are discussed in the Annex II.A1). This means that any trend towards warming will be overlaid with substantial variations around that trend. Some areas might even be going against the trend for a long and possibly indefinite period, due to a change that might permanently strengthen or switch on a cold current. As an example, substantial weakening of the Gulf Stream and the thermohaline circulation is a scenario that cannot be totally dismissed, even if it is considered unlikely.[9]

This has some important implications for the adjustment towards a changed climate in the ocean. First, how can a permanent change differ from a temporary one? In the past so-called regime shifts in various parts of the world have taken place which has been fairly long-lasting, such as the warm period in the northeast Atlantic in the 1920s and 1930s, the cooling off in the 1960s and 1970s, and the shift to a warmer regime in the north Pacific in the late 1970s.[10] It is not easy to distinguish such regime shifts from a more permanent change. On the other hand it can be argued that this does not much matter for practical purposes; from the point of view of investing in production equipment or finding new markets, a regime lasting 10-20 years is a regime lasting for ever.

As a result of such regime shifts, partly at least, fish stocks disappear and migrations have changed for long periods, and some have not returned to their previous state or patterns. The West Greenland cod stock was severely depleted in the 1960s and has been virtually nonexistent since 1990, while the shrimp stock increased.[11] The Northern cod of Newfoundland disappeared in the early 1990s. Also here shrimp, as well as crab stocks, increased. Migrations of Norwegian spring spawning herring to Iceland stopped when the waters north and east of Iceland became colder in the 1960s and have not fully resumed their previous pattern despite a warmer ocean and stock recovery after the mid-1980s. The Pacific sardine disappeared from the coast of California in the 1950s and was absent for decades (some of these changes are further discussed in Annex II.A1).

As was noted in the Introduction, if the changes in ocean climate are incremental, they might not pose much of a problem. Adjustment could occur gradually, and sound expectations could be formed on the basis of past experience. But the changes just discussed seem to be due to the passing of certain environmental thresholds rather than dramatic, underlying climate changes. As the temperature rose, or cooled, nothing much happened until suddenly a certain fish species was seemingly unable to reproduce or find enough food to survive, or predators invaded and decimated a fish stock that earlier was thriving. Such changes are impossible or at least very difficult to predict. In order to know the threshold values involved they must have been passed at some time in the past, but then the fish would not be around any more unless the change was reversible. Many such changes are in fact reversible; both the Norwegian spring spawning herring and the Pacific sardine were almost wiped out at one point, but once the environmental conditions were appropriate they came back, although much later than the environmental conditions would seem to warrant (see Annex II.A1).

As has been argued, global warming is certain to be a trend with inter-annual and perhaps even decadal variability, not least in the oceanic environment. This may mean that critical thresholds could be crossed in opposite directions from time to time. Does this mean that the ecosystem will return to its previous state? How quickly? These temporary setbacks are particularly likely to cause problems with shared fish stocks whose migrations might switch between different states' EEZs. This problem will be discussed more later on in this chapter.

Changes in fish stock productivity

As discussed in the previous section, climate change is likely to cause changes in fish stock abundance, albeit of uncertain magnitude and direction. Here international repercussions are ignored and assumptions that changes in fish stock abundance are confined to one nation's exclusive economic zone (EEZ) or, for stocks that move between the EEZs of different nations, affect them all in equal measure. This also covers the case where new stocks expand to new areas without declining in their traditional areas. Previous climatic variations provide examples of this latter effect. Cod and even herring began to spawn at Greenland during the warm period in the 1920s and 1930s. The area must have been seeded from somewhere, but not necessarily at the expense of those areas; adult fish probably migrated in search of food or larvae drifted with the currents and then settled at Greenland. Migrations or larval drift from other areas to which the adult fish return, like the cod at Iceland that drifts over to Greenland and then returns, is a different issue which would get us into the subject of shared stocks and how sharing agreements are affected by climate change, the subject of the following section.

Climate change, whether it is warming or cooling, will affect different fish species differently. Each fish species is found only within a certain temperature range, which may have as much to do with the availability of prey as with temperature as such. Any change in temperature is therefore likely to be beneficial for certain stocks and harmful to others. Disappearance of cod and booming shrimp and crab stocks at Newfoundland and Greenland as a result of climate change has already been noted. Change in ocean currents, which manifests itself as a change in temperature, may also affect upwelling of nutrients from the deep sea. Even small changes can apparently cause major disruptions, such as the switch from anchovy to sardine and *vice versa* which occurs in various upwelling areas around the world (Benguela, Humboldt, the California current) from time to time, for reasons that are not well understood.

Whether or not global warming will affect the productivity of the oceans negatively or positively depends on two things: how it will affect *i)* primary production and *ii)* upwelling (or runoff) of nutritional material. The *Fourth Assessment Report* of the IPCC leans towards thinking that primary production will be negatively affected.[12] Nutritional upwelling from the deep sea depends critically on the strength of winds and the currents they generate, and it seems difficult or impossible to make any definite forecasts about that. A given primary production will end up producing a different species mix at each trophic level, according to how changes in ocean currents affect the survival of different species. Whether or not there will be a more or less valuable species mix as a result of global warming is very difficult to say.

How each particular country will be affected will depend on the composition of species within its EEZ (abstracting from any fishing the country could be involved in outside is own zone). It is unlikely that all its fisheries would be adversely affected; if, say, fish *X* that preys on fish *Y* will be adversely affected, fish *Y* is likely to survive better, and provided that there is enough food around for fish *Y*, the country in question could increase its catches of this fish. Whether the country in question gains or loses from the change will depend on, among other things, the value (monetary or otherwise) of fish *Y* relative to the value of fish *X* and the costs associated with taking them. As a case in point, consider what happened to the fisheries in Newfoundland after the collapse of the Northern cod in the early 1990s. A contributing factor to the collapse of this fishery was the cooling off of the waters around Newfoundland at the time. This fishery was both large and valuable, and its disappearance caused a major disruption to the economy and culture of Newfoundland. However, the abundance of crabs and shrimps increased in the wake of the collapse of the cod, probably due to less predation from cod on these species or their larvae. After a few years the value of fish catches (including crabs and shrimps) was higher than ever before.[13] However, the impacts on Newfoundland were serious: the benefits of the shrimp and crab fisheries were distributed among a much smaller segment of the population than were those of the cod fishery; the cod fishery was fundamental to the culture of Newfoundland; and there were substantial costs in helping thousands of fishers and processing workers make the transition to other industries.

Regardless of whether in the end a country would gain or lose from a climate change in the waters around its coasts, all changes, even those for the better, necessitate adjustments. Boats may need to be adapted to catch new species and new ones might need to be built. This, needless to say, is likely to be most demanding when new and very different species replace old ones. It was not too much of a problem in the herring fisheries of Norway and Iceland to switch to capelin when the herring stocks collapsed (these

fisheries are discussed at greater length in Annex II.A1), but switching from cod to crabs or shrimp is likely to be more problematic, as the fishing gear is quite different. On the processing and marketing side the problem of switching will depend on how similar the species are with respect to the processing equipment required and the markets they supply. The aforementioned switch from herring to capelin as raw material for the fish meal industry was unproblematic, both with respect to processing and marketing; the meal from both is very similar and the same processing equipment can be used for both. The situation would be different if, for example, a herring fishery providing raw material for cured products collapses. Cured products of herring do not have perfect or maybe not even close substitutes and appeal to a specific and acquired taste among consumers. If a switch from Species *X* to Species *Y* is required and Species *Y* serves a totally different market, it will be necessary to find and make inroads on such markets and probably to invest in new processing equipment as well. In the end the country might end up with more valuable fish catches, but at a certain cost.

It is difficult to generalize about these points, other than to say that flexibility on all fronts will be helpful. Regulatory regimes should be such that the industry can switch its boats and processing equipment from the retreating species to the expanding one as needed. In regimes that rely on fish quotas or licenses there should be flexibility as required to switch from a quota or a license for species *X* to species *Y*, needless to say without unduly raising the exploitation pressure on species *Y*. This could be achieved with markets for licenses or quotas where the total amount for each type of fish is decided on sound biological and economic principles, allowing the industry to achieve maximum efficiency within those limits.

Likewise, easy market access would be helpful to cope with switches to new species and markets. Traditional supplies to a given market could dry up if the fish species involved can no longer be caught by the traditional suppliers be they domestic fishermen or some specific exporting country. It would be in the interest both of the consumers in those markets and of the new potential suppliers emerging if imports of fish are unimpeded by tariffs and other trade restrictions, except those necessary for health and safety purposes.

In general, one would be tempted to conclude that the richer a country is, the better it will be able to cope with structural changes made necessary by climate change, in fisheries as in other industries. Rich countries certainly are in a better position to pay monetary compensation to those whose skill and capital equipment might be made obsolete by disappearing fish stocks. On the other hand, rich economies are often more demanding in terms of specific skills than poor ones; specialization is indeed one of the factors behind economic growth. The skills acquired in an industry like fishing could, in a rich country, be less easily transferable to other industries relying on a different set of skills. Hence, reintegrating redundant fishermen into the labour market could be more difficult and expensive in rich countries than in poor countries.

The ACIA report, earlier mentioned, went into considerable detail about the possible economic effects of changes in fish abundance in the Arctic and sub-Arctic region.[14] Of particular interest is the analysis of what might happen to the economies of Iceland and Greenland. This is so because in most countries fisheries are a very small part of the overall economy, but often important locally and possibly pivotal in certain regions. The impact of changes in fish stocks would therefore hardly be noticed in statistics at the national level,

while regional statistics are often too rudimentary to evaluate such regional effects and may not exist at all. For the Icelandic economy a gradual change in fish stocks spread over 50 years would hardly have a discernable impact on the economy. However, a more sudden change for the worse – a decline of 25% over five years – would produce serious effects, producing a dip in GDP to 90 per cent of a reference level, attained over a few years, and then a recovery.[15] The Greenland economy, being more fish-dependent, seems still more sensitive to changes in fish abundance, so even a moderate increase in fish abundance would have a significant impact on the economy. From this it appears clear that such gradual and moderate effects as foreseen by the ACIA scenarios would have a relatively minor impact, except in extremely fish-dependent communities with few opportunities, such as Greenland.[16]

Changed fish migrations and shared stocks

Some fish stocks traverse the great oceans; tuna is a primary example. This is most likely driven by a search for food. Some stocks migrate recurrently to certain locations to spawn; Northeast Arctic cod and Norwegian spring spawning herring are two examples, discussed at some length in Annex II.A1. Whatever the reason, the extensive migrations of some fish stocks take them across national boundaries at sea, and sometimes into what is left of the high seas.

The fact that one country cannot effectively control a stock that periodically migrates out of its EEZ and into that of another or into the high seas, has prompted some of the countries sharing a stock to agree on its management and control. All countries involved have an interest in avoiding overexploitation, but apart from that their interests and incentives may be different. Their goals might possibly differ, and even if they are only concerned with economic gain, the relevant parameters such as costs, prices, or discount rates might differ among them. But even if the said parameters were the same the incentives for avoiding overfishing could vary in strength.

Fish stock management involves the resolution of two questions: *i)* how much fish should be caught from each stock at each point in time, and *ii)* how that amount should be divided among the parties. Several principles have been invoked in the resolution of the latter question; some at least are based on what may loosely be called zonal attachment, *i.e.,* how much of the stock is within the EEZ of one particular country, or how much time the stock spends there. Both are essentially variations on the same principle.[17]

But things could be less straightforward. If sovereign states are to agree to anything, they must fare better under the agreement than without it. This means that a state will only agree to limiting its fishing effort if this results in greater gain than it would get otherwise. This is only loosely related or not at all to zonal attachment. In Box II.1 this is illustrated with a simple, numerical example. It is also illustrated how a sudden, unexpected and perhaps imperfectly understood change in the distribution of the stock might upset an existing agreement.

One example of how a scenario of the kind illustrated by the example in Box II.1 can play out is the warming of the northeast Pacific after the late 1970s and its consequences for the salmon runs to the rivers of Canada and the United States. The runs to the rivers of Oregon and Washington were adversely affected, and so were the runs to the Fraser River in Canada, but the latter increasingly took a northerly route north and east of Vancouver Island instead of rounding its southern tip where they would have been temporarily

Box II.1. **Zonal attachment and the sharing of a fish stock**

Suppose there is a stock 20% of which annually spills over from Country *A*'s EEZ to Country *B*'s EEZ. The reproduction of the stock from one year to the next depends on how much of the stock is left after fishing in both countries' zones, the stock remaining in Country *B*'s zone after fishing returning to Country *A*'s zone. Suppose the stock reproduces according to the relationship $R = S^a$ where $0 < a < 1$, so that the size of the stock in the absence of fishing would be $R = S = 1$, and the sustained catch would be $S^a - S$ in case S is always left behind after fishing. Suppose, for simplicity, that both countries have the same economic parameters such that if one of them controlled the stock it would be interested in maximizing the sustainable yield. That would in this simple example mean that it would maximize $S^a - S$, which would imply $\alpha S^{\alpha-1} = 1$. With $\alpha = 0.5$, one would get $S = 0.25$, so 25% of the stock would be left for breeding and growth, giving a total catch of $\sqrt{0.25} - 0.25 = 0.25$.

Would Country *B* be happy with getting 20% of this? This is, arguably, its zonal attachment of the stock. This would amount to 0.05. But what would country *B* do on its own? It knows that *A* would try to maximize its catch, given whatever amount of fish is left to migrate from *B*'s to *A*'s zone. Country *A* would maximize $0.8(S_A + S_B)^{\alpha} - S_A$, that is, the share of the stock in its zone less what it leaves behind to breed and grow, the subscripts *A* and *B* denoting the stock levels left behind in the two countries' respective zones. Country *A* can only determine what it leaves behind, and for any given stock that country *B* leaves behind, the solution to country *A*'s maximization problem implies $0.8\alpha(S_A + S_B)^{\alpha-1} = 1$, which gives us a solution for S_A for any given S_B. A similar result can be obtained for Country *B*, $0.2\alpha(S_A + S_B)^{\alpha-1} = 1$, from which a solution can be found for S_B for any given S_A. The problem is, however, that for most stock levels that country *A* might leave behind, Country *B* would not want to leave behind anything at all, knowing that it would always get some fish to its zone due to *A*'s incentives to preserve the stock. The mutually consistent solution to both problems would be $S_A = 0.16$ and $S_B = 0$, resulting in a catch of 0.16 for *A* and 0.08 for *B*.* Country *B* would therefore not be satisfied with its zonal attachment share of the maximum sustainable yield, which has been seen is equal to 0.05; it could get 0.08 on its own, and this much it will demand as a minimum if it is to go along with an agreement about managing the stock.

Suppose, then, that *A* and *B* have reached an agreement in their best mutual interest, so that the sum of what they leave behind is 0.25, producing a stock of 0.5 at the beginning of each season, of which 0.1 spills over into *B*'s zone. *B* takes 0.08, the minimum acceptable to it, leaving behind 0.02, with *A* leaving behind 0.23 and taking 0.17. Suddenly the tables are turned, with Country *B* now getting 80 per cent of the stock and Country *A* only 20 per cent. This may take some time to discover, at any rate with a sufficient degree of certainty. Country *B* would most likely consider itself entitled to a greater catch of fish, and *A* might be reluctant to recognize its present eroded position. *A* used to have a stock of 0.4 within its zone at the beginning of each season, but now it has only 0.1. There is no way Country *A* can catch 0.17 and leave behind 0.23 as it used to do. Suppose that, partly in ignorance and partly in frustration, *A* takes all the fish in its zone, and that Country *B* feasts on the bonanza and only leaves behind 0.02 as it used to do. In the next period a stock of only $\sqrt{0.02} = 0.1414$ appears, instead of 0.5. A vicious downward spiral has begun. How quickly would the parties recognize and adjust to the new situation? Would the authorities in the two countries believe this is just a freak event or permanent? How long would it have to prevail before they accept it as permanent? How large losses would occur in meantime? Could the stock be fished to extinction?

* With $S_A = 0.16$ and $S_B = 0$, the emerging stock is $\sqrt{0.16} = 0.4$. Of this 80%, or 0.32, is in Country *A*'s zone, and Country *A* catches 0.16 if it leaves behind 0.16. Twenty per cent of the stock, or 0.08, migrates to Country *B*'s zone, and Country *B* can take it all, knowing that Country *A* has an incentive to leave 0.16 behind in its zone. If we check the maximum condition for Country *B*, we find that $0.2 \times 0.5/\sqrt{0.16} = 0.25$ instead of 1, which means that Country B would want to leave a negative amount of fish behind (–0.15), which is not possible.

available in United States waters. The agreement between the United States and Canada had sought an acceptable interference by Americans with the runs to the Fraser River and by Canadians with runs to Washington and Oregon. The warm regime kept the Fraser River salmon mostly in Canadian waters, while the runs to Washington and Oregon were severely down. Further north, salmon runs to Alaska increased greatly, and Alaskans were increasingly able to catch fish heading for rivers in Canada. This essentially led to the emergence of three players; Oregon and Washington as one, Canada as second, and Alaska as third, all with different interests and differently affected by the climate change. The sharing agreement broke down in 1993, but was eventually renegotiated, with allowances for differential changes in salmon abundance and inclusion of side payments.[18]

Changes in fish migrations due to climate change could thus put the existing agreements on sharing fish stocks under strain, or make it more difficult to reach agreement where none is in place. Some sinister outcomes are possible. Suppose, for example, that a stock has been confined to Country *A*'s EEZ. Climate change increasingly diverts the stock into Country *B*'s EEZ, while the growth and reproduction of the stock still depend on how much of the stock is left after fishing in the EEZs of both countries. Country *A*'s command over the stock will be steadily eroded and so will its previously strong incentives to protect it, while Country *B* will acquire an interest in the stock, at first fleeting but then a more substantial one. If things continue in this direction, *B* will ultimately acquire a stronger incentive than *A* to preserve the stock for reproduction and future growth, while *A* will become a player which only has a minor fraction of the stock and which in fact will be able to demand a disproportionate share of the stock, since it will in any case benefit from *B*'s conservation efforts without making much of a contribution itself. But how quickly will the players realize this reversal of roles and how timely will they adjust to it? This is likely to be a difficult issue, because global warming and the changes it leads to in ocean climate will be a trend around which will see substantial variations, similar to the climatic variability in the past. Changes in fish migrations are thus likely not to be smooth trends but trends with temporary reversals. How is Country *B* to know that the fish are shifting over to its zone on a long term basis? With expectations formed on the basis of recent experience, Country *B* may see fluctuations without much of a long term trend and may thus come to realize its pivotal role for the stock much too late. And when will Country *A* realize that the stock will leave its EEZ for good and that its days with a major interest in the stock are numbered? It is possible to think of a "twilight" period in which Country *B* has not yet realized that it has acquired a permanent, major interest in the stock while Country *A* will realize that it has no long term interest in the stock any more. Country *A* may therefore decide that it serves no purpose to preserve the stock for future use and so neglect to leave any of it behind, while Country *B* has not yet realized that it would be in its interest to do so. As a result, the stock would be depleted, possibly once and for all.[19]

Are there examples of stocks which could be shifted permanently out of one country's zone into another's? No stock seems to have undergone such radical permanent shifts, but there are stocks which have experienced major shifts as a result of depletion or climate change and possibly a combination of both. As the stock of the Pacific sardine collapsed, what remained of it was mainly within what is now the EEZ of Mexico, while in its heyday sardines were caught as far north as British Columbia. As the stock has grown in recent years it has again been found as far north as British Columbia. Prior to its collapse in the late 1960s, the Norwegian spring spawning herring migrated towards Iceland during the summer and was caught in what is now the Icelandic EEZ in substantial quantities. After

the collapse it became confined to what is now the Norwegian EEZ, although its changing habits were at least in part caused by a temporary cooling of the waters north and east of Iceland.[20] This was well before the EEZs became established, but in any case one may surmise that a sharing agreement based on the catch shares or "zonal attachment" back in the 1950s and early 1960s would hardly have survived these changes. A sharing agreement for the stock in fact broke down for a few years early this century because expectations about the stock migrations did not materialize.

Another example along similar lines is the North Sea herring. As the stock was decimated in the 1970s it became more and more concentrated in the EU-part of the North Sea. When the fishery was resumed in the 1980s Norway and the EU, within whose EEZs the stock was located, negotiated a total quota and how it should be shared. The EU wanted to base the sharing on the zonal attachment of the stock, which had been found to be 4 per cent in the Norwegian zone. The Norwegians argued that this low attachment was due to the concentration of a small stock in the EU-area and refused to accept the offer. They allowed their fishing fleet to fish at will within the Norwegian zone, resulting in a much greater Norwegian share of the catch than the 4 per cent offered by the EU. The following year a sliding scale for sharing the total catch was agreed, with the Norwegian share being greater the larger the stock.

A warming of the Barents Sea could change the habitat of the Northeast Arctic cod, which inhabits the EEZs of Norway and Russia. Its spawning grounds are off the coast of Norway, while the larvae drift towards Spitzbergen and into the Barents Sea. A warming of the ocean in this area is expected to shift the stock further east and north, into the Russian EEZ. Ever since the EEZs were established and a total quota imposed for the stock, the two countries have shared it evenly, apart from a minor allocation to third countries. A major relocation of the stock might undermine this sharing agreement for the reasons discussed above.[21]

It is possible that the picture being painted above is too gloomy. There are factors mitigating against dramatic fish stock depletion and breakdown of agreements as a result of climate change. One such is that fishing costs are sensitive to stock size. If the cost per unit of landed fish goes up as the stock is depleted, this provides some protection against a serious stock depletion resulting from a breakdown of sharing agreements. And the sharing agreements themselves could be resilient against variations in fish migrations. Oceanographic conditions vary a great deal from year to year, due to factors that are unlikely to be related to global warming, and so do fish migrations. Many of the existing sharing agreements seem to be quite resilient to these variations, even if no formal allowance is made for this. The sharing of the North Sea stocks between Norway and the EU is based on an investigation carried out in the early 1980s and has withstood the test of time, with the exception of the North Sea herring already discussed. But both the North Sea herring example and the north Pacific salmon runs indicate that if changes in fish migrations are too dramatic and long lasting, agreements on stock sharing will indeed come under pressure.

High seas fisheries

Changed fish migrations need not only affect the EEZs of individual countries, migrations between one or more EEZs and the high seas could become established or existing ones be affected, positively or negatively. Some stocks (straddling stocks) are

mainly contained within the EEZ of one or more countries while others are predominantly or even exclusively in the high seas area. The example in the previous section about a stock migrating out of Country *A*'s area into Country *B*'s area is perhaps particularly pertinent to stocks straddling into the high seas, with the latter replacing Country *B*'s EEZ in this context. Not only would the conservation incentives for Country *A* be seriously eroded by the weak incentives the high seas players have to leave anything behind, the high seas players also face considerable difficulties in co-ordinating their actions and in finding a common interest.

There is no doubt that management of fish stocks that are partly or wholly within the high seas is a great deal more difficult than it is for stocks confined within the EEZs, even those that migrate between the EEZs of two or more countries. The reason is the absence of national jurisdiction on the high seas; boats fishing in this area are under the jurisdiction of their home countries. The UN fish stock agreement has given the role of fish stock management on the high seas to regional management organisations (RFMOs), and some experts are of the opinion that fishing in contravention of regulations by these organisations is in contravention of international law, even if the offending country is not a member of or does not accept the authority of the RFMO in question.[22] The enforcement of these regulations is still up to the individual countries whose boats fish in this area, an arrangement that is much less effective than if one single state had jurisdiction, as the case is within the EEZs. The attempts to deal with enforcement have therefore concentrated on access to markets or port services, denying access to markets for fish taken in contravention of RFMO regulations and services to boats engaged in such fishing. How successful this is depends on market concentration and how vigorously these measures are pursued by the countries where the major markets are.

It is very difficult to say anything in general about how global warming might affect fish migrations into the high seas *versus* containment within one or more countries' EEZ. To the extent that fish migrations into the high seas increase, fish stock management is bound to become more difficult. That difficulty is due to the fact that it is more difficult to reach agreement the more parties that must agree, and on the high seas there are more parties to be reckoned with than there are for stocks that stay within the EEZs. This problem is aggravated to the extent that the number of parties with an interest in a high seas stock is indeterminate, while the number of countries with an interest in stocks that stay within EEZs is either just one or at any rate defined by the migratory habits of the stock in question (and which may change as already argued). Traditionally, fishing on the high seas used to be open to any country, and it is still unclear to what extent the RFMOs can limit that number or whether, and in that case how, they must accommodate new, untraditional members.

Among the high seas stocks that could be affected by climate change the tuna stocks are the most important, partly because of their extensive migrations and partly because of their high value. Miller (2007) has discussed the effects of climate change on the tuna stocks and pointed out the need for flexible arrangements that could adjust automatically to the challenges of climate change. She mentions transferable catch or effort quotas that could be utilized irrespective of where the fish are taken. Such measures would require that the RFMOs involved have reached an agreement on allocation of quotas or fishing licenses among the parties involved and solved the new member problem so that an existing agreement could not be undermined by countries that suddenly might want to engage in the fishery. This is a taller order than it might seem; it is possible to imagine that

those who now are engaged in these fisheries deliberately abstain from ambitious agreements that might appreciably improve the profitability of the fishery, as this might attract entrants that would not find it worthwhile to participate in the fisheries as they are at present.

It is possible that the strains climate change might put on the tuna fisheries, and other high seas fisheries for that matter, will depend on the shape and size of the EEZs involved *versus* the high seas. Both the Indian Ocean and the Eastern Pacific have vast spaces of high seas in which much of the tuna fishing takes place, and there are relatively few national EEZs involved. The Western Pacific is different in that it is interspersed with EEZs of many independent island countries, with high seas "holes" in between. The El Niño events are known to displace tuna migrations by hundreds or even thousands of miles.[23] This has led to major shifts in catches taken by some of the Pacific island nations in the area. Migrations between the EEZs and the high seas are also affected. Such international agreements on tuna fishing as there are or might be attained in the Indian Ocean and the Eastern Pacific are therefore less likely to be upset by climate change, as the distribution of fish between the high seas and the EEZs will not change much, while in the Western Pacific climate change might cause major shifts in the bargaining strength of the different nations involved.

Conclusions and policy implications

One thing is certain: there will be changes in the ocean climate, as there have been in the past, irrespective of whether global warming is happening or not. Global warming will add two complications. First, it will add a trend, around which ocean climate will fluctuate. Second, because of that trend, it is more likely than it used to be that changes in ecosystems will be irreversible. It is uncertain how great the associated changes in fish stocks will be, in what direction, and how quickly they will happen. They are also likely to differ from place to place, not only in magnitude but also in direction. Certain stocks may fade in certain areas, or may disappear altogether and in some cases be replaced by other stocks. Whether on balance this is for the better or for the worse will vary from place to place. Suffice it to say that all changes, be they for the better or for the worse, call for adjustments, and adjustments are always costly.

What are the implications for fisheries management? This depends on whether the effects of climate change occur gradually or not, and whether they can be predicted or not. If these effects take place in small, incremental steps they would not seem to be very problematic; adjustment could be made in similarly small, incremental steps. That climate change will occur as variations around a trend might seem to support the notion that its effect will also be gradual and at times even reversing direction, but this would be too hasty a conclusion. It is quite possible, and indeed likely, that there are certain threshold levels in terms of water temperature, salinity or flow of currents that make certain fish stocks unviable in their previous environment, or at least substantially affect their abundance. These effects could manifest themselves suddenly as the critical threshold levels are surpassed, even if the underlying climate change itself is incremental. Furthermore, it is highly uncertain whether fish stocks would bounce back from their depleted levels, even if the climate change that led to their demise was reversed.

Could sudden and possibly dramatic effects of climate change on fish stocks be predicted? If they could, management authorities could develop responses to cope with them. Unfortunately, it is uncertain whether or not these effects can be predicted

sufficiently far in advance. To make such predictions, one would need either to have experienced similar changes in the past or to have a firm understanding of the mechanisms of climate change and its impacts on ocean ecosystems. It is worrying that none of the fisheries collapses that occurred in the past, some of which are discussed in the Appendix, were predicted; on the contrary they came as surprises. However, these collapses occurred before significant attention was focused on climate effects on fisheries. More recent developments and ongoing work suggest that there is hope to have fewer such surprises in the future, although the issue of possibly increasing climate variation will complicate the picture.

That the effects of climate change on fisheries cannot be predicted with much confidence and will sometimes occur suddenly has two implications for how to respond to them. First, a strengthening of marine science and its interface with climate science is needed. It is of obvious value to know what might happen, even if one cannot predict precisely when it will happen and on what scale. Such understanding can only come from a general advance in marine science; from oceanography, which tells us how ocean currents, salinity, temperature, upwelling and uptake of carbon dioxide in the ocean is likely to be affected, to fish ecology, which tells us how plankton, fish stocks and marine mammals interact, and how a change in one will affect the abundance of another.

The second implication is, in broad terms, the need for flexibility in response. If changes cannot be reliably predicted the only possible option is to respond to them after they have occurred. To do so in the fisheries context, flexibility is needed both in terms of market access and for adjustment in the use of labour and capital. Unnecessary barriers between different types of fisheries, some of which could expand while others must contract, should be avoided; this could be accomplished by transferable fishing licenses or quotas where the total number of licenses or quotas is based on sound biological principles applied to changing stocks. It is particularly important to avoid "preserving" work opportunities if this is achieved by maintaining a large and unsustainable catch from a dwindling stock. Instead, mobility out of a fishery that must rely on smaller catches because of worsening environmental conditions should be encouraged. In an economy with far-reaching specialization and few opportunities for unskilled labour this would often necessitate support for retraining and perhaps geographic mobility as well. For capital equipment there may be second hand markets, especially once the world gets a grip on the global overcapacity problem. For markets, unimpeded access would facilitate switching to new sources for supplies when needed.

The changes that have been observed in world fisheries in the past and that appear related to climate change are suggestive of what might happen as a result of climate change and how one could or should respond. These changes have sometimes been of a magnitude to call forward adjectives such as "spectacular" and nouns such as "collapse". Over just a few years fisheries have collapsed, from hundreds of thousands of tonnes to nearly nil. These collapses are unlikely to have been caused solely by climate change; the primary reason is likely to have been in large part mismanagement, due to insufficient information, inappropriate interpretation of the information at hand, lack of appropriate institutions or measures, or short sighted lobbyism by industry. However, climate change may have added to the evils of bad management and helped bring about a collapse.

Several conclusions follow from this. The outcomes of future climate changes may in some ways be quite similar to those experienced in the past – there are some similarities

between changes in ocean climate in the last century and what can be expected to happen in the coming decades. The global temperature has in recent years reached a higher level than has been seen since the beginning of reliable measurements. Further increase could take us into an unchartered territory and, together with other stressors on marine ecosystems, cause unprecedented impacts. Second, what is critical is good management of stocks. The management of many of the stocks that have collapsed was either absent (Atlanto-Scandian herring, North Sea herring) or deficient (Northern cod). Therefore, management, or the lack of it, is likely to have been the major cause of the collapse. How these stocks would have fared under better management one cannot know, but it is not unlikely that the protracted absence of the herring could have been avoided, and the cod fishery of Newfoundland might have been saved.

Hence, climate change serves to strengthen further the arguments for good management; in particular avoiding such overfishing as typically results from open access. Global warming is unlikely to pose fundamentally new problems for fisheries management, but the present focus on it serves the good purpose of emphasizing how dependent fisheries are and have always been on the variability in ocean climate. This has important, but unfortunately unclear implications for the sustainability of fisheries. The deterministic fisheries models, despite their usefulness as pedagogical devices, may have led some people to believe that sustainability of fisheries revolves around maintaining steady stock levels and steady catches over time. This is unlikely to be desirable for stocks, the growth and reproduction of which depend critically on a fluctuating environment, and it may even be impossible to attain. Hence, if sustainability means anything, it means adaptation to a fluctuating environment. Moreover, it is not clear what that adaptation means. Does it mean preserving depleted fish stocks in the expectation that they will bounce back once the environmental conditions have returned to an advantageous state, or are some stocks doomed in certain areas because of irreversible changes in the ocean climate, so that one had better take them while they are still around? It is not easy to answer these questions, because of the difficulty to know whether climate changes are permanent and irreversible or part of a repetitive pattern.

Notes

1. This is not, of course, true for aquaculture, but it is capture fisheries that are the subject of this paper.
2. This is analyzed formally by Arnason (2006).
3. See IPCC (2007b), pp. 234-236 and p. 333.
4. IPCC (2007b), Chapter 6.
5. IPCC (2007b), p. 236.
6. ACIA (2005). This report has been well summarized by Schrank (2007).
7. See ACIA (2005), Chapter 9.
8. See ACIA (2005), Chapter 13.
9. See IPCC (2007b), p. 797 and 802.
10. On the warm period in the northeast Atlantic, see Vilhjálmsson (1997) and Drinkwater (2006). For further information on the regime shifts in the north Pacific, see Miller and Munro (2004) and references therein.
11. ACIA (2005), Chapter 13.
12. IPCC (2007b), pp. 234-5.

13. The value of total fish landings in Newfoundland in 1989-90, while the cod was still around, was about CAD 275 000 per year (Historical Statistics of Newfoundland and Labrador, government of Newfoundland and Labrador, 1994). In 2004-07 it was about CAD 470 000 per year (website of government of Newfoundland and Labrador). According to the consumer price index for Canada, prices rose by 40% from 1990 to 2006, so allowing for inflation the value of fish landings was about 20% higher in 2005-07 than in 1989-90. In the first years of this century the value of fish landings in Newfoundland was even higher.
14. See ACIA (2005), Chapter 13.
15. This is about the same as the dip in GDP expected to occur in 2009 as a result of the collapse of the Icelandic banks.
16. The analysis of Iceland and Greenland is discussed from a more technical point of view in Arnason (2007).
17. On the zonal attachment principle, see Engesæter (1993).
18. On this, see Miller and Munro (2004) and Miller (2007).
19. This problem, with adaptive expectation, is considered formally in Hannesson (2007).
20. See Malmberg (1969) and Hamilton, Otterstad and Ögmundardóttir (2006).
21. This problem is considered in a bioeconomic model in Hannesson (2006). This exercise illustrates the point made above that a decline in zonal attachment may up to a point strengthen the bargaining position of the country so affected.
22. See, *e.g.,* Serdy (2008).
23. See Miller (2007).

References

ACIA (2005), *Arctic Climate Impact Assessment*. Cambridge University Press, Cambridge.

Arnason, R. (2006), *Global Warming, Small Pelagic Fisheries and Risk*, in Hannesson *et al.* (eds.), pp. 1-32.

Arnason, R. (2007), "Climate Change and Fisheries: Assessing the Economic Impact in Iceland and Greenland", *Natural Resource Modeling* 20: 163-197.

Baumgartner, T.R., A. Soutar and V. Ferreira-Bartrina (1992), "Reconstruction of the history of Pacific sardine and northern anchovy populations over the past two millennia from sediments of the Santa Barbara Basin", *California. California Co-operative Oceanic Fisheries Investigations Report* 33: 24-40.

Drinkwater, K. (2006), "The Regime Shift of the 1920s and 1930s in the North Atlantic." *Progress in Oceanography* 68: 134-151.

Engesæter, S. (1993), "Scientific Input to International Fish Agreements", *International Challenges. The Fridtjof Nansen Institute Journal* 13(2), 85-106.

Glantz, M. (Ed., 1992), *Climate Variability, Climate Change and Fisheries*, Cambridge University Press, UK.

Hamilton, L., O. Otterstad and H. Ögmundardóttir (2006), "Rise and Fall of the Herring Towns: Impacts of Climate and Human Teleconnections", in Hannesson *et al.* (eds.), pp. 100-125.

Hannesson, R. (2007), "Global Warming and Fish Migrations", *Natural Resource Modeling* 20: 301-319.

Hannesson, R. (2006), "Sharing the Northeast Arctic Cod: Possible Effects of Climate Change", *Natural Resource Modeling* 19: 633-654.

Hannesson, R., M. Barange and S.F. Herrick, Jr. (eds., 2006), "Climate Change and the Economics of the World's Fisheries", Edward Elgar, Cheltenham.

Herrick, S.F., Jr., K. Hill and C. Reiss (2006), "An Optimal Harvest Policy for the Recently Renewed United States Pacific Sardine Fishery", in Hannesson *et al.* (eds.), pp. 126-150.

IPCC (2007a), "Climate Change 2007 – The Physical Science Basis", Oxford University Press, Oxford.

IPCC (2007b), "Climate Change 2007 – Impact, Adaptations and Vulnerability", Oxford University Press, Oxford.

IPCC (2007c), "Climate Change 2007 – Mitigation of Climate Change" Oxford University Press, Oxford.

IPCC (2007d), "Climate Change 2007 – Synthesis Report", Oxford University Press, Oxford.

Lorentzen, T. and R. Hannesson (2006), "The Collapse of the Norwegian Herring Fisheries in the 1960s and 1970s: Crisis, Adaptation and Recovery", in Hannesson *et al.* (eds.), pp. 33-65.

Malmberg, S-Aa. (1969), "Hydrographic changes in the waters between Iceland and Jan Mayen in the last decade", *Jökull* 19: 30–43.

Miller, K.A. (2007), "Climate Variability and Tropical Tuna: Management Challenges for Highly Migratory Fish Stocks", *Marine Policy* 31: 56-70.

Miller, K.A. and G.R. Munro (2004), "Climate and Co-operation: A New Perspective on the Management of Shared Fish Stocks", *Marine Resource Economics* 19: 367-393.

Schrank, W.E. (2007), The ACIA, "Climate Change and Fisheries", *Marine Policy* 31: 5-18.

Serdy, A. (2008), "International Fisheries Law and the Transferability of Quota: Principles and Precedents", Paper given at a workshop on rights-based management and buybacks in international tuna fisheries, La Jolla, 5-9 May, 2008, Inter-American Tropical Tuna Commission (proceedings in press).

Toresen, R. and O.J. Østvedt (2000), "Variation in abundance of Norwegian spring-spawning herring" (*Clupea harengus*, Clupeidae) throughout the 20th century and the influence of climatic fluctuations. *Fish and Fisheries* 1: 231-256.

Vilhjálmsson, H. (1997), "Climatic Variations and Some Examples of Their Effects on the Marine Ecology of Icelandic and Greenlandic Waters, in Particular During the Present Century", *Rit Fiskideildar* 15(1), 8-29.

ANNEX II.A1

Examples of Past Changes in the Ocean Environment and the Impact on Fisheries

This annex will describe several well known cases of fisheries collapses and changes in the oceanic environment. It is recognized that the global temperature has in recent years reached a higher level than has been seen since the beginning of reliable measurements and that further increase could take us into an unchartered territory and, together with other stressors on marine eco-systems, cause unprecedented impacts. However, it is valuable to review past experiences to identify potential lessons for the future. The environmental indicator used is ocean temperature, but the temperature is unlikely to have been the causal factor behind the collapses, even if any given fish species thrives within certain temperature limits and so could have been rendered unviable by passing critical thresholds. Rather the temperature is associated with other attributes of the water masses involved; such as salinity, higher concentrations of nutrients (upwellings), or transport of plankton and prey fish necessary for fish higher up in the food chain. Yet temperature is a convenient and widely used indicator for environmental changes in the ocean.

Another point to note is that the association between changes in ocean temperature and the collapse of fisheries is suggestive rather than a clearly established quantitative, causal relationship. Yet these associations appear to be widely accepted among fisheries biologists and oceanographers. The picture is further complicated by the fact that misinformed and inflexible fish stock management has also been involved in the fisheries collapses to be discussed.

Pacific sardine

In the 1930s and 1940s, the Pacific sardine supported one of the largest fisheries in the world (*cf.* Figure II.A1). Some fish was used for reduction to meal and oil and some by a large canning industry in California, made famous by John Steinbeck's novel "Cannery Row". In the 1950s the sardine fishery collapsed. The collapse was initially attributed to overfishing.[1] Later, when marine biologists began analyzing cores from sediments in the Santa Barbara channel, they found that sardine and anchovy appeared to have alternated in this area long before European colonization and attributed this to climate changes.[2] The collapse of the sardine fishery may thus have been partly due to a climate change. In the 1950s the North Pacific became cooler and entered a climate regime disadvantageous to the sardine, with anchovy taking its place in the ecosystem. As Figure II.A1 shows, the anchovy fishery flourished in the period when the sardine was down (note that the scales for the two fisheries are different).

Figure II.A1. **California landings of anchovy and sardine**
(1920-2002)

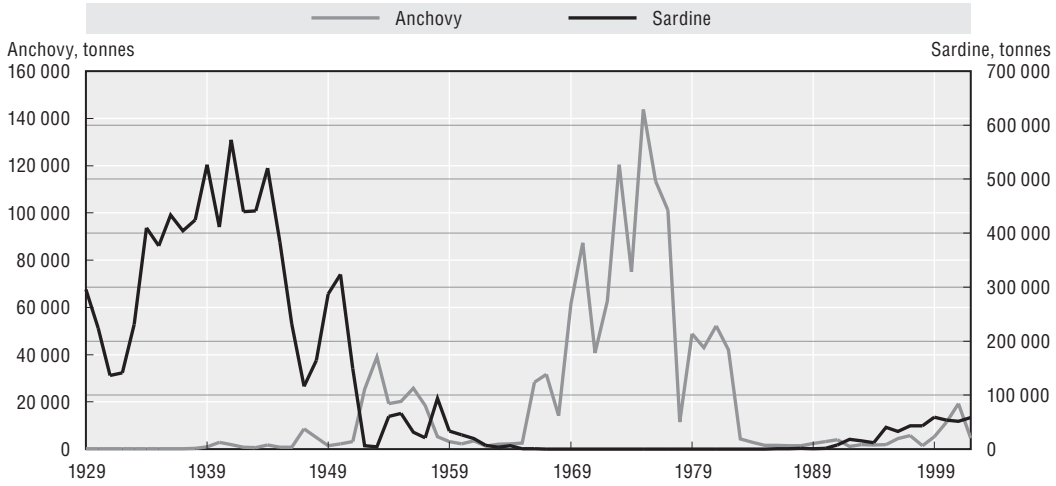
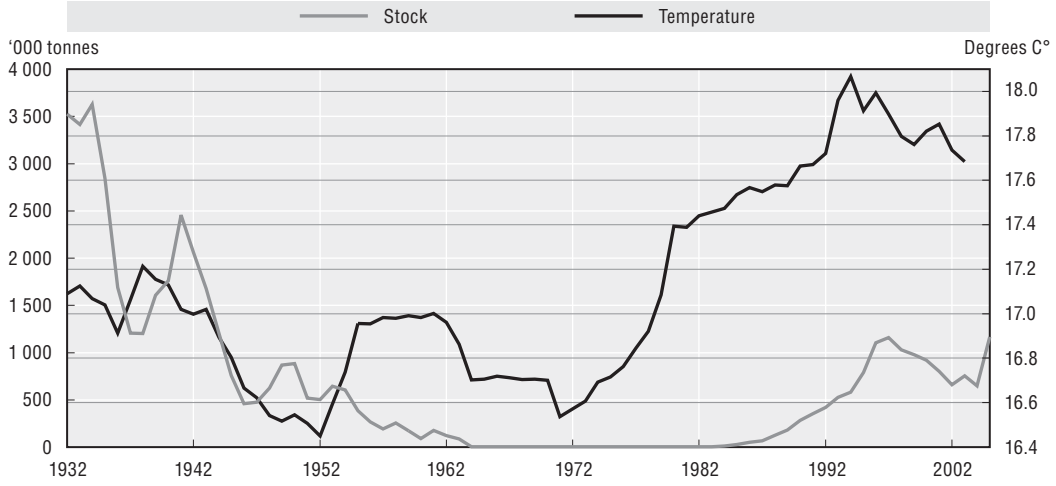


Figure II.A2 shows the sardine stock and the 9-years moving average of the average annual temperature at the Scripps Pier in La Jolla, California. The figure suggests a positive correlation between temperature and the abundance of the sardine, although it is by no means perfect. The decline in the stock in the early 1940s coincided with a declining temperature, and the upswing in the 1990s coincided with a substantial rise in temperature. Due to a bulge of high temperatures in the late 1950s the temperature during the virtual absence of the sardine was not much lower than during the sardine heydays in the 1930s and early 1940s, but certainly well below what it has been from the mid-1980s onwards.

Figure II.A2. **Spawning stock of pacific sardine and temperature at scripps pier, La Jolla, California**
(9 years moving average)



As a result of the collapse of the sardine, people were thrown out of work, fishing boats became obsolete, and so did processing capital onshore such as fish meal factories and canneries. Some of the fishing and processing equipment was exported to countries where new and similar fisheries emerged, partly as a result of the collapse of the sardine fishery

in California.[3] In the 1950s both the anchovy fishery in Peru and Chile and the sardine fishery in South and Southwest Africa developed. Over a few years these became major suppliers of fish meal on the world market. Some of the cavernous sardine canneries in Monterey are now used by the Monterey aquarium.

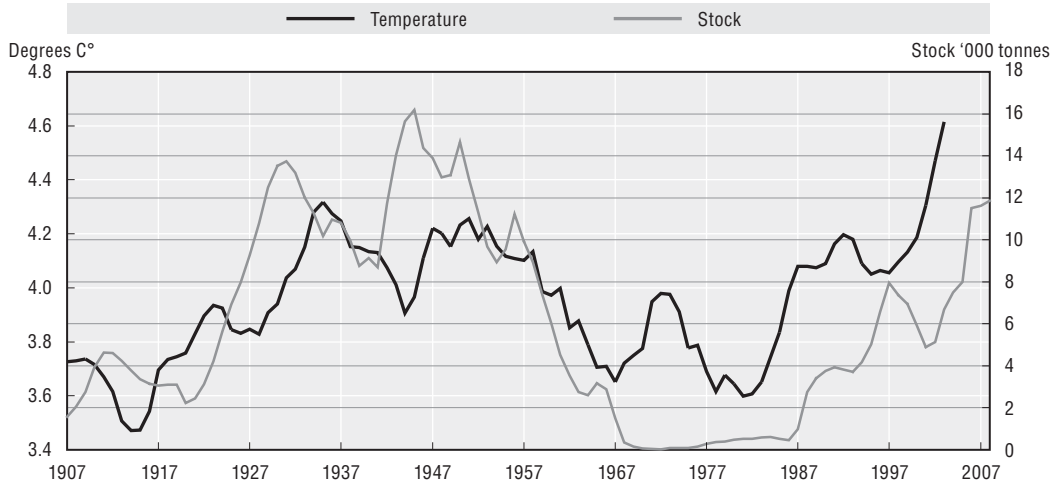
The Atlanto-Scandian herring

The collapse of the Atlanto-Scandian herring was no less spectacular than the collapse of the California sardine. The collapse has usually been attributed to overfishing, brought on by a major technological change that occurred in the fishery over just a few years (the introduction of a mechanical winch to haul in purse seines). At the time (late 1960s) the fishery was largely conducted in international waters, and an effective control of the fishery would have involved an international effort by Norway, Iceland and the Soviet Union and possibly others. This was not attempted. Apart from the difficulties in getting several parties to agree, it is doubtful if the problem was recognized in a timely enough fashion to do anything about it.

Lately attention has been drawn to the fact that there probably is a correlation between ocean temperature and the abundance of the herring stock.[4] Figure II.A3 shows the size of the spawning stock of Norwegian spring spawning herring and average annual temperature at the Kola section (9-years moving average). The figure indicates a positive correlation between herring abundance and temperature; the period while the herring stock was down (1967-87) coincides with a period of lower temperature than before or after, and the recovery of the herring stock occurred after the temperature began to rise. While few would go as far as attributing the collapse of the stock to climate change only, it is certainly likely that some decline in the stock would have occurred as a result of cooling temperatures if the fishery had continued in the same fashion as it did before the technical change.

Figure II.A3. **Spawning stock of Norwegian spring spawning herring and average annual temperature at the Kola section**

(9-years moving average)

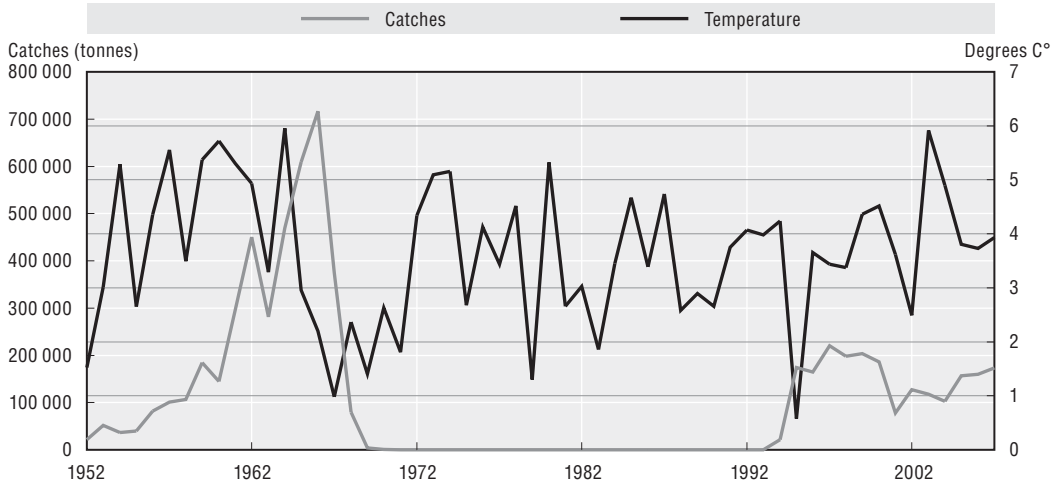


The decline in the herring fishery caused major disruption in the fishing industries of Norway and Iceland.[5] In Iceland the gross domestic product fell, unemployment became a major problem, and many people emigrated in search of work. At the aggregate level these

effects are much less visible in Norway, the Norwegian economy being much bigger and more diversified. In both countries the collapse of the herring fishery led to the development of new fisheries, especially the capelin fishery, which for a while was the major supplier of raw material for the fish meal factories in Norway and still is in Iceland. It is indeed possible that the capelin stock in the Barents Sea, exploited by Norway and Russia, came to occupy a part of the ecological niche left vacant by the herring.

What probably aggravated the herring collapse in the Icelandic fishery was a temporary cooling of the waters north of Iceland in the late 1960s (Figure II.A4).[6] This adversely affected primary production in the area and disrupted the traditional feeding migration of the herring to this area. In fact, a separate stock of spring spawning herring that spawned at Iceland disappeared at this time, either due to overfishing or adverse climatic conditions. The same thing happened to the spring spawning herring at the Faeroe Islands, so the Norwegian component is the only one remaining of what used to be called Atlanto-Scandian herring (an autumn spawning herring stock still remains at Iceland). The importance of the temperature regime for the collapse in the catches of herring is masked by the fact that after the migrations to the traditional area north of Iceland stopped in 1963, the boats chased it further east and north towards Spitzbergen. The migrations did not resume after the temperature recovered in the mid-1970s, the reason probably being that there was very little left of the stock (*cf.* Figure II.A3). These migrations still have not been fully re-established, but since the mid-1990s the Icelandic catches have been resumed, even if the Icelandic stock of spring spawners appears to have vanished.

Figure II.A4. **Icelandic catches of spring spawning herring and spring temperature ocean temperature at Siglunes**



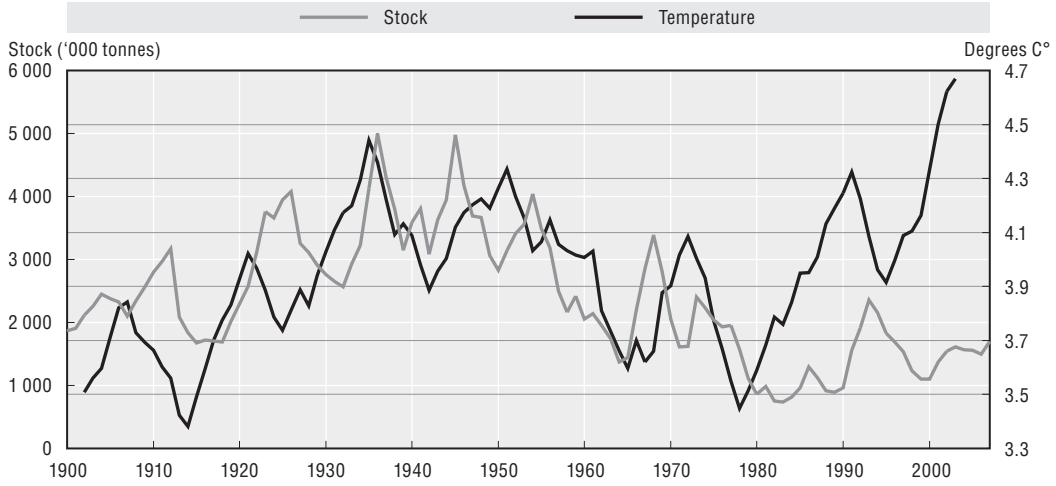
The Northeast Arctic cod

Figure II.A5 shows the abundance of Northeast Arctic cod and the average annual temperature in the Kola section (7-years moving average). The figure suggests a positive correlation between stock abundance and temperature. The correlation is least convincing for the years after 1980. Since then the temperature has been on the rise, reaching in 2007 its highest level since 1900, but the stock abundance has been relatively low during that entire period, even if it did reach a local peak in 1994, about 3 years after a local peak in temperature. This is a long-lived stock; maturing at an age of 6-7 years (later in earlier

years) and recruited to the fishery at an age of 3. If temperature primarily affects recruitment, a time lag of 5 years or more between temperature and the stock should be expected, and there is some indication of that. Unlike the herring and the sardine stocks, this stock has not collapsed, but the rate of exploitation increased very substantially in the 1960s and 1970s, which could be the reason why the correlation between temperature and stock size is less convincing for the years after 1970.

Figure II.A5. **Stock of Northeast Arctic cod and average annual temperature at the Kola section**

(7-years moving average)



The ocean climate is probably particularly important for recruitment to the stock. Figure II.A6 shows recruitment to the stock and the temperature at the Kola section 3 years earlier. The correlation between the two is not particularly high (0.27), but it is significant at the 5% level. Figure II.A7 shows a scatter plot of recruitment and the spawning stock 3 years earlier. It is difficult to see any relationship between those two, except perhaps that a large spawning stock would not bring a large recruitment.

Figure II.A6. **Recruitment of 3-year olds to the Northeast Arctic cod stock and temperature at the Kola section 3 years earlier**

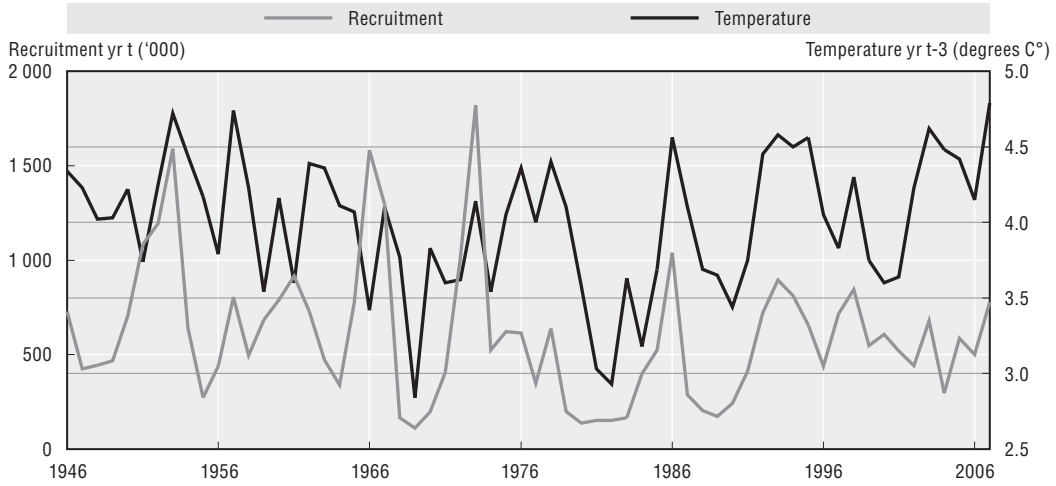
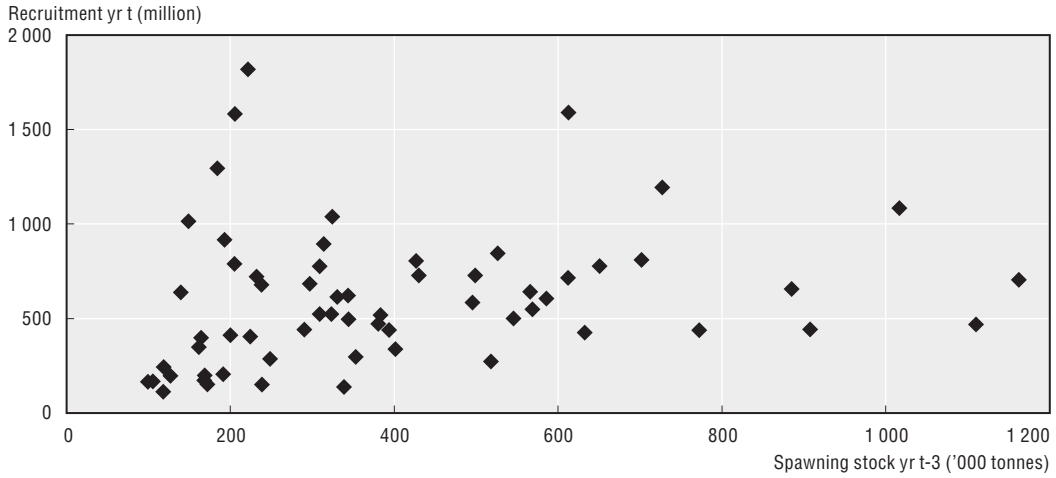


Figure II.A7. **Recruitment of 3-year olds to the Northeast Arctic Code Stock and the Spawning Stock 3 years earlier**



The Northern cod of Newfoundland

The Northern cod of Newfoundland is probably the only one among major commercial fish stocks that has been fished to extinction in an economic sense. The fishery was closed in 1992 and has not been reopened since, except on an experimental basis to help assessing the stock. This happened despite a management policy that was explicitly cautious (the $F_{0.1}$ criterion was used as a guideline). In hindsight the stock turned out to have been overexploited, due to erroneous stock assessment. Investigations have not uncovered serious methodological faults, but belatedly it was realized that the catch per unit of effort did not fall as much with the stock as expected, due in all probability to a herding behaviour of the stock in warm water pockets on the Grand Banks during a cold ocean climate regime. The colder ocean climate may also have played a further role by retarding the growth and reproduction of the stock. The story illustrates well how difficult it can be to account for environmental variability despite well developed fisheries science and good intentions.

Figure II.A8. **Catches of Northern Cod**
(1850-1992)

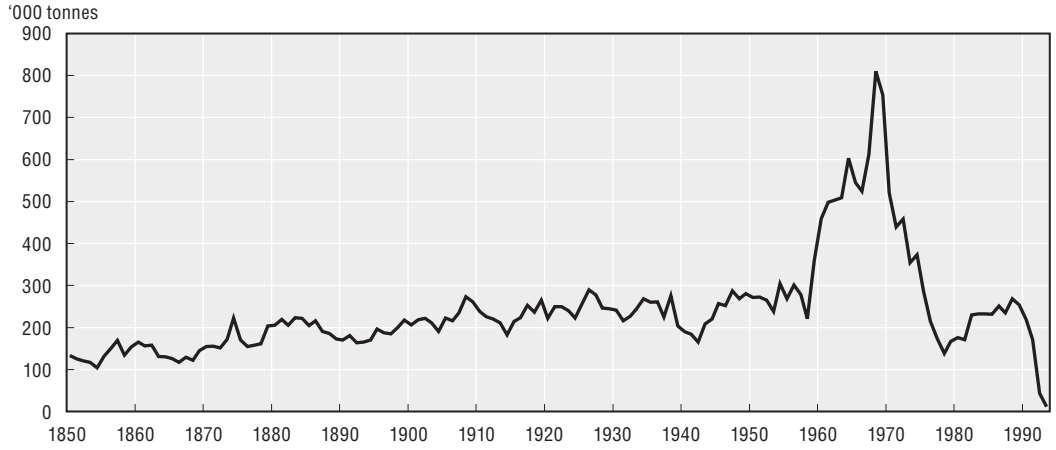
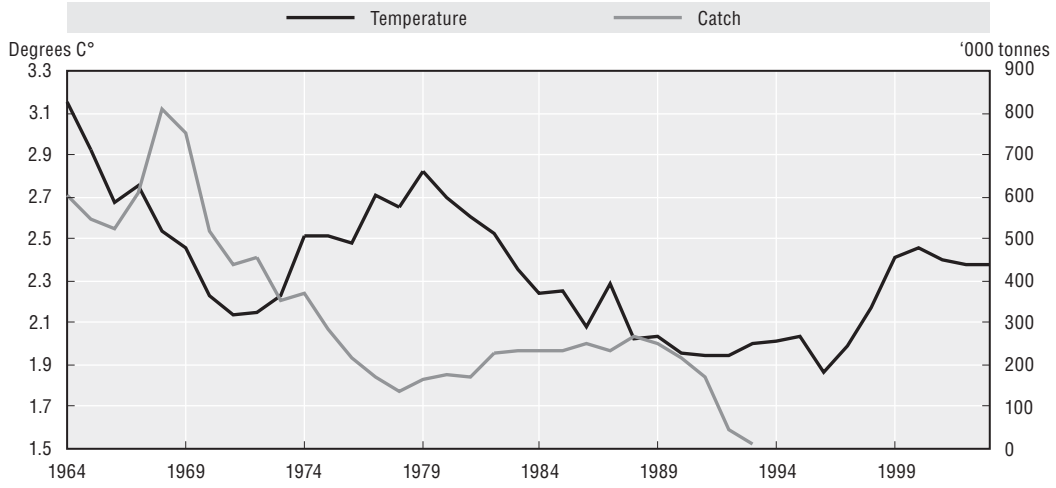


Figure II.A8 shows the catches of Northern cod from 1850; the high peak reached in the 1960s was due to the advent of large trawler fleets from various nations, which raised the rate of exploitation to an unsustainable level. After Canada established its exclusive economic zone in the late 1970s the catches fell to a level similar to what had prevailed before the international trawler fleets came along and continued in that fashion for about ten years, until the collapse in 1992. Figure II.A9 shows that the collapse coincided with a cold ocean climate regime in the area.

Figure II.A9. **Catches of Northern cod and summer sea surface temperature at Newfoundland**

(9-years moving average)



The North Sea cod

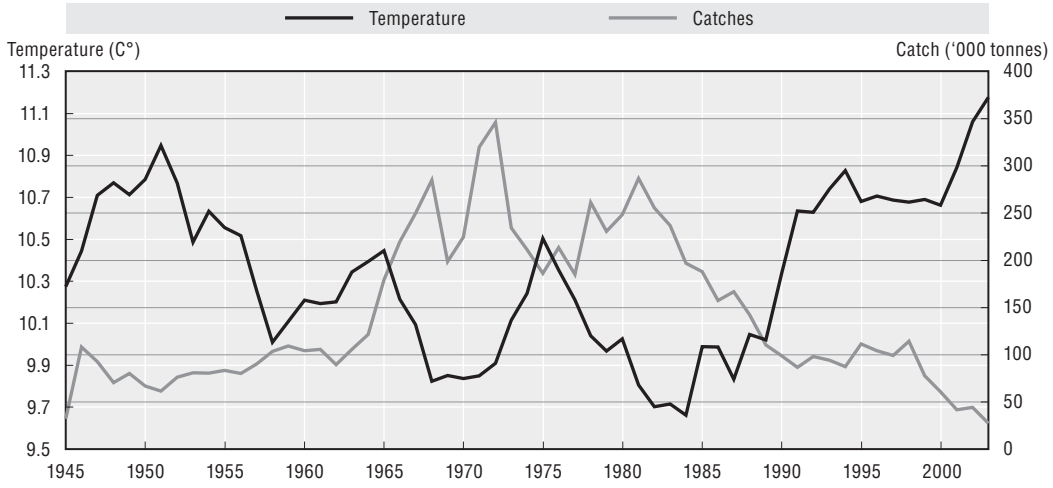
It is generally acknowledged that the North Sea cod stock is not in a good shape. This is typically attributed to overexploitation. This may indeed be true, but it is also true that the catches of North Sea cod are inversely related to ocean temperature, indicating that there may be more to the story than just overexploitation. Figure II.A10 illustrates this, using temperatures from the northern fringe of the North Sea.

If ocean climate plays such as large role as Figure II.A10 indicates it raises some challenging questions. Is it possible to save the North Sea cod, or is it doomed to disappear because of adverse environmental changes? If so, it would not help much to cut back on fishing, and it might make most sense to catch it while it is still around. Similar questions can be asked about the Baltic cod. Both the Baltic and the North Sea are marginal areas for the cod, so that relatively small environmental changes threaten their survival.

The Peruvian anchovy

The fishery for anchovy in Peru developed in the late 1950s, partly as a response to the collapse of the Pacific sardine. A new fish meal industry was built on the basis of the Peruvian anchovy, and some of the equipment made redundant by the collapse of the California sardine was sold to the new Peruvian industry. Before the late 1950s hardly any anchovy was caught in Peru, and the anchovy was "harvested" indirectly by guano

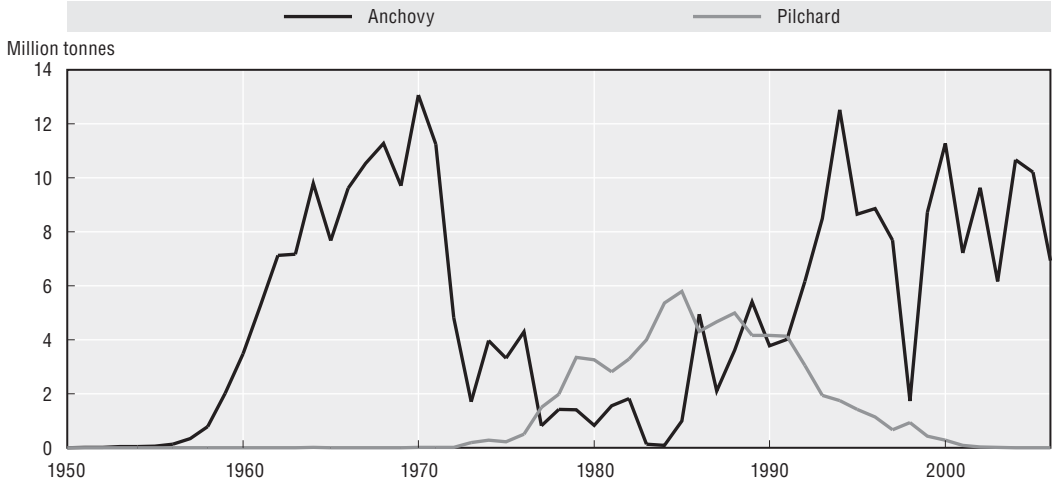
Figure II.A10. **Catches of North Sea cod and ocean temperature off the Sognefjord**
(7-years moving average)



deposited on islands off Peru and Chile. The guano industry opposed the development of the anchovy fishery, fearing that its raw material base would disappear.

Figure II.A11 shows the development of the anchovy and sardine (pilchard) fisheries in Peru and Chile. In 1972 there was a strong El Niño event, adversely affecting the catches of anchovy. Measures for cutting back the anchovy fishery were not taken in time, the stock collapsed, and the fishery did not regain its previous peak until 1994.

Figure II.A11. **Catches of anchovy and pilchard (sardine) in Chile and Peru**



In 1997 there also was a strong El Niño event. This time measures were taken to reign in the fishery. The catches dropped precipitously in 1998, but recovered already next year. It appears that the lessons of the early 1970s had been learned, but prior to that time there was no experience of how the El Niño event might affect the anchovy fishery.

Noteworthy in Figure II.A11 is the rise of the sardine fishery after the collapse of the anchovy, as well as its decline after the anchovy recovered. Sardine and anchovy occupy

the same niche in the ecosystem and typically alternate in abundance, a phenomenon known to occur in several upwelling systems such as the California current, discussed above, the Benguela current, and the Canary current. So even if one species virtually disappears for a time, it is not necessarily the case that the primary production (plankton) goes unutilized.

Notes

1. On the Pacific sardine fishery, see Herrick, Hill and Reiss (2006).
2. See Baumgartner *et al.* (1992).
3. This is described at some length in Glanz (1992).
4. See Toresen and Østvedt (2000).
5. See Hamilton, Otterstad and Ögmundardóttir (2006) and Lorentzen and Hannesson (2006).
6. See Malmberg (1969) and Hamilton, Otterstad and Ögmundardóttir (2006).

PART III

Country Notes

PART III

Chapter 1

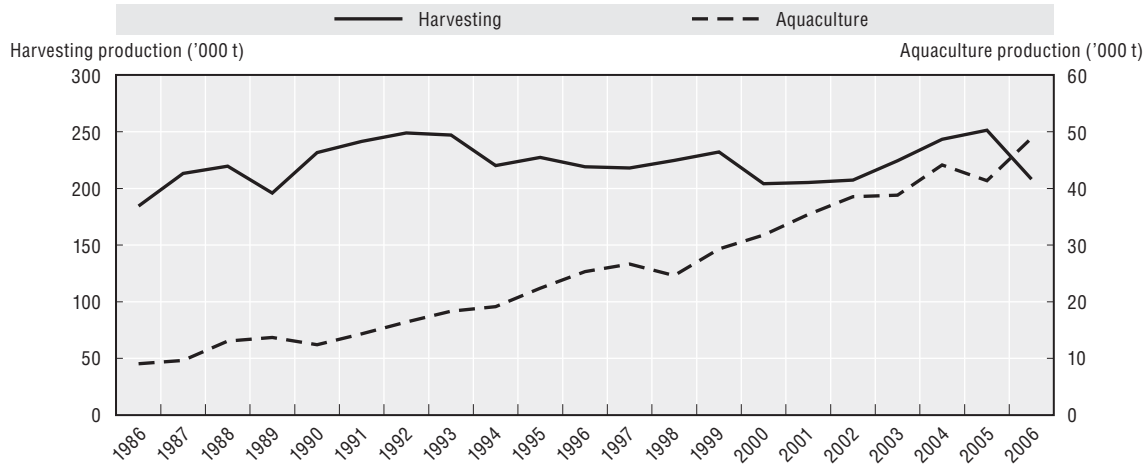
Australia

Australia

Summary of recent developments

- Commercial fisheries and aquaculture are Australia's fifth most valuable rural industry, consisting primarily of low-volume, high-value species for export. Volume and value have been negatively affected by changes in a number of important variables, like rising fuel prices, the appreciation of the Australian dollar, and increased competition on the domestic market from low value imports.
- The Australian government has committed a total of AUD 17 million over four years in an expanded Research Program to support the expansion of the research conducted by the Department of Agriculture, Fisheries and Forestry in relation to Commonwealth fisheries.
- To address the issue of profitability and sustainability, the Australian government has taken steps to change the operating environment of Commonwealth fisheries. The Australian Fisheries Management Authority has implemented tighter controls on catch and effort, particularly for overfished stocks. The Australian government's Harvest Strategy Policy aims to stop overfishing, allow overfished stocks to recover and promote the longer term profitability of the fishing industry.
- The government has continued its strong action against illegal, unreported and unregulated fishing in various global and regional initiatives, including in the development of a global record of fishing vessels, a global legally-binding instrument for port State measures, and international guidelines for the management of deep sea fisheries on the high seas.

Harvesting and aquaculture production

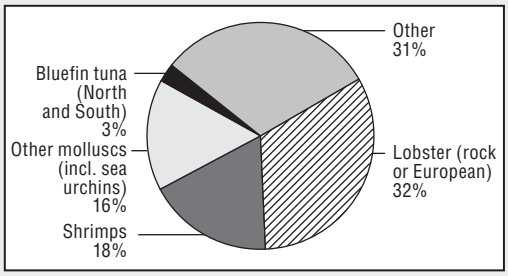


Source: FAO.

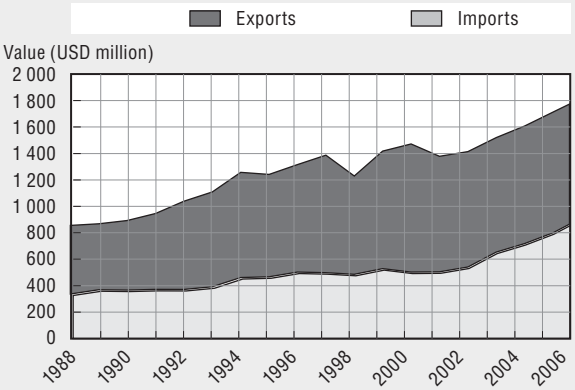
Key characteristics of the sector

- The aquaculture growth potential has been fully recognized by the Australian government. The production of high value species like salmonoids which account by now for 44% of the total aquaculture production volume is expected to increase further under the Aquaculture Industry Action Agenda.
- Main markets for the high value export products rock lobster and tuna are Hong Kong and Japan. Imports are dominated by frozen fillets and canned fish products from Thailand, New Zealand, China and Vietnam.
- Fisheries management costs have increased significantly from AUD 29.02 million in 2002/03 to AUD 43.52 million in 2006/07, largely due to major efforts to control foreign fisheries compliance.

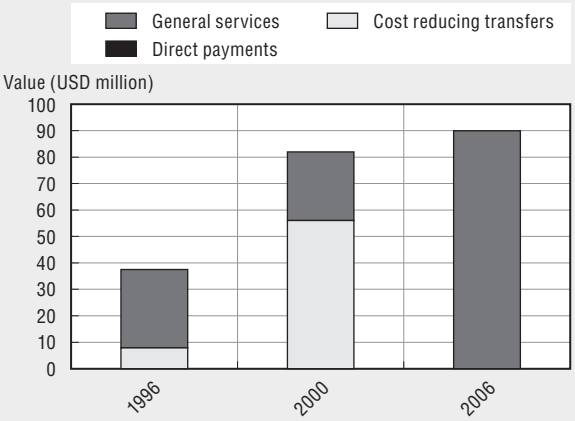
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	9 200	9 735
Number of fish farmers	3 900	3 628
Total number of vessels	1 179	494
Total tonnage of the fleet	60 732	n.a.

n.a.: Not available.

Legal and institutional framework

The Australian government and the state and territory governments are responsible for managing fisheries and aquaculture within their respective jurisdictions. The Offshore Constitutional Settlement 1983 (OCS) is the jurisdictional arrangement between the Commonwealth and states/Northern Territory that sets out responsibilities for offshore fisheries, mining, shipping, navigation and crimes at sea. State/Northern Territory laws apply inside three nautical miles. Commonwealth laws apply from three to 200 nautical miles. Both legislations allow alternative arrangements to be made for a fishery overriding the existing jurisdictional lines set out by the OCS (OCS fisheries arrangements) to account for the fact that fish stocks do not necessarily align with legal boundaries.

OCS fisheries arrangements for single or co-management of fisheries:

- Status Quo Management: no agreement under the OCS has been reached between the Australian government and the relevant state. The state controls fishing in waters within three nautical miles and the Australian government has responsibility for fisheries from three nautical miles out to 200 nautical miles.
- State Management: arrangement under the OCS provides for the relevant state to manage a fishery located in the waters of only one state. Management occurs under state law.
- Commonwealth Management: arrangement under the OCS provides for the Australian government to manage a fishery located off one state. Management occurs under Commonwealth law.
- Joint Authority Management: arrangement under the OCS provides for the Australian government and one or more states to form a single legal entity, which manages a fishery under a single law, either Commonwealth or state.
- Regional Management: arrangement under the OCS provides for the Australian government and two or more states to manage a fishery under a Joint Authority under one or more laws. Management can occur under Commonwealth or state laws and the Commonwealth can take a stewardship or active management role.

The Australian Fishery Management Authority (AFMA) manages fisheries under Commonwealth jurisdiction in accordance with the provisions of the Fisheries Management Act 1991 (FMA). AFMA adopts a partnership approach between fisheries managers, industry, scientists, fishing operators, environmentalists/conservationists, recreational interests and the general public. Management advisory committees or consultative committees facilitate the approach. The management advisory committees usually consist of the AFMA manager for the fishery, industry representatives, a research scientist, a conservation member and, where relevant, a member representing state/territory governments and a recreational fishery or charter boat fishery representative. Consultative committees apply to smaller or developing fisheries. Resource assessment groups provide assessments of the status of target, byproduct and bycatch species and the broader marine ecosystem to both types of committee. In 2007 there were 16 resource assessment groups established.

AFMA is also responsible for enforcing the provisions of the FMA through the detection and investigation of illegal activities by domestic and foreign fishing boats in the Australian Fishing Zone and Commonwealth managed fisheries.

The Torres Strait fisheries are managed under a Treaty arrangement with Papua New Guinea to protect the traditional way-of-life and livelihood of indigenous inhabitants. The Australian jurisdiction under the Treaty is managed under an OCS with Commonwealth management by the Torres Strait Protected Zone Joint Authority (PZJA), established under the Torres Strait Fisheries Act 1984, composed of the Australian government, Queensland government and the Torres Strait Regional Authority. Powers are delegated to AFMA and the Queensland Department of Primary Industries and Fisheries for management, licensing and compliance. There are two PZJA management advisory committees, for prawns and for other fisheries. Since 1989 all non-Indigenous participation in Torres Strait fisheries has been capped to grant any further expansion to traditional inhabitants. In 2005 the Joint Authority agreed on a tender process in the Tropical Rock Lobster fishery to meet Australia's obligations to Papua New Guinea under the Torres Strait Treaty and to increase the allocations for traditional inhabitants. Just over 30% of the fishery has been reallocated. In 2007 the Australian government Minister for Agriculture, Fisheries and Forestry announced that funding totalling AUD 10.6 million from the Australian government and the Torres Strait Regional Authority (TSRA) resulted in the buyout of 100% of the non-traditional Transferable Vessel Holder licences. The Traditional Inhabitant Boat sector holds 100% of the Australian share of the Spanish mackerel and coral trout quota.

Capture fisheries

In 2006-07 the gross value of production from state and territory wild catch fisheries fell by 1% compared to the year before, while the gross value of production of Commonwealth wild catch fisheries rose by 5% to AUD 293 million. The total value of capture fisheries production fell slightly by AUD 1.2 million to AUD 1.43 billion. Over the five years to 2006-07 the real value of wild catch fisheries production has fallen by 30%. In particular, the real value of prawns has fallen by 47% and the real value of tuna has fallen by 58% over this period due to declining unit prices caused by the strong appreciation of the Australian dollar.

Rock lobster remained the most valuable species in 2006-07, followed by salmonids, prawns, abalone and tuna. These top five fishery products account for 63% of total fishery production by value and 44% by volume. The southern and eastern scalefish and shark fishery generated the highest value of production of all Commonwealth fisheries, with a gross value of production of AUD 95.3 million in 2006-07. The Northern Prawn Fishery continued to be Australia's most valuable single method Commonwealth managed fishery, with a gross value of production of AUD 63.8 million in 2006-07.

Estimates indicate that commercial fishing employment fell to 9 700 jobs in 2006-07, a minimum over the last two decades. More than one-third of total employment was in aquaculture.

In the Commonwealth-managed fisheries a total of 97 target species were available for evaluation in 2006. The number of stocks or species classified as not overfished increased to 27 in 2006, following a 7-year period in which they remained stable at around 19.

The number of stocks overfished and/or subject to overfishing fell to 19 in 2006 from a peak of 24 in 2005. The number of stocks classified as uncertain has increased almost continuously since statistics were first collected in 1992, peaking at 51 in 2006. The increase is mostly a consequence of the addition of new stocks not previously classified.

Table III.1.1. **Employment in the Australian fishing industry by industry segment (August 2006)**

Fishery industry segment	Employment	% of total
Aquaculture	3 628	37.3
Finfish trawling	278	2.9
Line fishing	86	0.9
Prawn fishing	648	6.7
Rock lobster fishing	1 154	11.9
Other fishing	3 941	40.5
Total (production)	9 735	100
Fish wholesaling	4 202	67.7
Seafood processing	2 001	32.3
Total (processing)	**6 203**	**100**

Source: Australian Bureau of Statistics Census Data, August 2006.

Table III.1.2. **Employment in the Australian fishing industry by region (August 2006)**

	Capture fisheries	Aquaculture	Wholesaling and processing
New South Wales	532	709	1 242
Victoria	289	280	1 118
Queensland	762	551	1 310
Western Australia	836	325	809
South Australia	575	766	969
Tasmania	427	935	680
Northern Territory	171	62	58
Australian Capital Territory	4	0	17
Total	**6 107**	**3 628**	**6 203**

Source: Australian Bureau of Statistics Census Data, August 2006.

Of the 24 stocks classified as overfished and/or subject to overfishing in Fishery Status Reports 2005, the following 19 remain in that classification in Fishery Status Reports 2006: blue warehou; deepwater sharks (Commonwealth trawl sector); eastern gemfish; orange roughy (Commonwealth trawl sector); smooth oreo dory; other oreo dories; eastern redfish; silver trevally; school shark; southern scallop; southern bluefin tuna; bigeye tuna (Pacific Ocean); yellowfin tuna (Pacific Ocean); swordfish (Indian Ocean); yellowfin tuna (Indian Ocean); orange roughy (South Tasman Rise Fishery); and sandfish, black teatfish and surf redfish (bêches-de-mer) in the Torres Strait. Australia is actively conducting research and assessments to achieve ecologically sustainable fisheries and recovery of fisheries resources.

The status of other fish species caught incidentally is assessed through ecological risk assessment techniques. Specific attention is being paid to high risk sharks, skates and rays with a management handbook (to be released in 2009). AFMA is introducing bycatch work plans within the framework of the Bycatch Action Plan to reduce the catch of high risk species and unwanted bycatch.

Species listed as threatened, endangered or protected by Australian environmental law – the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) – are required to have specific responses, including a threat abatement plan. Under this same legislation all Commonwealth fisheries must undergo a strategic assessment and regularly seek approval to export product from Australia.

Management

In 2005 the Minister for Fisheries, Forestry and Conservation issued a formal Ministerial Direction to AFMA to end overfishing, limit the risk of future overfishing and manage the broader environmental impacts of fishing. This complemented the Australian government's AUD 220 million Securing our Fishing Future Initiative announced in 2005.

The 2007 Commonwealth Harvest Strategy Policy to develop and implement harvest strategies to ensure an evidence-based precautionary approach to monitor and assess the long-term biological sustainability and economic profitability of fisheries is one activity under the Ministerial Declaration.

In addition, independent reviews to determine the suitability of individual transferable quotas for various Commonwealth fisheries, and whether the existence of boat permits/boat statutory fishing rights were a barrier to efficient fisheries management are carried out.

Increasingly, ecological based fisheries management approaches are used to address the broader environmental impacts of fishing, including minimising interactions with threatened or otherwise protected species, and to reduce bycatch and discarding in Commonwealth fisheries and independent surveys in various Commonwealth fisheries are carried out to increase the transparency and integrity of catch and effort information.

Management instruments for fisheries under Commonwealth government jurisdiction vary for each fishery:

- Northern Prawn Fishery: Input controls (limited entry, seasonal closures, permanent area closures, gear restrictions, and operational controls) and the Bycatch Action Plan apply. A crew member and scientific observer program has been implemented. It is an approved wildlife trade operation under the EPBC Act for 2008.
- Southern Bluefin Tuna Fishery: Output controls (individual transferable quotas) managed under the Southern Bluefin Tuna Management Plan consistent with obligations under the Convention for the Conservation of Southern Bluefin Tuna and the Bycatch Action Plan apply. The Commission for the Conservation of Southern Bluefin Tuna agreed on an Australian national allocation of 5 265 tonnes.
- Southern and Eastern Scalefish and Shark Fishery (comprising Gillnet Hook and Trap, Commonwealth Trawl Sector, Great Australian Bight Trawl): Input controls (limited entry, gear restrictions, boat length restrictions, area closures) and output controls (total allowable catches and individual transferable quotas) apply for 34 species or stocks of shark and finfish and the Bycatch Action Plan applies. A Harvest Strategy Framework was developed and implemented in 2005 to set total allowable catches for individual transferable quotas species (06/07 and beyond). There are additional compulsory and voluntary spatial closures.
- Eastern Tuna and Billfish: Input controls (limited entry with vessel size restrictions in some areas, gear restrictions and closures) and the Bycatch Action Plan apply. The Fishery is considering moving to management using total allowable catches and/or individual transferable quotas. It met the requirements of the Threat Abatement Plan and a Management Plan was implemented in November 2005 as the basis for the allocation of individual tradeable effort units (expected in 2008). Observer coverage is approximately 8%. Competitive total allowable catch and supporting trigger points were introduced on two species to address decline in Swordfish catch rates and to manage a switch to albacore fishing. A revised line weighting regime to mitigate seabird interactions and a revised Threat Abatement Plan (Seabirds) were introduced.

- Bass Strait Central Zone Scallop: Input controls (limited entry, size limits, seasonal and area closures), output controls (catch limits) and the Bycatch Action Plan apply. A Management Plan was determined in September 2002, and individual transferable quotas were introduced. A zero total allowable catch has been set over the entire fishery for the period 2006-2008.
- Torres Strait Protected Zone Joint Authority Fisheries: Input controls (limited entry on fully transferable licences, vessel size restrictions, size limits, gear restrictions, area closures, seasonal closures) and output controls (possession limits, total allowable catches) A Prawn fishery management plan is due to be implemented in 2009. Quotas significantly reduced for two sea cucumber species. Humpheaded Maori wrasse, grey nurse, hammerhead and tiger sharks and all sharks > 2 metres where no take species. Allocated fishing days in the prawn fishery were reduced by 31.2% in 2006-2007.
- Sub-Antarctic Exploratory Fisheries (Macquarie Island; Heard and McDonald Islands): All managed either under or consistent with Convention for Conservation of Antarctic Marine Living Resources (CCAMLR). Input controls (limited entry, closures), output controls with a total allowable catch and the Bycatch Action Plan apply. There is an increased use of longlining to take toothfish and icefish quota over trawling.
- Southern Squid Jig: Input controls (limited entry) and the Bycatch Action Plan apply. A Management Plan came into effect from 1 January 2006 and introduced a total allowable effort. A trigger point for total catch was established to provide for a decision making process should catch levels significantly increase.
- Western Tuna and Billfish Fishery: Input controls (limited entry, area restrictions) and the Bycatch Action Plan apply. The Western Tuna and Billfish Fishery Management Plan 2005 implements quota management for the fishery. The allocation of statutory fishing rights under the management is underway.
- Christmas Island, Cocos (Keeling) Islands: Trawl and aquarium fish input controls (limited entry, area restrictions) and output controls (total allowable catch) apply. In late 2002, the inshore waters (*i.e.* within 12 nautical miles) were exempted from the application of the Fisheries Management Act 1991. Responsibility for managing these waters now lies with the Commonwealth Department of Infrastructure, Transport, Regional Development and Local government. The Department of Infrastructure has entered into a service delivery arrangement with the Western Australian Department of Fisheries for the management of these inshore fisheries.
- Coral Sea: Input controls (limited entry) and output controls (sea cucumber fishery catch limits) apply.
- Small Pelagic Fishery: Input controls (limited entry, geographic zones, trigger catch levels and total allowable catches applied in certain zones) and the Bycatch Action Plan apply. The drafting commenced on a Statutory Management Plan that will provide individual transferable quotas and statutory fishing rights.
- Norfolk Islands: Exploratory fishing ceased on 31 December 2003. Public consultation was undertaken during 2005-06 on a proposal for a new exploratory fishing program.
- North West Slope Trawl: Input controls (limited entry, cod end mesh size restrictions, dog fish trigger limits) apply. A scientific observer program has been implemented.
- South Tasman Rise: total allowable catch for orange roughy were allocated (shared with New Zealand under a Memorandum of Understanding). Australia has input controls

(limited entry, and compliance requirements). The fishery has been closed to commercial fishing until further information is gathered on the current status of stocks (orange roughy and oreo dory).

- Western Deepwater Trawl: Input controls (limited entry, dogfish trigger limits) apply. A scientific observer program has been implemented.

The Australian government has provisions under the Fisheries Management Act 1991 for granting foreign fishing licences and allowing Australian boats to fish on the high seas.

The Australian government's 2003 Looking to the Future: A Review of Commonwealth Fisheries Policy committed to exploring ways of ensuring that traditional Indigenous fishing is effectively incorporated into Commonwealth fisheries management. It continues to look for opportunities for the involvement of Indigenous people in commercial fishing and aquaculture to improve economic benefit, whilst protecting their traditional way of life and livelihood (*e.g.* sponsorship of two Indigenous Aquaculture workshop in 2006 and 2008).

A relatively high proportion of the people in Indigenous communities live on the riparian systems and along Australia's coastline and fishing is an important source of food and income. The 2000-2001 Recreational and Indigenous Fishing Survey covered Indigenous people aged five years and older, living in coastal communities across northern Australia. It has helped to redress the lack of Indigenous fishing information on a national scale by involving Indigenous communities in the gathering of fisheries statistics (*www.daff.gov.au/fisheries/recreational/recfishsurvey*).

AFMA administers compliance programs directed for domestic and foreign fishing vessels, covering licensed and illegal fishing activity. The Commonwealth also has flag state responsibilities for fishing undertaken by Australian boats on the high seas under international treaties and agreements. AFMA's main monitoring and enforcement functions include *i)* ensuring compliance with AFMA's domestic fisheries management measures; *ii)* ensuring licensed foreign boats comply with conditions for fishing within the Australian Fishing Zone; and *iii)* surveillance and apprehension of unlicensed foreign vessels fishing in the Australian Fishing Zone, including conducting deterrence measures.

Effective compliance is achieved through continued education and stakeholder participation in the development of management rules, effective law enforcement deterrents involving targeted operations and inspections, intelligence gathering, risk assessments, monitoring activities, mitigation measures and a comprehensive catch/landing reporting system for quotas. In the majority of fisheries managed by AFMA vessel monitoring systems provide real-time position reporting of boats and movements in and out of port. Vessel monitoring systems became mandatory on all Commonwealth licensed fishing vessels in 2007.

Strategies that have led to deterrence Illegal foreign fishing in Australia's northern waters include strong at-sea enforcement actions including the loss of catch, fishing gear and fishing vessels, and an extensive education program in Indonesia. Fisheries officers from Australia and Indonesia work together at many levels, including: undertaking co-ordinated surveillance patrols through the joint Fisheries Surveillance Forum; managing resources of joint interest; conducting public information campaigns in Indonesia; and studying the causes and impacts of IUU fishing in the region.

Australia and Indonesia have developed the joint initiative, the Regional Plan of Action to Promote Responsible Fishing Practices including Combating Illegal, Unreported and Unregulated (IUU) Fishing (RPOA) agreed by 10 other South-East Asian countries in 2007.

Priorities are *i)* strengthening of monitoring, control and surveillance (MCS) systems, *ii)* coastal State measures, *iii)* regional capacity building, *iv)* the current resource and management situation in the region and *v)* port State measures.

In 2007 efforts to deter illegal foreign fishing in Australia's southern ocean waters were successful with AFMA involved in patrols provided by an Australian Customs Service vessel. No illegal activity was detected inside Australia's Exclusive Economic Zone around Heard Island and McDonald Islands in 2007. Fisheries officers also continued to participate in joint patrols of the Southern Ocean with officers embarking on two the French navy warships.

Fisheries monitoring and enforcement is also conducted by state/territory fisheries agencies. The National Fisheries Compliance Committee (NFCC), a committee of the Australian Fisheries Managers Forum, is composed of representatives of all Australian fisheries agencies and enables co-operation between these bodies. It works under the National Fisheries Compliance Strategy 2005-2010, which outlines the objectives that Australian fisheries agencies will pursue to promote voluntary compliance and create effective deterrence to illegal fishing activities and the principles that agencies will use when planning cost-effective and efficient fisheries compliance programs with throughout Australia.

Australia has recently strengthened its enforcement powers over illegal fishers through the Fisheries Legislation Amendment Bill 2008 giving stronger powers to border protection officers to apprehend ships involved in illegal fishing. It creates new offences for Australian citizens if involved in illegal fishing overseas.

Australia is continuing to actively engage in consultation to develop an international legally-binding port State instrument under the auspices of the FAO. Australia has also contributed to the development of a comprehensive global record of fishing vessels as a potential tool to detect, impede and eliminate vessels that engage in IUU fishing and is actively contributing to the development of international guidelines for the management of deep sea fisheries on the high seas.

Australia also has a strong focus on IUU fishing controls in the region, including through the Pacific Islands Forum Fisheries Agency (FFA), bilateral and multilateral IUU fishing control initiatives with Papua New Guinea, Indonesia and other South-East Asian countries, and in Australia's Territories in the Southern Ocean.

The overall reduction in apprehensions of illegal vessels is a result of surveillance, apprehensions, vessel forfeiture, prosecutions and detention. A matrix of national, sub-regional and regional MCS needs and potential actions has been developed, and agreement made to establish a regional MCS network and subregional forums.

Australia is a member and active participant of the Commission for the Conservation of Southern Bluefin Tuna, the Indian Ocean Tuna Commission and the Western and Central Pacific Fisheries Commissio, the Commission for the Conservation of Antarctic Marine Living Resources. Australia aims to ensure these organisations are equipped to maintain highly migratory and other fish stocks at levels that provide for their long-term conservation and sustainable use.

In recognising the valuable role of RFMOs in managing global fish stocks, Australia participated in the development of the text of the Southern Indian Ocean Fisheries Agreement (SIOFA), signed in 2006, and is working towards ratification. Australia is also participating in negotiations for the development of a RFMO to manage discrete high seas and straddling fish stocks in the South Pacific and was the host of the 6th international

conference for the development of the South Pacific RFMO in 2008. These RFMOs will fill major gaps in international governance arrangements for non-highly migratory species on the high seas.

Australia is currently implementing interim management measures agreed at the 3rd conference to establish a South Pacific RFMO in accordance with the direction agreed to in the 2006 United Nations General Assembly Sustainable Fisheries Resolution 61/105, to adopt effective interim bottom fishing management measures. Australia has also developed and distributed draft interim measures for consideration and discussion by SIOFA signatories and interested parties, based on those agreed for the South Pacific.

A joint declaration between Australia, France and New Zealand was signed in 2006 to formalise co-ordination of respective maritime surveillance capabilities to ensure better monitoring, control and surveillance of fishing activities in the Pacific region.

In 2006 a co-operative treaty on enforcement of fisheries laws between Australia and France was verified and initialled by Ministers. It formalises co-operative enforcement arrangements against IUU fishing vessels undertaken by joint patrols of the French and Australian Southern Ocean exclusive economic zones and territorial seas. The co-operative Fisheries Enforcement Treaty builds on the Australia-France Surveillance Treaty from 2005. Australia is also holding discussions with South Africa for a similar co-operative arrangement for the Southern Ocean.

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) came into force in 2000. Under Part 10 of the EPBC Act, Commonwealth fisheries are subject to strategic environmental assessments. They are also assessed against the export provisions of Part 13A and the listed species and communities' provisions of Part 13. To gain accreditation under Part 13 of the EPBC Act, a specified plan or management regime must require that persons engaged in fishing take all reasonable steps to ensure that members of species listed under the EPBC Act are not killed or injured as a result of fishing, and that the fishery is not likely to adversely affect the survival or recovery in nature of the species.

Assessments for all Commonwealth-managed fisheries and all state-managed fisheries with an export component have been completed. The assessment of the Torres Strait Turtle and Dugong Fishery is currently being finalised. Amendments to the EPBC Act commenced in 2007 with the aim of streamlining assessment and accreditation processes and strengthening the Australian government's compliance and offences regime for Marine Protected Areas (MPAs) and protected species, and ecological communities.

In 2005 the Australian government brought its program of regional marine planning directly under the EPBC Act. The plans will be known as Marine Bioregional Plans to reflect the part of the EPBC Act under which they will be established.

The South-East region was completed under the previous planning process and the South-East MPA network declared in 2007. Marine Bioregional Plans will be developed for the four remaining regions (North-West, North, North-West and East) by 2010. The Marine Bioregional Planning process involves three stages: first, Bioregional Profiles, describing the natural resources, economic, social and heritage values. The Profiles also identify the regional conservation values. Secondly, Draft Marine Bioregional Plans, which will identify the conservation objectives and conservation management tools, including a draft network of MPAs. The draft plans will be available for public comment. And lastly Final Marine Bioregional Plans, which are ongoing plans which will be reviewed when new information is available.

The development of a National Representative System of Marine Protected Areas (NRSMPA) is a key commitment by the Australian, state and territory governments for biodiversity conservation in the marine environment. The following Commonwealth MPAs, which all contribute to the NRSMPA, have been declared since 1998: Macquarie Island Marine Park (1999), Lord Howe Island Marine Park (2000), Cartier Island and Hibernia Reef (2000), Heard and McDonald Islands Marine Reserve (2002), Cod Grounds Commonwealth Marine Reserve (2007) and the South-East Commonwealth Marine Reserve Network (2007 – 13 reserves covering 226 000 km^2).

The Marine Bioregional Planning process is now accelerating the delivery of the NRSMPA in Commonwealth offshore waters. MPA networks in the remaining four marine regions are due to be finalised by 2010. The Great Barrier Reef Marine Park was re-zoned in 2004 through a representative area program, increasing the area of no-take areas in that region by over 30% to 344 000 km^2.

A Threat Abatement Plan for the Incidental Catch (or Bycatch) of Seabirds during Oceanic Longline Fishing Operations (TAP) was released in 1998 and revised in 2006. The TAP was developed under the EPBC Act, following the listing of [ldquoe]incidental catch (or bycatch) of seabirds during oceanic longline fishing operations' as a Key Threatening Process to reduce the bycatch of seabirds through implementation of bycatch mitigation measures, development of new measures, education, and collection of information upon which to base future decisions (Australian Antarctic Division – *www.aad.gov.au*). The Australian government is also drafting a National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (NPOA-Seabirds). Whereas the TAP applies only in Commonwealth waters (generally beyond 3 nautical miles), the NPOA-Seabirds will have application to state fisheries.

The Agreement on the Conservation of Albatrosses and Petrels (ACAP) was opened for signature in June 2001. To date there are 12 signatories – Argentina, Australia, Brazil, Chile, Ecuador, France, New Zealand, Norway, Peru, South Africa, Spain and the United Kingdom. Of these, Australia, Chile, Ecuador, France, New Zealand, Peru, South Africa, Spain and the United Kingdom have also ratified ACAP.

Australia's National Plan of Action for the Conservation and Management of Sharks (Shark Plan) in accordance with the requirements of the FAO International Plan of Action for the Conservation and Management of Sharks was endorsed in 2004. It addresses conservation and management issues through reviewing and, where necessary, improving existing conservation and management measures; improving data collection and handling to improve species identification and quantification; research and development; education or awareness raising; and improved co-ordination and consultation. The practice of shark finning is not permitted in fisheries managed by the Australian government. Similar measures are in place in fisheries managed by the states and territories. In Commonwealth waters conditions are mandatorily placed on relevant fishing permits issued by AFMA.

The draft National Strategy to Address Interactions between Humans and Seals: Fisheries, Aquaculture and Tourism was released in 2006 in response to the need to mitigate adverse impacts of the fisheries, aquaculture and tourism sectors on Australian seal and sea lion populations. It aims to assist the commercial fishing, aquaculture and tourism sectors to understand the basis for, and requirements of, legislation protecting all species of seals and sea lions in Australian waters. It was supported by a 2007 National Assessment of Interaction between Human and Seals: Fisheries, Aquaculture and Tourism.

A Key Threatening Process listed under the EPBC Act was "Injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris". A related draft Threat Abatement Plan (TAP) has been developed to provide a national framework for the co-ordinated implementation of measures to prevent and mitigate the impacts of marine debris. It will guide Australia's efforts in international forums to build and strengthen collaboration to identify the origins of, and effective responses to, marine debris on a regional and international level. It should be finalised in early 2009.

Fisheries management costs for AFMA have increased significantly from AUD 29.02 million in 2002/03 to AUD 43.52 million in 2006/07, largely due to foreign fisheries compliance costs.

Table III.1.3. **Australian government transfers to commerical fishing 2006/2007**

			AUD million
Market price support			n.a.
Direct payments			n.a.
General services (management costs)	AFMA	Domestic Fisheries Compliance	5.07
		Foreign Fisheries Compliance	31.66
		Research and Data	5.32
		Licensing and revenue collection	1.47
	FRDC		16
Cost Recovery from industry (collected by AFMA)			10.99

n.a.: Not available.
Source: AFMA, FRDC and Annual Reports.

Adjustment assistance is only used in special circumstances to facilitate the introduction of new fisheries management arrangements. Where Marine Protected Areas (MPAs)/zones create additional requirements for fishing effort reduction beyond that required for achieving fisheries management objectives, Australian government-funded adjustment assistance may be considered on a case-by-case basis to support the reduction in fishing effort. One example of structural adjustment in the Australian fishing industry was the 100% buy-back of Torres Strait Finfish entitlements.

Recreational fishing

The Australian government can manage all forms of recreational fishing if this power is granted in a Commonwealth fisheries management plan or temporary order. The day-to-day management of recreational fishing is for the most part undertaken by the state and territory governments. The main forms of management action within Australia's recreational fisheries are: controls on gear types and amounts; size (minimum and/or maximum), sex and/or number of fish of a given species; seasonal and/or area closures; and prohibition on the sale of fish.

Aquaculture

The management and regulation of aquaculture on a day-to-day basis is primarily a state government responsibility. The Australian government has a role in aquaculture development, especially in the co-ordination of Australian government policy over national issues such as quarantine, disease outbreak controls, product quality, labelling, trade and taxation. The Australian government also continues to contribute to funding for education and research.

In 2003 the Australian government in partnership with industry implemented the Aquaculture Industry Action Agenda (AIAA) for the Australian aquaculture industry. Ten strategic initiatives were proposed under the Action Agenda: National Aquaculture Policy Statement to signal Australia's support for the aquaculture industry; Regulatory and business environment to support the sustainable development of the aquaculture industry; Implementation of an industry driven Action Agenda; Industry growth within an ecologically sustainable framework to improve access to natural resources and to improve ecologically sustainable practices; Protection from aquatic pests and diseases; Facilitating investment in the Australian aquaculture industry; Promotion of aquaculture products in Australia and overseas; Tackling the research and innovation challenges; Education, training and workplace opportunities and Opportunities for Indigenous Australians in the aquaculture industry.

The Department of Agriculture, Fisheries and Forestry (DAFF) and the former Aboriginal and Torres Strait Islander Commission (ATSIC) jointly established DAFF's Indigenous Aquaculture Unit (IAU) in 2003 to promote Indigenous aquaculture development, provide realistic advice and co-ordinate funding applications. It is a broker between Australian, state and territory government agencies, and provides scientific, technological, and economic guidance on projects as well as cultural understanding on key aquaculture issues.

A total of 20 projects and initiatives have been supported to date. These projects have been completed or are at various stages of development. The key program which the IAU implements is the Indigenous Aquaculture Strategy to deliver important outcomes sought by Indigenous participants through projects that are socially, environmentally and economically sustainable. As part of the biennial Australasian Aquaculture Conference and Trade Show (3-6 August 2008), the IAU held a half-day workshop to discuss the current and future operating environment within the Indigenous aquaculture sector and funded the participation of eight people from around Australia.

Markets and trade

The volume of Australian seafood production in the period 2006/07 was 238 000 tonnes, down from 278 000 tonnes in 2004/05. However, the value of Australian seafood production only dropped by 1% compared to 2004/05 to AUD 2.19 billion in 2006/07. This small drop in value highlights Australia's focus on high value export species.

The volume of Australian aquaculture production in 2006/07 was 57 800 tonnes, a 7% increase since 2004/05. Over the last decade to 2006-07 aquaculture production almost doubled from 29 300 tonnes to 57 800 tonnes, whereas the wild caught seafood remained relatively stable. The dramatic rise in value of aquaculture in percentage terms indicates a longer-term trend, which suggests the aquaculture sector will provide the major impetus for medium to long-term growth in the value of Australia's seafood production.

The gross value of aquaculture production in 2006/07 was AUD 793 million, with the most valuable aquaculture species being farmed salmonoids (salmon and trout). Together they accounted for 44% of total production volume and approximately one-third of the total production value. They are followed by yellowtail kingfish, barramundi and southern bluefin tuna. Australia's total fisheries exports in 2006-07 were valued at AUD 1.49 billion, comprising of edible fisheries exports of AUD 1.15 billion, and non edible fisheries exports

of AUD 340 million. Rock lobster continued to be the most valuable fisheries export. Hong Kong and Japan are the major export markets, in particular for tuna.

Australia's total fisheries imports in 2006/07 were valued at AUD 1.47 billion, comprising of edible fisheries imports of AUD 1.18 billion, and non edible fisheries imports of AUD 283 million. The largest categories of edible finfish imports in value terms were frozen fish fillets (AUD 228 million) and canned fish (AUD 243 million). Crustacean and mollusc imports consisted mainly of prawns (AUD 246 million) followed by calamari, squid and octopus (AUD 55 million) and scallops (AUD 29 million). Non-edible fisheries products imported into Australia in 2006-07 consisted of pearls, fish meal, marine fats and oils and ornamental fish. Thailand (AUD 278 million), New Zealand (AUD 192 million), China (AUD 155 million) and Vietnam (AUD 154 million) continued to dominate as the major source of edible fisheries products imported into Australia, accounting for around 66% of total edible imports.

The non-profit company Seafood Services Australia (SSA) established by the Fisheries Research and Development Corporation (FRDC) and the former Australian Seafood Industry Council in 2001 provides information and advice on technical issues, guidance on food safety and quality management standards, environmental management systems, supply chains, trade and market access and assistance with value-adding through developing new products and processes.

There are general requirements in the Australia New Zealand Food Standards Code that all foods offered for sale should be safe for human consumption. In 2005 the Food Safety Australia New Zealand (FSANZ) Board approved the Final Assessment Report for the Primary Production and Processing Standard for Seafood which contains a scientific evaluation of risk within the seafood industry and management options to minimise this risk. In 2005 Standard 4.2.1 – Primary Production and Processing Standard for Seafood became part of the Australia New Zealand Food Standards Code. Seafood businesses are now required to comply with this standard. To help with interpreting Standard 4.2.1, FSANZ developed the Safe Seafood Australia guide for government agencies responsible for enforcing the requirements of the Food Standards Code relating to seafood and for businesses.

Enforcement of food labelling requirements is the responsibility of Australia's states and territories. The Australian government funds the establishment, promotion and support of the Australian Seafood Consumer Hotline, a free-to-call number service as single point of contact for consumers to lodge complaints regarding mislabelled seafood which are then referred to the relevant state or territory agency for action. The hotline supports the 2006 Country of Origin Food Labelling (CoOL) requirements that apply to all seafood. The CoOL requirements distinguish Australian seafood products from others in the market place. According to a review into the effectiveness of the hotline in early 2008 it is helping to reduce the level of mislabelling of seafood in Australia and supported CoOL.

To address the mislabelling of seafood, a consortium of government and seafood industry representatives funded by the FRDC have created the Australian Fish Names List, formally endorsed as an Australian standard in 2007. The list of approved marketing names for commercial seafood species available in Australia ensures conformity of fish nomenclature throughout the seafood industry. The Australian Fish Names Committee authors the standard which is intended to be referenced in the Australian Food Standards Code.

Outlook

The combined impacts of softening global demand and a stronger Australian dollar has encouraged imports and discouraged exports. Declining returns have placed pressure on many seafood operators. These circumstances have arisen despite a generally positive consumer attitude to seafood and increased demand for domestically produced and imported seafood.

The National Representative System of Marine Protected Areas (NRSMPA) will establish marine areas for the purpose of protecting biodiversity. Bycatch action plans will protect high-risk species and manage the health of Australia's marine resources and ecological risk assessments for Commonwealth fisheries will further ensure effective targeting of management action for high-risk species.

Improved monitoring and compliance measures (*e.g.* requirement for all fishing vessels to carry vessel monitoring systems, increased surveillance measures to combat IUU fishing) will ensure that the efforts to ensure the sustainability of fish stocks are not negatively impacted by non-compliant activities.

Aquaculture production now accounts for approximately one third of Australia's gross value of fisheries production. This may be attributed to the ongoing adoption of a wide range of innovative and sustainable farming practices as well as increased marketing in existing and new overseas markets. The sector is expected to continue to grow in the future and is likely to provide the major impetus for medium to long-term growth in the value of Australia's seafood production. For aquaculture to continue to develop sustainably significant investment will be needed to secure land and water resources, production technologies, supply chain development, value-adding, marketing and promotion and people development.

Consumer demand for healthy and clean seafood remains a key strength of the Australian fishing industry. Australia's discerning consumer base is increasingly appreciating the benefits of eating seafood products and is increasingly willing to pay for the best quality food. The challenge is to continue to enhance the seafood product available through innovation and marketing and to minimise the risk of adverse consumer experiences due to poor quality or mislabelling.

PART III

Chapter 2

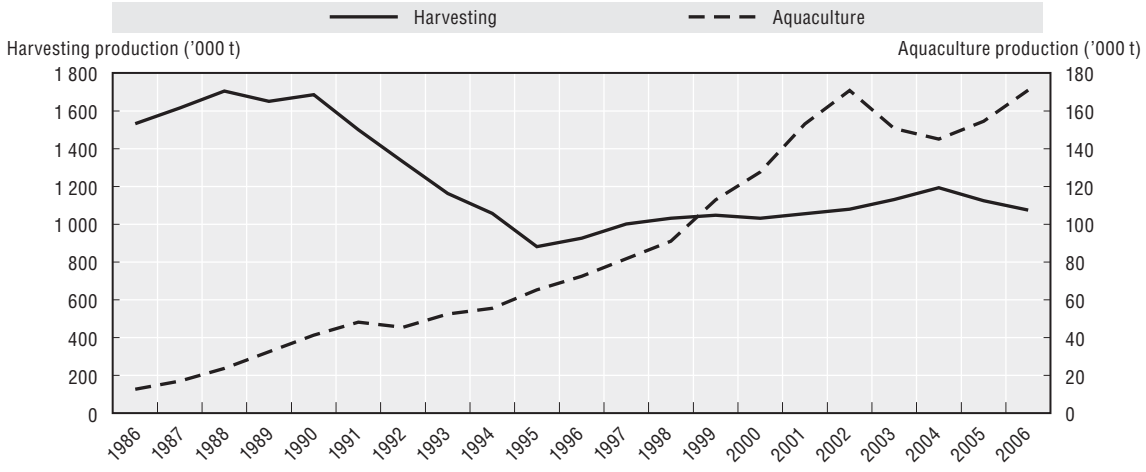
Canada

Canada

Summary of recent developments

- Canada's Fisheries Act of 1869 is currently undergoing a renewal process to include modern management approaches, including the precautionary and ecosystem approach. Under the overall objective of improved sustainability, this new legal framework also envisages improved strengthened surveillance and enforcement measures.
- In 2007 Canada introduced the National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries and the National Plan of Action for the Conservation and Management of Sharks, both in line with the respective international plans of action developed by FAO (IPOA-Seabirds, IPOA-Sharks).
- To improve international co-operation, Canada signed Memorandums of Understanding (MoU) with Spain in 2007 and the Russian Federation in 2008. The agreements cover a wide range of issues, like research, trade and sustainable production. An MoU with Chile focuses on aquaculture collaboration.
- Canada is actively looking for opportunities to improve its growing aquaculture sector. Certification is a major issue in this context on which Canada is closely collaborating with the FAO.

Harvesting and aquaculture production

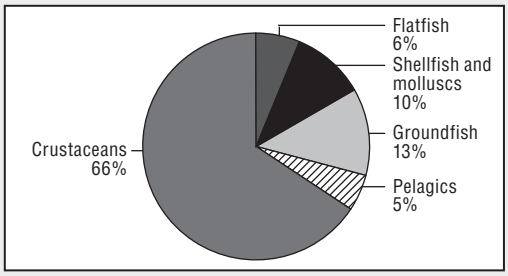


Source: FAO.

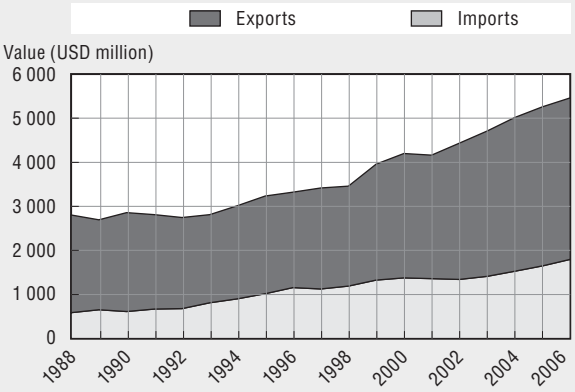
Key characteristics of the sector

- The value of Canada's commercial harvest of fish and seafood products has declined in recent years due primarily to the appreciation of the Canadian dollar relative to the United States dollar, as the majority of Canadian fish and seafood products are exported to the US.
- In 2007, Canada exported approximately CAD 3.88 billion worth of fish and seafood products. The United States remains Canada's top export destination accounting for roughly half of all Canadian fish and seafood exports. Canadian imports have remained fairly steady in recent years and were valued at approximately CAD 2.2 billion in 2007.
- The value and diversity of Canadian aquaculture operations has been steadily increasing in recent years. In 2006, the Canadian production of aquaculture was valued at over CAD 900 million.
- Recreational fishing continues to be an important and growing segment of Canadian fisheries. In total, anglers spent CAD 7.5 billion on recreational fishing within Canada in 2005.

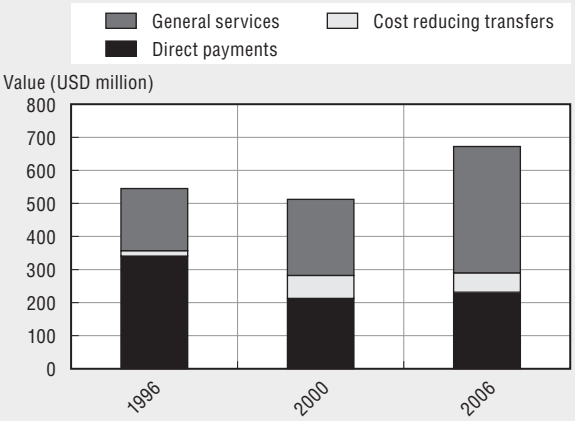
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2005
Number of fishers	n.a.	47 158
Number of fish farmers	n.a.	3 920
Total number of vessels	27105[1]	21 857
Total tonnage of the fleet	n.a.	n.a.

1. Vessels in 1997.
n.a.: Not available.

Legal and institutional framework

The federal government, led by the Minister of Fisheries and Oceans Canada (DFO), is responsible for the conservation, protection, and sustainable use of all fisheries and fish habitat in Canadian marine waters. This authority is granted under the Constitution Act 1867. Federal government, working in partnership with the provincial and territorial governments, is also responsible for the sustainable development of the Canadian aquaculture industry.

DFO is currently in the process of undertaking a legislative renewal of the 139-year-old Fisheries Act, Canada's statute for the conservation and protection of fish and fish habitat. The proposed Act incorporates modern management principles *(e.g.,* the ecosystem approach) and will provide DFO with the tools needed to manage a sustainable and competitive fisheries industry. The proposed legislation will also provide a basis for better transparency and predictability in decision making, strengthen accountability to Canadians, safeguard aquatic ecosystems *(e.g.,* it includes a requirement to consider the impacts of fishing activities on habitat), and provide a modern and effective compliance regime.

Capture fisheries

Status of fish stocks

On the Atlantic Coast, the condition of exploited populations varies considerably by species group and in some cases by population. Atlantic groundfish resources remain generally depressed in comparison to historical levels, although there are some exceptions. The status of Atlantic cod stocks remains generally poor, with closures in a number of cases and reduced removals in most others. Haddock on the Scotian Shelf is in good condition albeit with reduced individual growth of fish. Hake and other groundfish populations are generally in poor or declining condition. Flatfish status is more mixed. Atlantic halibut abundance continues to improve both in the Gulf of St. Lawrence and on the Scotian Shelf, as does Greenland halibut in the Gulf of St. Lawrence. Greenland halibut off Newfoundland is declining and management actions are being discussed by NAFO. Witch flounder in the Gulf of St. Lawrence remains stable while American plaice in this same area and others continues to decline and is currently at a very low level. Many other more localized flatfish stocks also remain at low levels.

Among major pelagic stocks, Atlantic herring is in generally good condition, with the exception of the spring component in the southern Gulf of St. Lawrence where sharp management actions have been taken to halt continuing declines. Declines in southwest Nova Scotia herring have been reversed through management action and this stock is improving. Atlantic mackerel remains in moderately good condition after a period of higher abundance, with notable changes in the apparent distribution of this resource being noted.

Invertebrate populations remain in generally good condition on the Atlantic Coast. Pink shrimp remains at near or all-time highs of abundance across the Coast. Landings of lobster also remain high in comparison to historical averages; however, some localized declines are notable such as the western Northumberland Strait. Snow crab populations are in varied status at the moment, but at moderate levels overall. The southern Gulf population is currently moving downward in its cycle of abundance with new recruitment not expected for at least several more years. On the other hand, on the Scotian Shelf, the population is benefiting from recruitment which is expected to continue for several more seasons. Off Newfoundland, stock conditions are in varied status, but at moderate levels overall. The

biomass is generally increasing off Labrador and North-eastern Newfoundland and, in most cases, good recruitment is expected. In southern grounds, the biomass is generally stable at low levels with management adjustments being made. In many cases, recruitment is expected to improve. Major scallop populations in the larger Atlantic fisheries are now closer to average levels following higher-than-average abundances earlier in the decade.

On the Pacific Coast, despite some local concerns that led to conservation measures, the major stocks are at or above long-term average condition. Most Pacific groundfish stocks are at or near long term average levels of abundance. Pacific Halibut and Petrale sole have been showing signs of increased abundance for nearly a decade. Offshore rockfish populations are stable with many of the smaller forge species showing signs of increased abundance. Nearshore rockfish, depleted during the 80's and 90's, are being are being managed under a recovery strategy. Offshore Pacific Hake, Pacific Cod and sablefish stocks are in decline.

Among pelagic species, Fraser River eulachon stocks, and possibly some northern stocks, are depressed and a conservation concern. Pacific herring stocks also are down all along the coast. Management actions have been taken to conserve eulachon and herring stocks. Managed shellfish stocks in the Pacific Region are generally in good shape. Abalone is the notable exception and conservation measures have been implemented for this species.

Concerning Pacific salmon, most returns during 2007 and 2008 are quite depressed due to extremely poor marine survival of juvenile salmon that entered the sea during 2005. While there have been a few improvements in 2008 *(e.g.,* Skeena River sockeye), most salmon fisheries have remained severely restricted or closed in these past two years; including notably, Fraser River sockeye salmon. Stocks that have limited fisheries in past years *(e.g.,* Cultus Lake and Sakinaw sockeye, Interior Fraser coho, and central coast sockeye) have not been a limitation due to the generally poor returns of all salmon. There is strong evidence that poor marine survival is the explanation for these weak Pacific salmon returns and marine conditions have become more favorable for salmon in the past couple of years.

Resource management

Canada is moving forward with a transformative fisheries policy renewal agenda that will entrench precautionary and ecosystem approaches to fisheries management. The aim is to help ensure the long-term sustainability of the resource and set in place the conditions necessary to maximize prosperity in the fishing industry. Fisheries Renewal promotes stability, transparency and predictability, and is based on the understanding that Canada's fisheries can be sustainable only if fisheries resources are conserved, ecosystem impacts are managed and the conditions exist to promote prosperity in the fishing industry.

An important element of Fisheries Renewal is the Resource Management Sustainable Development Framework. The Framework pulls together important existing and new conservation and economic policies and tools into one cohesive package, supporting and building upon work already undertaken in Canada's marine fisheries to promote sustainability. The Framework also introduces a mechanism to assess results against clear objectives and to identify and address any gaps. This will ensure continuous improvement in resource management.

Canada is also working diligently to promote collaboration with the fishing industry and policy coherence among domestic government agencies and at different levels of

government. Engaging participants along the seafood value chain is essential so that they can work jointly to improve sustainable resource use, competitiveness and economic prosperity in the fishery.

Canada released its National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (NPOA-Seabirds) in March 2007. It was developed in accordance with the principles and provisions of the International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA-Seabirds), as developed by FAO. The document provides an assessment of bycatch levels of seabirds within Canada's longline fisheries, identifies priorities for the NPOA, highlights Canada's current legislative framework and international commitments, reviews Canada's integrated fisheries management framework, and presents a series of actions for better identifying bycatch levels and further enhancing efforts to reduce the incidental capture of seabirds.

In 2007, Canada also released its National Plan of Action for the Conservation and Management of Sharks (NPOA-Sharks). It was developed in accordance with the principles and provisions of the International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks), as developed by FAO. The NPOA-Sharks provides an overview of the shark stocks in Canadian fisheries waters, identifies priorities for the Plan of Action, highlights Canada's current legislative framework and international commitments, and outlines current measures to monitor, assess and manage these populations and their related fisheries. The Plan also provides recommendations for possible enhancements to existing conservation and management practices.

Recreational fisheries

With respect to recreational fishing of freshwater species, provinces and territories are generally responsible for management and allocation of freshwater species (where delegated), licensing, enforcement, industry promotion, and marketing. The federal government retains management responsibilities in tidal waters.

Recreational fishing in Canada is an important economic activity in the natural resources sector. In total, anglers spent CAD 7.5 billion in Canada in 2005. Of this amount, CAD 2.5 billion was directly associated with recreational fishing and spent on such items as transportation, food and lodging, package deals, fishing services, and supplies. The remaining CAN 5.0 billion was spent for such durable goods as fishing equipment, boats, motors, camping equipment, special vehicles, and real estate.

Aboriginal fisheries

The key programs with respect to Aboriginal fisheries are the Aboriginal Fisheries Strategy (AFS), the Aboriginal Aquatic Resource and Oceans Management (AAROM), the Atlantic Integrated Commercial Fisheries Initiative (AICFI) and the Pacific Integrated Commercial Fisheries Initiative (PICFI). This integrated Aboriginal program approach focuses on more structured relationships including co-management approaches aimed at building fishing capacity, and incentives to support Aboriginal communities' participation in fisheries management. The more recent five year AICFI and PICFI initiatives were designed to support Aboriginal participation in integrated commercial fisheries on the East and West coasts. AICFI is directed at providing the 34 Mi'Kmaq and Maliseet First Nations affected by the *Marshall* decision with the means to develop commercial fisheries enterprise governance and business management skills, build capacity in commercial fisheries operations, and have a more effective voice in fisheries co-management. Similarly, PICFI responds to the

emerging conservation and fisheries sustainability challenges facing Pacific fisheries and the need for greater co-operation amongst fish harvesters to secure economically viable and environmentally sustainable commercial fisheries.

Monitoring and enforcement

In early 2006, DFO implemented a process to redefine and modernize the departmental compliance and enforcement program. As part of this process, DFO developed a National Compliance Framework consisting of a three pillar model and nine underlying principles to help shape the future direction of the Conservation and Protection program and all of DFO's compliance-related activities.

In 2007, DFO implemented the Compliance System Refresh project, which encompasses a refresh of two major mission-critical national compliance systems, the Departmental Violations System (DVS) and the Fisheries Enforcement Activity Tracking System (FEATS). The DVS is a national system which allows Fishery Officers to record violations data related to fisheries and habitat enforcement. The FEATS is a national system that allows Fishery Officers to record their activities and results by fishery. This project will include a full review of data requirements, which will allow for the enhancement of our core systems, including new modules to focus on both emerging requirements and the modernization of the systems in general.

Multilateral agreements and arrangements

In 2007, Canada and Spain signed an MOU to ensure co-operation in fishery research projects, productive and commercial development, trade, biotechnology, sustainable management, and responsible fishing. That year Canada also signed an MOU with the Russian Federation to ensure the promotion of technical, scientific, economic and enforcement co-operation on fisheries matters among the stakeholders including governmental institutions, corporations, trade groupings, communities and individuals.

In 2008 Canada and Norway signed an MOU to ensure the promotion of technical, scientific, economic and enforcement co-operation on fisheries matters among the stakeholders including governmental institutions, corporations, trade groupings, communities and individuals.

Aquaculture

Canadian aquaculture continues to grow. In 2006, total production increased to 181 491 tonnes from 155 298 tonnes in 2005. Salmon leads the production growth, but a number of other species contributes to diversity. This includes rainbow trout, mussels, oysters, and scallops. In keeping with production growth, aquaculture's contribution to the Canadian economy increased in 2006 to CAD 396 million in terms of gross value-added, up 58% from 2005. The sector supported over 14 000 jobs (direct and indirect).

Canada is seeking to set the conditions for the success of a more vibrant and innovative Canadian aquaculture sector that is environmentally and socially sustainable and internationally competitive for the benefit for all Canadians.

This will be achieved through focusing on the following four inter-related program elements:

- Governance and Regulatory Reform;
- Regulatory Science;

- Innovation; and
- Certification and Market Access.

Canada is an active member of the UN FAO COFI Sub-Committee on Aquaculture and is currently working with others through the Expert Working Group on Aquaculture Certification to develop globally acceptable guidelines for the development of aquaculture certification schemes.

Canada has recently signed a MoU on aquaculture collaboration with Chile that emphasizes Canada and Chile's shared commitment to sustainable aquaculture development and commits both countries to work collaboratively in areas of mutual interest, including efforts to increase public confidence, market access, trade and investment.

Fisheries and the environment

The 2005-2007 Oceans Action Plan (OAP), involving seven federal partners, established governance mechanisms in five Large Oceans Management Areas, as well as the identification of ecologically and biologically significant areas, and identification and establishment of Marine Protected Areas (MPAs). In April 2008, Canada established a new MPA, the Bowie Seamount, adding to the current network of protected areas in all three of Canada's oceans. The Bowie seamount is Canada's seventh MPA designation under the Oceans Act and the second MPA on the Pacific Coast.

Building on the successes of the OAP, in 2007, as part of a National Water Strategy, Canada announced funding over five years towards Health of the Oceans to help clean and protect our oceans. The Health of the Oceans agenda is comprised of 22 initiatives led by five federal partners and in collaboration with provinces, territories, and stakeholders. Canada has committed to: improving pollution prevention, surveillance, and response measures; expanding our scientific knowledge of marine ecosystems to further advance the health of the oceans; designating nine new MPAs in all three of Canada's bordering oceans and establishing a Federal-Provincial MPA Network within five years; and, increasing collaboration with international partners predominantly in the Gulf of Maine and in our Arctic waters.

Government financial transfers

The government of Canada does not provide capacity-enhancing subsidies to the fisheries sector. The federal government does provide general services to the fishing sector in the form of fisheries management (CAD 198.8 million), aquaculture management (CAD 4.5 million), fisheries research (CAD 104.4 million), and aquaculture research (CAD 22.9 million). The total expenditure for general services provided to the fisheries (including marine and freshwater) and aquaculture sector in 2006 is estimated to be CAD 428.8 million.

Markets and trade

In 2007, Canada exported approximately CAD 3.88 billion worth of fish and seafood products. While the quantity of fish and seafood exports to the United States (US) as portion of Canada's total fish and seafood exports has been declining, the US remains Canada's top export destination accounting for roughly half of all Canadian fish and seafood exports. The European Union and Japan are Canada's next largest export markets respectively. Canada's most valuable exports include lobster, crab, salmon, and shrimp.

Canada's imports of fishery products have remained steady in recent years at just over CAD 2 billion. Over one-third of Canada's imports in terms of both quantity and value come from the United States. Canada also imports a significant amount of fish and seafood from China and Thailand. Fresh and frozen shellfish are again the leading import items, representing over one-third of the total value of fisheries products imported in 2007, with a value of approximately CAD 752 million.

The Canadian government is currently participating in market development activities that encourage all partners in the export value chain to work more effectively and efficiently together. Through the industry-led and Agriculture and Agri-Food Canada funded Seafood Value Chain Roundtable (SVCRT), cross-cutting issues affecting the entire seafood industry and its international competitiveness are discussed. The SVCRT's three main priorities are to augment the image of Canada's seafood, to enhance the seafood industry's ability to compete internationally, and to encourage integrated government responses to current and emerging issues facing the industry. The Canadian Agriculture and Food International Program assists the seafood industry's associations as it promotes its products in international arenas. Moreover, the continued restructuring of the Canadian seafood sector has led to the development of more co-management associations.

Outlook

High fuel prices and the strong Canadian dollar are expected to continue creating unfavourable conditions for some fish workers in the export-driven Canadian fish and seafood industry. However, Fisheries and Oceans Canada will continue to work towards improving conservation and management measures of domestic and international fisheries and oceans resources.

PART III

Chapter 3

European Community

European Community

Summary of recent developments

- For the period 2007-2013, a new Council Regulation establishes a European Fisheries Fund (EFF) which succeeds the previous Financial Instrument of Fisheries Guidance (FIFG). The EFF is designed to secure a sustainable European fishing and aquaculture industry. The fund will both support the industry as it adapts its fleet to make it more competitive and promote measures to protect and enhance the environment. It will also help fisheries communities most affected to diversify their economic base.
- The Community aims at a progressive implementation of an ecosystem-based approach to fisheries management, which contributes to efficient fishing activities within an economically viable and competitive fisheries industry, while minimising the impact of fishing on marine ecosystems.
- In 2006-2007, the EU Council adopted 13 regulations regarding fisheries agreements with 13 third countries for a value of around EUR 148 million. Out of these 13, 3 are new fisheries agreements (Morocco, Micronesia and Solomon). In 2007, the Commission renegotiated two fisheries agreements (Ivory Coast and Guinea Bissau) and 1 fisheries protocol (Seychelles)
- In 2007, the EC recorded a EUR 14 billion trade deficit in fishery products (imports EUR 16 billion, exports EUR 2.7 billion). Norway is the primary supplier (20% of the EC fishery imports), while Japan, Russia and China are the main destinations of EC fishery exports.
- A new Generalised System of Preferences (GSP) was adopted with Council Regulation (EC) No. 732/2008 of 22 July 2008. It establishes generalised tariff preferences for the period from 1 January 2009 to 31 December 2011 and amends Regulations (EC) No. 552/97 (EC) No. 1933/2006 and Commission Regulations (EC) No. 1100/2006 and (EC) No. 964/2007.
- In 2006, the European Commission launched a major public consultation exercise, based on the Green Paper "Towards a future Maritime Policy for the Union: A European vision for the oceans and seas". The new integrated maritime policy will truly encompass all aspects of the oceans and seas in a holistic, integrated approach and will tackle all economic and sustainable development aspects of the oceans and seas, including the marine environment, in an overarching fashion.

Legal and institutional framework

On the basis of the Treaty establishing the European Community (Article 3 and Articles 32 to 38), the European Community has exclusive competence for conservation and management of marine fish stocks. The Community therefore has responsibility for the adoption of all relevant rules in this area – which are then applied by the member states – and for entering into external arrangements with third countries or qualified international organisations.

The Community's competences extend to fishing activities in national waters and on the high seas. However, measures relating to the exercise of jurisdiction over fishing vessels, the right of such vessels to fly the flag and the registration of fishing vessels fall within the competence of the member states, under the conditions laid down in the Community law. Responsibility for a number of policy areas, which are not directly related to the conservation and management of fishery resources, such as research, technological development and development co-operation, is shared by the Community and Member States.

Council Regulation (EC) No. 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy (CFP) provides for a legal framework on the basis of which fisheries management is conducted.

The 2002 reform of the CFP provided for greater and earlier involvement of stakeholders in the CFP process through the creation of the Regional Advisory Councils (RACs). Since 2004, six RACs have been put in place: the North Sea RAC, the Pelagic RAC, the North Western Waters RAC, the Baltic Sea RAC, the Long Distance RAC and the South Western Watters RAC. In 2007, RACs were declared as bodies pursuing an aim of general European interest entitling them to non-digressive funding. In June 2008, the Commission adopted a report on the functioning of RACs.

On 7 June 2006, the European Commission launched a major public consultation exercise, based on the Green Paper "*Towards a future Maritime Policy for the Union: A European vision for the oceans and sea*" to determine how an integrated approach to the EC maritime activities could best be translated into innovative cross-sectoral policies that generate sustainable economic growth and jobs. The new integrated maritime policy will truly encompass all aspects of the oceans and seas in a holistic, integrated approach.

The European Community has carried out major new initiatives in border surveillance, sustainable tourism, maritime transport strategy, climate change, marine and maritime research strategy, or maritime governance. The Commission's services co-ordinating this policy have been reorganised within DG Maritime Affairs and Fisheries to provide cross-cutting co-ordination on a regional basis.

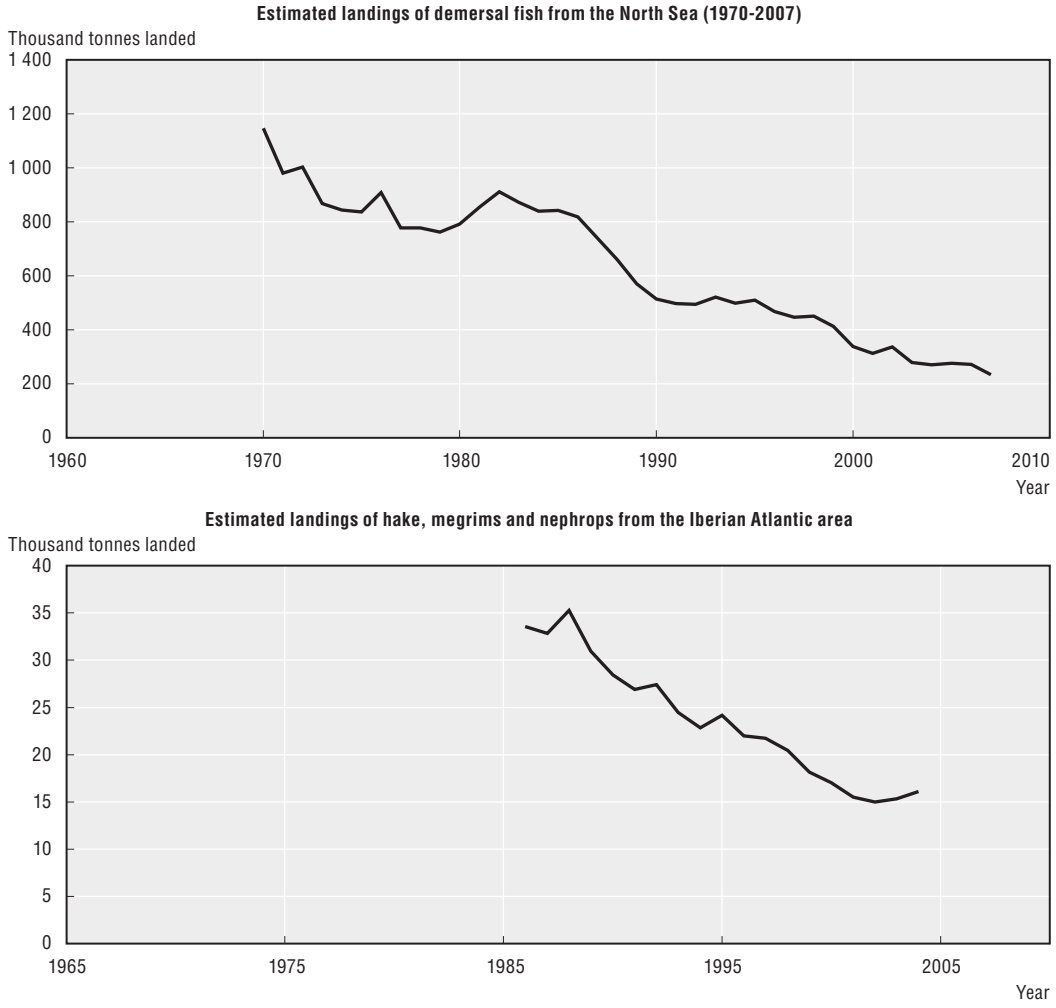
Capture fisheries

Most demersal stocks have declined and are not sustainable, being exploited outside safe biological limits. Species such as capelin and sandeel that are used to make fish meal have been scarce. Bluefin tuna are overexploited and there is a serious control problem. However swordfish stocks are healthier. Many other pelagic stocks are fished sustainably. In the Mediterranean, only two demersal and two small pelagic species are monitored. The demersal stocks are outside safe biological limits, but the two pelagic stocks are not fully exploited.

Scientific agencies assess each year whether they are outside "safe biological limits". Largely because of inaccurate catch reports, the state of some 57% of stocks is unknown. 32% of the assessed stocks are fished sustainably while 68% are at high risk of depletion. In comparison, only about 25% of the globally assessed stocks are classified as overfished (FAO, 2006). Some 19% of the EU stocks are in such bad state that scientists advise closing of the fishery.

Due to overfishing, fishing in EU waters contributes much less to the European economy and to the food supply than it did in the past. The demersal stocks in the North Sea now only produce one fifth of what was harvested 25 years ago. Similar trends are seen in most areas where information is available.

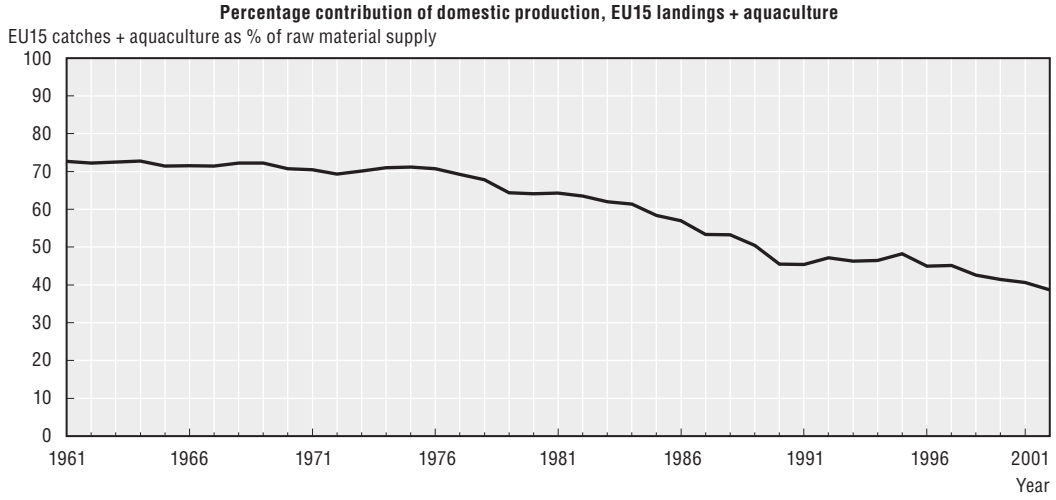
Figure III.3.1. **Estimated landings of demersal species from the North Sea (1970-2004) and estimated landings of hake, megrims and Nephrods form the Iberian Atlantic Sea**



Source: ICES (2005).

This reduction in productivity has led to increased dependence on imported raw materials for the European food industry and for the European market. While 75% of fish products for the European market originated from domestic resources in the early 1970s, domestic products now only contribute some 40%.

Figure III.3.2. **Relation between EU15 fish production and imports in % (1961-2001)**



Source: Eurostat.

Despite substantial efforts, there are no significant signs of stock recovery since 2003. With some exceptions, fisheries management in the European Union is not working as it should and the objective of achieving long-term sustainability is not being reached.

The Community fleet at 31 December 2007 consisted of 88 188 vessels with an overall capacity of 1 920 495 GT and 7 011 040 kW. These figures include motorised and non-motorised fishing vessels active on the mainland fleet, in aquaculture and in the outermost regions.

Table 3.A1. **European fishing fleet 2005-2007**

	2005		2006		2007	
	Number	Total GT	Number	Total GT	Number	Total GT
Total vessels	88 729	2 017 593	86 690	1 957 122	88 188	1 920 484
Vessels with engine	82 008	2 012 479	80 312	1 952 235	81 495	1 915 114
Unknown						
0-5.9 m	24 735	19 891	24 009	19 349	24 285	19 807
06-11.9 m	41 076	156 168	40 631	154 620	41 959	157 285
12-17.9 m	8 092	190 383	7 887	184 921	7 710	180 733
18-23.9 m	4 193	316 436	4 029	304 158	3 920	298 249
24-29.9 m	2 161	297 259	2 077	288 266	2 000	278 685
30-35.9 m	804	192 499	771	185 707	728	176 119
36-44.9 m	597	234 966	575	229 157	568	226 085
45-59.9 m	171	145 223	161	137 331	155	132 765
60-74.9 m	90	139 944	84	133 652	81	129 440
75 m and over	89	319 710	88	315 074	89	315 946
Vessels without engine	6 721	5 114	6 378	4 887	6 693	5 370

Source: Eurostat.

Management

The TACs and quotas allocated to each member state are established in annual Regulations. Through multi-annual plans the Community aims at a progressive implementation of an ecosystem-based approach to fisheries management, which

contributes to efficient fishing activities within an economically viable and competitive fisheries industry, while minimising the impact of fishing on marine ecosystems. The assessment of the Commission is based on scientific advice, mainly from the International Council for the Exploration of the Sea (ICES).

The Council has so far adopted recovery and management plans for the following stocks: Northern hake stock (adopted in April 2004), Cod in the North Sea, west of Scotland and Irish Sea (adopted in February 2004, revised and extended to the Celtic Sea in 2008), Greenland Halibut in Northwest Atlantic Fisheries and Southern hake and Norway lobster stocks in Cantabrian Sea and Western Iberian peninsula (adopted in December 2005), sole in the Bay of Biscay (adopted in February 2006), sole in the western Channel (adopted in may 2007), North Sea sole and plaice (adopted in June 2007), European eel (adopted in September 2007), Baltic cod (adopted in September 2007) and bluefin tuna in the Mediterranean and eastern Atlantic (adopted in December 2007). Several Commission Regulations on the adjustment of fishing quotas were adopted in 2006 and 2007 in response to quota overfishing or use by some member states.

Under the effort management system established by Regulation 1954/2003 in western waters, effort ceilings were set in July 2004 which are still in force. Effort limitations in the form of maximum days at sea were also set for fisheries covered by the multi-annual plans for cod in the North Sea, west of Scotland and Irish Sea, sole and plaice in the North Sea, sole in the western Channel, southern hake and Nephrops (Iberian peninsula) and sandeel in the North Sea. Emergency measures were set up twice in 2005 for the anchovy stock in ICES sub-area VIII. In 2007, this anchovy fishery was shut down.

In the context of the CFP reform of 2002, a specific regime for deep-sea stocks was set by Regulation 2347/2002. It sets out the conditions associated to this type of fisheries in terms of fishing permits, effort management regime, control measures, including observers on board, and monitoring. This regulation also establishes a set of orange roughly protected areas. In 2004, a Regulation on technical measures for the conservation of certain stocks of highly migratory species was adopted by the Council.

A Regulation on conservation of fishery resources through technical measures in the Baltic Sea, the Belts and the Sound was adopted in December 2005, including measures related to gear types, restricted areas and minimum landing size. Council Regulation 1967/2006 concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea was adopted in 2006. This regulation sets the new framework for fisheries management in the Mediterranean including specific provisions on the protection of vulnerable species and habitats, sets minimum technical rules for the size and the use of fishing gear and minimum sizes for commercial species and requires member states to establish a network of fisheries protected areas to protect nursery areas, spawning grounds or marine ecosystems in general.

Since the accession of Bulgaria and Romania to the European Union on 1 January 2007, the CFP applies also to the Black Sea. As a first conservation measures TACs and quotas and some technical rules have been set for 2008 and 2009 on two species, sprat and turbot.

The CFP includes strict capacity management measures that can be summarised as follows:

- any entry of capacity has to be compensated by the exit of at least an equivalent capacity, measured both in terms of tonnage and power; and
- the capacity withdrawn (scrapped) with public aid cannot be replaced.

After five years of application of the regime since the 2002 CFP reform, the capacity reduction is still modest. The data available in the Community Fishing Fleet Register include fishing vessel identification, physical and technical characteristics, fishing gear, owner and agent information.

On the basis of a proposal by the Commission tabled in October 2007, the Council adopted a new comprehensive EU policy against IUU fishing via Regulation 1005/2008, which will apply from 1 January 2010. This Regulation establishes a new regime governing the access to the Community territory of third country fishing vessels and trade of fisheries products, according to which only those fisheries products certified as legal by the Flag State concerned would be authorized to access the Community territory.

The European Union Marine Strategy Framework Directive (adopted in June 2008) is to protect the marine environment across Europe more effectively. It aims to achieve a good environmental status of the EU's marine waters by 2011 and to protect the resource base upon which marine-related economic and social activities depend.

Aquaculture

Total aquaculture production in the EU25 was close to 1.3 million tonnes, worth some EUR 3 billion in 2006. There are some 14 400 aquaculture firms in the EU, the vast majority being small and medium enterprises. Direct employment in the EU aquaculture sector is estimated at 65 000 full-time jobs.

Table 3.A1. **Aquaculture production 2005-2007**

	2005		2006	
	Quantity (tonnes – live weight)	Value (1 000 EUR)	Quantity (tonnes – live weight)	Value (1000 EUR)
Total fishery products	1 262 608	2 851 774	1 269 740	2 995 448
Sturgeons, paddlefishes	1 689	9 952	1 609	10 142
Oysters	134 912	307 179	130 019	299 645
Mussels	462 974	389 732	472 218	354 460
Clams, cockles, arkshells	77 146	259 583	65 208	265 849
European seabass	49 009	257 722	52 138	286 414
European eel	8 066	70 762	9 094	75 508
Common carp	66 574	127 387	57 754	130 420
Atlantic salmon	144 800	478 639	144 588	581 364
Gilthead seabream	70 940	305 883	71 232	317 955
Rainbow trout	196 961	486 773	193 395	496 524
Sea trout	2 086	9 899	850	9 944

Source: Eurostat.

The Regulation on the European Fisheries Fund of 2006 provides financial support to sustainable development of aquaculture during the period 2007-2013. Council Directive 2006/88/EC on animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals, was adopted in October 2006 providing a new and improved legal framework to address health issues in aquaculture.

Two important steps in the implementation of the Community strategy for the sustainable development of aquaculture were represented by the adoption by the Council

in June 2007 of Regulation (EC) No. 708/2007 concerning use of alien and locally absent species in aquaculture; and of Regulation (EC) No. 834/2007 on organic production and labelling of organic products, which also covers organic production in aquaculture.

Government financial transfers

Since 1 January 2007, the European Fisheries Fund (EFF) replaced the previous Financial Instrument for Fisheries Guidance (FIFG). EFF is designed to secure a sustainable European fishing and aquaculture industry. The fund will both support the industry as it adapts its fleet to make it more competitive and promote measures to protect and enhance the environment. It will also help the most affected fisheries communities to diversify their economic base.

The EFF will run for seven years (2007-2013), with a total budget of EUR 4.305 billion. The Fund particularly focuses on:

- supporting the major objectives of the CFP: sustainable exploitation of fisheries resources, stable balance between these resources and the capacity of Community fishing fleet;
- strengthening the competitiveness and the viability of operators in the sector;
- promoting environmentally-friendly fishing and production methods;
- providing adequate support to people employed in the sector; and
- fostering the sustainable development of fisheries areas.

The EFF targets five priority areas:

- adaptation of the Community fishing fleet;
- aquaculture, inland fishing, processing and marketing of fisheries and aquaculture products;
- measures of collective benefit;
- sustainable development of fisheries areas; and
- technical assistance to facilitate the delivery of assistance.

De minimis state aid (Commission Regulation (EC) No. 875/2007 of 24 July 2007) is aid deemed not to distort competition. Under the Regulation, the ceiling is set at EUR 30 000 per three-year period, per beneficiary, under the condition that the total amount of such aid represents less than 2.5% of the annual national fisheries output. None of this aid may be used to purchase or construct new vessels, or to enhance existing fleet capacity, to ensure that the overarching objective of the CFP to obtain a better balance between fishing fleet capacity and available fisheries resources is not compromised.

Bilateral and multilateral agreements

In the years 2006-2008, the Council adopted Regulations for Fisheries Partnership Agreements with the following countries: Micronesia, Salomon Islands, Cape Verde, Comoros, Seychelles, Morocco, Sao Tome and Principe, Kiribati, Gabon, Mauritania, Greenland, Madagascar, Mozambique, Ivory Coast, and Guinea Bissau.

The Community has substantially contributed to the work of international organisations such as the OECD and the FAO and of 16 established and evolving Regional Fisheries Management Organisations (RFMOs). Within the FAO, the EU has been particularly involved in the negotiations of new guidelines for the management of deep sea

Table 3.A1. **Indicative committment appropriations from the FIFG and the EEF (EUR)**

	2005 (FIFG)	2006 (FIFG)	2007 (EFF)
Austria	700	700	713 446
Belgium	2 884 849	6 350 000	0
Bulgaria			5 818 765
Cyprus	1 126 162	2 182 503	2 653 171
Czech Republic	2 420 887		3 360 014
Germany	14 446 009	21 345 206	21 738 775
Denmark	25 104 734	32 400 000	17 980 908
Estonia	4 009 497	4 377 309	9 130 309
Spain	264 823 255	270 102 954	158 892 124
Finland	6 456 000	7 190 000	5 306 338
France	40 425 141	41 512 372	29 061 723
UK	33 347 393	32 120 586	0
Greece	33 064 111	42 088 250	30 260 710
Hungary	1 465 243	1 898 316	0
Ireland	9 250 000	8 030 000	0
Italy	64 730 195	66 297 079	57 584 417
Lithuania	4 119 701	4 846 706	13 597 544
Latvia	8 799 000	9 267 000	6 937 316
Malta	94 564	1 227 603	0
Netherlands	6 500 000	6 600 000	6 534 378
Poland	67 375 653	87 317 926	0
Portugal	28 984 119	42 365 045	33 552 177
Romania			15 127 527
Sweden	10 472 842	11 134 758	7 353 069
Slovenia	594 539	77 009	0
Slovak Republic	610 591	790 822	1 996 248
Total	**631 105 185**	**699 522 144**	**427 598 959**

Source: European Commission.

fisheries, which were completed in a technical consultation in 2008, and in the ongoing negotiations for a new Treaty on Port State measures against IUU fishing. With regard to RFMOs, the EU has been a key actor in the implementation of new regime for the management of deep sea fisheries.

In the context of the developments in the UN General Assembly and related bodies dedicated to the high sea fisheries, the Commission adopted in 2007 an EU strategy on the protection of vulnerable marine ecosystems from the adverse impacts of high seas bottom fishing gears. The EU participated actively in the definition of new regimes for high seas bottom fishing in the competent RFMOs (NEAFC, NAFO, CCAMLR, GFCM, SEAFO), and the Council adopted EC Regulation 734/2008 of 15 July 2008 which applies to high seas areas which are not covered by any other body.

Markets and trade

In 2007, the EC recorded a EUR 14 billion trade deficit in fishery products, with imports of EUR16 billion and exports of EUR 2.7 billion. Norway is the primary supplier (20% of the EC fishery imports), while Japan, Russia and China are the main destinations of EC fishery exports.

The new European Fisheries Fund includes, under "Priority axis 2: aquaculture, inland fishing, processing and marketing of fishery and aquaculture products" measures aimed to support the fish processing and marketing sectors. Aid will apply to micro, small, medium

and some of the large enterprises. Investments to improve working conditions, health and hygiene standards, protect the environment and provide high quality products will be eligible for support.

Moreover, innovation will be considered as a key aspect not only for products but also for production methods and application of new technologies. In the current context of scarcity of raw materials, the Fund will promote a better use of underutilized species, by-products and waste.

EUR 12.6 million and EUR 10.6 million were spent respectively in 2006 and 2007 for market intervention.

Legislation

In 2006-2007, the Commission adopted Regulations which amended previous Council Regulations on tariff quotas for selected fishery products from Norway, Faroe Islands and Iceland.

An EC catch certification scheme will be introduced in the future to improve traceability of all marine fishery products traded with the Community (imports and exports), irrespective of means of transport, and at all stages of the production chain, from the fishing net to the plate.

A new Generalised System of Preferences (GSP) was adopted with Council Regulation (EC) No. 732/2008 valid for the period from 1 January 2009 to 31 December 2011 and amending Regulations (EC) No. 552/97, (EC) No. 1933/2006 and Commission Regulations (EC) No. 1100/2006 and (EC) No. 964/2007. In addition, a new tri-annual regime of autonomous tariff quotas for the period 2007 to 2009 was introduced.

Food safety and hygiene rules has been amended through a series of Commission Regulations (1662/2006; 1664/2006; 1666/2006). The Commission Decision 2006/766/EC establishes a lists of third countries and territories from which imports of bivalve molluscs, echinoderms, tunicates, marine gastropods and fishery products are permitted, drawing up the list of third countries from which the import of fishery products is authorized for human consumption. The Commission Decisions 2006/767/EC, 2003/804/EC, 2007/158/EC and 2003/858/EC establish certification requirements for live molluscs and live fish of aquaculture origin and products thereof intended for human consumption and for the import of these.

The Commission Decision 2008/392/EC authorizes the implementation of an Internet-based information page with information on aquaculture production for businesses and authorised processing establishments.

Outlook

A major policy initiative will be the launching of proposals to reform the CFP. The proposals should build on the consultation results further to the "Green Paper on the reform of the CFP" (planned adoption: April 2009).

At the end of 2008, the Commission proposed a fundamental reform of the control system applicable to the CFP. The proposal is intended for Council adoption by the end of 2009 and entry into force on 1 January 2010.

An important core business in the short term will also concern the negotiation of the Common Organisation of the Markets in fisheries and aquaculture products.

From January 2010, compliance with conservation and management rules will govern our external trade with fishery products under the IUU Regulation. This will be a major change compared to the current situation where the regulatory framework for the external trade with fishery products is essentially influenced by customs and sanitary rules and, to a minor extent only, by conservation and management rules.

The new Integrated Maritime Policy will truly encompass all aspects of the oceans and seas in a holistic, integrated approach. In its *Action Plan* presented on 10 October 2007, the European Commission enumerated a set of actions to be taken as a first step towards the implementation of the new policy. The Commission plans to launch a number of new policy initiatives in the coming months and a new work program will be established for the Integrated Maritime Policy.

The entry into force of the Lisbon Treaty will have a crucial bearing on a number of core activities, such as the regulation of fishing opportunities, as under the new Treaty this will be dealt with by co-decision.

ANNEX 3.A1

Table 3.A1. **Allocation and captures of the European Community**

Species name	TAC	Allocation EU	Catch EU	% catch EU
Albacore	65 415	44 983	17 873	40
Alfonsinos nei		328	322	98
European anchovy	8 000	8 000	5 571	70
Anglerfishes nei	54 455	61 127	46 755	76
American angler			0	
Greater argentine		6 758	4 043	60
Bigeye tuna	90 000	31 500	8 238	26
Northern bluefin tuna	29 500	16 780	22 513	134
Blue ling and ling		3 065	2 643	86
Blue ling		2 628	2 396	91
Black scabbardfish		11 351	9 263	82
Atlantic blue marlin		103	26	25
Capelin	0	28 490	0	0
Wolffishes (= Catfishes) nei			71	
Cod and haddock		500	433	87
Atlantic cod	876 930	130 961	137 133	105
Common dab/Flounder	17 100	17 100	12 890	75
Picked dogfish	3 669	3 619	1 956	54
Deep sea sharks		2 637	1 745	66
Flatfishes nei		300	89	30
Greater forkbeard		2 410	1 875	78
Greenland halibut	11 856	16 146	15 116	94
Haddock	81 335	78 152	58 153	74
Atlantic halibut		1 200	65	5
Atlantic herring	2 321 210	895 713	689 071	77
European hake	58 808	70 817	37 775	53
Red hake			158	
White hake	8 500	5 000	160	3
Industrial fish		800	422	53
Jack and horse mackerels nei	240 487	250 765	183 455	73
Megrims nei	26 224	28 618	14 959	52
Ling		16 338	8 148	50
Lemon sole/Witch flounder	6 175	6 175	3 716	60
Atlantic mackerel	874 713	409 540	354 580	87
Norway lobster	81 240	90 214	67 468	75
Norway pout		5 000	87	2
Orange roughy		314	372	119
Other species		8 210	4 928	60
Tanner crabs nei		500	0	0

Source: European Commission

Table 3.A1. **Allocation and captures of the European Community** *(cont.)*

Species name	TAC	Allocation EU	Catch EU	% catch EU
Penaeus shrimps nei	4 108	4 108	2 362	58
Amer. plaice (= Long rough dab)	0	0	949	0
European plaice	69 895	73 545	66 513	90
Saithe (= Pollock)	139 827	84 708	57 629	68
Pollack	17 980	17 980	5 914	33
Northern prawn	37 604	24 661	21 342	87
Atlantic redfishes nei	73 503	47 662	20 744	44
Roughhead grenadier			605	
Roundnose grenadier		12 000	7 812	65
Atlantic salmon		444 116	152 540	34
Sandeels (= Sandlances) nei	0	178 238	179 344	101
Blackspot (= red) seabream		2 515	1 619	64
Raja rays nei			152	
Common sole	30 072	32 804	25 029	76
Soles nei	1 216	1 216	493	41
European sprat	233 144	655 764	458 193	70
Northern shortfin squid	34 000		0	
Rays, stingrays, mantas nei	15 690	10 690	6 700	63
Swordfish	31 000	13 598	11 996	88
Turbot/Brill	5 263	5 263	4 576	87
Tusk (= Cusk)		1 009	650	64
Fishes unsorted, unidentified			44	
Blue whiting (= Poutassou)	8 500 000	627 778	320 975	51
Whiting	50 884	50 861	32 226	63
Atlantic white marlin		47	4	9
Witch flounder	0	0	280	0
Whiting, Pollack		190	42	22
By catches (virtual) (Regl. 1691/2004)		2 480	3	0
Yellowtail flounder	15 500	0	666	0

Source: European Commission

PART III

Chapter 4

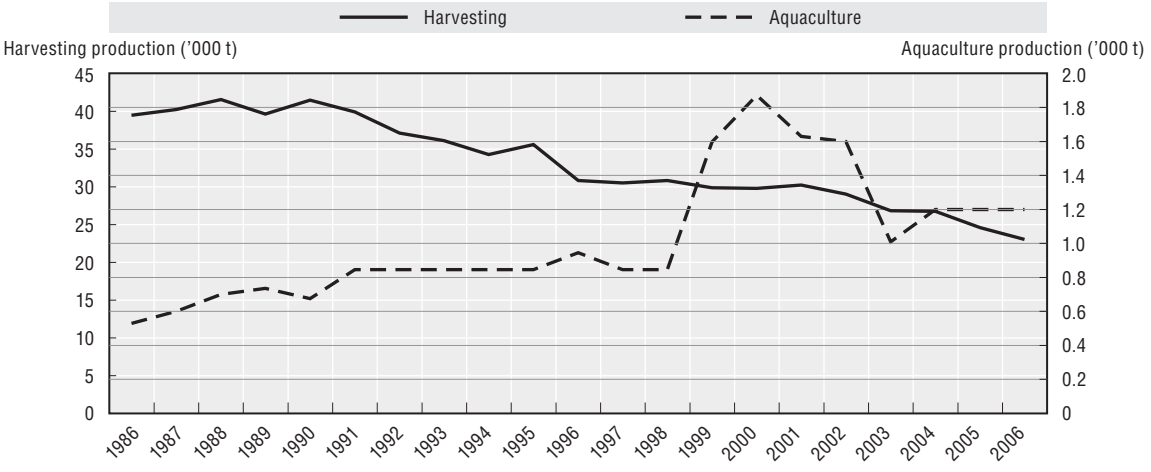
Belgium

Belgium

Summary of recent developments

- The number of Belgian fishing vessels decreased from 120 in 2005 to 107 in 2006, partly by scrapping of vessels and partly by incorporating engine capacity from withdrawn vessels to existing vessels. In 2007, the number of fishing vessels decreased once again to 102 vessels with a total capacity of 60 620 kW (+0.7%) and 19 292 GT (–4%).
- The total catch of fishery products by Belgian vessels in 2006 decreased by 6% to 20 264 tonnes, compared to 2005 and increased then by 8% to 21 793 tonnes in 2007. The average price for fishery products in 2007 was 4.19 EUR/kg. Thus, the total value of the catches in both Belgian and foreign ports amounted to EUR 90.3 million in 2007.
- The Belgian fleet consists almost exclusively of demersal trawlers. In 2006 and 2007 respectively, 88% (–2% compared to 2005) and 86% of the catches were demersal species. Amongst them, sole is economically the most important species. In 2006, landings of sole represented 51% of the value of all landings by Belgian vessels (+1%). In 2007, this percentage decreased to 48% of the total value, caused by the very low prices for sole in the second half of the year.
- In 2006 and in 2007, Belgian seafisheries, as other EU-fleets, were hampered by the high fuel prices. Fuel prices in 2006 increased by 12% to a mean value of 0.48 EUR/l and remained at this level in 2007.

Harvesting and aquaculture production

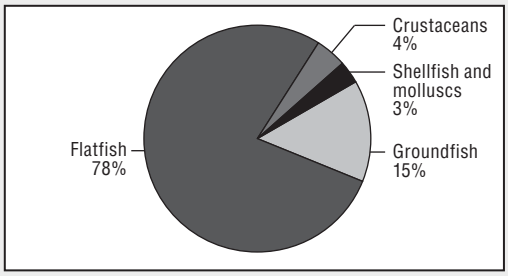


Source: FAO.

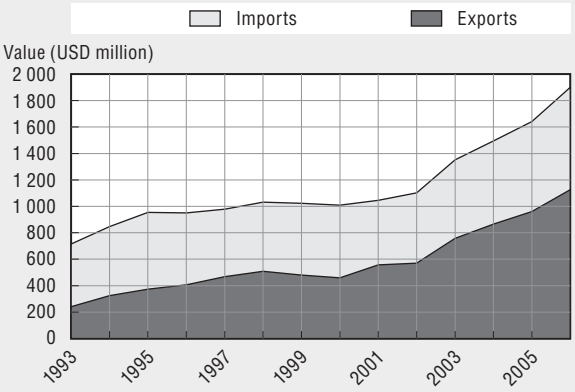
Key characteristics of the sector

- In Belgium, fish is an important part of the national diet. High value species like sole and plaice represent the biggest share of the national capture production. Mussels account for more than 60% within the shellfish and molluscs segment. Aquaculture production in Belgium is very limited.
- Belgium is a net importer of fish. Approximately 30% of imports are fresh fillets and fish meat. Another 30% of imports are crustaceans. Fresh fish accounts for about 10% of total fish and fishery product imports.
- Government financial transfers decreased from a total of EUR 6.1 million in 2006 to EUR 4.3 million in 2007. This decline is mainly due to reductions in structural adjustments. The allocation for 2007 favoured in particular direct payments for processing.
- A new fleet category was introduced in 2007: vessels with a capacity of 221 kW and 70 GT can register in the coastal fleet category. This fleet segment is allowed to fish without quotas for certain species.

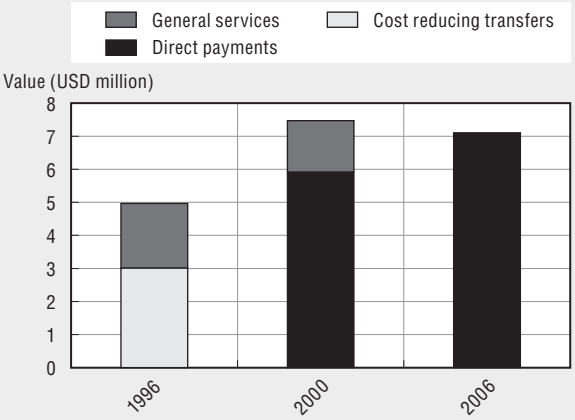
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	n.a.	481
Number of fish farmers	n.a.	n.a.
Total number of vessels	155	107
Total tonnage of the fleet	23 031	20 035

n.a.: Not available.

Legal and institutional framework

The EU Common Fisheries Policy (CFP) sets out the boundaries for any national policy on the matter. From 2002 on, authority over agriculture and fisheries has been delegated to the regions in Belgium. All issues pertaining to marine fisheries are dealt with by the Flemish authorities, while aquaculture is a matter of consultation between Flanders and Wallonia.

Since the formal instatement of an EEZ and the adoption of a specific law concerning the maritime environment in 1999, a national co-ordination exercise was started between the federal state and the Flemish region and resulted in the creation of a coast guard structure in 2005. The EEZ law of 22 April 1999 regulates the co-ordination of the different existing sea fishery laws.

The Royal Decree of 14 August 1989 establishes complementary national measures for the safeguarding and the management of the fishing grounds and for the control of fishing activities. This decree was modified in December 2002 to limit access to the 3 nautical miles zone to fishing vessels with a tonnage of less than 70 GT. Recreational fishery is also regulated by this decree.

A Decree of the Flemish government of 16 December 2005 esatblished a new system for fishing licenses and temporary measures for the conservation and sustainable exploitation of the fish resources. This decree foresees the possibility of increasing vessel capacity under certain conditions (up to a maximum of 1 200 kW for the large fleet segment). Capacity from 5 withdrawn vessels in 2006 and 2007 was transferred to existing vessels.

Declining fishstocks and fuel price fluctuation nurture a growing need for structural adjustments of the fleets. The Flemish government decided at the beginning of 2006 to scrap another 10 vessels to increase the profitability of the remaining fleet. Nine vessels, from which six in the large fleet segment (capacity > 221 kW), were withdrawn from the fleet in 2006.

Important legal initiatives in 2006 and 2007 were:

- creation of a coastal fleet segment in 2006 in addition to the existing small fleet segment (capacity £221 kW) and large fleet segment (capacity > 221 kW): vessels with an engine capacity £221 kW and £70 GT performing fishing trips of less than 24 hours with start and return in Belgian ports can ask to become part of the coastal fleet segment. The coastal fleet has the right to fish without limitation for a number of species. They cannot, for a period of 5 years, combine their engine capacity with that of other vessels; and
- a simplification was introduced to the collective quota system in 2006 and continued in 2007: more quota were attributed on the basis of motor capacity and for fixed periods in a year. More flexibility was introduced by creating a system of deducting days at sea when overfishing the maximum quotas.

Capture fisheries

In 2006, the average number of days at sea realised by the small fleet segment (KVS) decreased from 180 in 2005 to 172 (–4%), while the average number of days at sea realised by the large fleet segment (GVS) increased from 239 in 2005 to 243 (+2%). In 2007, the number of days at sea increased for the KVS by 3% and for the GVS by 2%.

For most of the fleet segments, except for coastal fisheries, the average total value of production increased significantly in 2006. In 2007, the average total value increased for the coastal fisheries and the big beamtrawlers, but decreased for the eurokotters.

For the coastal fisheries, the average productivity in 2006 was EUR 189 per day at sea. In 2007, the value increased to EUR 460 per day at sea. For Eurokotters the productivity was EUR 580 per day at sea. In 2007, the average total value produced by Eurokotters stagnated but costs decreased, so the gross results increased to EUR 824 per day at sea. In 2006, Beamtrawler productivity decreased to EUR 585 per day at sea compared to 2005. In 2007, the value increased to EUR 892 per day at sea.

Table III.4.1. **General performance of the Belgian fleet in 2005-2007**

	2005	2006	2007
Number of vessels	120	107	102
Average capacity (kW)	545	563	594
Average tonnage (GT)	188	187	189
Total catches (tonnes)	21 545	20 264	21 793
Total value of catches (million EUR)	86.3	90.7	90.3
Mean value of catch (EUR/kg)	4.07	4.54	4.19
Mean gas oil price (EUR/l)	0.43	0.48	0.48

Source: Uitkomsten van de Belgische zeevisserij 2005, 2006 and 2007 – Publicatie van de Dienst Zeevisserig.

Table III.4.2. **Structure of the Belgian fleet in 2005-2007**

	Number of vessels			Average kW[2]			Average GT[2]		
	2005	2006[1]	2007	2005	2006[1]	2007	2005	2006[1]	2007
Small fleet segment									
(KVS) (≤ 221 kW)	57	51	48	210	213	219	74	80	91
KVS – Coastal fisheries (≤ 221 kW)	24	27	23	200	204	215	44	55	58
KVS – Eurokotters (≤ 221 kW)	28	21	20	220	221	221	93	101	107
KVS – Others (≤ 221 kW)	5	3	5	220	–	–	100	–	–
Large fleet segment									
(GVS) (> 221 kW)	63	56	54	852	879	882	303	310	314
GVS – Beamtrawlers (> 662 kW)	53	47	46	895	900	907	323	319	324
GVS – Others (> 221 kW)	10	9	8	472	478	478	168	151	151

1. During 2006 the classification of the small fleet segment in coastal fisheries and euokotters was renewed. Therefore, some vessels previously known as eurokotters became coastal fishery vessels.
2. Results of a number of financial accounts sent in for 2006 (n = 62) and 2007 (n = 59).

Source: Uitkomsten van de Belgische zeevisserij 2005, 2006 and 2007 – Publicatie van de Dienst Zeevisserig.

Table III.4.3. **Statistical results of the financial accounts for 2006-2007 (average value per vessel)**

	Group		Average number of days at sea		Average total value (EUR)		Average gross results	
	2006	2007	2006	2007	2006	2007	2006	2007
Small fleet segment								
(KVS) (≤ 221 kW)	172	178	499 501	571 282	73 497	126 447	–13 999	24 465
KVS – Coastal fisheries (≤ 221 kW)	147	165	232 736	322 718	27 853	75 971	–4 907	19 376
KVS – Eurokotters (≤ 221 kW)	193	184	721 805	695 564	111 534	151 684	–21 576	27 009
Large fleet segment								
(≤ 221 kW)	243	247	1 392 219	1 501 901	144 755	217 056	–63 372	14 578
GVS – Beamtrawlers (> 662 kW)	244	248	1 413 696	1 536 600	142 749	221 145	–69 911	14 245
GVS – Others (> 221 kW)	231	230	994 878	929 371	181 856	149 581	57 588	20 063

Note: Sample size in 2006: 62, in 2007: 59.

Source: Uitkomsten van der Belgische zeevisserij 2006 and 2007 – Publicatie van de Dienst Zeevisserij.

Table III.4.4. **Employment trends 2004-2007**

	2004	2005	2006	2007
Fishing	666	655	481	690
Fish processing	993	959	1 324	
Aquaculture	84	84		
Total	**1 743**	**1 698**	**1 805**	**690**

Management

The most important management instruments on the input-side are vessel licences and a collective system of fishing effort regulation. On the output-side, Belgium is using a collective quota-system. The Belgian quota are allocated on the basis of historical data between the small fleet segment and the large fleet segment.

In 2006, Belgium started a project on individual quota on the basis of individual catches. In 2006 only one vessel was interested in the individual quota system and none were registered in 2007. It was therefore decided, not to continue the individual quota system from 2008 on.

In addition to the EU-rules and regulations, national measures are aimed at ensuring year round fishing activity of the national fleet. Thus, quota swaps with other EU member states increase the available quota of some species. In 2006, 38 quota swaps were accomplished. The quota for sole was increased by 23%, those for plaice and cod increased by 26% and 73% respectively. In 2007, 34 quota swaps were realised, increasing the quota for sole by 25% and for plaice by 56%. Catch and activity limitations are imposed to ensure that the available quota last throughout the year. Nevertheless, some fishing grounds had to be closed prematurely for certain stocks: seven in 2006 and six in 2007 (including important stocks like cod and plaice in the North Sea from mid november on).

Since 2000, the complete fleet, with the exception of only three vessels, has been equipped with vessel monitoring systems (VMS), allowing for a near-realtime follow-up of positions at sea. The fishery protection vessels of the Navy and of the DAB-fleet accomplished 109 days at sea in 2006 during which 141 boardings with a complete inspection of a fishing vessel were carried out. In 2007, 74 days at sea were accomplished with 154 boardings. An aerial surveillance program was worked out together with the athorities in charge of the application of the Bonn agreement. In total, 34 serious infringements on fisheries regulations were reported in 2006 and 36 in 2007.

Table III.4.5. **Monitoring and enforcement activities in 2006 and 2007**

	2006	2007
In auctions	69	50
Elsewhere	19	23
At sea (boardings)	141	154
By airplane	219 vessels	254 vessels

In 2006, nine fishing vessels were withdrawn from the fleet by scrapping and loss of their fishing licences. By doing so, 6 038 kW (9.3%) and 2 224 GT (9.8%) were withdrawn from the fleet. The public intervention amounted to EUR 6 933 745, 50% paid by national contribution and 50% by European contribution.

Table III.4.6. **Overview of government financial transfers associated with fishery policies 2006-2007 ('000 EUR)**

	2006			2007		
	National contribution	EU contribution	Total	National contribution	EU contribution	Total
Direct payments						
Marine capture	79	61	140	125	115	240
Aquaculture				55		55
Processing	160	338	498	648	1 323	1 971
Cost reducing transfers	194		194	156		156
General services	150		150	163		163
Structural adjustments	1 733	3 466	5 199	1 733		1 733
Total	**2 316**	**3 865**	**6 181**	**2 880**	**1 438**	**4 318**

Recreational fishing

Since 2003 the activities of non-professional anglers are limited by a maximum quantity. They are allowed to fish to avoid competition between professional and non-professional activities. In 2006 and 2007 the restrictions for recreational fishing were a maximum of 20 kg of cod and seabass per person and per seatrip, of which maximum 15 kg could be cod.

The use of towed gear for non-professional shrimp fisheries is restricted to the three nautical miles zone, with a number of additional restrictions, concerning catch composition, authorized period and legal use of the catch. Even fishing activities on the beaches are strictly regulated in order to limit them to purely recreational activities.

Markets and trade

In 2006, the average Belgian consumer bought 5.8 kg of fresh fish, molluscs and crustaceans, a deline of 14% compared to 2005, mainly due to a bad mussel season. The consumption of fresh fish, molluscs and crustaceans increased again to 6.3 kg/capita in 2007 with a regular share of molluscs and crustaceans of 60.6%. The consumption of fresh fish decreased since 2000 by 40% to 1.6 kg/capita. In 2000, two out of three Belgian families bought fresh fish, in 2007 this decreased to 57%. The main reason for this change in pattern is undoubtedly the high price for fresh fish and a changing life style.

The market for processed fish, molluscs and crustaceans continued to grow: 5.36 kg/capita in 2006 (+1%) and 5.4 kg/capita in 2007. Consumption of preparations of fish, molluscs and crustaceans increased from 1.93 kg/capita in 2000 to 2.54 kg/capita in 2007 (+32%).

There is a clear increase in the share of discounters and small supermarkets in the sales of fish, molluscs and crustaceans. In 2007, discounters accounted for 26% of the whole market. Supermarkets like Carrefour and Delhaize remain the most important market player with a share of 44.2%. Specialised fish mongers and public markets shares decreased to 11.6% and 6.9% of the total sales. For fresh seafish and preparations of fresh fish, specialised fish mongers and public markets remain more important with a market share of respectively 26% and 16%.

Data on fish sales in Belgian auctions (Zeebrugge, Oostende and Nieuwpoort) are received electronically and are complemented with information from logbooks.Sales at foreign auctions – predominantly in the Netherlands – are also reported in electronic format on a monthly basis.

Table III.4.7. **Belgian consumption pattern 2003-2007**

	2003	2004	2005	2006	2007
TOTAL consumption of fresh fish, molluscs and crustaceans (kg/capita),	7.01	7.21	6.82	5.84	6.28
Of which (kg/capita):					
Fresh seafish	1.96	2.05	1.79	1.83	1.59
Molluscs and crustaceans	4.07	4.19	4.13	3.19	3.81
Fresh water fish	0.98	0.97	0.90	0.82	0.88
TOTAL consumption of processed fish. molluscs and crustaceans (kg/capita).	4.68	4.83	5.02	5.36	5.40
Of which (kg/capita):					
Preparations of fish. molluscs and crustaceans	2.23	2.29	2.25	2.48	2.54
Frozen fish. molluscs and crustaceans	1.38	1.46	1.60	1.68	1.75
Smoked fish	0.78	0.81	0.86	0.88	0.86
Canned fish	0.29	0.29	0.31	0.32	0.26
Total consumption (fresh and processed – kg/capita)	**11.69**	**12.04**	**11.84**	**11.20**	**11.68**

Belgium's degree of self-sufficiency in fisheries products is very low. In 2006, imports were over 14 times higher than domestic production (288 000 tonnes against 20 260 tonnes). Main export species from Belgium are sole, cod, whiting and plaice. The major export markets are the Netherlands, France, Denmark, Germany, United Kingdom and Spain. In 2006, France became the main export market for fishery products with 34% of the total volume, ahead of the Netherlands (29%).

Table III.4.8. **Foreign trade in fishery products 2004-2006 ('000 EUR)**

	2004		2005		2006	
	Import	Export	Import	Export	Import	Export
Fish, alive	22 707	7 117	23 933	6 695	22 660	3 409
Fresh fish (excl. filets and fish meat)	112 021	70 679	118 295	73 125	123 064	76 603
Frozen fish (excl. filets and fish meat)	39 139	33 672	41 110	31 080	42 184	32 469
Fish filets and fish meat	295 938	186 119	333 457	214 755	372 972	232 198
Fish salted, smoked and dried; fishmeal for human consumption	46 774	13 454	51 182	12 846	59 878	11 967
Crustaceans	336 168	213 079	349 493	225 143	410 472	288 946
Molluscs	128 321	38 017	149 325	54 733	167 542	73 958
Total	**981 068**	**562 138**	**1 066 798**	**618 380**	**1 198 773**	**719 550**

Source: National Bank of Belgium.

Outlook

On a national level, the poor condition of a lot of fish stocks and the fluctuating fuel prices encourage the continued search for more environment-friendly and less fuel-consuming fishing techniques which should lead to a fleet that can fish in a sustainable and profitable way.

The results of the experiment with individual quota in 2006 and 2007 show sthat there was no interest from the fishermen to subscribe to this system. Therefore it was decided to continue only with the collective quota system

The simplification of the collective quotas ystem in 2006 will be continued from 2008 on: more quota will be attributed on the basis of motor capacity and for fixed periods in the year. In addition, the system of deducting days at sea when overfishing the daily maximum will be continued.

PART III

Chapter 5

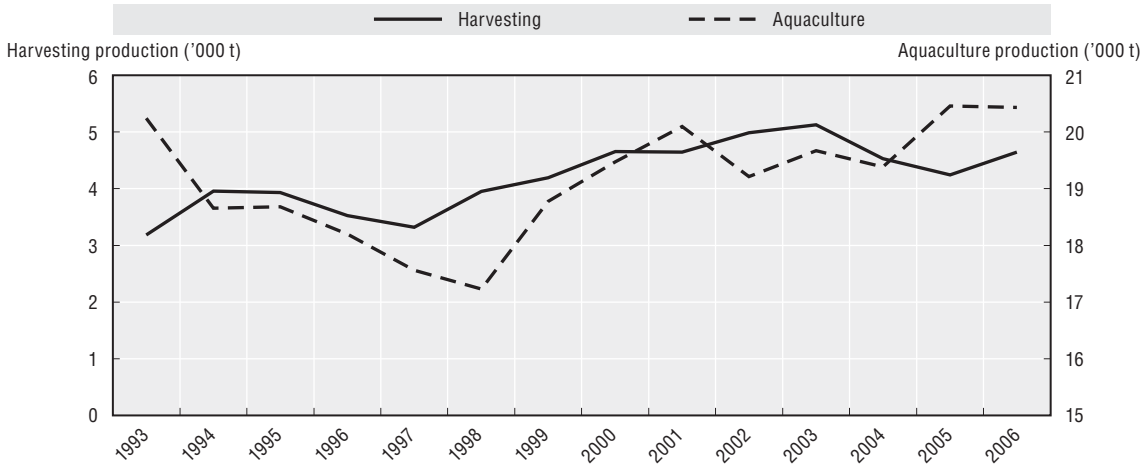
Czech Republic

Czech Republic

Summary of recent developments

- The Czech Republic is a landlocked country with no sea fisheries but important aquaculture (pond-based) production of carp. Carp breeding is rooted in the history, culture and society of the Czech Republic and has proved highly profitable since the 15th century. The Czech Republic has over 24 000 ponds and tanks, mostly in southern Bohemia covering a total of around 50 000 ha.
- In the Czech Republic, there are more than 2 000 recreational fishing grounds with an area of almost 42 000 ha. Some 350 000 people engage in recreational fishing (mainly angling) and are registered as members of anglers' unions. Management of fishing grounds consists in maintenance of river systems and upkeep of recreational fishing populations.
- Aquaculture production in the Czech Republic was 20 431 tonnes in 2006 and 20 447 tonnes in 2007 while recreational fishers caught 4 646 tonnes in 2006.

Harvesting and aquaculture production

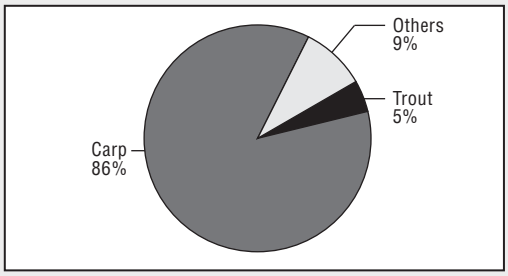


Source: FAO.

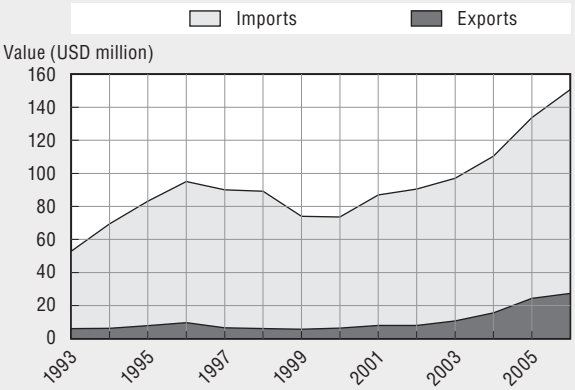
Key characteristics of the sector

- Carp is the most important farmed species in the Czech Republic. It contributed 86% of aquaculture production in terms of value in 2006.
- In the Czech Republic, imports of fish and fish products are more than double of the volume of exports. A great quantity of imports is saltwater fish and products. Imports have considerably increased since 2003 and reached USD 150.6 million in 2006. Exports were relatively stable between USD 6 and 9 million until 2003 followed by a sharp increase, reaching USD 27.4 in 2006. However, the trade deficit of fish and fish products has constantly expanded over the past two decades.
- Government Financial Transfers (GFTs) in the fisheries sector have significantly increased since the Czech Republic's joining of the European Union in 2004. GFTs in 2006 were USD 3.3 million, but the Czech Republic reported that 92% of the transfers were devoted to support non-productive functions of ponds in the framework of helping provincial areas.
- The number of fish farmers in the Czech Republic has been stable since 2003 at about 1 700 people.

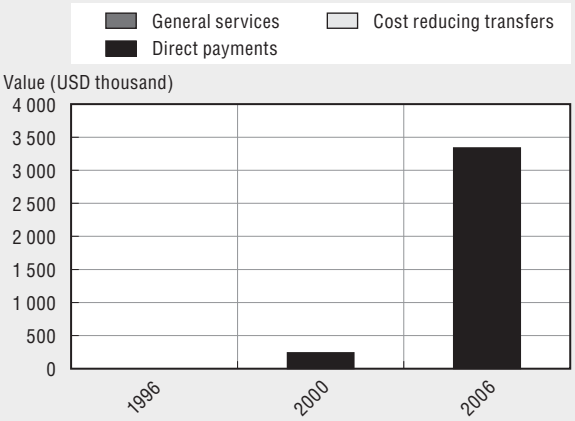
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	0	0
Number of fish farmers	2 495[1]	1 714
Total number of vessels	0	0
Total tonnage of the fleet	0	0

1. Farmers in 1999.
n.a.: Not available.

Legal and institutional framework

Fishing activities are regulated by a relatively new legislation (Act No. 99/2004) covering two basic areas: pond fish-farming and the production of freshwater fish; and fishing activities in fishing reserves (recreational/sport fishing).

National legislation on fish production is closely based on the provisions of the EU legislation. The legislation also addresses the issue of the protection of aquatic resources. It identifies the authorities responsible for fisheries, *i.e.* municipal and regional authorities and ministries, and specifies that the Ministry of Agriculture is responsible for fisheries management at the central government level.

Aquaculture

The major part of the fishing industry in the Czech Republic is pond-fish farming. Further, salmonoid species are raised in special facilities. Fishpond cultivation is based on man-made bodies of water that are situated primarily in rural areas. The fish farming industry shows stable output and therefore undesirable price fluctuations do not occur.

In the territory of the Czech Republic, there are more than 24 000 ponds and water reservoirs, the total area of which comprises some 52 000 ha. Of that total area, 42 035 ha of ponds are located in Bohemia and Moravia for raising fish. The theoretical volume of water in the ponds comes to approximately 600 million m^3, while the actual amount of water in the ponds is around 400 million m^3. The reason for this difference is the ponds' high level of siltation. The amount of sediment is estimated at 200 million m^3.

In addition to fish production, fishponds serve to fulfil other, non-production functions in their regions, such as water retention, protection against flooding, and biological cleaning of water. They also provide artificially created areas for bird nesting and protected territories for animals. They also fulfil recreational and eco-stabilisation functions and contribute to preserving biodiversity.

The annual production of marketable fish in the Czech Republic has been 17.2-20.5 thousand tonnes over the past ten years. In 2007, the production reached 20 447 tonnes, of which 19 686 tonnes were taken from fish ponds and 748 tonnes were farmed in special facilities (mainly trout farming system) while 13 tonnes were taken from reservoirs.

The fish production is influenced by the possibilities to sell fish on the domestic and foreign markets. On the domestic market, 8 578 tonnes of live fish were supplied in 2007, representing an increase of 127 tonnes from the previous year. Exports of live fish reached 9 552 tonnes in 2007, which represented a decrease of 382 tonnes compared to 2006. In the meantime, 1 904 tonnes of fish in live weight were processed in 2007, which is 9.3% of the volume of caught and marketable fish.

The proportion of species of marketable fish is relatively stable and did not vary significantly compared to previous years. Carp accounted for 87.8% of the total volume of fish production, while salmonoid fish (3.8%), herbivorous fish (3.7%), tench (1.3%), and predatory fish (1.1%) contributed to rest of the production.

The domestic market, supplied by 41-43% of the total fish production in the last three years, continued to favour live fish, while 46-49% of live farmed fish were exported. In addition, 9-11% of the production was processed.

Table III.5.1. **Fish production from farming in the Czech Republic and its utilisation (000 tonnes)**

	Total	Domestic sales of live fish	Processing	Exports of live fish
2004	19.4	8.2	1.7	9.8
2005	20.5	8.6	2.2	9.4
2006	20.4	8.5	1.9	9.9
2007	20.4	8.6	1.9	9.6

Table III.5.2. **Fish production by species (tonnes)**

	2004	2005	2006	2007
Total	**19 384**	**20 455**	**20 431**	**20 447**
Carp	16 996	17 804	18 006	17 947
Salmonoid fish	694	737	669	776
Tench, Coregonus fish	213	288	278	295
Herbivorous fish	850	1 023	769	747
Predatory fish	194	211	205	218
Thermophilic species	12	9	10	9
Other species	425	383	494	455

More than half of the total production is based on the natural pond food (zooplankton, benthos), which has high content of animal proteins. The energy component of the feeding is supplemented by additional feeding with unprocessed cereals. Approximately one-third of carp production is carried out on the basis of additional feeding, which results in high-quality carp for consumer use. The average yield from ponds in the Czech Republic in 2007 was 468.3 kg of fish per hectare.

In the Czech Republic, piscivorous predators have been one of the concerns in managing fisheries. It is obvious that this problem will not be solved without effective international co-operation because, among other reasons, cormorants are very active migrants. Meetings with opponents of the proposed pan-European program for managing the populations of these piscivorous predators, however, have not led to achieving the objective, and it seems that they will not do so soon.

The population of cormorants in the Czech Republic has considerably increased from 1 731 in 299 to more than in 2007. Their food included 21 fish species with sizes as large as 41 cm and weight as much as 735 g. Cormorants' increased consumption in winter results from their feeding on bigger fish, not on larger numbers of fish. In the meantime, cormorants continue feeding on fish from fish farms as well as open waters, thus causing – as mentioned in Article 9 of EU Directive on bird protection – "material" loss to the fish farming industry without adequate compensation for the damage and to fish management in open waters. Fish losses reported by the Czech Fish Farmers Association and the Czech Fishing Union reached CZK 234.5 million in 2007.

Government financial transfers

Upon the Czech Republic's joining the European Union in 2004, the possibilities have broadened to obtain subsidies in the fisheries sector. In 2007, available support funds included: National Sector Support; Operational Program for Fisheries; Support and Guarantee Fund for Farmers and Forestry; and Grants according to Annex No. 11 to Act No. 622/2006 Coll.

National Sector Support

These grants are provided according to the "Principles" established in the Sections 2 and 2d of Act No. 252/1997 Coll., on agriculture. The grants called Performance recording, Special advisory for livestock production and School establishments were notified by the European Commission on 28 October 2004. Another grant named Support for non-production functions of ponds and Genetic resources was notified by the Commission on 7 March 2005.

The grant for maintaining and improving genetic potential of the specified livestock is provided for breeders with up to 60% of documented direct costs for performance recording of each year.

The grant for advisory and education is provided for organisers of seminars or training courses with up to 60% of direct costs to run the seminars or courses. It is also offered for publishers of advisory publication on animal husbandry and covered 100% of direct costs of the publications that were provided to breeders with free of charge.

The grant for school establishments is provided for entrepreneurial entities that are engaged in co-operation with secondary schools to provide vocational training opportunities for future workers in the fisheries sector. The amount of the grant is CZK 29 per student per hour and it cannot exceed CZK 1 million per entity.

Support for non-production functions of ponds is intended to provide partial compensation for a loss incurred by fishing entities to ensure water-management and society-wide functions of the ponds. This grant is offered to fishing entities having fish farms larger than 5 ha and the amount is up to CZK 1 000 per ha.

Operational Program for Fisheries 2007-2013

The Operational Program for Fisheries 2007-2013 is intended for drawing funds from the European Fisheries Fund (EFF) in the period of 2007-2013. It is based on the Council Regulation No. 1198/2006 on the European Fisheries Fund and on the Commission Regulation No. 498/2007, laying down detailed rules for the implementation of the Council Regulation No. 1198/2006. EUR 27 106 675 are allocated from the EFF to the Czech Republic. The Czech government supplements this amount with an additional EUR 9 035 559. Therefore, the total available grants in the fisheries sector is EUR 36 142 234.

The EFF established five priority axes and the Czech Republic will use axis 2 (Aquaculture), axis 3 (Measures of Common Interest), and axis 5 (Technical Assistance). In relation to the priority axis 2, the Czech Republic will support Measures for Productive Investments in Aquaculture, Aqua-Environmental Measures, Animal Health Measures, and Investments in Processing and Marketing. The Czech Republic allocated 44% of the funds from the EFF to priority axis 2. In relation to the priority axis 3, the Czech Republic will support Collective Actions, Measures Intended to Protect and Develop Aquatic Fauna and Flora, Development of New Markets and Promotional Campaigns, and Pilot Projects. The Czech Republic allocated 51% of the funds for this priority axis. With respect to the priority axis 5, the Czech Republic will support Technical Assistance and allocated 5% of the funds.

Support and Guarantee Fund for Farmers and Forestry

The Support and Guarantee Fund for Farmers and Forestry provides guarantees for loans of business entities in agriculture, forestry, water management, and industries

involved in processing of agricultural production. More detailed conditions for grants are established in the document "Instructions for Providing Grants by the Joint-Stock Company Support and Guarantee Fund for Farmers and Forestry".

Grants according to Annex No. 11 to Act No. 622/2006 Coll.

According to the "Binding rules for providing funds in relation to water in 2007 and for methods of controlling their utilisation", grants were provided for renewal, dredging and reconstruction of fishponds and reservoirs. This grant is designed to support dredging of the most clogged fishponds; and renewal and reconstruction of fishponds and water reservoirs, including their dams and functional structures, in order to restore their basic functions, improvement of the security of their operations (especially during floods), improvement of water-management and non-production functions with an emphasis on strengthening their retention capabilities. Detailed rules for ensuring the organisation and realisation of these programs were established by the Methodological Direction of the Ministry of Agriculture for "Support for renewal, dredging and reconstruction of fishponds and water reservoirs".

Markets and trade

Fish consumption

In the Czech Republic, fish consumption as a whole has recently stagnated at 5.3 kg in 2000 and 5.7 kg in 2007. As shown in Table III.5.3, the Czechs eat much more saltwater fish than freshwater fish because there is a wider selection of saltwater fish on the market and the prices of saltwater fish are often lower than those of freshwater fish. Due to a continuing tradition, the consumption of freshwater fish is concentrated mostly in the Easter period and, especially, at Christmas.

Table III.5.3. **Per capita fish consumption in the Czech Republic**

	2000	2001	2002	2003	2004	2005	2006	2007
Total fish (kg)	5.3	5.4	5.4	5.3	5.5	5.8	5.7	5.7
Freshwater fish (kg)	1.0	0.9	0.9	1.6[1]	1.4	1.4	1.4	1.4

1. As from 2003, the figures include wild-caught fish in addition to the fish obtained through farming.

Fish processing

In 2007, fish was processed in 12 specialised establishments within the Czech Fish Farmers Association, of which 10 have permission to export their products to the EU countries. In addition to freshwater fish, six establishments are also engaged in processing saltwater fish. Processing of saltwater fish helps to improve the financial situation of the processing enterprises because the volume of live freshwater fish is not enough to fully operate the facilities. Smoking of freshwater fish as well as saltwater fish is carried out by seven entities. The reason for slow changes in fish processing is not technical problems but the seasonality of consumption and persisting consumers' preference for fresh or live fish. Another reason is the fact that other substitute foods compete with the fish products.

Table III.5.4. **Fish processing in the Czech Republic (in tonnes)**

	Volume of live fish for processing in tonnes	Utilisation	
		On domestic market	For export
2004	1 720	1 161	559
2005	2 170	1 314	856
2006	1 920	1 474	446
2007	1 904	1 414	490

Trade

In the Czech Republic, imports of fish are more than double the volume of exports. This is caused especially by the considerable quantity of imported saltwater fish and fish products. On the other hand, imports of live fish are much lower than exports. Carp is the most important live fish contributing the exports.

Table III.5.5. **Imports of fish and fish products in the Czech Republic in 2007**

	Volume (tonnes)	Value (million CZK)
Live fish	451.1	31.5
Fresh chilled fish	1 835.8	214.6
Frozen fish	9 587.1	280.3
Processed fish, filet	24 098.1	1 102.1
Dried salted smoked fish, fish flour	1 460	142.8
Langoustes, lobsters, shrimps, crabs and crayfish	486.2	55
Molluscs and other aquatic invertebrates	949.4	61

Table III.5.6. **Exports of fish and fish products in the Czech Republic in 2007**

	Volume (tonnes)	Value (million CZK)
Live fish	10 326.3	536.1
Fresh chilled fish	468	41.4
Frozen fish	766.4	53.4
Processed fish, filet	3 965.8	204.7
Dried salted smoked fish, fish flour	585.7	48.3
Langoustes, lobsters, shrimps, crabs and crayfish	25.2	8.9
Molluscs and other aquatic invertebrates	236.8	30.4

PART III

Chapter 6

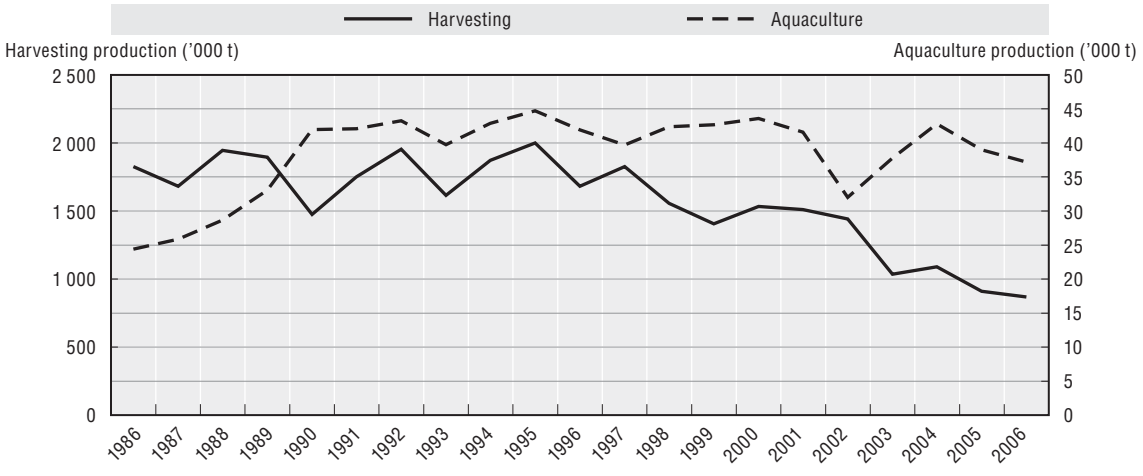
Denmark

Denmark

Summary of recent developments

- In 2005 a decision was taken on a major reform of the national regulation of demersal fisheries. The reform has led to more individual fisheries management as well as a higher degree of ownership of fishing rights for the individual fisherman. The reform follows similar regulation reforms for pelagic and industrial fisheries. As a consequence the number of commercially active vessels in the Danish fleet fell substantially in the period 2005-2007.
- In the context of the EU's European Fisheries Fund a new national strategy for the fisheries sector was developed and adopted in a new 7 year program for the development of the fisheries sector. A plan of action for the fisheries sector was adopted by the government in October 2006. Since 1 January 2007 all important Danish fisheries have been managed by individual fishing rights, either as ITQ's or as Fixed Quota Allocations (FQA).
- Since 2006 Denmark has used risk based control as a concept for enforcing control of the Danish fishing fleet *i.e.* control resources are used in those areas and fisheries where the risk of overfishing is greatest.
- The process to designate additional Natura 2000 sites in Danish marine water has begun. Some existing marine Natura 2000 sites will be extended and new areas will be designated, especially in the North Sea. When the sites are designated and the European Commission has approved them, Natura 2000 management plans will be drawn up. The role of fisheries in these areas will be discussed and regulated when appropriate.

Harvesting and aquaculture production

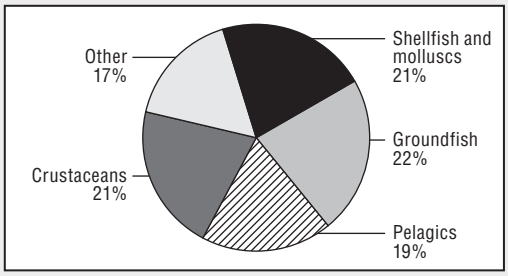


Source: FAO.

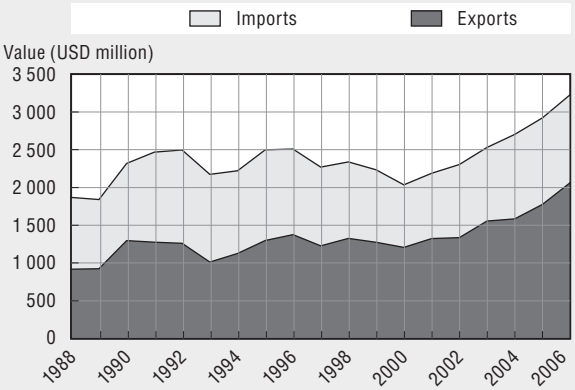
Key characteristics of the sector

- Landings by the Danish fleet amounted to 648 905 tonnes in 2007 at a value of DKK 2.719 billion. The processing industry also depends on raw materials from abroad. Denmark is one of the world's major exporters and importers of fish products. In 2007 imports amounted to 1.8 million tonnes, at a value of DKK 12.8 billion. In 2007 it exported 1 million tonnes of fish, at a value of DKK 19.1 billion. The activities of the fishing fleet in Denmark account for 0.13% of the Gross Domestic Product, whereas the entire fisheries sector including also aquaculture, fish processing and the wholesale branch accounts for 0.4 %.
- The 2008 budget for financial transfers to the fishing industry amounts to DKK 236.6 million. and is shared between EU, national and regional aid institutions. The government pays for management, control and research into capture fisheries. Expenditure in these areas amounted to approximately DKK 245 million in 2007.

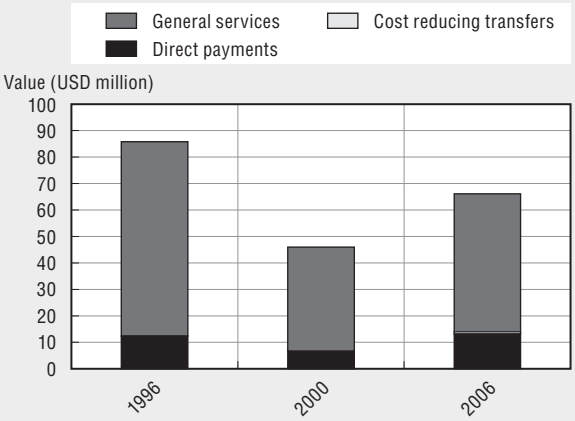
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	4 611[1]	3 497
Number of fish farmers	1 049[2]	700
Total number of vessels	4 830	3 268
Total tonnage of the fleet	109 435	91 468

1. Fishers in 2000.
2. Farmers in 1990.

Legal and institutional framework

The fisheries sector in Denmark – excluding Greenland and the Faroe Islands – is managed within the framework of the EU's Common Fisheries Policy (CFP).

The authority responsible for monitoring and enforcing EU and national conservation policies is the Directorate of Fisheries (*www.fd.dk*) which is part of the Ministry of Food, Agriculture and Fisheries (*www.fvm.dk*). The Directorate carries out inspection at sea and landings, as well as verification of EU marketing standards. Inspection of veterinary standards is the responsibility of the Veterinary and Food Administration, which from October 2007 has also been part of the Ministry of Food, Agriculture and Fisheries.

National legislation aims at utilising fishing opportunities while ensuring that Danish quotas are not exceeded. Technical rules are determined by the EU on the basis of scientific advice and are assessed regularly.

The 1999 Fisheries Act covers the protection of fish stocks, regulations on commercial and recreational fisheries, first hand sales and duties. Minor changes were made in 2002 and again in 2008.

Capture fisheries

The economic performance of the Danish fishing fleet is shown in Table III.6.1.

Table III.6.1. **Key Indicators of the Danish fishing sector, 2005-2007**

	2005	2006	2007
No. of registered vessels[1]	3 275	3 139	2 968
No. of commercially active vessels[1]	1 179	1 093	846
No. of employed	2 667	2 341	1 751
Total landing value (DKK million)	2 902	3 183	2 719
Average per commercially active vessel			[2]
Landing value (DKK 1 000)	2 395	2 785	3 053
Earning (DKK 1 000)	1 399	1 726	1 988
Operating profit (DKK 1 000)	384	620	696
Net profit (% of insurance value)	9	15	16

1. A vessel is considered active with an annual catch value of more than DKK 252.720 (2007).
2. Preliminary estimate.

Source: Institute of Food and Resource Economics, "Economic Situation for the Danish Fishery 2008".

The number of commercially active vessels in the Danish fleet fell substantially in the period 2005-2007 as did employment as well as for the total value of landings. However, the economic performance for the remaining commercially active vessels has improved. Both the average value of landings and earnings have increased. Average operating profits were 80% higher in 2007 than in 2005, and the net profits also increased.

This development is due to normal variations in fishing quotas and price. However, more importantly, the introduction of new regulation has changed the results and prospects. First, individual transferable quotas were introduced for herring in 2003, followed later by mackerel. In 2007 this was followed up by the introduction of fixed quota allocations in the rest of the Danish fishing sector, including in the demersal fishery. As a result some vessels have left the fishery, and the remaining vessels have experienced a better economic performance.

Management

On 1 January 2007 a new regulation of the Danish fishery was adopted. The new regulation focuses mainly on the demersal fishery (*e.g.* cod, plaice and sole) but also includes some pelagic quotas which were not covered by the already existing IQ system (individual quotas). According to the new regulation Fixed Quota Allocations (FQA) were introduced as a regulation principle for these species. Vessels carrying out a commercial fishery in the period 2003-2005 with a turnover of more than DKK 224 000 were categorized as FQA vessels and obtained a fixed share of the Danish quota. This share results in a certain yearly quantity of fish depending on the size of the overall Danish quota for that year. FQA vessels account for one third of the fleet.

Part of Danish fishery is regulated by another mean *i.e.* that of Individual Transferable Quotas (ITQ). ITQs were introduced in the herring fishery on 1 January 2003, in the mackerel fishery on 1 January 2006 and in the sprat fishery on1 January 2007. By the end of 2007 all mackerel, herring and sprat fisheries (except for sprat in the North Sea) which previously were regulated by FQA were regulated by ITQs. On 1 January 2008 ITQ regulation of the industrial fishery (*i.e.* fish for fishmeal and oil) was implemented.

The main difference between FQA and ITQ is that when a share of the quota is transferred in the FQA system it is obligatory to transfer part of the vessel tonnage (GT). This is not obligatory in the ITQ system. Nevertheless, in 2007, there has been a reduction in the total GT used in the FQA segment. This is due to the fact that FQAs have been transferred between vessels. As a result some of the vessel tonnage is not necessary in the fishery at the moment.

Some fisheries are regulated on the basis of personal licenses. These fisheries include brown shrimps along the west coast of Jutland, and blue mussels in various Danish waters. These licenses cannot be transferred to other fishing vessels.

The common (EU) policy on fleet and fleet capacity has been implemented by the already existing rather tight entry-exit system. Individual transfers of capacity rights are allowed. Overall capacity keeps falling and it is expected that this trend will continue because the reform of the regulation makes it possible to concentrate fishing rights among fewer vessels. Work on assessing overcapacity in the fishery has confirmed that there is still some overcapacity in the short term.

In general, there are no restrictions on access to services in Danish ports and no special provisions for foreign vessels, whether they are from the EU or from a third country. Most services are provided by private companies and the availability is thus dependent on what is on offer.

Denmark follows existing EU rules on access for fishing vessels to ports and landings of catches. Fishing vessels on the IUU list adopted by NEAFC are not allowed entry to ports or access to services. EU legislation requires EU vessels to notify 4 hours before entry/ landing in another member state. Special rules apply in the context of recovery plans, etc. (Recovery plans for cod, hake, plaice, sole and for certain pelagic stocks). These measures involve notification in advance as well as limiting landings to designated ports. Such rules also apply to Danish vessels.

Third country vessels (*i.e.* non EU) have to notify landings or transhipments 3 working days in advance. A permit to land is issued after the vessels' flag state has verified the legality of the pre-announced catch. These rules apply to frozen fish and landings can only take place in designated ports.

For third country vessels landings of fresh fish must be pre-announced 72 hours before landing. Special derogations have been made for vessels in the Baltic Sea (6 hours notification) and for vessels flying the flag of Norway and Iceland (2 hours notification). Landings of fresh fish from third country vessels are limited to designated ports.

To ensure proper monitoring, and as part of the EU's cod recovery plan, Denmark has introduced a national regulation which requires that the first hand sale of all cod caught in the North Sea and Skagerrak, or landed in any Danish port facing the North Sea and Skagerrak, is carried out at public auctions (in Denmark or abroad pending effective place of landing). These rules apply to landings of cod from both Danish and foreign vessels as well as transit from another EU country or third country.

With respect to industrial fisheries, in 2000 the EU closed the fishery for sand eel in the Firth of Forth area off the coast of Scotland, while maintaining commercial and scientific monitoring. The closure was initially for three years (2000-2002), but has been extended and is still in force in 2008. Monitoring is being carried out by 6 Danish commercial industrial fishing vessels in close collaboration with the UK authorities and the European Commission.

Since 2006 Denmark has used risk based control as a concept for enforcing control of the Danish fishing fleet. This means that the control resources are used in those areas and fisheries where the risk of overfishing is greatest. Thus control resources are utilized more efficiently.

Recreational fishing

The recreational fishery is regulated by restricting the amount and kind of gear used. It is forbidden to sell fish caught in the recreational fishery and there are no limits to the value of catch. Apart from these regulations, national measures include the release of fish and research financed by the fees charged for fishing permits.

Aquaculture

Except for fully re-circulated farms, all Danish fish farms have to be officially approved in accordance with the Danish Environmental Protection Act. In order to meet the environmental requirements for freshwater farming, there are strict and fixed limits on feed use and specific requirements regarding feed conversion ratio, water use, rinsing and outlets, and removal of waste and offal. The feed limits are assigned to each facility on an Nannual basis by local authorities. When stipulating these requirements, broad environmental considerations are taken into account.

In 2004, new Danish rules came into force for farming freshwater and saltwater fish under an organic label. Farmed fish for labelling may be treated with antibiotics only once. There is a ban on adding *e.g.* synthetic additives, amino acids and colour to the feed and GMO feed is not permitted. Furthermore, GM fish are not allowed and there is also a ban on the use of biologically treated fish and reproductive materials. A few freshwater farms have joined the program, but production is still on a small scale. Common EU regulations for organic aquaculture are expected to enter into force on the 1 January 2009.

Approximately 700 people are directly employed in Danish aquaculture, mainly in traditional fish farming. A significant number of people are also employed upstream and downstream or in associated industries such as smokehouses. Aquaculture production in Denmark is mainly focused on rainbow trout *(Oncorhynchus mykiss*), farmed in freshwater

systems and in off-shore or land based marine aquaculture. In addition, eel is farmed in re-circulated freshwater systems. Mussels, oysters and crayfish are produced in minor quantities. Turbot fry is produced mainly for export. A variety of other species are produced in minor amounts or raised primarily for restocking.

Government financial transfers

All major support schemes for fisheries are part of EU schemes. The structural scheme is financed by the EU and Danish public funds, whereas aid in the framework of the market organisation is entirely financed by the EU. Table III.6.2 shows the 2008 budget for structural aid. Danish Public aid for the fisheries sector has previously focussed on scrapping overcapacity and on projects to develop and adjust the sector. Less money has been spent on aid to direct investments. From 2007 it is the intention not to make use of aid for decommissioning (scrapping).

Table III.6.2. **2008 budget on national aid and aid from the European Fisheries Fund (DKK million)**

Fleet	EU	National	Regional	**Total**
Modernisation of vessels and young fishers	15.7	15.7	0.0	**31.4**
Processing, aquaculture, aquaculture including organic aquaculture and elimination of diseases in aquaculture	34.7	34.7	0.0	**69.4**
Collective measures, pilot projects, fishing ports and fresh water programs	47.3	18.8	28.5	**94.6**
Local community programs	18.6	18.6	0.0	**37.2**
Technical assistance	2.0	2.0	0.0	**4.0**
Grand Total	118.3	89.8	28.5	**236.6**

National support schemes include financial assistance for fisheries consultants and the Innovation Law which provides assistance for research and development within agriculture and fisheries.

In addition, the government pays for management, control and research into capture fisheries. Expenditure in these areas amounted to approximately DKK 295 million in 2007.

Post-harvest practice and policies

The structure of the processing industry and trading firms and their development between 2004 and 2005 is shown in Table III.6.3. From 2004 further concentration in the processing and handling facilities took place and average sales increased for canning and filleting. It should be noted that "business units" refers to the average local economic units registered as VAT contributors within a firm. Employment in semi-processing (filleting) activities is decreasing, whereas employment in processing, wholesale and retail sale of fresh fish remains more stable.

Markets and trade

Knowledge of domestic consumption of seafood products is limited because no official statistics on seafood consumption exist. However, an *ad hoc* survey from 2001 suggests an annual per capita consumption of EUR 80, corresponding to a total Danish consumption of EUR 430 million. The quantities consumed are estimated to be in the range of 20-25 kg live weight per capita. By value, shrimps, whitefish, salmon, trout and herring account for two

Table III.6.3. **Overview of the Danish processing industry and trading firms in 2004 and 2005**

	No. business units		DKK million			
	2004	2005	Sales		Average sales	
			2004	2005	2004	2005
Smoking and drying	57	55	1 595	1 616	28.0	29.4
Canning and filleting	79	82	7 803	8 457	98.8	103.1
Fish meal and oil	6	8	2 015	3 963	335.8	495.4
Wholesale trade	485	471	15 894	16 696	32.8	35.4
Retail trade	295	292	551	487	1.9	1.7

Note: Industry grouping according to the Danish DB03 nomenclature, which conforms to the EU classification NACE. Smoking and drying: DB03 152020, canning and filleting: DB03 152010, fish meal and oil: DB03 152030, wholesale trade: DB03 511710 and 513810, retail trade: DB03 522300.
Source: Yearbook of Fishery Statistics 2004-2005.

thirds of total consumption. Seafood products are sold in several different product forms with canned, preserved and fresh being the most important. There are indications that the consumption of farmed fish, such as salmon, has been increasing over a longer period. This is also the case for imported cold water shrimp. At the same time, the consumption of traditional species such as whitefish, flatfish and herring is falling. Fresh fish and convenience seafood products are on the increase and as international trade increases, the supply of fish becomes wider.

Denmark is a major exporter of fish products. In 2007 it was ranked sixth in the world according to FAO. At the same time, Denmark is a major importer, globally ranked No. 9, of raw materials used for further processing and then re-exported. Danish imports and exports are shown in Table III.6.4.

Table III.6.4. **Imports and exports of Danish fish products 2006 and 2007**

2006	Exports		Imports	
	Tonnes	DKK million	Tonnes	DKK million
Unprocessed	357 866	7 476	450 943	5 814
Semi-processed	170 131	5 508	95 505	2 761
Processed	137 045	4 150	77 675	2 113
Fish meal and oil	413 496	2 363	823 752	2 217
Total	**1 078 537**	**19 497**	**1 447 875**	**12 905**
2007	Exports		Imports	
	Tonnes	DKK million	Tonnes	DKK million
Unprocessed	369 481	7 375	437 974	5 702
Semi-processed	153 782	5 190	88 547	2 462
Processed	143 287	4 374	79 003	2 201
Fish meal and oil	342 159	2 174	1 213 426	2 475
Total	**1 008 710**	**19 114**	**1 818 949**	**12 839**

Note: Fish products for consumption: unprocessed: HS-codes 0301, 0302, 0303, 0306 and 0307, semi-processed: 0304 and 0305, processed: 1604 and 1605.
Fish meal and oil: both unprocessed and processed: 0511, 0508, 1504, 2301, 2309.
Source: The Danish Directorate of Fisheries Foreign Trade Register.

Other EU countries purchase 83% of Danish exports, while exports to other parts of the world, including central and Eastern Europe and China, are increasing. Russia receives an increasing amount of herring and cold water shrimp, whilst China increasingly imports cod and cold water shrimp. Frozen cod is filleted and re-exported mainly to the EU and the USA. This is mainly done by Danish companies which have outsourced their processing activities due to lower wage costs.

Imports originate from a relatively limited number of countries located mainly in the Northeast Atlantic area. Salmon and herring are imported from Norway, and cold water shrimp from Greenland and Canada. Whitefish has traditionally been supplied by Norway and the Faeroe Islands, but today supplies are widening. Falling European supplies of cod are to some extent replaced by imports of Alaska Pollack from the USA and Russia, hoki from New Zealand and pengasius from Southeast Asia.

Outlook

It is expected that the new management arrangements will encourage the fleet to better adjust to fishing possibilities and changes in markets. Overall capacity keeps falling and it is expected that this trend will continue because the reform of the regulation makes it possible to concentrate fishing rights among fewer vessels.

The European Fisheries Fund measures will be in operation from 2008. The measures aim to improve innovative and environmentally-friendly investments as well as collective efforts to develop the industry. The overall aim is to improve the performance of the sector and to develop a viable and competitive industry so as to maximize the economic benefit to society.

PART III

Chapter 7

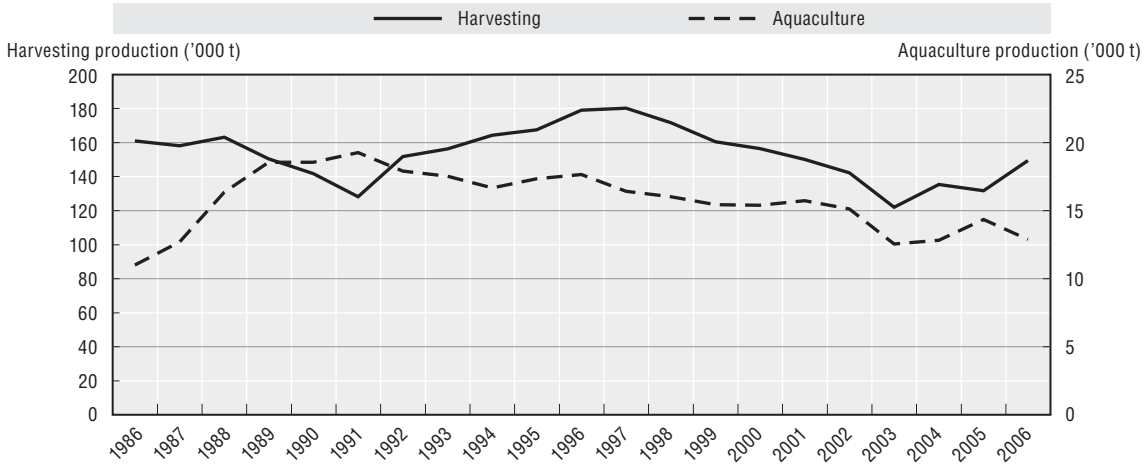
Finland

Finland

Summary of recent developments

- Total commercial marine catch was 81 322 tonnes in 2005 with a value of EUR 13.6 million. Catch since then has increased to 101 092 tonnes in 2006 (value: EUR 18.0 million) and 111 971 tonnes in 2007 (value EUR 19.6 million).
- Aquaculture production was 13 031 tonnes in 2007 (value: EUR 42.6 million), 140 tonnes more than in 2006 (value: EUR 44.2 million). This compares with a total production of 14 355 tonnes in 2005 (value EUR 44.1 million).
- The number of people engaged in recreational fishing has been stable at a level of 1.9 million in recent years: 1.5 million inland fishers and 0.5 million maritime fishers. In 2004, the total figure was 1.9 million. The total recreational catch in 2006 was 41 987 tonnes (the 2004 figure was 38 208 tonnes). In 2006, the inland catch was 31 676 tonnes and maritime catch 10.3 tonnes. The recreational catch is not marketed.

Harvesting and aquaculture production

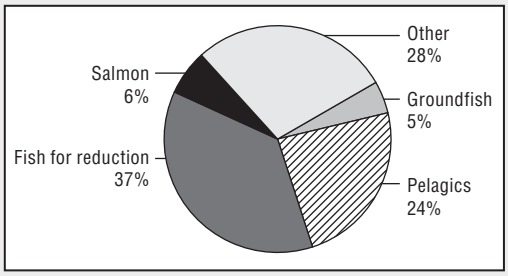


Source: FAO.

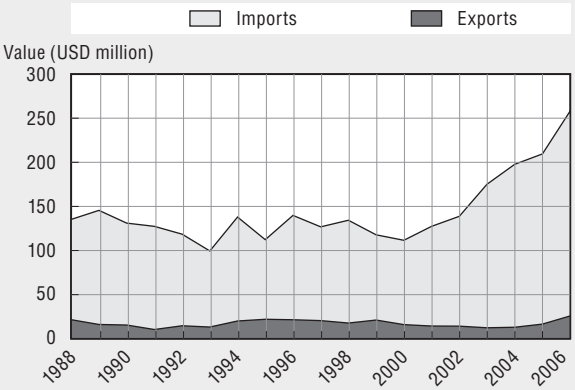
Key characteristics of the sector

- National government appropriation for different subsidy measures amounted to EUR 13.4 million in 2006 and EUR 15.9 million in 2007, including appropriations for Aland County. Total appropriation, including the share of Community's co-financing (FIFG and EFF), was EUR 18. million in 2006 and EUR 22.1 million in 2007.
- The total capacity (GT) of the Finnish fishing fleet has further contracted since 2005 due to a decommissioning scheme. Capacity decreased by 3.2% in 2006 (16 413 GT) and 9.0% in 2006-07 (15 425 GT) compared to the capacity level of 2005 (16 948 GT).
- Total recreational fisheries catch was 41 987 tonnes in 2006 and the estimated number of fishers was 1 951 000 individuals. The figures from the year 2004 were 38 208 tonnes and 1 858 000 individuals respectively.

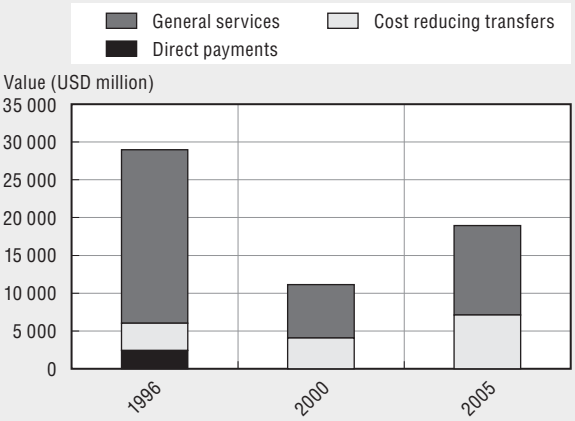
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	4 140	2 766
Number of fish farmers	1 049[1]	494
Total number of vessels	4 026	3 196
Total tonnage of the fleet	23 846	16 413

1. Fish farmers in 1998.

Legal and institutional framework

The resource management in Finland is harmonized with the Common Fisheries Policy of the EU. Finland also implements Community legislation concerning the common market system, structural assistance, a fishing vessel register and control systems, etc.

The Finnish fishing vessel register includes all vessels engaged in commercial maritime fisheries. The register is a part of the Community fishing vessel register. The catch register and first buyer register are also maintained in accordance with the appropriate control system applicable to the EU Common Fisheries Policy.

Capture fisheries

Finland implemented the Fourth Community Multi-Annual Guidance Program for fishing fleets during the years 1997-2002 (MAGP IV). Finland managed to fulfill the requirements of the MAGP by the end of 2002. The Community's fleet management system was renewed from the 1 January 2003 and special capacity reference levels for the fleets of Community member states were launched. This constitutes the sum of the fleet segments. The Finnish reference level for the fishing fleet is 23 203 GT and 216 195 kW.

Two separate decommissioning schemes for the Finnish fleet (vessel scrapping with community aid) were carried out during 1997-99 and 2004-06. During 2000-03, however, there was no decommissioning scheme in use. The total capacity reduction with public aid during the years 1997-99 was 827 GT and 4 158 kW. The equivalent reduction during the years 2004-06 was 1 378 GT and 6 025 kW.

Registered fishing fleet capacity at the end of 2007 consisted of 3 162 vessels (2006: 3 196 vessels). There were 15 pelagic trawlers (over 24 metres) engaged in Baltic herring and sprat fisheries (2006: 18 vessels) but only 1 bottom trawler in cod fishery (2006: 1 vessel). The number of mid-size (12-24 metres) vessels was 102 (2006: 103 vessels). The rest of the units (small boats under 12 metres), 3 045 in 2007 and 3 174 in 2006, were used in small scale coastal fishery (Baltic herring, salmon and brackish water non quota species).

The total marine commercial catch was 111 971 tonnes with a value of EUR 19.6 million in 2007. In 2006, the catch was 101 092 tonnes and the value of this was EUR 18.0 million. The most important species are Baltic herring (Clupea harengus membras) and sprat (Sprattus sprattus), which together constitute about 95% of the catch volume.

The commercial inland fisheries catch in 2006 was 4 498 tonnes with a value of EUR 6.3 million. Vendace (Coregonus albula) is economically the most important inland species (2006 catch was 2 468 tonnes with a value of EUR 4.4 million).

Aquaculture

The total number of people employed (including the owners) in fish farms was 494 persons in 2006 (up from 439 persons in 2005). There were 151 sea farm units and 350 inland farm units in 2007. Of this amount, 201 units were engaged in fish production for direct human consumption. The food production facilities are mostly marine net cages and they are commonly situated in the coastal archipelago area. The rest of the farms produce juveniles for stocking and breeding purposes either in farms (2007: 108 units) or in natural food ponds (2007: 235 units).

Aquaculture production for human consumption consists mainly of large-size rainbow trout. Production with roe was about 12 056 tonnes in 2007 and 12 047 tonnes

in 2006. The production value (excluding VAT) was EUR 37.2[1] million in 2007 and EUR 39.9[2] million in 2006. For other fish species, the corresponding figures were 971 tonnes and EUR 5.4 million in 2007 against 844 tonnes and EUR 4.3 million in 2006. Of this, as much as 944 tonnes and EUR 5.3 million (821 tonnes and EUR 4.2 million in 2006), was Powan (*Coregonus lavaretus*) production.

The competition between farmed rainbow trout and imported farmed salmon and rainbow trout from Norway continued to be strong, but slightly eased due to protection measures taken in the Community. The import price was low for many years, causing problems in the profitability of the domestic production of farmed rainbow trout. In late 2005, the import price of salmon rose to almost EUR 3.5 per kg.

Government financial transfers

According to Community fisheries policy, the sector is granted economic assistance following the rules of Financial Instrument on Fisheries Guidance (FIFG). This structural program (2000-2006) was opened on 1 January 2000 and closed on 31 December 2006. From 1 January 2007, a new structural program (2007-2013) (the European Fisheries Fund (EFF)) has been in place. Structural assistance may be granted for permanent withdrawal and transfer of vessels, modernisation of vessels, development of aquatic resources, aquaculture, fishing port facilities, processing and marketing, inland water and winter fishery, small scale coastal fishery, social-economic measures, sales promotion, operations by members of the trade and technical support.

The government subsidy was EUR 0.80 million in 2005 and EUR 1.08 million in 2006 and EUR 93 million in 2007. This scheme is still under the scrutiny of the European Commission. The aim of this is to determine whether the scheme is in harmony with the common market policy. The transportation of fish from sparsely populated areas into marketing areas was subsidised by EUR 70 000 in 2006 and by EUR 66 000 in 2007. This subsidy was EUR 135 000 in 2005.

Since 1995, new fishing loans with a government interest rebate scheme from private banks for fishing vessels, gear and equipment, have not been granted. The rate of interest of old loans for the beneficiary is as low as 2.5%, according to the reference rate of the Finnish Bank. Due to this, the interest on old loans was not subsidised during the years 2005-2007.

As before, the fisheries insurance scheme was maintained by six fisheries insurance associations plus one private insurance company in Aland County. The main part of indemnification comes from the government. Only commercial fishermen are entitled to insure their vessels, gear and equipment under this scheme, which applies to the Baltic Sea region. The insurance scheme will be aligned with the common market organisation system of the European Union within the next few years.

The commitments of fisheries assistance in above mentioned structural programs in Finland amounted to EUR 14.1 million in 2006. The national share for that was EUR 8.9 million, leaving EUR 5.2 million as contributions from the Community. In 2005, the figures totalled EUR 19.5 million (national: EUR 12.8 million and Community EUR 6.7 million). The structural assistance according to the new EFF program for 2007 totalled EUR 17.7 million. The national share was EUR 11.5 million and the Community share was EUR 6.2 million.

The total amount of financial support from the government including national schemes, co-financing in Finland and including the share of the Aland County, was about EUR 18.6 million in 2006 and about EUR 22.1 million in 2007 (EUR 23.8 million in 2005). The national share of the figures were EUR 13.4 million in 2006 and EUR 15.9 million in 2007 (EUR 17.1 million in 2005).

Outlook

The Baltic herring fishery is the most significant in Finnish fisheries, not only for human consumption but also for industrial purposes. The latter is generally forbidden in the EU but in the Baltic Sea this fishery may be conducted according to Council Regulation (EC) 2187/2005 laying down technical conservation measures for the Baltic Sea.

Notes

1. The value of roe is included.
2. The value of roe is included.

PART III

Chapter 8

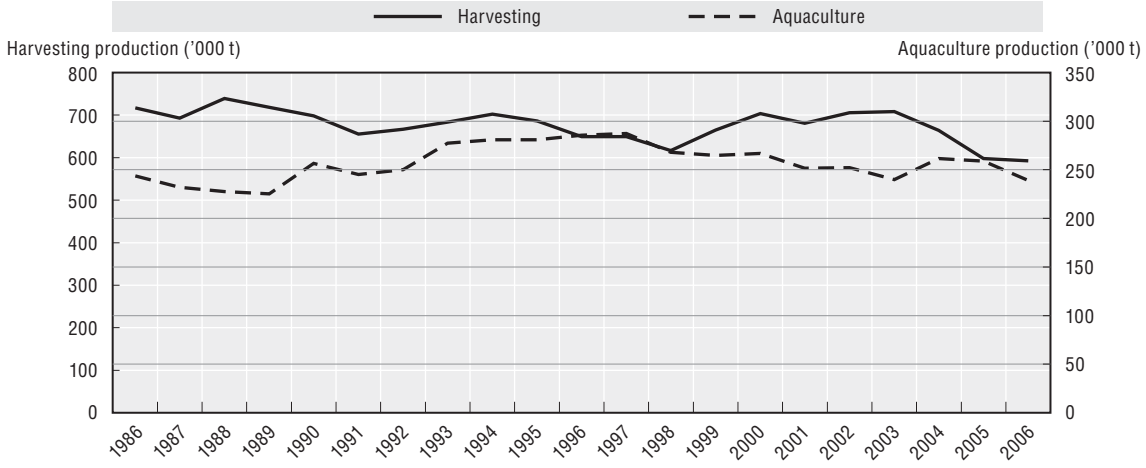
France

France

Summary of recent developments

- The significance of the French maritime economy in 2005 lies in the fact that it generated almost EUR 19 billion in value added and accounted for 500 000 full-time jobs.
- The fisheries and aquaculture sectors, from primary production to processing, accounted for 13% of value added and 10% of employment in the maritime industrial sector as a whole.

Harvesting and aquaculture production

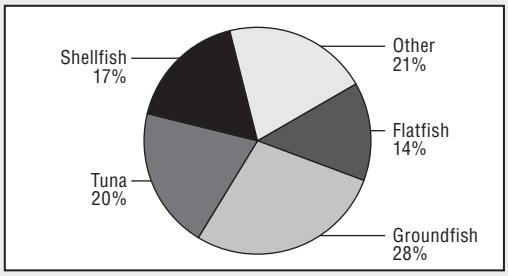


Source: FAO.

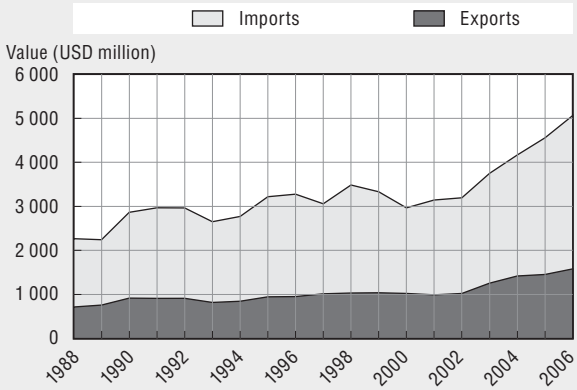
Key characteristics of the sector

- In 2006, almost 30% of marine products came from aquaculture. Oysters and mussels accounted for the bulk of aquaculture output. In 2008, the quotas awarded to France under Council Regulation (EC) No. 40/2008 of 16 January 2008, amounted to 287 308 tonnes. However, through transfers with other member states, France was able to increase its fishing opportunities to 300 634 tonnes (mainly sole, mackerel, cod, anglerfish, black scabbardfish, nephrops and bluefin tuna).
- The leading commercial species in value terms remain: tuna, anglerfish, sole, scallop, hake and nephrops. 60% of metropolitan sales took place in French fish auctions and one-quarter abroad. Brittany alone accounted for one-third of sales.
- The volume of imports amounts to some 1 million tonnes a year, for a total value of EUR 3.8 billion in 2007 (source OFIMER customs data). Half of these imports are from European countries, mainly the United Kingdom, Norway, Spain, the Netherlands and Denmark. Six products alone account for over half of the value of our imports: shrimp, salmon, tuna, cod, scallop and saithe. In addition to traditional species, it is increasingly common to find tropical fish on the market such as grouper, white grouper or red-tipped grouper from Senegal, Thailand or Venezuela. There is also increasingly strong demand from the French market for fillets of farmed tropical fish such as pangasius (Vietnam) or tilapia (Zimbabwe, Costa-Rica), which are already very common on other European markets, particularly in the United Kingdom and Germany.

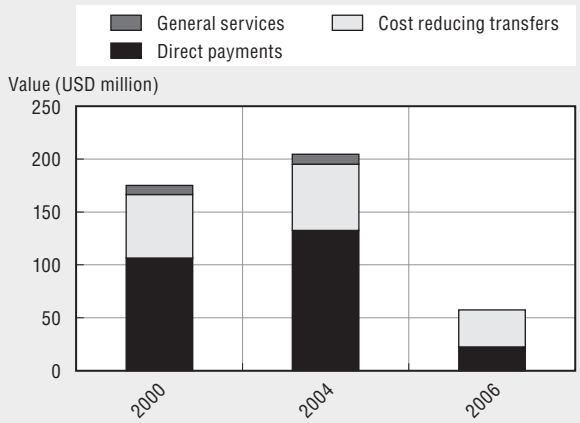
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	38 270	20 869
Number of fish farmers	n.a.	21 076
Total number of vessels	6 473	7 671
Total tonnage of the fleet	197 740	208 493

n.a.: Not available.

Legal and institutional framework

In Community waters, France, as a member of the European Union, implements the Common Fisheries Policy (CFP), which was reformed in 2002. The CFP regulations comprise: a traditional management tool based on TACs and quotas; technical measures relating to gear or catches; management measures relating to fishing effort, and measures to rebuild, over a period of several years, stocks whose sustainable harvesting is under threat.

In terms of domestic law, the Legislative Decree of 9 January 1852, as amended by subsequent legislation including the Outline Act of 18 November 1997 on Sea Fisheries and Marine Farming, established a national framework for the various components of France's fisheries policy. Responsibility for administering the sea fishing and aquaculture industry lies with the Directorate for Sea Fisheries and Aquaculture (DPMA), part of the Ministry of Agriculture and Fisheries (MAP). The Directorate lays down policy in the industry and implements the relevant regulations and measures. It is supported throughout the country by regional or departmental directorates for maritime affairs (DRAM, DDAM), regional surveillance and rescue operations centres (CROSS) for the surveillance of sea fisheries, under the aegis of the Ministry of Transport, Infrastructure, Tourism and the Sea. It also relies on the interbranch agency OFIMER (*Office national interprofessionnel des produits de la mer et de l'aquaculture*), over which it has oversight. As the body responsible for action in the fishing and aquaculture sectors, OFIMER's remit is to implement market intervention and steering programs for fishing and aquaculture products and to develop sectoral awareness within the framework of public policies set at EU and national level.

The DPMA is also in charge of the research institute IFREMER (*Institut Français de Recherche pour l'Exploitation de la Mer)*, along with the Ministry of Infrastructure, Transport and the Sea, the Ministry of Research and the Ministry of the Environment. The industry's participation and involvement in resource management is ensured in particular through the National Committee for Sea Fisheries and Aquaculture, an inter-branch organisation representing the entire sector. It is mandatory for the National Committee to be consulted on any domestic or Community measure regarding fisheries conservation or management, the conditions applicable to commercial fishing or the working of the industry as a whole. The Committee can, like the regional committees, issue licences endorsed by the government for certain fisheries. The regional and local sea fishery committees, for their part, provide the industry with technical assistance and information and are actively involved in drawing up measures taken at the national level regarding regional committees (issuing of licences) and social initiatives (accident prevention, occupational training, assistance to families in distress).

There are 39 local committees based in individual ports (or groups of ports) with a significant level of activity, 14 regional committees and one national committee. France has drawn up a plan for the future of fishing (PAP) consisting in a strategic framework that can be used to set targets and determine which tools should be used to help the sector adjust to an ever-increasing number of constraints and pave the way for modernisation. To ensure that this work is carried out successfully, a national strategy committee on fisheries and aquaculture, composed of a broad cross-section of representatives of the fishing and aquaculture industries, was set up in November 2005. Regional sub-committees have also been set up in each coastal region, including France's overseas *départements* (DOM).

France no longer signs bilateral fishing agreements as this is now a Community prerogative. It retains this competence solely in respect of overseas territories not covered by the CFP. Consequently, a number of foreign vessels can access French waters under the CFP.

Capture fisheries

France accounts for approximately 11% of EU captures (2005). The French fishing fleet takes two-thirds of its catches in the North-East Atlantic. 30% come from tropical waters in the Atlantic and Indian Oceans (primarily tuna fishing), and 7% from the Mediterranean.

The leading commercial species in value terms remain: tuna, anglerfish, sole, scallop, hake and nephrops. 60% of metropolitan sales took place in French fish auctions and one-quarter abroad. Brittany alone accounted for one-third of sales.

A vessel registered under the French flag is allowed to take catches included in national quotas, or will be licensed to fish, only if there exists a genuine economic link with the territory of the Republic of France, and if the vessel is operated and monitored from a permanent establishment located on French soil. Moreover, under fishery access management rules and fishing effort controls, the vessel must have a licence issued in accordance with EU regulations as well as an operating licence issued by the French authorities for fishing capacity management purposes.

For species subject to Community quotas, each year the French authorities allocate the fishing quotas awarded to France under the EU Common Fisheries Policy to producer organisations (POs) and to vessels not in POs. This quota management is based on the principle of equitable distribution among the various POs in the form of sub-quotas which take into account producers' catch histories, market trends and socio-economic equilibria, in line with the Decree of 9 January 1852 (as amended).

In 2008, the quotas awarded to France under Council Regulation (EC) No. 40/2008 of 16 January 2008 amounted to 287 308 tonnes. However, through transfers with other member states, France was able to increase its fishing opportunities to 300 634 tonnes (mainly sole, mackerel, cod, anglerfish, black scabbardfish, nephrops and blue-fin tuna).

Moreover, special measures have been taken to ensure rational and sustainable management of resources by restricting access to fisheries: in addition to introducing quotas on catches (as in the case of scallops in French territorial waters), fishing licences and permits are issued by the administration or through the inter-branch organisation for sea fisheries. These include licences to harvest certain species (shellfish, diadromous species, albacore tuna) or fish in certain regions (Corsica, Mediterranean) as well as special fishing permits (deep-sea species, demersal species, cod and sole recovery zones).

As of 1 September 2006, the metropolitan fleet numbered 5 346 vessels with an average power rating of 135 kW and average tonnage of 28.22 GT. The breakdown of the fleet remains the same with most vessels falling into the under-12 metre category and a small, but particularly efficient, share of the fleet exceeding 25 metres in length.

Inshore fishing activity, three-quarters of which takes place within the 12-mile zone, occupies 70% of vessels but generates only 30% in terms of value. Deep-sea fishing activity, three-quarters of which takes place outside the 12-mile zone, occupies 15% of vessels but generates over 50% in terms of value. Lastly, mixed fishing, encompassing both types of activity, occupies 13% of vessels and generates 20% in value terms.

Table III.8.1. **Breakdown of the metropolitan fleet by length category**

	Length category (meters length)			
	> 25	12-25	0 < 12	**Total**
Number of vessels	140	1 190	4 016	**5 346**
Average tonnage (UMS)	624.26	78.79	4.93	**37.59**
Average power rating (kW)	1 187.35	305.27	81.04	**159.92**
Average length (m)	42.65	18.23	8.16	**11.31**

Source: DPMA, 1 September 2006.

A multi-year management plan for sustainable harvesting of fish stocks in the Bay of Biscay was adopted in February 2006. As stocks in the Bay of Biscay were close to the precautionary level for biomass, measures to restrict the fishing effort were introduced through a special fishing permit system (PPS), allowing management of total capacity in order to prevent any increase in fishing effort. This plan is in three parts: *i)* a rule for setting the TAC which should allow France (the main member state concerned) to maintain a virtually constant TAC over the next three years; *ii)* management of the fishery through a special licensing system for vessels targeting sole and incentives to withdraw from the fleet to ensure a sustainable reduction in fishing effort; and *iii)* inspection measures, notably through a requirement that any catches of sole of over 300 kg from the Bay of Biscay be weighed at auction.

Scallops are one example of a fishery subject to specific management rules to prevent over-fishing, including opening and closing dates, mandatory licences, gear restrictions and maximum catch quotas per vessel/person/day. Other species subject to similar management measures include crustaceans and estuary fish.

The industry is currently working to improve the management of bass fishing by French vessels. This is primarily a result of repeated conflicts between the various fishing trades with an interest in this species.

Decree No. 2001-426 on commercial seashore fishing confers professional status on seashore fishermen. Having gained this recognition in 2001, they were able to join the sea fisheries trade association and accordingly authorised to take part in the latest industry elections. To harvest and market their catch, they must obtain seashore fishing licences from the government (issued by departmental Prefects). A revised version of this decree, currently being drafted, should eventually enable these licences to be managed nationally, although they would still be issued by the Prefects.

Mediterranean fisheries are distinctive in terms of: the geography of this semi-enclosed sea with a narrow continental shelf; the diversity and density of users of marine resources; the species targeted; and the absence of any TAC or quota systems (the one exception being blue-fin tuna). In this particular context, France has developed its own resource management system governed by Decree 90-95 of 25 January 1990, which lays down the general requirements for Mediterranean Sea fisheries. The system is part of the broader set of Community regulations designed to manage fisheries through the introduction of appropriate technical measures (Regulation No. 1626-94 of 27 June 1994, currently under review). Harvesting is based on a system of licences for specific types of gear, *e.g.* bottom trawls, mid-water trawls, seines, and small-scale inshore gear.

The French Southern and Antarctic Territories (FSAT) are not covered by the EU Common Fisheries Policy. The relevant sea fisheries regulations are based on the Act of

18 June 1966 on sea fishing and the harvesting of marine products in the FSAT, and on the Decree of 27 March 1996 on the conditions governing sea fisheries, which is in turn subject to local enabling orders. These instruments lay down rules for resource management, and more specifically total allowable catch (TAC) and the technical requirements governing fishing. The regulatory system also includes the measures adopted by France as a member of the Commission for the Conservation of Antarctic Living Marine Resources (CCAMLR).

France is extremely concerned about illegal, unregulated and unreported (IUU) fishing which targets the FSAT in particular, and develops policing resources and close co-operation with neighbouring countries that have been deployed to combat this serious problem. The fight against illegal fishing of Patagonian toothfish in the EEZ around Kerguelen and Crozet Islands motivated the signature of a co-operative agreement on control and enforcement between the local fisheries police force and Australian authorities confronted with this problem in the waters of Heard and MacDonald Islands.

Responsibility for enforcing sea fishery controls lies with MAP (DPMA), which decides on the necessary steps to be taken at sea and on land and may call upon the maritime affairs services and regional surveillance and rescue operations centres for that purpose. It also uses the services of the French Navy, the *Gendarmerie*, customs, competition authorities, consumer affairs services, the fraud squad and veterinary services. Responsibility for co-ordinating the services involved on the ground lies with the maritime Prefects (at sea) and the regional and departmental Prefects (on land).

The bilateral co-operation agreement on fisheries inspection and control between Australia and France is designed to supplement the treaty these two powers had already signed on the surveillance of fishing activities in maritime areas adjacent to the French Southern and Antarctic Territories (FSAT), Heard Island and the McDonald Islands. Through this agreement Australia and France express their desire to work more closely together in implementing the legal and regulatory provisions for the management of fishing activities in the waters under their respective jurisdiction. Australia and France intend in particular to provide an effective response to illegal, undeclared and unregulated fishing activities (IUU) in the waters placed under their jurisdiction and/or adjacent to those waters.

In particular, the provisions of the agreement specify the powers of both parties' fishery inspectors when the latter take action from a resource belonging to the other party, as well as the conditions governing the pursuit at sea of a vessel held to have infringed the legislative and/or regulatory provisions of one or the other party. The agreement also sets out guidelines for criminal and administrative prosecutions relating to arrests, as well as for exchanges of information and the financing of operations.

France, as a nation with overseas territories and *départements* and an EU member state, is a contracting party to several regional fishing organisations (RFOs). It is thus actively involved in drawing up recommendations and conservation measures aimed at ensuring the rational harvesting of fishery resources in international waters and Exclusive Economic Zones (EEZs).

Management of recreational fisheries

Recreational fisheries are subject to Decree No. 90-618 of 11 July 1990 on recreational sea fishing. There is also a Ministerial Order, dated 21 December 1999, laying down minimum sizes for marine species caught by pleasure boats. French regulations on recreational fishing impose comprehensive restrictions on the types of gear authorised for pleasure boats.

In the case of underwater recreational fishing, the use of breathing apparatus and night fishing are both prohibited; practitioners of snorkel fishing must notify the local authorities and in addition take out civil liability insurance. Special regulations are also in place at local level. The sale of recreational fishery catches is strictly prohibited.

Aquaculture

To take better account of environmental concerns, professional fish farmers are now committed, with the support of the Minister of Agriculture and Fisheries, to a program of sustainable aquaculture. This program is designed to meet consumer expectations (regarding nutritional and health standards), to ensure animal welfare and to reduce the use of fish meal and oils in the feeding of farmed fish (development of feed formulas that are richer in plant matter). This initiative has the support of French research agencies (INRA, IFREMER).

Shellfish farming is the main aquaculture activity in France, generating a turnover of EUR 380 million and an output of some 190 000 tonnes, with oysters accounting for 60% and mussels 38% (source DPMA, 2006). The industry comprises 3 300 farms employing 19 500 people, or 10 300 full-time equivalent jobs. Shellfish production (measured in terms of sales to consumers) remains very stable over the long term, despite some sharp changes stemming from the economic climate: the decline over 10 years has been only 1% (less than 0.1% a year on average). France is the leading producer of oysters in the European Union, and ranks second for aquaculture as a whole, behind Spain but ahead of Italy. Farmed fish output stands at 52 528 tonnes, generating a turnover of EUR 140 million (2007 data).

Turnover from inland fish-farming is estimated at EUR 90 million for an output of 45 000 tonnes of freshwater fish. Salmon is the main species farmed in France, with an output of 37 100 tonnes of salmonids in 2007 (including 34 000 tonnes of rainbow trout), down 20% on 1997. There are 460 enterprises and 600 sites throughout the country. However, production is concentrated mainly in Aquitaine and Brittany.

Turnover from marine fish farms is estimated at EUR 50 million for an output of 7 500 tonnes of fish and crustaceans (source DPMA 2007), and they employ some 650 people. The farms usually specialize in either breeding fry or growing fish. The main species are bass, sea bream, turbot and salmon.

Government financial transfers

The fleet withdrawal plan for 2006 has been supplemented with a safeguard and restructuring plan for fishing enterprises, at a cost of EUR 26 million, aimed at both adapting the fleet composition to the resource and improving the medium and long-term viability of fishing enterprises. This safeguard and restructuring plan, amounting to over EUR 20 million, also provides for consolidation loans and structural support for items such as engine changes and fishing gear upgrades. Other provisions cover social support for seamen and tax incentives for vessels withdrawing from the fleet.

This 2006 fleet withdrawal plan, with its budget of EUR 26 million (13 million from the State and 13 million from the FIFG) should cover 80 vessels, achieving a reduction of over 5 500 UMS and over 23 300 kW, or some 3% of the reference level.

Post-harvesting policies and practices

Regulation (EC) No. 2065/2001, in force since 1 January 2002, lays down rules on consumer information about fishery and aquaculture products. The drive to modernise the fishing industry (distribution/marketing) and make it more competitive is focusing on the following strategic areas: improving conditions for the landing and initial sale of fish, in particular prior-to-landing reporting, harmonised auction grading practices, and collective investment in fishing ports and wholesale fish markets; modernising enterprises downstream in the industry (fish trade, processing), particularly in terms of product quality and traceability/identification; and developing innovation and research into new processes at every stage of the industry, be it production and marketing, quality enhancement or new product development.

These strategic areas correspond to domestic and EU policies in the same field. The operations featuring in this drive receive – and will continue to do so in years to come – both EU support (under the 2007/2013 FIFG program) and domestic support (government and/or OFIMER), including "plan contract" aid which mobilises local authority funds.

The processing sector, which produces frozen products, canned products and chilled delicatessen products (Table III.8.2), comprises 287 enterprises generating a combined turnover of EUR 3.27 billion and some 13 000 jobs (source OFIMER/IFREMER, 2004). The French processing industry primarily utilises imported products, particularly salmon, Alaska Pollack, shrimp, tuna and scallops. In contrast there are few exports, primarily canned tuna.

Canned and sterilised produce accounts for 30% of turnover in this sector, frozen produce for 21%, smoked/cured produce for 20% and fresh delicatessen produce for 22%. 26% of enterprises are located in Brittany, 20% further down the Atlantic coast, 20% on the Channel-North Sea coast, 13% on the Mediterranean coast and 21% inland. This is an expanding industry. Markets such as delicatessen or smoked produce are growing by over 7% a year. The seafood delicatessen market is forecast to triple in volume over the next ten years. Enterprises on the sterilised seafood market are more import-dependent, and thus more sensitive to fluctuations in the price of raw materials.

Table III.8.2. **Breakdown of turnover in the processing industry by process (2005)**

Canned products	27%
Frozen products	21%
Smoked, salted, dried fish	19%
Boiled shrimp	11%
Surimi	8%
Other chilled delicatessen products	14%

Source: OFIMER/IFREMER.

The vast majority of processing enterprises are located in coastal regions. There is a contrast in their distribution across the country. Normandy has a small number of large-scale enterprises. The Nord-Pas-de-Calais region (mainly Boulogne-sur-Mer), Brittany and the rest of the Atlantic coast account for a large share of overall turnover with enterprises that are closer to the average in size. Conversely, there are numerous but in most cases small enterprises in the Mediterranean/Rhône-Alpes region. The other French regions have a significant number of processing enterprises, but with very low turnover (Table III.8.3).

Table III.8.3. **Regional breakdown of processing enterprises and turnover (2005)**

	% of enterprises	% of total turnover
Nord-Pas-de-Calais	12	11
Normandy	8	17
Brittany	26	32
Atlantic	20	29
Mediterranean	13	6
Others	21	5

Source: OFIMER/IFREMER.

The fish and seafood processing industry, even more than the fish trade itself, is characterised by a very large number of small enterprises making a small contribution to total turnover, and by a small number of larger enterprises accounting for the lion's share of industry turnover.

Fresh fish are landed at over 1 400 locations in 419 ports and placed on sale in 42 licensed fish auctions at different coastal locations. 75% of fresh fish caught by the French fleet are auctioned in those 42 fish auctions: 37% of offshore catches, 33% of inshore catches and 30% of small-scale fishing catches.

The turnover from maritime fishing in metropolitan France is just over EUR 1 billion (fresh fish + frozen fish, including landings abroad). Brittany is the leading region with 34% of sales in value terms, followed by Nord-Pas-de-Calais with 11% (Table III.8.4).

Table III.8.4. **Regional breakdown of enterprises and turnover in the fish trade (2005)**

	% of enterprises	% of total turnover
Nord-Pas-de-Calais	12	20
Normandy	14	10
Brittany	36	33
Atlantic	23	18
Mediterranean	12	10
Other	3	9

Source: OFIMER.

Three thousand six hundred fishermen and 2 500 vessels are involved in sea fishing in the DOM (overseas *départements*). Turnover from sea fishing in the DOM amounts to EUR 180 million.

Fish trading companies are established in almost all coastal regions. There is a contrast in their distribution across the country. The situation in Normandy and on the Mediterranean is close to average. Enterprises in the Nord-Pas-de-Calais region are fewer in number but larger in size, whereas Brittany and the rest of the Atlantic coast have larger numbers of smaller enterprises (Table III.8.6).

The fish trade sector is divided between a few large and numerous small enterprises, with a mere 8% of enterprises accounting for 48% of turnover, whereas 82% of enterprises account for the remaining 52%.

Taking all fresh, frozen, processed and farmed-fish products as a whole, the top ten products in terms of sales value are: salmon (EUR 225 million), cod (EUR 205 million),

oysters (EUR 154 million), mussels (EUR 122 million), saithe (EUR 79 million), scallops (EUR 73 million), common sole (EUR 67 million), Nile perch (EUR 67 million), whiting (EUR 66 million), anglerfish (monkfish) (EUR 66 million). Taking all species as a whole, consumption of fish and aquaculture products stands at around 2.25 million tonnes live weight equivalent, which is over twice domestic output in 2006, namely 808 000 tonnes.

Taking all products as a whole, major and medium-sized outlets account for 77% (in volume terms) of the distribution of fishery and aquaculture products, and fishmongers/ markets for 23%. However, this breakdown depends upon the type of product. For fresh products, for example, the share of large and medium-size outlets is only 47% whereas that of fishmongers is 20% (Table III.8.5).

Table III.8.5. **Breakdown of purchases of fishery and aquaculture products by presentation and distribution channel in 2005**

	Fresh	Chilled delicatessen	Frozen	Canned
General distribution	47%	86%	57%	89%
Fishmongers and markets	20%	4%	0%	1%
Commercial catering	30%	7%	16%	5%
Institutional catering	3%	3%	27%	5%

Source: OFIMER TNS and OFIMER GIRA.

The volume of imports amounts to some 1 million tonnes a year, for a total value of EUR 3.8 billion in 2007 (source OFIMER customs data). Half of these imports are from European countries, mainly the United Kingdom, Norway, Spain, the Netherlands and Denmark. Six products alone account for over half of the value of our imports: shrimp, salmon, tuna, cod, scallop and saithe. In addition to traditional species, it is increasingly common to find tropical fish on the market such as grouper, white grouper or red-tipped grouper from Senegal, Thailand or Venezuela. There is also increasingly strong demand from the French market for fillets of farmed tropical fish such as pangasius (Vietnam) or tilapia (Zimbabwe, Costa-Rica), which are already very common on other European markets, particularly in the United Kingdom and Germany.

Imports, which had been rising steadily for the past fifteen years, are now showing a slight decline (down 2% on 2006). This is mainly in tuna, small pelagics, salmon, cod, crustaceans (with the exception of crab and shrimp) and cephalopods, whereas imports of farmed Mediterranean fish (bass and sea bream) or farmed tropical fish (pangasius) are on the rise.

France is also an exporting country. French exports of fishery and aquaculture products for human consumption amount to some 350 000 tonnes a year and were worth EUR 1.3 billion in 2007 (source OFIMER customs data). These exports, three-quarters of which remain concentrated within the European Union (particularly to Italy and Spain), fall into four broad categories: exports of products not widely eaten in France such as horse mackerel, anchovy, megrim or eel; exports of products for processing abroad and subsequent re-importation into France such as frozen tropical tuna (for canning) or cuttlefish (fillets); re-exports of products that have only passed through France (fresh salmon, frozen shrimp, frozen scallops); exports of products processed from imported raw materials such as smoked salmon or boiled shrimps.

French exports to China have also risen sharply, in value and volume (up by over 30%).

Table III.8.6. **Balance of imports and exports 2007**

	Imports 2007		Exports 2007	
	Volume (tonnes)	Value (EUR millions)	Volume (tonnes)	Value (EUR millions)
Live, fresh, chilled	343 281	1 265	111 670	606
Frozen	423 421	1 535	184 764	358
Salted, dried, smoked	21 798	111	8 944	56
Canned	218 938	690	48 936	202
Non-food use	112 561	92	62 364	67
Total	**1 111 998**	**3 693**	**416 678**	**1 289**

Outlook

The plan for the future of fishing (PAP) is a strategic framework that can be used to set targets and determine which tools should be used to help the sector adjust to an ever-increasing number of constraints and pave the way for modernisation. The proposals set out in the plan reflect the following ten main areas of emphasis:

- Responsible resource management.
- Renewing the information system.
- Improving enterprise profitability.
- Strengthening organisational structures in both the industry and the administration.
- Enhancing the industry's appeal.
- Adding value to products.
- Safety.
- Supporting the development of aquaculture.
- Overseas *départements*.

PART III

Chapter 9

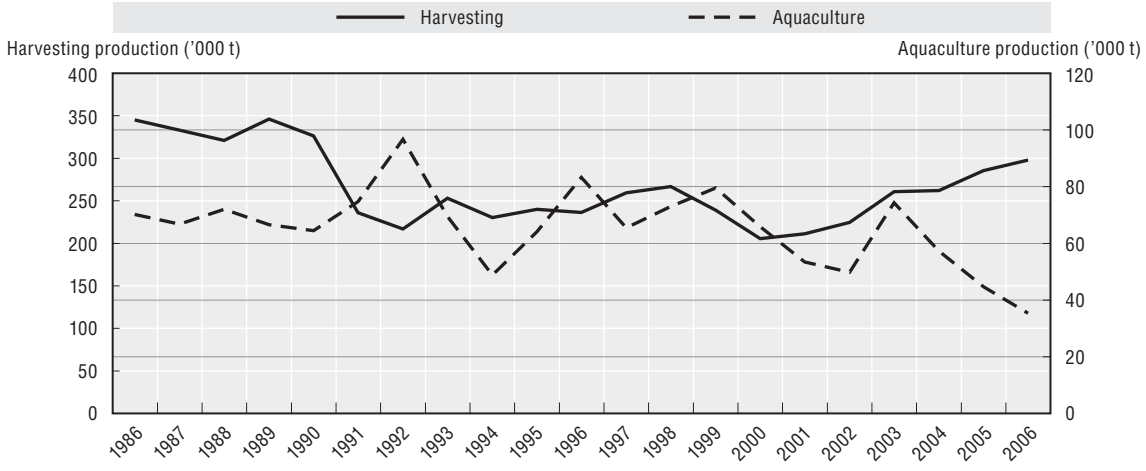
Germany

Germany

Summary of recent developments

- In 2007, the German fisheries sector experienced an increase in both landings and values as compared with previous years. Rapidly increasing fuel prices, however, had a negative impact on the overall result. With a degree of self-sufficiency of merely 24%, the processing industry plus consumers in Germany are still heavily dependent on imports from other EU member states and from third countries.
- Fish consumption rose substantially in 2006 and 2007 and per-capita fish consumption increased to 15.5 kg in 2006 and according to preliminary data, this was 16.4 kg in 2007. This is partly due to the favourable economic development in the Federal Republic of Germany. Factors damping demand such as an increase in value added tax, falling real wages and rising energy and food prices seem to have hardly any impact on the sale of fishery products.

Harvesting and aquaculture production

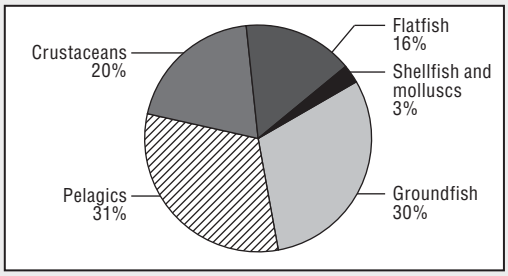


Source: FAO.

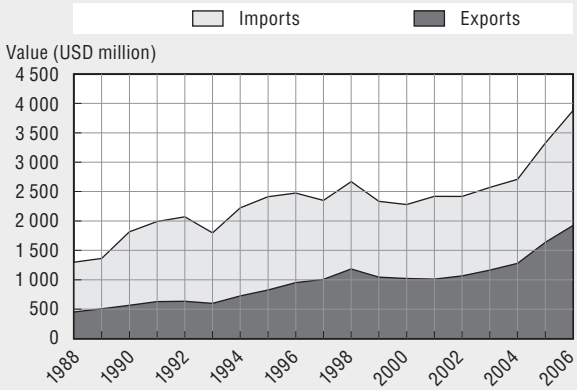
Key characteristics of the sector

- The supply of the Federal Republic of Germany with fisheries products is still mainly ensured by import trade. The degree of self-sufficiency fell to 23.9% in 2007, due to the increasing market volume. The rise in domestic demand contrasts sharply with a decline in fish exports. Export prices for fish and fishery products rose slightly in 2007 all in all, whereas import prices stagnated at the prior-year level. The strenghtened Euro against the US dollar was the chief stabilising influence here.
- As regards the distribution of fish consumption among the various product categories, a shift occurred towards the deep-frozen segment that accounted for over one third. Canned fish and marinades make up just under one third of all fishery products. Fillets and fish sticks of Alaska pollock prevailed in the frozen food segment with demand chiefly focusing on canned herring and herring marinades. Crustaceans and molluscs, fresh fish (tending downward), smoked fish, fish salads and other fisheries products were consumed less frequently. Alaska pollock was again the most frequently consumed fish in Germany in the period under review. This species accounted for just under one quarter of fish consumption. It was followed by herring and salmon ranking second and third on the list of the most popular fish species.

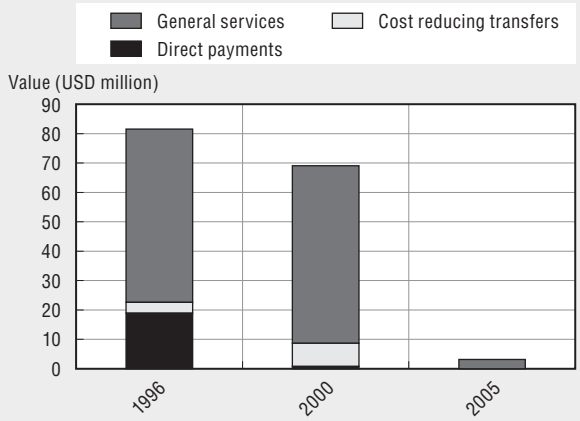
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	4 360	2 133
Number of fish farmers	n.a.	n.a.
Total number of vessels	2 371	1 873
Total tonnage of the fleet	73 058	69 081

n.a.: Not available.

Legal and institutional framework

German fisheries policy is fully integrated in the Common Fisheries Policy (CFP) of the EU. Within the Federal government, responsibility for sea and inland fisheries as well as aquaculture lies with the Ministry of Food, Agriculture and Consumer Protection (BMELV). Implementation of the CFP rules, primarily translated into national law by the Sea Fisheries Act, is incumbent upon the Länder in close co-operation with the BMELV.

Capture fisheries

The structure of the German fishing fleet is relatively stable with the fishing fleet currently consisting of around 1 870 units with a total tonnage of 69 000 GRT and an engine power of 160 000 kilowatt. Only 9 of these vessels are engaged in deep-sea trawler fisheries. Due to their structural characteristics, they meet the preconditions required for fishing activities in Community waters as well as in third country and international waters that are being managed by regional fisheries organisations. All vessels of this fleet category process and freeze their catch at sea and thereby also supply top-quality fish products from remote areas. The other vessels of the fleet are active in cutter deep-sea and coastal fisheries. Their fishing grounds are mostly in the North and Baltic Sea. Many of these vessels are open vessels and smaller cutters that are mainly engaged in daylight fisheries. The fleet's development is subject to the structural policy for fleets adopted by the European Community. An increase in fleet capacity is therefore impossible.

Table III.9.1. **Structure of the German fishing fleet as of 31.12.2007**

Overall length	Number	Engine power in kW	Tonnage in GRT
< 10 m	1 391	23 534	2 500
10 – < 12 m	104	9 777	1 215
12 – < 15 m	63	9 636	1 361
15 – < 18 m	155	28 844	5 211
18 – < 24 m	101	22 326	7 984
24 – < 40 m	40	21 145	8 155
> 40 m	19	45 624	42 655
Total	**1 873**	**160 886**	**69 081**

In 2006, the total landings of German fishing vessels added up to 261 000 tonnes (landed weight) of fish and fishery products. This level increased to 268 000 tonnes in 2007. At the same time, proceeds rose from EUR 215 million to EUR 229 million. Prices for many economically important fish species tended upward. At the same time, the fuel and energy prices that have been rising for some years now placed a strain on operating profits.

Deep-sea fishing vessels contributed landings totalling 150 000 tonnes towards the overall result, of which 31 000 tonnes were unloaded in Germany and 119 000 tonnes abroad. In order to improve the working conditions for their vessels, the deep-sea fishing shipping companies co-ordinated their fishing voyages so that, on the one hand, the deep-sea fleet was put to the best possible use with consideration to commercial aspects and so that the catch quota available to Germany could be used in the best possible way, on the other hand. Fishing for shoaling pelagics like herring, mackerel, horse mackerel and blue whiting in the North Sea and in the North Atlantic was satisfactory as in previous years. In spite of high utilisation rates, the catch quotas assigned were sufficient to secure fishing

activities of the vessels all year round. German pelagic trawlers for the first time also participated in fishing for horse mackerel in the South Pacific. This was intended to offset reduced catch quotas of shoaling pelagics in the North Atlantic. Fishing for redfish in the Irminger Sea turned out to be difficult, so available catch levels could not be exhausted. In contrast, fishing for black halibut was stable and satisfactory. The vessels were employed off the coast of Greenland and fully exhausted the catch quotas assigned to them. The same also applied to cod, haddock and saithe fisheries in Norwegian waters. For the first time in 15 years, the vessels also harvested a minor cod quota off the coast of East Greenland.

German cutter and coastal fisheries remained largely stable in 2006 and 2007. As in deep-sea fishing, soaring fuel costs in some cases curbed the operating profits. In 2006, an application for MSC certification (Marine Stewardship Council) was filed for saithe fisheries in the North Sea. The procedure is expected to be completed in September 2008. Cod fisheries were characterized by improved catch opportunities but had to be terminated ahead of time in 2007 because the quota was exhausted. Quota bottlenecks also exerted an adverse effect on flatfish fisheries. Coupled with a lowering of the catch effort and higher energy prices, this resulted in a substantial deterioration of operating profits in this line of business. In shrimp fisheries, the establishment of a transnational producer group, that takes care of the transboundary co-ordination of the marketing of shrimp whilst strengthening the market position of producers towards wholesaling, has had a positive impact on enterprises.

Cod fisheries in the Baltic Sea developed favourably in the Eastern part so that quotas could be exhausted. Sprat fisheries also developed satisfactorily whereas herring fisheries, especially in the land-locked coastal waters of Mecklenburg-Western Pomerania, yielded far worse results.

Management

During the period under review, 2006/2007, there were no substantial changes in fisheries management in Germany. New fishing vessels can still only be put into service if at the same time old vessels of at least the same tonnage (GRT) and engine power (kW) are permanently decommissioned. Modernisation measures of existing fishing vessels that lead to increased tonnage and engine power are only authorised if corresponding old capacities are withdrawn. This ensures that the fishing capacity of the fleet does not grow. It should also be mentioned that the capacity ceiling established by the European Commission for the German fleet is not fully utilised.

The basic principles as regards the allocation of quotas did not change in 2006/2007. Following a hearing of fishing associations, available catch quotas continue to be first distributed among the enterprises engaged in deep-sea trawler and cutter fisheries. As a rule, enterprises active in deep-sea trawler fisheries obtained individual catch licences to fish for individual stocks in different sea areas and/or joint catch licences for several enterprises, enabling the fleet to operate more flexibly. Different catch management instruments are being used to manage fish species such as plaice, saithe, sole, cod and herring that are important for inshore and cutter fishing enterprises as well as some other species where an early quota utilisation can be expected. Individual catch licences are also granted here to some extent. They enable the enterprises to individually fish for the catch levels assigned to them. Catch licences are, however, also issued to specific groups of vessels in some cases or total allowable catches fixed within certain periods of time.

Recreational fisheries

The number of active anglers in Germany is still estimated at 1.5 million. A basic precondition for being able to acquire an angling licence which, in turn, is a prerequisite to engage in line-fishing is to prove extensive knowledge of fishery biology, hydrology as well as animal welfare and water conservation. As there are no catch records providing universal coverage, information on the catches made by anglers is based on estimates. These estimates amount to approximately 15 000 tonnes (about 10 kg per angler). Catches may not be commercially marketed. The *Länder* (federal states) have, in part, adopted different rules governing closed seasons and minimum sizes of the fish concerned. Moreover, water-specific restrictions on fishing gear and catch levels are usually in place.

Monitoring and enforcement

On 1 January 2007, the Joint Maritime Emergency Reporting and Assessment Centre took up its activities in Cuxhaven. The crisis management centre constitutes the operational core of the Maritime Safety and Security Centre, an organisation intended for sea surveillance, improvement of hazard control and accident management. In the process, federal authorities and authorities of the coastal federal states collaborate in a network. The federal authority that is competent for fisheries monitoring and control is also present at the crisis management centre in a 24 hour shift. This marks a major step towards improving fisheries monitoring, notably with regard to enforcing prohibitions of entry into port for IUU vessels.

In 2006, the Federal Republic of Germany placed a contract for the construction of two ocean-going fishery inspection vessels. The contract volume amounts to around EUR 63 million. The entry into service of the two vessels is expected for autumn 2008 and spring 2009 respectively. The vessels are identical as regards construction and have state-of-the-art navigation systems and machine technology that allow operations also under poor weather conditions. The vessels replace two older fishery inspection vessels and are to be employed in the North and Baltic Sea as well as in the North Atlantic for fisheries monitoring and control.

Aquaculture

Except for shellfish fishing, aquaculture is mainly operated inland in the Federal Republic of Germany. The responsibility for inland waters fisheries rests with the individual federal states, so there is no direct aquaculture policy of the Federal government. However, some federal acts exert an impact on aquaculture installations, such as the Federal Water Act, the Animal Welfare Act, veterinary legislation as well as the Federal Nature Conservation Act, just to mention a few examples. There have been no major changes for aquaculture installations in the period under review. The authorisations under water law that are frequently handled in a restrictive manner often prove to be an obstacle to the expansion of aquaculture production in Germany, *e.g.* in the form of net cage systems.

In addition, the concerns of aquaculture producers are also affected by EU directives that are implemented by the individual federal states. This chiefly concerns the FFH Directive, the Water Framework Directive and the Wild Birds Directive. The implementation that differs significantly from federal state to federal state often results in excessive restrictions on the entrepreneurial freedom of producers in some regions. This

especially concerns carp pond farming that covers a comparatively large area. The problem posed by cormorants constitutes a major conflict of interest between bird protection and aquaculture.

Other EU Directives that are relevant for aquaculture in Germany are the Directives 91/67/EEC and 93/53/EEC concerning the designation of aquaculture installations and areas as free from specific fish diseases. The number of disease-free farms currently amounts to 116. Nine areas, too, obtained the disease-free status. The application of these directives mainly affects producers of salmonidae. However, a carp pond farm that produces pike fry is also approved according to these Directives.

The federal authorities only record shellfish production directly. Its volume greatly fluctuates depending on the availability of larvae and amounted to around 2 334 tonnes and EUR 1.6 million in 2006 and to 5 913 tonnes and EUR 8.4 million in 2007.

Aquaculture production in inland waters, on the other hand, is recorded or in some cases only estimated by the individual federal states. This type of aquaculture is relatively stable in spite of minor fluctuations. Over 400 full-time flow-through systems and almost 10 000 part-time flow-through systems annually produce about 19 000 tonnes of rainbow trout for consumption, 3 000 tonnes of rainbow trout for stocking as well as about 2 000 tonnes of additional species (mainly common trout and char) of a total value of over EUR 120 million. Carp pond farming is the second largest aquaculture segment that annually produces around 11 000 tonnes of food carp, 3 000 tonnes of carp for stocking and around 1 000 tonnes of additional species (other cyprinids, percidae, catfish, pike, common sturgeon, small fish species) with a total value of EUR 50 million in around 200 full-time farms and around 12 000 part-time farms. Technical fish farming facilities (closed recirculation systems) are less important. There are around 20 installations in the Federal Republic of Germany and their total output exceeded the 1 000 tonnes mark for the first time in 2006. This production method is used to produce relatively high-priced fish species such as eel, European catfish, carp for stocking, sturgeon, striped bass and pike-perch with a total value of around EUR 13 million. Furthermore, minor quantities of rainbow trout, sturgeon, carp and pike-perch are produced in around 20 net cage systems, their value adds up to around EUR 1 million.

Government financial transfers

Within the scope of the Common Fisheries Policy, Germany was provided government Financial Transfers (GFT) in the amount of EUR 216 million from the FIFG Structural Fund (Financial Instrument for Fisheries Guidance) for the period between 2000 and 2006. Responsibility for the implementation of funding programs lies with the Länder, the federal government plays only a minor role. Funding priorities from 2000 to 2006 included the following sectors:

- Processing and marketing.
- Fishing port facilities.
- Modernisation of vessels.
- Aquaculture.
- Innovative measures.

The follow-up arrangement for the FIFG, the European Fisheries Fund (EFF), was adopted in June 2006. EFF-funding for Germany amounts to EUR 155 million for the period 2007 to 2013 (see contribution of the European Union).

Markets and trade

With regard to the eco-labelling of fisheries products, an agreement was reached at the EU level that the Community should set minimum requirements, but leave the detailed arrangements to the economic operators. In Germany, the round table for sustainable fisheries and eco-labelling of fishery products was established in this connection in November 2007. A working group composed of representatives of the fish industry, trade as well as consumer and environmental action groups is currently working out a proposal for the setting of minimum criteria to certify sustainable fisheries that Germany intends to bring in into the legislative procedure at EU level. Another working group addresses the problem of improving the consumer information regarding a more detailed indication of fishing grounds in the sale of fishery products to ultimate consumers.

The share of aquaculture fishery products in the German market is steadily growing. Hence, fishery products from the category "freshwater fish" (including salmon) that mainly contains fish from aquaculture covered almost 21% of the entire domestic market for fishery products in 2007. Crustaceans and molluscs that are partly provided by aquaculture also showed an upward trend with a market share of around 11%.

Outlook

The dominance of import trade in the market supply with fishery products is reflected in the negative balance of trade for this economic sector.

	Import		Export		Balance of trade	
	Quantity (tonnes)	Value (000 EUR)	Quantity (tonnes)	Value (000 EUR)	Quantity (tonnes)	Value (000 EUR)
2006	908 560	2 947 845	541 591	1 349 807	–366 969	–1 598 038
2007	906 748	2 940 150	468 046	1 348 860	–438 702	–1 591 290

The dependence on imports was particularly high for frozen white fish fillets, salmon and tuna products. The share of German catches in the total volume of mackerel catches indicates a tendency upwards and already amounted to 58% in 2007. Traditionally, commercial transactions have mainly been conducted with partners from third countries. 37% of deliveries originated in the Community. China replaced Norway in 2007 as the most important single supplier of fish and fishery products and ensured the market supply in Germany, notably in the case of frozen fillets.

PART III

Chapter 10

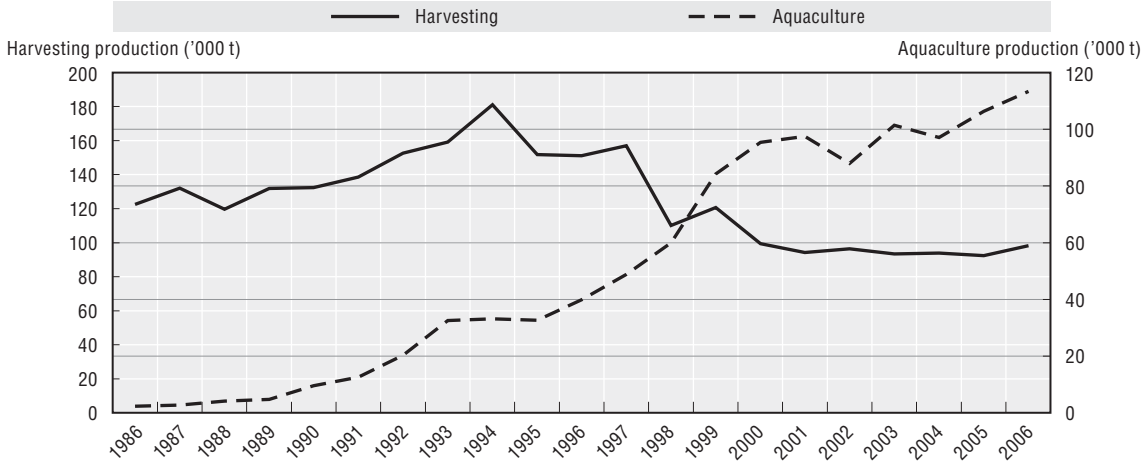
Greece

Greece

Summary of recent developments

- The marine fisheries and aquaculture sector are very important to Greece due to its economic, social and cultural contribution to coastal areas, both for islands and mainland Greece. Significant aquaculture development has resulted in remarkable results not only regarding the production of domestic fresh, cheap and high quality fish (especially seabass and gilthead seabream), but also the creation of a socio-economic structure that directly and indirectly involves thousands of employees, particularly in the fisheries-dependent areas of the country. In addition, mariculture is the only productive activity that has colonized uninhabited islands and rock-islands which are normally excluded from other investments.
- Greek policy in the aquaculture sector aims to increase the supply of products with high nutritional value and quality at satisfactory prices; improve production conditions while decreasing production costs; ensure rational fishing management of inland waters; reduce fish imports and increase exports; increase the number of employment opportunities and working conditions especially on small islands and in poor regions as well as equality between men and women; differentiate fishery production by adopting new technologies in the culture of aquatic species; adopt measures for environmental protection; and improve competitiveness as well as the commercial and administrative organisation of aquaculture companies by introducing new technologies and better terms in co-operation among companies.

Harvesting and aquaculture production

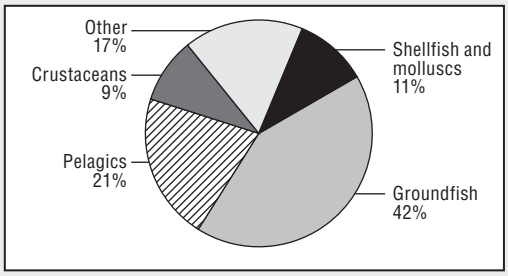


Source: FAO.

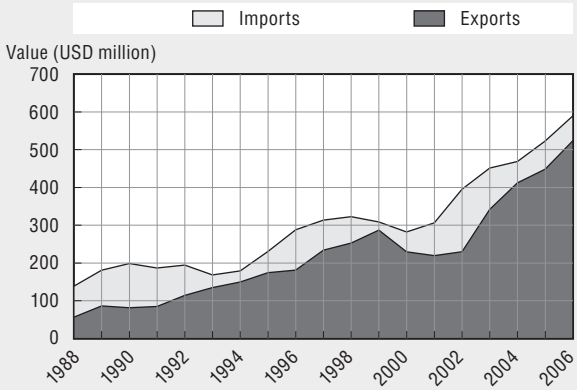
Key characteristics of the sector

- Aquaculture production has risen steadily in Greece and production now exceeds capture fisheries supply. The main capture species are anchovies, sardines, hakes and bogues.
- Greece's main export market is other EU countries, with over half of production of fish and shellfish species directed to Italy, Spain, the UK and Germany.
- Aquaculture is a significant sector in Greece that contributes 53% to total fisheries production. In 2006, aquaculture reached 113 092 tonnes corresponding to EUR 382 million. About 70% of this production and 90% of the value comes from marine finfish aquaculture. The proportion of shellfish products corresponds to 25%. Seabream and seabass are the main species farmed in Greece, although tuna fattening is also increasing significantly.

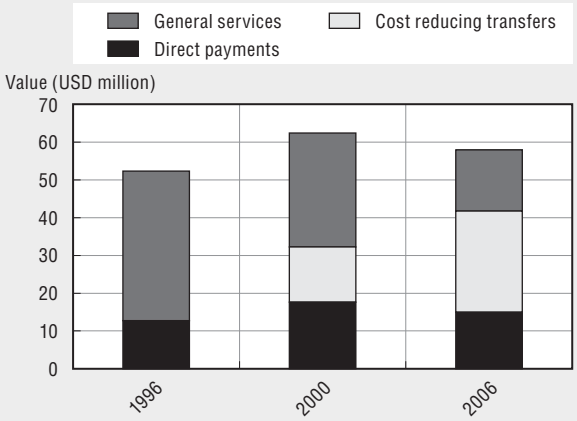
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	40 145[1]	30 040
Number of fish farmers	4 850[1]	6 653
Total number of vessels	11 524	17 854
Total tonnage of the fleet	123 406	92 527

1. 1998 Data.

Legal and institutional framework

The Ministry of Rural Development and Food (MRDF) has authority over the marine fisheries sector at the national level. The Ministry also has responsibility for the implementation of the Common Fisheries Policy and of national measures for the conservation and management of fish stocks. Furthermore, the MRDF has responsibility for issuing additional regulatory measures for the performance of capture fisheries in Greek territorial waters.

Capture fisheries

The Greek fishing fleet consists of three basic vessel categories according to activity:

i) fishing vessels equipped with static gears;

ii) fishing vessels fishing with trawls;

iii) fishing vessels fishing with surrounding nets.

Vessels must have both a professional fishing license and a specific fishing permit for one year in order to be able to fish. Predominant fishing vessels (93.8%) are small scale coastal fishing vessels (total length less than 12 m).

Fishing in national territorial waters is only permitted by vessels flying the Greek flag and holding a fishing license. Fishing in international waters is only permitted by professional fishing vessels, provided that they are supplied with specific permission to fish for one year.

Stock assessments are focused on the most important species that constitute the target of fishing activities and utilize studies and research programs. Current results reflect the fact that the status of certain fish stocks are declining, despite a reduction in fishing capacity (being also a goal for the future) achieved by the implementation of the 3rd ommunity Frame of Support that has decreased pressure on fish stocks to a certain degree. After the yearly quota for bluefin tuna is exhausted, fishing permits for this species are rescinded. Fishing for swordfish was prohibited from 15 October until 15 November 2008 and all fishing, trade and retail of swordfish is prohibited during October, November, December and January each year.

Within the framework of fishing agreements concluded between the EU and third countries, Greece took advantage of a percentage of the fishing capacity that was assigned to her from the Community share, based on her historical rights. She also made use of the fishing possibilities that were assigned to her by other member states after being partially used by them.

Management

The management of the fishing fleet follows the rules of the EU Common Fisheries Policy in accordance with which the member states apply measures to adjust fishing fleet capacity in order to achieve a stable balance between fishing capacity and fishing possibilities. National Greek legislation specifically deals with: area and time restrictions; the technical specifications for fishing gears; minimum size of harvested species; the regime of issuing general licenses and special fishing permits.

The control of fishing activities and the enforcement of current legislation is performed by the competent authorities of the Ministry of Mercantile Marine, Aegean and Island Policy, following the National, Community and International legislations. In case of

confirmation of infringement, administrative penalties are imposed (such as a fine, or temporary or permanent withdrawal of the vessel and captain's fishing license, seizure of illegal gear, fish catches, etc.).

The total number of the certified infringements, for which administrative penalties were imposed, is 439 infringements with fines totally EUR 375 767 in 2006 and 516 infringements with fines totally EUR 406 013 in 2007.

Recreational fishing

Recreational fishers numbered approximately 230 000 in 2006 and remained stable for 2007.

Recreational fishing is regulated by National and Community legislation. National legislation includes provisions concerning the use of specific fishing gears, the determination of the highest permitted fishing quantities as well as time and local closures. Trade of catches is prohibited by amateurs. The above provisions are stricter than the relative Community legislation.

Aquaculture

In 2006, the total number of aquaculture farms reached 1 046 units. The number of mariculture farms was 329 farms. The production systems are mainly open water containment systems (cages) and the main species produced are Gilthead seabream (53%) and Seabass (41%). New species like Common seabream, Sharpsnout seabream, White seabream, Red porgy and Common dentex are beginning to make their way into the industry.

The marine aquaculture sector also includes shellfish-farms (602 in 2006), mainly located in the Northern part of Greece. Freshwater aquaculture includes 109 farms producing rainbow trout (88 farms), salmon, eel and carp. Recent business activity, has led to remarkable investments in infrastructure, technology and knowledge, and to high economical profits through exports of the products.

The quantities of bluefin tuna encaged for fattening purposes during 2006 were 560 tonnes and 432 tonnes during 2007. The quantities of bluefin tuna marketed during 2007 were 581 tonnes. In 2007, a second Bluefin Tuna farm was authorised to conduct fattening operations on bluefin tuna caught in the ICCAT Convention area. The farm has been declared in the ICCAT Register of bluefin tuna fattening farms.

All farming of fish and shellfish in Greece require a license from the Regional Fisheries Authorities. There is also a system of limited entry for seabass and Gilthead seabream in order to control their production. No new licenses have been issued since August 1994. A limited entry of new licenses is in place for some Mediterranean species such as common seabream, sharpsnout seabream, white seabream, Red porgy and common dentex.

The development and management of the aquaculture sector is implemented in multiannual or annual action projects by the Ministry of Rural Development and Food (MRDF) – General Directorate for Fisheries and within the framework of the Common Fisheries Policy (CFP) of the European Union. These policies are implemented through financial contributions provided by the "Community Support Framework" within the framework of EC Regulation 2792/99 and the "Operational Program for Fisheries" for the period 2000-06 drawn up by Greece. This program includes measures and actions eligible for financing in the aquaculture sector.

Government financial transfers

During 2006-2007, the European Financial Instrument for Fisheries Guidance and national credits assisted with the implementation of several measures and actions concerning:

- The adaptation of fishing effort.
- The renewal and modernization of fishing vessels.
- Accompanying measures with a socio-economic character.
- Appropriate measures for the support and enforcement of small scale coastal fishing.

The European Fund for Fisheries Guidance plus national contributions also assisted projects for the construction, extension and improvement (modernisation) of fishing ports, especially in remote island groups and in areas directly dependent on fisheries.

Markets and trade

The main species captured are anchovies, sardines, hakes and bogues. A promotional effort began in 2007 aiming at providing better knowledge of sea-bass and sea-bream farming to consumers. The project has a budget of EUR 3 000 000 until October 2008.

Outlook

In order to develop, restructure and improve aquaculture sites in coastal zones, a number of studies have been promoted especially for areas with organized development of aquaculture activity. Pilot projects and applied research were financed in order to obtain knowledge about new species and innovative aquaculture techniques. Collective actions were supported with a view to improving monitoring, protection of the environment and product safety. In 2007, a new Ministerial Decision was issued to regulate the licences regarding cultured species in marine fish farms in order to reduce administrative burden.

PART III

Chapter 11

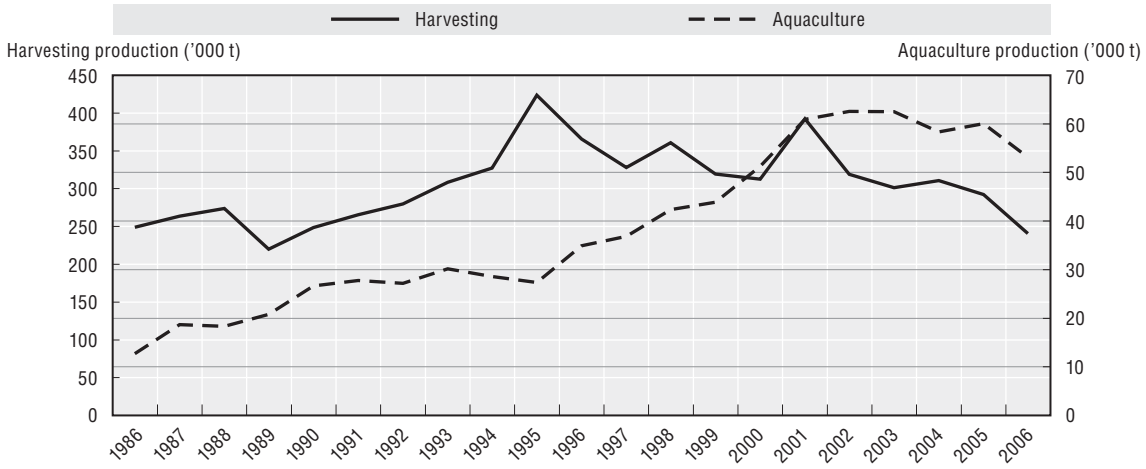
Ireland

Ireland

Summary of recent developments

- The need to ensure sustainable development of fisheries remains of the highest priority, with scientific advice remaining pessimistic for many stocks. At national level, the National Seafood Strategy Report was launched in January 2007 followed by the constitution of an implementation group representing each aspect of the seafood industry, state agencies and the Department of Agriculture, Fisheries and Food.
- The need for greater stakeholder involvement in fisheries management has been addressed with the establishment of Regional Advisory Councils.
- Late in 2008 the government announced its intention to rationalise a number of State Agencies and this included the establishment of a single National Inland Fisheries Board which will subsume the functions of the existing Central and Regional Fisheries Boards.

Harvesting and aquaculture production

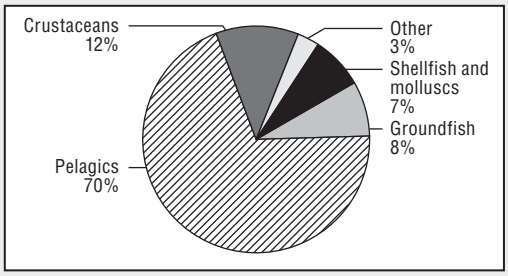


Source: FAO.

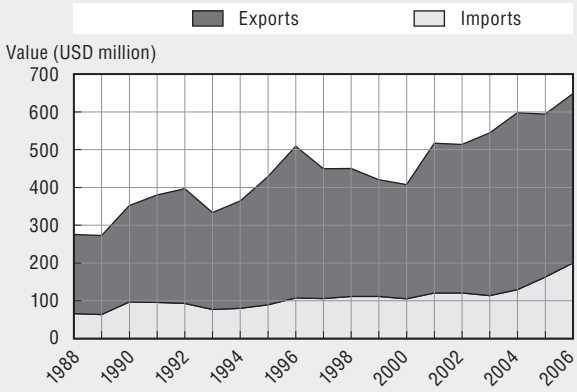
Key characteristics of the sector

- In 2006, landings of fish (quota and non-quota species) by Irish registered vessels totaled almost 267 817 tonnes with a total value of EUR 203.3 million. In 2007 the total volume was 214 818 tonnes with a corresponding value of EUR 272.7 million. Aquaculture production decreased from 57 422 tonnes in 2006 to 48 350 tonnes in 2007 while the corresponding values also decreased from EUR 124.7 million (2006) to EUR 105.7 million (2007).
- The Irish fishery production is by far dominated by pelagic species, in particular mackerel and herring.
- The total export value increased considerably until 2006 and slightly dropped since then. Except for mussel and horse mackerel, the per unit export value increased for the other export species between 2006 and 2008.
- GFT dropped considerably over the last decade and consist now mainly of EU-wide taxation arrangements concerning fuel.
- The tonnage of the Irish fleet increased by about 30% of the past 10 years even though the number of vessels decreased.

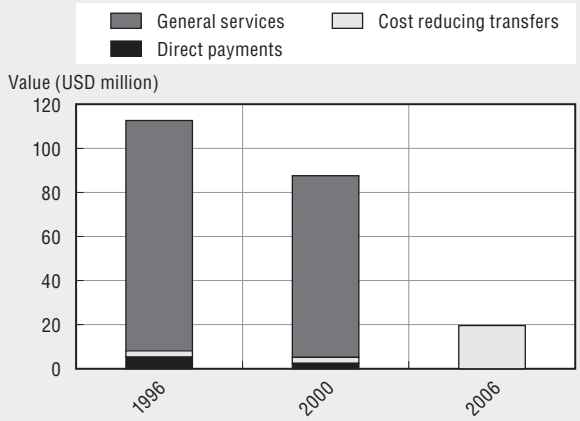
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	10 040[1]	4 226
Number of fish farmers	2 638[1]	2 058
Total number of vessels	1 249	1 932
Total tonnage of the fleet	61 128	80 634

1. 1998 data.

Legal and institutional framework

As a member of the European Union, Ireland implements fisheries policies which are decided at European level in the context of the Common Fisheries Policy (CFP), which was revised in 2002. Within this framework, Ireland implements policy at central government level through the Department of Agriculture, Fisheries and Food. The national legal framework comprises the Fisheries Acts, 1959 to 2006. Statutory Instruments are promulgated under this framework for such measures as quota management, fishery closures, licensing regimes, effort control and technical conservation measures. In the period in question a review of the existing national legislation in this area commenced with a view to updating it to ensure Ireland's compliance with the obligations of the CFP. This review was completed early in 2006 with a new Act, the Sea Fisheries and Maritime Jurisdiction Act 2006, enacted on 4 April 2006. This Act, coupled with a further Act introduced in 2003, means that the national framework for the implementation of sea fisheries law has been totally updated. This modern legal framework will ensure our full and continued compliance with the control obligations of the Common Fisheries Policy (CFP) and to allow for the implementation of the CFP. This enactment allows for the introduction of secondary legislation (Statutory Instruments) to bring into force EU and national control and conservation measures In addition new Fishery Management Notices are now in place to provide for management of Ireland's quota and fishing effort entitlements.

Capture fisheries

Table III.11.1. **Landings in volume and value (2006-2007)**

	Volume (tonnes)		Value (EUR million)	
	2006	2007	2006	2007
Deepwater	1 662	681	2.031	0.594
Demersal	23 690	42 258	48.048	58.656
Pelagic	192 281	146 137	73.255	142.634
Shellfish	50 184	25 742	79.994	70.844
Total	267 817	214 818	203.330	272.728

Total seafood sales on both domestic and export markets, excluding direct landings for Irish vessels into foreign ports, amounted to EUR 731 million in 2008, a decline of 3.5% on the corresponding value in 2007 reflecting adverse currency movements and rising consumer demand for lower valued seafood products. Of this total, seafood sales on the domestic market amounted to EUR 381 million while export sales totalled EUR 350 million.

In total approximately 11 000 people are employed directly in the sea fishing, aquaculture and support industries.

In terms of waters adjacent to Ireland, stocks in particular difficulty according to scientific advice include cod in Area VIa (which includes waters to the west and north of Ireland) and the Irish Sea. These stocks are subject to recovery plans.

Pelagic fisheries

The term "pressure stock" is applied to certain, high demand species. Such species are subject to additional management measures controlling times, areas and weekly or monthly amounts fished. An added stipulation requires early notification of intention to

fish. Open and closed seasons are imposed where necessary. At present the following are considered pressure stocks:

- Western Mackerel – In ICES Divisions IV, Vb, VI, VII.
- North West Herring – In ICES Divisions VIa(N), VIa(S)/VIIbc.
- Celtic Sea Herring – In ICES Divisions VIIfghjk.
- Horse Mackerel – In ICES Divisions Vb, (EC Waters), VI, VII, VIIIabde, XII, XIV.

In addition to requiring sea fishing boat licenses, participants in the above fisheries must hold current authorisations. Only one Management Advisory Committee is in operation (Celtic Sea Herring Management Advisory Committee).

Demersal fisheries

Key whitefish stocks of importance to Ireland are managed monthly. A whitefish quota management committee, comprising of members of the industry and national administration officials, meets monthly to undertake detailed analysis of key stocks including Cod, Haddock, Whiting, Hake, Monk, Megrim, nephrops, Sole and Plaice, as well as deep sea species (see below). The majority of quota fisheries are controlled by means of separate Fishery Management Orders made by the Minister which restrict the fisheries as necessary, by setting catch limits per boat, according to the size of the vessel based on recommendations of the committee. The principal objective is to maintain access on an equitable basis throughout the year. Practical implementation of management regimes falls to Sea Fisheries Protection Officers on land, and the Naval Service at sea.

Deep water species

Total allowable catches (TACs) for deep water species were adopted for the first time in 2002 (fixing quotas for 2003 and 2004). In December 2006 Total Allowable Catches were fixed for the years 2007 and 2008. Quotas for the following stocks were available in 2007 and 2008:

- Black Scabbardfish – In ICES Divisions V, VI, VII, XII (EC Waters).
- Greater silver smelt – In ICES Divisions III, IV, V, VI, VII, (EC Waters).
- Tusk – In ICES Divisions V, VI, VII (EC Waters).
- Roundnose grenadier – In ICES Divisions Vb, VI, VII, (EC Waters).
- Blue ling – In ICES Divisions II, IV, V, (EC Waters).
- Ling – In ICES Divisions VI, VII, VIII, IX, X, XII, XIV, (EC Waters).
- Red seabream – In ICES Divisions VI, VII, VIII, (EC Waters).
- Deep sea sharks – in ICES Divisions V, VI, VII, VIII, IX, X, XII.
- Forkbeards- in ICES Divisions V, VI, VII.

Under the EU Regulation adopted in 2002, and implemented at national level by Statutory Instrument, participants in this fishery are required to hold a permit (fishing authorisation), which is granted to an applicant who has met criteria as laid down in the Statutory Instrument.

Participants in this fishery are then issued with monthly notifications advising them of catch restriction limits. These monthly limits are set following consultation with the industry and take into account the uptake to date of the available quota.

Salmon management and alignment with scientific advice

International best practice for the management of North Atlantic Salmon requires the adoption of the precautionary approach and the cessation of indiscriminate mixed stock fisheries. These are the recommendations of the International Council for the Exploitation of the Sea and the North Atlantic Salmon Conservation Organisation (NASCO). In 2006 the government reaffirmed its commitment to manage the wild salmon fishery in line with the scientific advice from 2007 onwards in the interests of conservation of wild stocks and the following year essentially closed the Irish mixed stock salmon fishery (principally drift nets and some coastal draft nets).

Under the Fisheries Acts, a suite of Regulations and Conservation Bye-Laws are in place to protect species such as salmon and sea trout. The principal conservation measures are enshrined in the Wild Salmon and Sea Trout Tagging Scheme Regulations, which are revised on an annual basis and provide for the introduction of salmon conservation measures. Since 2007, the harvest of salmon, by commercial and recreational (angling) means, has been restricted to those stocks of rivers that are meeting their conservation limits.

Recognising that compliance with scientific advice would mean hardship for commercial fishermen and vulnerable coastal communities, the government introduced a hardship scheme for the fishermen affected by the decision to move to single stock salmon fishing. A fund of EUR 30 million was allocated for the purpose and 1 171 former licence holders received payments aligned with the previous catch history on the basis that they undertook not to engage in the fishery in future.

The policy of aligning with scientific advice has delivered significant overall catch reductions, aimed at achieving the government's prime objective of restoration of wild salmon stocks. The total catch and total allowable catch for each of the years since 2004 is set out in the following table:

Table III.11.2. **Total catch and total allowable catch 2004-2008**

	TAC number of salmon	Commercial catch	Angling	Total catch
2004	161 951	143 606	26 202	169 808
2005	139 900	121 180	22 361	143 541
2006	91 367	86 176	22 485	108 661
2007	64 011	8 843	19 430	28 273
2008	81 766	8 903	22 215	31 118

According to catch statistics the total number of salmon, taken by all methods of fishing has dropped by 88% from 259 475 in 2001 to 31 118 in 2008. In 2008 the *ad-hoc* Review Group established by NASCO to review salmon management congratulated Ireland on the major improvements in recent years in the management of its salmon fisheries.

Following the prohibition on mixed stock fishing the Standing Scientific Committee noted that as anticipated in 2007 all salmon indices (including counters) went up significantly. This increase would roughly equate to the reduction in exploitation as a result of the closure of the mixed stock fishery. In 2008, however, with the exception of a limited number of systems nearly all indices were down with some significant drops. They

cautioned that it is likely that this reflects the persistent downward trend in marine survival which is pervasive throughout all the North Atlantic stock complexes and is as reported by the International Council for the Exploration of the Sea. Worryingly in 2008 Irish marine survival indices were at their lowest since records began in the 1980s.

EU eel Regulation

The EU brought forward Council Regulation 1100/2007 the purpose of which is the establishment of a new framework for the protection and sustainable use of the stock of European eel. The objective of the Regulation is to achieve recovery of the stock to previous high levels. Conservation bye-laws were introduced in May 2008 as a step towards the conservation measures necessary. These capped the number of licences and restricted the season. In addition a draft Eel Management Plan (EMP) was prepared and submitted to the EU Commission in accordance with the Regulation.

Restructuring

Late in 2008 the government announced its intention to rationalise a number of State Agencies and this included the establishment of a single National Inland Fisheries Board which will subsume the functions of the existing Central and Regional Fisheries Boards.

Access to waters outside EU

Ireland participates in the "northern" pelagic agreements which the EU negotiates with Norway, the Faroe Islands, Iceland and Greenland, with particular interest in mackerel, herring (Atlanto-Scandean), horse mackerel and blue whiting. It also participates in the albacore tuna fishery (Atlantic Ocean north of 5° North) regulated by ICCAT. There are few vessels which partake in more distant water fisheries. Participation by foreign (EU and non-EU) vessels in Irish waters is governed at EU level under the CFP. However, the control and monitoring of this is enforced by the Irish authorities.

Management

With annual quotas imposed on all the principal species at EU level, the objective of fisheries management is to regulate and maximise the catching, sale and processing of fish within the limits set. Each month, on the basis of national quota allocations, the Department of Agriculture, Fisheries and Food, following consultation with the industry, decides on management regimes for the following month. These management regimes involve catch limitations per vessel and are implemented by means of Fishery Management Notices.

Preparation of a new National Biodiversity Action Plan was commenced by the Department of the Environment, Heritage and Local government in 2008. It is expected that the new plan will encompass measures to reduce adverse effects of marine fisheries and aquaculture on biodiversity.

In July 2003 ECOPACT, an Environmental Code of Practice for Aquaculture Companies and Traders, was launched. The ECOPACT initiative made considerable progress over the period 2006-2008 with 70 participants, as the process starts to gain recognition across the spectrum of producers.

ECOPACT is an initiative designed to bring Environmental Management Systems (EMS) into the Irish aquaculture industry. The adoption of a formal system of environmental

management by an aquaculture company represents a strong commitment to environmentally sustainable operations to a standard beyond legislative compliance in Ireland

Eco-Label for mussels and salmon has been developed, taking the basis of the Environmental Management System (EMS) for aquaculture ECOPACT, and using this to establish an environmental standard tailored to salmon and mussel production. The Eco-Label follows the FAO guidelines for eco-labelling marine fishery products for sustainable use of resources, sound management practices and consideration to ecosystem impact.

Recreational fishing

The Department of Communications, Energy and Natural Resources, Inland Fisheries Division, has overall policy responsibility for ensuring the effective conservation of inland fish habitats and stocks and facilitation of the exploitation of the resource on an equitable and sustainable basis. The Central Fisheries Board is responsible for policy advice, administration of national and EU funding programs, promotion and marketing of angling, management of fish rearing operations and co-ordination of the work of the seven Regional Fisheries Boards. The Regional Fisheries Boards are themselves responsible for conservation, management, promotion and development of the fisheries and ensuring compliance with environmental legislation such as the EU Habitats and Water Framework Directives. The responsibilities of the boards also extend to coastal waters within the 12-mile limit. Finally, the Loughs Agency is an agency of the Foyle, Carlingford and Irish Lights Commission established under the British-Irish Agreement Act 1999 to provide the effective conservation, management, promotion and development of the fisheries and marine resources of the Foyle and Carlingford areas.

In 2006 the government introduced conservation Bye-Laws limiting the catch of coarse fish by recreational anglers.

Aquaculture

Work on the Irish Quality Oyster scheme was completed. The document includes standards for sourcing, production, harvesting, handling, packing and distribution of Oysters. It includes requirements for hygiene, food safety, traceability, methods of control and inspection of product quality criteria according to a detailed Product Specification. The specification includes criteria for shell shape, size, fouling, meat yield and microbiological criteria.

In the salmon sector, a low level of supply over the last number of years has meant that the industry has been channelled into niche markets such as organic. This has proved a very successful strategy due to the high value of organic products in the marketplace. To service this organic sector, the Irish Quality Salmon scheme has added an organic standard to the suite. The standard has been developed in accordance with the requirements of EN45011 Product Quality Certification.

In 2007, there were a total of 1 981 people employed in the aquaculture industry, of which 686 were in full time employment, 478 were in part time employment and 817 were employed on a casual basis. There was a slight fall of 3.5% in overall aquaculture employment in 2007.

Table III.11.3. **Total aquaculture production (volume and value) 2006-2007**

Species	Volume (tonnes)		Value (EUR '000)	
	2006	2007	2006	2007
Rope mussel	9 660	11 200	7 177	7 784
Relaid rope mussel seed	4 300	0	1 935	0
Bottom mussel	23 583	18 270	35 789	20 906
Gigas oyster	6 511	7 032	14 623	15 390
Native oyster	360	382	1 941	1 630
Clam	245	170	1 382	1 038
Scallop	37	58	200	339
Shellfish other[1]			201	204
Total shellfish	**44 696**	**37 112**	**63 248**	**47 291**
Salmon ova/smolt[1]			3 378	2 869
Salmon	11 174	9 923	52 711	51 294
Sea reared trout	546	507	2 444	1 932
Freshwater trout	970	760	2 658	2 027
Other finfish	36	48	221	317
Total finfish	**12 726**	**11 238**	**61 412**	**58 439**
Total aquaculture	**57 422**	**48 350**	**124 660**	**105 730**

1. This category is expressed as individuals so is not included as a tonnage.
2. This includes additional value from sales of juveniles, etc.

Table III.11.4. **Aquaculture production by species**

Year 2007

	Number of producers	Max. employment
Abalone	3	13
Arctic charr	2	3
Bottom mussel	36	295
Clam	7	34
Freshwater trout	4	21
Gigas oyster	109	566
Lobster	1	2
Native oyster	Co-Ops	428
Ornamental fish	1	1
Perch	4	4
Rope mussel	59	313
Salmon	12	196
Scallop	4	39
Sea Reared trout	2	10
Smolt	6	54
Urchin	1	2

Government financial transfers

For the two years under review, the following direct payments (capital grants) were made to the sector.

Other than the application of EU-wide taxation arrangements concerning fuel, cost-reducing transfers are not a feature of the sector.

A social welfare scheme entitled “Fishing Assist” is available for fishermen, which provides a level of assistance in the absence of fishing activity for a minimum specified period.

Table III.11.5. **Government financial transfers**

	Grants paid (EUR Million)	
	2006	2007
Fleet and fisheries	16.005	4.783
Aquaculture	3.571	3.992
Processing and marketing	1.941	1.523
Total	**21.517**	**10.928**

In 2008 a decommissioning scheme for fishing vessels over 18 m in overall length was introduced. This scheme which was completed in 2009 involved the decommissioning of 46 boats, comprising 6 913 GT and 19 356 kW.

Markets and trade

Trends in domestic consumption

Research carried out by BIM, the Irish Sea Fisheries Board, shows a steady increase in national seafood consumption levels. Research carried out in November 2003 showed 76% of adults served any kind of fish in the home in the two-week period preceding the research, with 43% of households served fresh whitefish, 35% frozen fish and 15% fresh salmon. The latest research findings from BIM (2008) show that salmon, cod and prawns continue to be the preferred seafood for domestic consumers. Fillet fish has performed well (33% of sales) while breaded and smoked varieties comprise the other main market areas.

On the home market, BIM continue to work on initiatives which help to enhance marketing effort and expertise within the sector.

To assure consumers that Irish seafood meets the highest standards through every stage of catching and production, BIM has developed the Quality Seafood Program (QSP).

BIM continued to be active in promotional campaigns and at trade events overseas, in conjunction with other agencies, in the years under review.

Table III.11.6. **Key fish exports by product form**

Calendar year: 2006-2008

	2006		2007		2008	
	EUR	Tonnes	EUR	Tonnes	EUR	Tonnes
Mackerel	63 207 240	44 506	61 516 270	46 648	72 881 970	45 762
Herring	21 823 170	26 435	17 121 820	19 980	27 144 510	26 839
Horse mackerel	13 285 940	21 136	17 956 280	27 230	23 421 640	33 939
Crab	30 962 110	7 887	30 373 360	8 600	26 095 040	5 202
Mussels	42 719 780	20 466	33 150 190	15 536	23 864 780	12 473
Salmon	36 491 740	6 262	21 503 720	3 685	14 560 660	2 288
Prawn	28 370 920	4 291	37 054 210	6 196	29 825 730	4 283
Whitefish	69 940 680	22 892	66 135 950	28 869	41 617 720	13 565

In 2008 Irish seafood exports amounted to just over 155 000 tonnes valued at almost EUR 334 million. This represents an overall decline of almost 3% in value from EUR 362 million achieved in 2006 for over 160 000 tonnes.

Sales of salmon emerged as the seafood sector's star performer where sales increased by 13% in 2008 to EUR 58.7 million. Pre-packed sales of salmon were up a substantial 28.8% on 2007. The pelagic sector also performed well where sales of mackerel, horse mackerel, blue whiting and herring reached EUR 130 million. Total retail sales volume of all seafood increased by 12% in 2008 while the value of these sales increased by 3.2% to EUR 185.8 million.

Total seafood sales on both domestic and export markets, excluding direct landings for Irish vessels into foreign ports, amounted to EUR 731 million in 2008, a decline of 3.5% on the corresponding value in 2007 reflecting adverse currency movements and rising consumer demand for lower valued seafood products. Of this total, seafood sales on the domestic market amounted to EUR 381 million while export sales totalled EUR 350 million.

Within the EU, the main countries exported to in 2008 were France (EUR 75 million), UK (EUR 64 million), Spain (EUR 47 million), Germany (EUR 20 million) and Italy (EUR 15 million). In general, there has been a decline over the 2006 to 2008 period in trade with the main EU markets. Sterling weakness in particular in 2008 had a significant impact on export values. However gains have been made outside the EU, where the main countries exported to were Nigeria (EUR 22 million), Russia (EUR 17 million) and Egypt (EUR 9 million).

Food safety

In 2006 the regulatory framework underpinning food safety including seafood safety underwent a fundamental change, with the implementation of a group of EU regulations called the [ldquoe]Hygiene Package' designed to merge, harmonise and simplify the legal basis. In general terms, specific obligations of food business operators regarding necessary standards for placing seafood on the market were not subject to significant alteration by the introduction of this legislation. However the overarching ethos of the new Hygiene Package included some important shifts in emphasis. One example was applicability for all stages of the food chain from primary producers such as fishers or aquaculture producers right through to retail. A further example is the clear onus of responsibility for safety of food on food business operators, with the role of authorities becoming the verification of compliance.

An underlying tenet of this legislation is a risk-based approach to issues, with proportional responses and flexibility where appropriate. Harmonised interpretation and implementation in seafood sector has been progressed by devising agreed codes of practice *e.g.* on microbiological classification of shellfish production areas and bitotoxin monitoring of shellfish production areas. A specific requirement of this legislation is the need for all food business operators to be registered, and, for some food business operations typically processing, to be approved by the competent authority and these processes have taken place in Ireland.

Since July 2003, in accordance with the requirements of Council Regulation No. 104/2000 (EC), labelling system giving traceability information in respect of a wide range of seafood and aquaculture products has been in operation in Ireland under the terms of S.I. No. 320 of 2003. In addition to general EU food law, and general labelling regulations, which prohibit the misleading of consumers, these regulations require specific ancillary information to accompany fishery products and be provided to consumers, *e.g.* species name, production type (wild-caught or farmed) and catch area if wild caught. Official controls throughout the sea-food-chain, have continued to verify compliance with these requirements to ensure the provision of accurate information to consumers.

Effective marketing of fish products continues to receive high priority. A Quality Seafood Program is in place, which is designed to deliver a more integrated approach along the supply chain. During the period under review, work was also progressed in relation to the development of species-specific supply guides.

The period under review has seen a general consolidation in terms of processing facilities, with a smaller number of larger plants, and a concentration on value-added product, due to smaller volumes available for processing. On board, support was given towards promoting quality of fish and on-board processing.

Outlook

The need to ensure sustainable development of fisheries remains of the highest priority, with scientific advice remaining pessimistic for many stocks. At national level, the *National Seafood Strategy Report* was launched in January 2007 followed by the constitution of an implementation group representing each aspect of the seafood industry, state agencies and the Department of Agriculture, Fisheries and Food. The main areas of focus for the group comprise:

- market development;
- market-led innovation;
- development and restructuring of the processing sector;
- fleet restructuring and development;
- fisheries management;
- aquaculture development;
- enhancing competitiveness;
- the marine environment and conservation;
- education and training, and
- improved industry relations.

The need for enhanced and consistent control and monitoring is another high priority for Ireland. The Common Fisheries Policy has placed particular emphasis on this area and measures are planned within this framework in the coming years.

The need for greater stakeholder involvement in fisheries management has been addressed with the establishment of Regional Advisory Councils. This is a development greatly welcomed by Ireland at both administrative and industry level. At national level advisory committees have been established for key inshore fisheries, which are involved in the development of local management plans. The planned review of the CFP by 2012 is a priority for Ireland and Ireland is currently involved in intensive consultation with the stakeholders to inform Ireland's priorities in the reform process.

PART III

Chapter 12

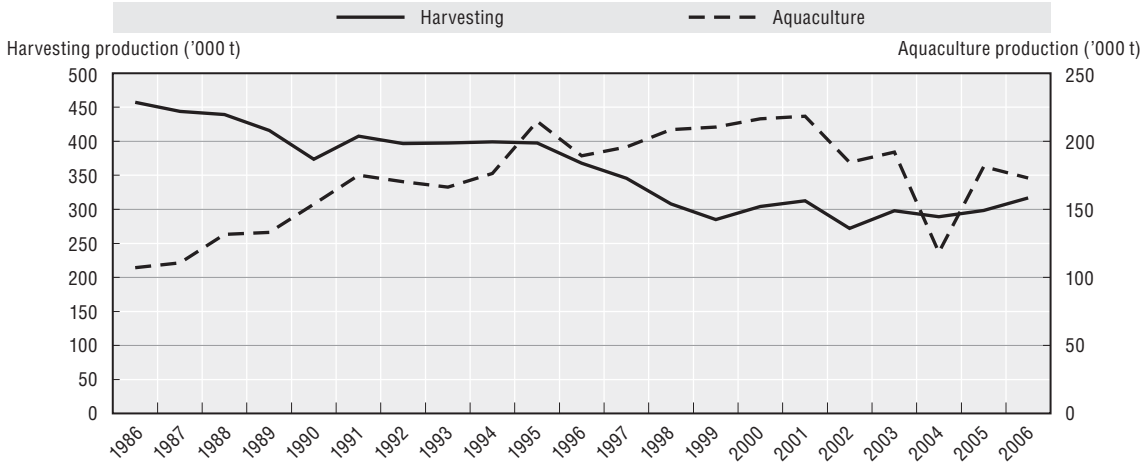
Italy

Italy

Summary of recent developments

- Over the past years few years, fish production has shown a steady decline. In the period 2000 to 2007, landings decreased by 40%. The persistency of productive decline is mainly related to the reduction of activity and capacity that affected most fleet segments. In 2007, total fish catch was 267 368 tonnes, a decrease of 6% compared to 2006. The value of landings amounted to EUR 1.3 billion. In comparison with 2006, the value of landings fell by 11%.
- In 2007, domestic consumption of fish decreased to 450 200 tonnes, a reduction of 1.2% compared to 2006 and reversing the positive trend of the previous three-year period. In value terms, expenditure remained stable at around EUR 4.4 billion. Over the same period the average price of fish products increased by 1.2%. Household purchases of fish amounted to 21.5 kg per EUR 199.

Harvesting and aquaculture production

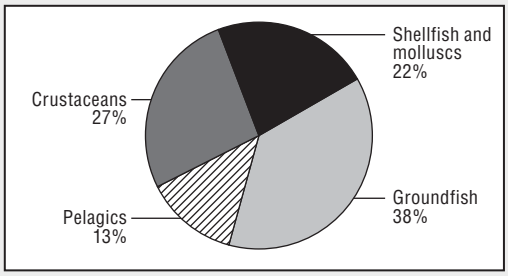


Source: FAO.

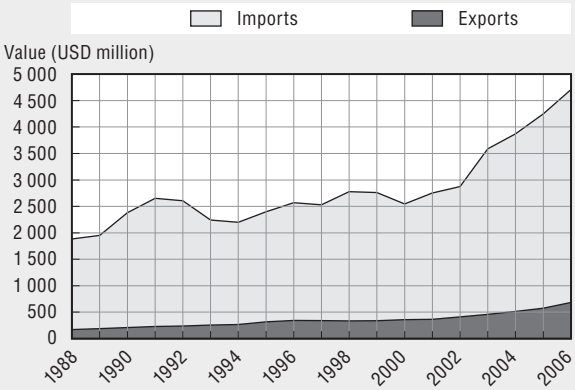
Key characteristics of the sector

- In 2007, the national fleet consisted of 13 955 vessels, of which around 9 000 were classified as belonging to the small scale fishery. The average vessel is 3.6 metres long, with 80 kW and a crew of 2.4 men. The fleet is characterised by a strong multi-specificity and multi-gear activity. Landings from the Adriatic Sea and Sicily Channel account for almost two thirds of national production. Over the last seven years, the fleet has been affected by a continuous decrease in all technical parameters. The fleet has decreased by 18% in number and by 12% in total tonnage.
- Fishing vessels are categorized by their characteristics and area of operation *i.e.* coastal, offshore, Mediterranean and high seas. Except for 1% of vessels operating in the Mediterranean and high seas, the majority of vessels operate in coastal waters around the Italian peninsula. The small-scale fishery has the greatest number of vessels, representing 66% of the total. This segment covers vessels using passive gears (mainly fixed nets), which are less than 12 metres in length. The small scale fishery accounts for more than a quarter of national landings by value. Small-scale fishermen represent 44% of the national total with an average crew of 2. Average incomes are low, but these vessels represent an important economic resource in some geographical areas with a high level of dependence on the fishery.
- The reduction of fishing capacity has had a negative impact in terms of employment and income of those communities strictly dependent on fishery. In the period 2000 to 2006, about 16 580 jobs were lost. This shrinking impacted on all fishing systems although coastal trawling and the small-scale fishery were most affected. In parallel, and as a consequence of the decrease in the fleet, a remarkable decline of the overall activity in terms of fishing days has been recorded (55% in the period 2000-2006).

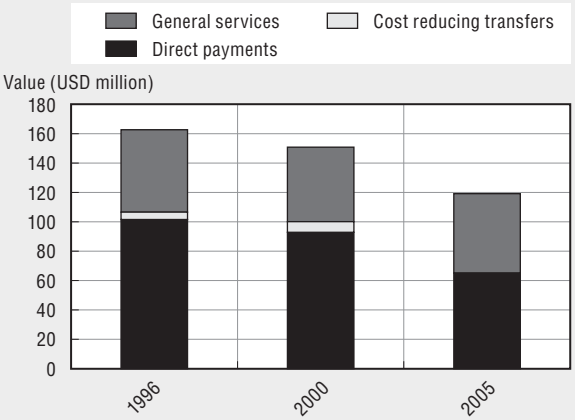
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	45 689[1]	31 302
Number of fish farmers	1 049[2]	n.a.
Total number of vessels	16 325	13 955
Total tonnage of the fleet	260 602	192 397

1. Fishers in 2000.
2. Farmers in 1998.

n.a.: Not available.

Legal and institutional framework

Management of marine fisheries resource is distributed on three levels: the EU Council, the state government and regional governments. As a European Community member state, EU Council regulations have direct application in Italy and national fisheries policies are integrated with the EU Common Fisheries Policy. The EU Council has general competence for fishery management regulations and is responsible for the implementation of the Common Fisheries Policy (CFP). The state government may take initiatives for the conservation and management of stocks in waters under its sovereignty or jurisdiction, provided that measures apply solely to fishing vessels flying the Italian flag and are compatible with the objectives set out in the Common Fishery Policy. Finally, regional governments hold competence in the areas of financial support for fleet modernisation, small scale fisheries and onshore investment and services.

Since the early 1980s, the management of coastal resources has been mainly based on effort (capacity and effort) regulations, together with other complementary technical measures such as mesh size and area and time closures. The only exceptions to this regard the management of bluefin tuna (*Thunnus thynnus*), which is regulated by Individual Quotas (IQ), as well as sedentary species, which are regulated by a self management approach based on TURFs (Territorial User-Rights in Fisheries).

In accordance with EU regulations, authorization for the landing of fish is necessary in Italian ports. Procedures are the same as for other commercial vessels: masters of vessels intending to land in an Italian port have to notify the competent port authority at least 24 hours before the estimated time of arrival at the port. The notification must indicate the time of arrival at the port of landing, the catches retained on board and the zones where the catch was made and whether in national waters or not.

Capture fisheries

The trawler fleet is the largest fishery by volume (Table III.12.1). In 2007, this segment accounted for 35% of total national catches and 50% of total value of landings, employing around 9 880 fishermen (33% of full time fishers). It is also the main segment in terms of capacity, amounting respectively to 58% and 50% of the total GT and kW.

The pelagic fleet represents the third most profitable fishery with 455 vessels. It is composed of purse seiners concentrated in Sicily and the Tyrrhenian Sea and by midwater pair trawler fleet that operate exclusively in the Adriatic coast. This fleet lands a high volume of small pelagic species, anchovies and pilchards in particular, and accounts for 38% of total national landings. This segment shows the highest level of landings per unit of effort (LPUE), due to a new management approach implemented in this sector in 2001 and based on self-management and control of landings.

Dredges are almost exclusively located in the central-north Adriatic coast and consist of 700 vessels. This fishery is highly specialised, targeting mainly clams (*Venus gallina*), whose consistency is subject to strong variations from one year to the next. Since 2000, despite an earlier positive trend, the landings of clams have fallen by 40 per cent in terms of volume. However, this segment, in response to sound self-management, has provided high landings per unit of effort (LPUE).

The multi-purpose vessel sector is composed of polyvalent vessels using passive gears (mainly nets) in combination with mobile gears (mainly trawls) according to season, demand

and fishing grounds. In 2007, they accounted for 4% of the total number of vessels in operation nationally and GRT represented 3% of national landings in both volume and value.

Longlines comprise many types of set and drift longlines, used to catch different species such as swordfishes, bluefin tuna, albacore tuna and hakes. The production is concentrated in the Tyrrhenian littoral and particularly in Sicily where the largest fleet is based. This sector represents 3% of national landings.

Table III.12.1. **Capacity and economic indicators by fleet segments, 2006**

	Total fleet	Trawlers	Pelagic fleet	Dredges	Small scale fishery	Multipurpose vessels	Longlines
Capacity indicators							
Volume of landings ('000 tonne)	285 833	100 894	101 109	21 146	45 299	7 294	10 091
Value of landings (EUR million)	1 495	740	183	62	381	48	81
Economic indicators							
Fleet – number of vessels	13 955	2 845	454	705	9 107	523	321
Fleet – total GT ('000)	192	120	30	9	17	7	9
Fleet – total GRT ('000)	163	94	23	7	25	6	7
Fleet – total kW ('000)	1 153	566	134	76	245	75	57
Days at sea ('000)	1 983	482	56	72	1 265	58	51
LPUE	12	6	45	31	14	12	9
Employment	30 351	9 880	3 165	1 416	13 211	1 324	1 353

Source: IREPA.

Table III.12.2. **Capacity and economic indicators by fleet segments, 2007**

	Total fleet	Trawlers	Pelagic fleet	Dredges	Small scale fishery	Multipurpose vessels	Longlines
Capacity indicators							
Volume of landings ('000 tonne)	267 368	92 716	87 689	30 863	42 744	5 656	7 700
Value of landings (EUR million)	1 338	664	164	64	333	46	68
Economic indicators							
Fleet – number of vessels	13 604	2 720	455	700	8 919	513	297
Fleet – total GT ('000)	195	122	32	9	16	7	8
Fleet – total GRT ('000)	165	95	26	7	24	6	6
Fleet – total kW ('000)	1 137	559	138	75	240	74	51
Days at sea ('000)	1 811	446	55	82	1 135	54	38
LPUE	11	6	36	37	13	8	8

Source: IREPA.

Apart from small pelagic species and some specific fisheries (shrimps, swordfish, tuna, clams), fishers can only partially target species they intend to catch, given the strong multi-specificity of the fisheries. The three dominant species are anchovy, striped venus and European pilchard. Together, they account for 39% of overall catches. Only about thirty demersal species out of over a hundred caught by fishing fleets in the Italian seas are important in terms of biomass and economic value. Among the most important demersal species hake, striped mullet and red mullet, Norway lobster, deepwater rose shrimp, common octopus and horned octopus (*Eledone cirrhosa*).

Table III.12.3. **Main species harvested by quantity and value**
2007

	Tonnes	%	EUR million	%
European anchovy	61 215.86	22.90	104.12	7.78
Striped venus	28 802.06	10.77	54.05	4.04
Other fish	26 196.72	9.80	167.36	12.51
European pilchards	14 134.05	5.29	13.51	1.01
European hake	14 090.99	5.27	107.40	8.03
Cuttlefish	13 519.71	5.06	84.13	6.29
Red mullet	9 099.08	3.40	46.14	3.45
Deep-water rose shrimp	8 334.70	3.12	81.98	6.13
Mantis squillid	6 818.18	2.55	43.39	3.24
Swordfish	6 518.32	2.44	81.63	6.10
Musky octopus	5 168.28	1.93	18.95	1.42
Horse mackerel	5 102.40	1.91	9.08	0.68
Bluefin tuna	4 527.99	1.69	25.46	1.90
Norway lobster (nephrops)	4 158.40	1.56	78.09	5.84
Striped red mullet	3 890.73	1.46	38.83	2.90
Total	**267 367.89**	**100.00**	**1 337.57**	**100.00**

Source: IREPA.

Stock assessments are regularly conducted for the most important species. The main demersal species (*Merluccius merluccius*, *Mullus barbatus*, *Nephrops norvegicus* and *Parapenaeus longirostris*) are considered to be over fished. For this reason, the Operational Program 2007-2013 establishes a reduction of the total fleet capacity, both in Gross Tonnage (GT) and in number of vessels.

In 2006, 30 351 fishers were employed in the Italian fishing industry, approximately 1 800 fewer than in 2005.

Management

With the recent approval of the new European Fund for Fisheries, the Italian management authority as chosen to draw and implement some 21 "national management plans". In each of the seven homogeneous areas (Geographical Sub Area – GSA) defined by the General Fisheries Commission for the Mediterranean (GFCM), management plans to be adopted by fleet segments have been drawn up *i.e.* trawlers, purse seiners, other gears. Each plan is characterised by measures meant to recover the main target species in the area through an effort management approach and by social and economic accompanying measures that support fishermen in the transitional period.

The main management method in the Italian fleet is effort control. Compared with previous plans, new management plans provide for a differentiated withdrawal by geographical areas and fishing gears. For instance, in the case of bottom trawlers, the withdrawal of gross tonnage varies from 25% to 8% depending on the rate of exploitation of the main demersal species in each GSA.

The other fishing effort control variables used are technical measures limiting both the input (mesh size and area restrictions) and the output side (size selectivity). Since the beginning of 2007, the main reference for technical measures is the Mediterranean (EC Reg. No. 1967/2006) has introduced further restrictions on the use of fishing gears, in particular mesh sizes, distance from the coast and the sizes of marine organisms. Some of these measures will be compulsory from 1 January 2009.

Recreational fishing

In Italy there is no specific legislation regarding recreational fisheries. In general, recreational fisheries are all activities practiced with a recreational or agonistic purpose. Sport fishers may only use fishing lines and none of the other designated commercial fishing gears. There is a 5 kg daily bag limit, with the harvesting of mussels for recreational purposes limited to 3 kg per day. Fish caught in recreational fisheries cannot be sold. There is no obligation to hold fishing licences and this is a primary source of conflict with the commercial sector.

An alternative legal framework is provided for the tuna sport fishery. After the adoption of the ICCAT quota regime in 1998, bluefin tuna sport fishermen are required to register at the Directorate-General of Fisheries and Aquaculture. From 1 May-30 September, their activity is restricted to a weekly total catch of one single tuna per vessel at a weight less than 6.4 kg. According to the Ministerial Decree 27 July 2000 that defines criteria for sharing tuna stocks and provides respective allocations among the various components of this fishery, a total of 1 826 tuna sport fishermen applied for an individual quota in 2007. Only 1 379 of them (75.5%) presented an official request in a manner that was acceptable to the rules. However, a study carried out in 2004 along the Italian coast detected a total of 4 016 tuna sport vessels and 9 708 fishers (Di Natale *et al*. 2004).

Aquaculture

In 2006, Italy had 1 000 fish farms, employing around 150 000 people (including the processing sector). Sixty one per cent of the sites are located in the northern regions that concentrate on inland and shellfish farming businesses. Aquaculture production reached 241 900 tonnes (corresponding to EUR 628 million) in 2006. Production has grown by an average of 2.3% per year since 2001. The largest segment includes shellfish farming, which accounts for 70% of volume and 46% of value. Among freshwater fish, the main farmed species include trout, eel and sturgeons. Among sea fish, the main species are seabass, seabream and mullets.

Table III.12.4. **Aquaculture production**

2006

Species	Tonnes	Var. 06-05%	EUR million	Var. 06-05%
Sea bass	9 300	2.2	66.00	7.8
Sea bream	9 500	0.0	64.00	7.6
Mullet	3 000	0.0	12.24	20.0
Eel	1 700	3.0	15.30	16.1
Rainbow trout	40 200	1.8	132.60	10.4
Catfish	600	–14.3	2.40	–14.3
Carp	700	7.7	1.90	0.8
Sturgeon	1 300	8.3	10.40	57.6
Other fish	5 600	47.4	35.86	68.4
Total fish	**71 900**	**4.1**	**340.70**	**14.8**
Mussel	125 000	0.0	81.25	0.0
Clam	45 000	12.5	207.00	12.5
Total shellfish	**170 000**	**3.0**	**288.25**	**8.7**
Total aquaculture	**241 900**	**3.3**	**628.95**	**11.9**

Source: Icram-API data processed by IREPA.

Markets and trade

The distribution of fish consumption by major categories remained relatively stable. Fresh or chilled fish products account for about 53%. Frozen seafood has a market share of 23%. Preserves account for 20%. Salted and dried fish products are 4%.

Table III.12.5. **Consumption of fishery products**

2006

	Tonnes	%	Var. 06-05%	EUR million	%	Var. 06-05%	Price (EUR/kg)	Var. 06-05%
Fresh or chilled	241 107	52.9	3.5	2 280	52.5	10.9	9.5	7.1
Frozen	104 143	22.9	6.3	915	21.1	9.0	8.8	2.6
Preserves	91 450	20.1	3.2	839	19.3	10.0	9.2	6.6
Salted/dried	18 871	4.1	0.8	312	7.2	13.2	16.5	12.3
Total	**455 571**	**100**	**3.9**	**4 346**	**100**	**10.5**	**9.5**	**6.3**

2007

	Tonnes	%	Var. 07-06%	EUR million	%	Var. 07-06%	Price (EUR/kg)	Var. 07-06%
Fresh or chilled	238 290	52.9	–1.2	2 259	51.9	–0.9	9.5	0.2
Frozen	103 698	23.0	–0.4	921	21.2	0.7	8.9	1.1
Preserves	89 711	19.9	–1.9	849	19.5	1.2	9.5	3.2
Salted/dried	18 577	4.1	–1.6	320	7.4	2.6	17.2	4.2
Total	**450 276**	**100**	**–1.2**	**4 349**	**100**	**0.1**	**9.7**	**1.2**

Source: Icram data processed by IREPA.

In the first ten months of 2007, external trade in fish products confirmed the national deficit position of Italy against foreign markets. The total deficit of fish products reached EUR 2.6 billion Preserves, frozen and salted or dried fishes represented the highest volume and value imported.

The most important fishing products suppliers were European countries, representing more than 57% of total imports. Outside the European Community, Thailand, Argentina and Vietnam were the most important suppliers. In terms of value, Spain remained Italy's main trading partner with 46.5% of total exports.

Table III.12.6. **Import-export trade of fishery products**

	2006	Var. 06-05%	2007[1]	Var. 07-06%[2]
Tonnes				
Import	901 436	3.4		
Export	141 501	6.9		
Balance	–759 935	2.8		
EUR million				
Import	3 681	8.8	3 068	1.8
Export	556	17.1	445	2.2
Balance	–3 125	7.5	–2 623	1.8

1. Data refers to the period January-October 2007.
2. Comparisons refer to the periods from January to October 2006 and 2007.

Source: Icram data processed by IREPA.

Outlook

Italy's three-year plan 2007-09 encourages extending its small scale fishery and the self-management approach developed in the clam fishery sector to other fisheries. This management program is aimed to develop consortia for the coastal fishery and local management plans. The Italian strategy has also foreseen the possibility for local organised fishers (co-operatives, consortia, Producer's Organisations) to implement "local management plans", which are drawn on a much smaller scale and concern few fishing grounds close to the coast. Implementation and control fall under the responsibility of small scale local fishermen organisations, while monitoring is undertaken by scientific bodies. In principle, the idea here is to move towards a self management approach, by combining territorial property rights and shared exploitation rules, thus eliminating the rivalry feature of common property resources.

PART III

Chapter 13

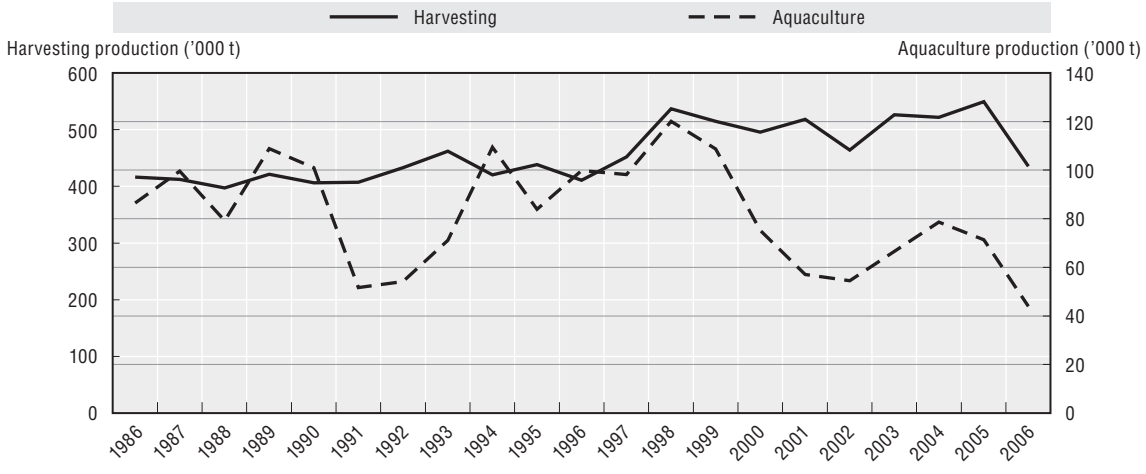
The Netherlands

The Netherlands

Summary of recent developments

- In 2007, the Dutch fisheries sector experienced a decrease in quota for its main species, sole and plaice. With increasing fuel prices, this had an overall negative impact on the Dutch marine fisheries sector. An additional consequence is that the processing industry in the Netherlands is increasingly dependent on imports from the EU and third countries.
- In 2007, fish consumption increased by 3% in The Netherlands to about 55 500 tonnes – or around one fish meal per citizen ever 2 weeks. The Dutch spent EUR 490 million in 2007 on domestic fish consumption. This is an increase of 4% compared with 2006.
- The Netherlands presented a National Strategic Plan and accompanying Operational Program for the programming period 2007-2013, approved by the European Commission in 2007. On the basis of this Operational Program, a total of EUR 120 million is available for the period 2007 until 2013 for transition and investments in more sustainable fisheries. In January 2006, the European Commission presented a proposal for long term management of plaice and sole. This proposal provides for a set of harvest control rules in combination with effort management. The main goal of the plan is a 10% reduction in fishing mortality per year. In anticipation of this reduction, the Netherlands decommissioned 15% of capacity in the beam trawl fleet in 2007.

Harvesting and aquaculture production

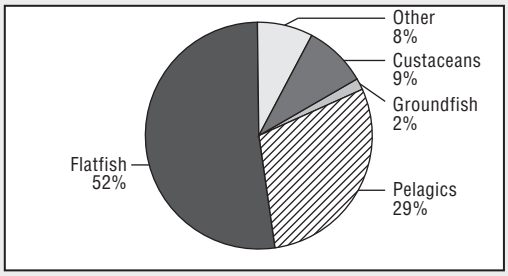


Source: FAO.

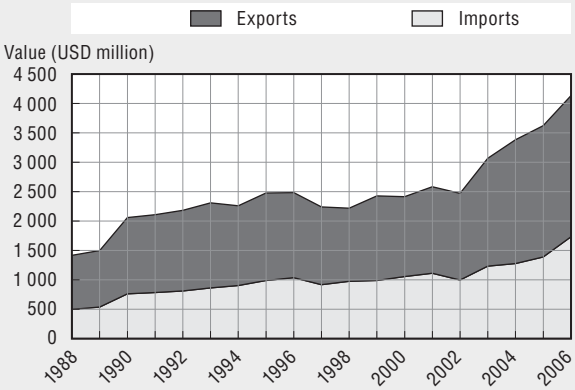
Key characteristics of the sector

- Imports in 2007 were stable in value compared to 2006, while the value of exports decreased by 1%, excluding re-export. Import value amounted to EUR 1.6 billion in 2006 and 2007, with shrimp, cod and salmon as the leading species. Export value came to EUR 2.28 billion in 2006 and EUR 2.26 million in 2007, with shrimp, sole, plaice, herring and mussels being the most important species.
- Most imports originated from Germany, Denmark, and Belgium. Nearly 50% originated from various other third countries.
- Eighty per cent of Dutch exports have EU member states as their point of destination; particularly Belgium, Germany, Italy, France and Spain.

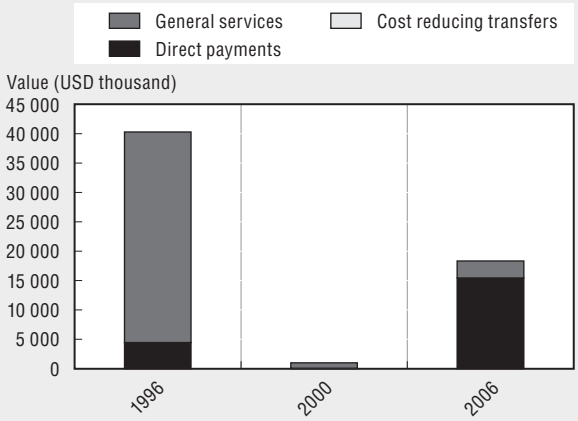
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	4425[1]	1938
Number of fish farmers	225[1]	260
Total number of vessels	1 057	894
Total tonnage of the fleet	177 820	158 920

1. 1997 figures.

Legal and institutional framework

The Netherlands' resource management and conservation policy is carried out in accordance with the Common Fisheries Policy of the European Union. The legal basis is the complete set of rules and regulations as agreed by the Council of Fisheries Ministers of the EU. In addition, the Dutch Fisheries Act of 1963 provides for regulations regarding inland fisheries. The Department of Agriculture, Nature and Food Quality is responsible for the formulation and implementation of policies for, among other areas, sea fisheries, aquaculture, inland fisheries and recreational fisheries.

Capture fisheries

The main species harvested by the Dutch fleet are, in order of economic importance: sole, plaice, cod, turbot, shrimp, dab, and lemon sole. In the pelagic fishery, important species are herring, mackerel, horse mackerel, blue whiting and sardinella. In 2007, the fleet consisted of 345 (active) cutters, 14 trawlers and 81 dredgers. Total landings for 2007 added up to EUR 476 million by value. The annex presents data on the value of fisheries for the last few years.

Table III.13.1. **Turnover of Dutch fisheries (in EUR million)**

	1999	2000	2001	2002	2003	2004	2005	2006
Cutter fisheries	303	290	307	257	262	241	240	256
High seas fisheries	109	113	119	126	143	131	137	125
Total	**412**	**403**	**426**	**383**	**405**	**372**	**377**	**381**
Mussel culture	54	73	72	68	66	60	56	49
Oyster culture	4	5	5	5	5	5	6	8
Cockel fisheries	23	7	11	10	10	10	–	–
Diverse fisheries	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Grand total	**493.5**	**488.5**	**514.5**	**466.5**	**476.5**	**451.5**	**439.5**	**438**

Employment in the fisheries sector adds up to approximately 14 400 (full-time employees) in 2007. Of this number, 2 130 are fishermen, 350 work in fish and shellfish farming, 280 people are employed in auctions, 5 000 work in the processing industry and wholesale, and there are 6 640 in retail.

Management

In the period 2004-2005, no major changes were implemented in the management regime in the Netherlands. The co-management system, which started in 1993, is still operational. A very large share of the fishermen in the cutter sector voluntarily joined this system, enabling them to optimise the economic use of their transferable quota (ITQ), by means of renting ITQs and days-at-sea within the co-management groups. In 2005, government and industry agreed to extend the co-management system to control and enforcement of engine power.

In 2007 the Netherlands finished its Operational Plan for the use of the European Fisheries Fund. The focus is on stimulating the transition to a more economically profitable and sustainable fisheries. It contains measures for reduction of fishing capacity by decommissioning, for innovations in sea fisheries and aquaculture and for collective actions carried out by the fisheries sector.

Various management measures have been put into place to ensure equilibrium between fleet size and available resources. Some measures are of a technical nature and

are aimed at a capacity reduction, like decommissioning schemes, licensing systems and fishing gear measures. Another important measure aimed at reducing catches by means of quota regulations is a co-management scheme, which has developed into an ITQ system. In 2006, The Netherlands introduced a system of administrative penalties for certain offences by fisherman.

Arrangements for access to foreign fishing grounds for Dutch operators are subject to EU regulations. Outside the Northern Atlantic (NEAFC) area the Dutch pelagic freezer trawlers make use of the opportunities created by the EU Fisheries Partnership with the Islamic Republic of Mauritania. Furthermore, Dutch trawlers are active in the high seas of the Southern Pacific, where access is arranged through an interim regulation agreed under the auspices of the SPRFMO (South Pacific Regional Fisheries Management Organisation), to be established.

The Netherlands has implemented several instruments in the framework of the cod recovery plan in order to comply with CFP obligations. In conformity with EU measures, the Netherlands implemented VMS systems on vessels larger than 18 metres. The Netherlands promotes regional co-operation between the North Sea member states on inspection, control, enforcement and implementation of EC regulations. The Netherlands also promotes co-operation in the new control agency that has been established in Vigo by the European Union. The introduction in 2006 of administrative penalties has had a positive influence on the level of compliance with the common fishery rules by fisherman.

Recreational fishing

Recreational fisheries are regulated by restrictions on the amount and kind of gear used, closed seasons and minimum size limits for specific fish species. It is prohibited to sell fish caught in recreational fisheries.

Aquaculture

Aquaculture is concentrated on the production of shellfish, in particular, mussels and oysters in coastal estuaries. Intensive land-based culture of finfish takes place in closed recirculation systems. Major species are eel and catfish. In general, the policy favours the further development of fish culture in closed recirculation systems. EFF funds are used to stimulate this development.

New policies were introduced regarding fish welfare. New European legislation regarding fish health and the use of non-indigenous species will also affect the aquaculture sector. Mussel production is under scrutiny, due to the fact that part of production activities take place in a national wetland area (the Waddenzee) and cockle production is no longer allowed as of 2006. Based on nature conservation regulations, the harvest of mussel larvae is prohibited by the Dutch court where an impact assessment has not been undertaken.

Government financial transfers

The following financial transfer instruments were used during the reporting period:

- Structural adjustment: A decommissioning scheme for the removal of vessels from the fleet. In 2007-2008, 23 vessels were removed, for which a total of EUR 27.5 million was disbursed under the European Fisheries Fund (EFF).
- General services: this item consists mainly of research costs.

- Fishery Guarantee Fund: this fund is set up to support fishing companies to make investments, improving the sustainability of their fishing activities. It is designed for solvent fishing companies which are not able to make this kind of investment without the government as a guarantor for a part of the investment due to a shortage of private financial guarantees.
- Subsidiary scheme for innovations in aquaculture in 2006 and 2007. A total of 9 projects were approved with a EUR 2 million contribution from FIFG.

Neither Revenue Enhancing Transfers nor Cost Reducing Transfers took place in the Netherlands.

Post-harvesting policies and practices

In 2002, the General Food Law (Regulation 178/2002/EG) established the European Food Safety Authority and the general principles for a European basis of food safety and food safety policy. Earlier the HACCP (or an equivalent system) was in place from 1993 through various European Directives. After the entry into force of the General Food Law, new European regulations have been formed and others have been renewed in the "hygiene package", published in 2004 and entered into force in 2006. An important feature of the Regulations on the hygiene of foodstuffs is the identification of the primary responsibility of the food business operator.

In May 2006 the Pelagic Freezer-trawler Association (PFA) was awarded the Marine Stewardship Council (MSC) certification for sustainable fisheries for its North Sea herring fisheries. The North Sea brown shrimp fishery is in the pre-assessment stage of the MSC program.

Outlook

A co-management scheme with regard to the rules on limitation of engine power of fishing vessels has been in operation since 2006. In 2007, a joint government-industry group was established and is working out how to bring the EU rules on technical measures with regards to nets under co-management.

The Fisheries Innovation Platform is a three-year project that was established by the Dutch Minister of Agriculture, Nature and Food Quality and was set up to encourage innovation towards sustainable and profitable development of the North Sea Fisheries sector and related supply chain. The Fisheries Innovation Platform has ten members that represent various sectors of society, including research, NGO's, political parties, the government and the fisheries industry. The Platform is supported by an advisory group, including fishermen.

Today, in Dutch policy development, increasing attention is paid to aquaculture. The revision of the EU Action Plan for Sustainable Development of Aquaculture, expected late 2008, will further facilitate aquaculture development in the Netherlands. At Community level, as well as at national level, recovery plans are being developed on several species such as cod and eel.

As a consequence of the implementation of the Habitats and Bird Directive, management plans will be put in place for coastal areas and Marine protected areas in the North Sea. This will have implications for the regulation and scope of fisheries in these areas.

PART III

Chapter 14

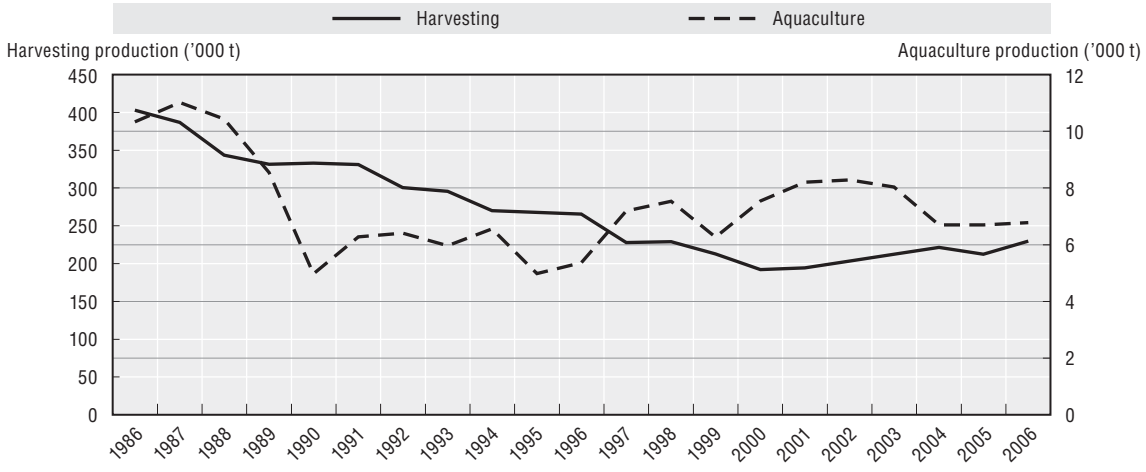
Portugal

Portugal

Summary of recent developments

- Portugal has drawn up a national strategy for the fishing industry, namely the National Strategic Plan for Fisheries (PEN) for 2007-2013. More specifically, it also approved the Operational Program for Fisheries 2007-2013 (PROMAR) and drew up the necessary regulations.
- In terms of resource management, various recovery plans were drawn up, one for hake and Norway lobster in the Community waters under national jurisdiction, another for Greenland halibut in NAFO waters and the third for bluefin tuna in the Atlantic and the Mediterranean.
- Under the Portuguese Presidency of the EU, illegal fishing was high on the agenda and the focus of a Ministerial Conference on Eradicating Illegal, Unreported and Unregulated (IUU) Fishing.
- Portugal's trade balance for fishery products remained in the red in 2007, with a deficit of over EUR 877 million, with the exception of the canning industry, which showed a surplus of some EUR 43 million. Much of the increased deficit was due to a rise in imports, which amounted to 422 000 tonnes, or approximately EUR 1 395 million in value terms. This was a 7.7% increase in volume and a 9.6% increase in value on 2006. Exports amounted to 144 000 tonnes, for a value of some EUR 518 million, *i.e.* a rise of 10% in volume and 11.6% in value on 2006.

Harvesting and aquaculture production

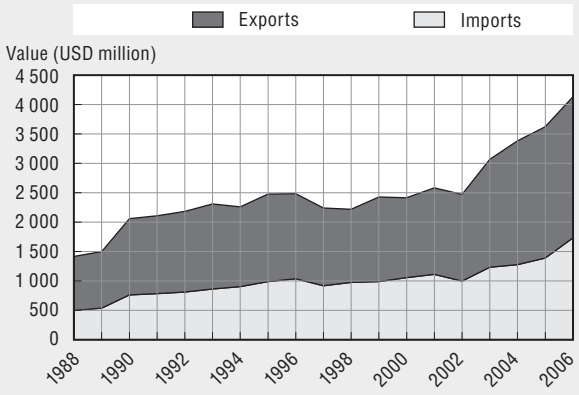


Source: FAO.

Key characteristics of the sector

- With regard to imports, frozen fish was the leader in terms of volume (35%) and in value (29%), followed by fresh and chilled fish – 19% in volume and 14% in value – and dried, salted or brined cod – 13% in volume and 23% in value – the main product being wet salted cod.
- The growth in exports was due to an increase in average export price, in particular for canned products which accounted for 21% of the total value, followed by fresh and chilled fish (14%) and frozen fish (12%).
- The number of registered fishermen stood at 17 021 in 2006, confirming a year-on-year decrease of 240, particularly in trawling and seine-netting.
- In 2007 there was a sharp fall in the volume of landings of fresh and chilled fish by foreign vessels in mainland ports, down 38% on 2006. The same year, landings in national ports of fresh and chilled products fished in national waters were in excess of 160 000 tonnes or EUR 275 million in value terms.

Trade evolution



Production profile

	2006
Number of fishers	n.a.
Number of fish farmers	n.a.
Total number of vessels	8 754
Total tonnage of the fleet	106 890

n.a.: Not available.

Legal and institutional framework

Responsibility for managing the fisheries sector lies with the government, within the framework of the Common Fisheries Policy. The Ministry of Agriculture, Rural Development and Fisheries is in charge of drawing up domestic policy on the fisheries sector, including marine fisheries and aquaculture, while responsibility for enforcement lies with the regional Directorates for Agriculture and Fisheries.

As a member of the European Union, Portugal is continuing its efforts to phase in an environmental approach to fisheries management by supporting policies that are conducive to biodiversity conservation and not only reflect environmental concerns but also promote the economic and social stability of coastal communities.

Capture fisheries

In 2007, Gross Value Added (GVA) in fisheries (provisional data) grew in volume by 7.1% and in nominal terms by 4.7%, an improvement on the previous year. Stock status assessments by the International Council for the Exploration of the Seas (ICES) and other international organisations concerning resources of interest to the Community indicate a trend similar to previous years regarding the decline in biomass abundance, recruitment and fishing effort, in particular for hake, anglerfish and Norway lobster (nephrops) fished by the Portuguese fleet.

In terms of volume, most of the catch comprises small pelagics, including sardines which can have a short life-cycle and high abundance variability. Demersal species, with

their longer life-cycles, are showing signs of overfishing and their medium-term recovery will require an increase in the number of adult fish by allowing recruits to reach maturity.

In 2007, Portuguese output of fishery products (excluding aquaculture) harvested in both national and other waters stood at approximately 210 000 tonnes, a rise of some 10% on the previous year. Although the volume of frozen fish was slightly down on 2006 (–1.1%), an overall increase was confirmed by a 12.4% rise in catches of fresh and chilled fish, which accounts for over 80% of all fish landings in terms of volume.

As of 31 December 2007, the nationally registered fishing fleet was comprised of 8 637 vessels with a total tonnage of 106 693 GT and a total engine power of 381 879 kW, reflecting a degree of stability in the fleet. The only decreases were a 1% fall in the number of vessels and a 0.2% fall in total tonnage (GT), as total engine power (kW) was up 0.4% on 2006. For this reason, the Operational Program 2007-2013 establishes a reduction of the total fleet capacity, both in Gross Tonnage (GT) and in number of vessels.

Portugal, as a member of the EU, benefits from fishing opportunities afforded by agreements between the European Union and third countries, particularly in Africa (Mauritania, Senegal, Guinea-Bissau, Cape Verde, São Tomé, Comoros, Seychelles, Madagascar, Mauritius, Gabon, Côte d'Ivoire, Guinea, Equatorial Guinea, Mozambique and Kiribati) and cod and redfish quotas allocated by Norway under the Agreement creating the European Economic Area. In 2006 and 2007, Portugal acquired redfish quotas under EU fisheries agreements with Greenland, as a result of quota transfers between member states. Portugal's main fishery agreements are for the Atlantic, focusing on crustacean fisheries, either as EU fisheries agreements with Guinea-Bissau, Mauritania and Senegal, or as chartering arrangements or joint ventures, for instance with Mozambique and Brazil. A substantial share of Portugal's surface long-liners operates in the EEZs of Cape Verde, Guinea, São Tomé, the Comoros, Madagascar and the Seychelles.

Portugal participates in various regional fishery organisations or RFOs (NAFO, NEAFC, ICCAT, SEAFO, IOTC and IATTC). In NAFO (North Atlantic) waters, the Norwegian EEZ, the Svalbard and the Irminger Sea (ICES areas XIV, XII and V), the approach to the annual authorisation to catch demersal species subject to quotas was based on the idea of complementary fisheries and the allocation of individual transferable quotas, with prior permission from the fisheries authorities. Quotas for redfish in Greenland waters and the Irminger Sea and for Greenland halibut in NAFO waters were transferred from Germany to Portugal.

Management

To establish management models for rational and responsible fishing and long-term management, legislation was amended with a view to adapting technical measures to: ensure sustainable resource harvesting, the aim being to make stakeholders more responsible; fishing licences and specific rules were introduced; continue checks on fishing effort for species subject to recovery plans, special management measures and/or fishing quotas and also the harvesting of marine life in compliance with legislation; raise awareness throughout the industry about the need to protect resources effectively and ensure the future of fishing.

Over this period, a 10-year recovery plan was drawn up at the EU level for hake and Norway lobster. To mitigate the economic and social implications of the restrictions on hake fishing, quotas for 2007 and subsequent years were differentiated for individual

vessels, based on their catch history. The stock status of the main crustaceans fished by authorised trawlers became subject to special conservation measures.

Without actually fishing for bluefin tuna, Portugal does catch it as bycatch in tuna fishing, surface longlining and madrague (trap net) fishing on the South coast. To allow the recovery of bluefin tuna in the Atlantic and the Mediterranean, the annual ICCAT meeting in 2006 adopted a 15-year recovery plan that provides for a reduction in TACs until 2010, restrictions on fishing in specific fisheries at specific times, a new minimum weight restriction, measures affecting recreational fishing, supervisory measures and a Joint International Inspection Program.

The General Directorate for Fisheries and Aquaculture (GDFA) is the fisheries authority in charge of co-ordinating inspection and surveillance by all of the entities in SIFICAP (Integrated system for the surveillance, taxation and inspection of fishing activities), including the Navy, the Air Force and the tax authorities. The inspection work conducted by the GDFA on Portuguese territory focused on production, in particular the activities of fishing vessels and aquaculture facilities, but also, to a lesser extent, the marketing and distribution of fishery products.

The main purpose of inspection work at the production level was to monitor vessels upon arrival in ports, particularly in terms of the fishing gear used, compliance with minimum size regulations, and the compulsory recording of data. Marketing and distribution channels are inspected mainly to identify breaches of the rules on mandatory sale at auction or minimum sizes. Surveillance was stepped up on landings in ports by vessels from third countries, in particular those fishing for species subject to conservation measures (hake, Norway lobster, tuna and deep-sea species) and those identified as IUU (Illegal, Unreported and Unregulated fishing) vessels.

In 2007, the GDFA conducted 474 fishing-vessel inspections, 1 280 post-first-sale inspections and 877 auction inspections, in coastal areas. As a result, 160 infringement proceedings were taken. Following the signing of a Memorandum of Understanding with Canada in 2005, Portugal has also agreed to sign a bilateral agreement with Norway on fisheries control and surveillance to combat IUU fishing in international maritime waters.

Recreational fishing

Conditions covering access to resources, characteristics and gear used, restrictions and bans on the harvesting of vulnerable species, conservation areas and licensing procedures, are in place in Portugal. This legislation is aimed mainly at managing recreational fisheries, with a view to conserving resources and marine biodiversity. Licences for recreational fisheries became compulsory on 1 January 2007 and are available from cash machines.

Aquaculture

Aquaculture production in Portugal in 2006 comprised 1 490 operational establishments, 1 341 of which were family-run aquaculture units producing bi-valve molluscs. Aquaculture output in 2006 stood at 7 893 tonnes, 17.9% up on 2005, owing to mortality in the farming of bivalve molluscs in the Ria Formosa. Sea- and saltwater products accounted for some 88% of output in 2006. The main species were carpet shell, followed by sea bream and bass (Table III.14.1).

In spite of the country's favourable natural and environmental conditions, aquaculture has not expanded as planned and still accounts for only a small share of output in the fisheries sector. The initiatives conducted during the reference period were aimed at increasing fish supply, in particular the farming of new species to help meet the demand for fishery products. Under the 3rd Community Support Framework (CSF III), the emphasis has been on project analysis and environmental rules, including the treatment of effluent and the use of alternative energy or innovative technology. CSF III has also supported an aquaculture project for turbot (*psetta maxima*) that will, in the medium term, double Portugal's aquaculture output. Local pilot projects were promoted with a view to improving sea-cage building techniques as a means of developing the commercial aquaculture of specific native species.

Table III.14.1. **Aquaculture output in internal and oceanic waters, by type of water and farming regime, broken down by species**

	Freshwater, sea-and saltwater							
	Total		Extensive		Intensive		Semi-intensive	
	Tonnes	000 EUR	Tonnes	000 EUR	Tonnes	000 EUR	Tonnes	000 EUR
2005	6 695	34 485	2 630	15 377	1 410	5 362	2 655	13 746
2006	7 893	43 238	3 584	22 613	1 862	7 342	2 447	13 283
Fresh and saltwater	944	2 067	1	12	943	2 051	1	4
Eel	1	13	1	12	0	0	0	1
Trout	943	2 054	0	0	943	2 054	1	3
Seawater	6 948	41 171	3 333	22 151	919	5 291	2 696	13 728
Fish	3 443	18 961	168	1 201	919	5 291	2 355	12 468
Meager	23	264	23	264	0	0	0	0
Bream	1 623	8 633	133	706	573	3 048	917	4 879
Sole	9	104	1	9	2	23	6	72
Turbot	185	1 391	0	0	185	1 391	0	0
Bass	1 584	8 314	0	1	155	813	1 429	7 499
White bream	2	16	0	0	0	0	2	16
Misc. sea fish	16	239	11	221	4	15	1	3
Molluscs and crustaceans	3 506	22 210	3 165	20 950	0	0	341	1 260
Carpet shell	2 335	20 815	2 246	20 010	0	0	89	805
Cockle	115	103	115	103	0	0	0	0
Razor shell	1	1	1	1	0	0	0	0
Mussel	372	123	372	123	0	0	0	0
Oyster	679	1 163	679	1 163	0	0	0	0
Misc.	3	4	3	4	0	0	0	1

Fisheries and the environment

The essential thrust of adopted policies is that of sustainable resource harvesting with a view to maintaining the capacity of ecosystems for self-regulation and the conservation of marine biodiversity, with the ultimate aim being sustainable fishing and social welfare. Sustainable fishing accordingly strikes a balance between resource conservation and environmental quality, biological/ecological restrictions and economic and social needs by building on knowledge, training and scientific research as pillars for economic growth and job creation.

Portugal has long been monitoring the status of the stocks harvested by its fishing fleet, in both national and international waters using either its own resources or relying on

co-operation agreements with international bodies. At the present time, almost all commercially interesting stocks have been given biomass and mortality reference points. Resources are managed in such a way as to keep harvesting levels below the reference points. There are numerous long-term management plans, based on the precautionary approach, for stocks harvested in the Community EEZ and international waters.

Government financial transfers

Following further structural adjustment in 2006 and 2007, Portugal continued to implement Community and domestic support programs for the fishing industry as part of MARE (Program for the sustainable development of the fishing industry) and MARIS (the fishery component of the Regional Programs for the Mainland), under the 3rd Community Support Framework for 2000-2006. PROMAR, co-funded by the European Fisheries Fund (EFF) complies with the National Strategic Plan (PEN), approved in 2007. The main recommendations of the Plan are to guarantee resource sustainability, promote competitiveness in the industry and boost economic and social cohesion in the most fisheries-dependent communities.

With the support of exclusively domestic funds, other projects to support local and inshore fisheries have been funded under the SIPESCA Fisheries Incentive Scheme, with a view to supporting the renewal and modernisation of small vessels so as to: improve safety and working conditions and the handling and conservation of fish on board; fostering competitiveness without increasing fishing effort; investing in quality and promoting the use of more selective and environment-friendly gear; enhancing the organisation and capacity of small-scale fishing and solving the problems specific to fishing communities. A total of EUR 518 690 was awarded to 45 modernisation projects.

The Wage Compensation Fund grants financial support for those in the fishing industry who are temporarily unable to carry out their work due to exceptional circumstances and one-off situations. As the scope of the Fund needed to be extended to cover those who fish from the shore and gather marine life, an appropriate regime was set up.

Markets and trade

To ensure the market integration of fishery products, in particular through co-ordination and co-operation between production and the processing industry with a view to achieving responsible resource use and promoting quality, product diversification and consumer protection, practical initiatives have been envisaged with a view to improving the hygiene, technical, functional and environmental standards of facilities subject to the new industry licensing system; stepping up the work of Producer Organisations via initiatives to develop their products, expanded direct marketing channels or the production of own-brand processed products in partnership with local industry; and restructuring the marketing of fresh and chilled fish to increase the sector's access to the value generated by the production chain.

On the mainland, there are 200 authorized production units (Table III.14.2), 115 of which are for fresh and frozen products, 45 for cod salting/drying, 18 for canning and 22 for other activities. In 2006 the industrial units, most of them of small to average size, employed a total workforce of around 6 300, with an output of 167 000 tonnes, 82% of which was taken up by the domestic market. Sales in value terms did not exceed EU

R634 million, a figure that has remained relatively stable since 2005. Canning is the only sub-sector not showing a deficit in the trade balance and the one best placed to benefit from national resources, in particular sardines.

The processing industry in the Azores, producing almost exclusively for export to Europe, comprises mainly tuna-canning units that account for some 90% of jobs in the industry, with a workforce of over 800 and an output of approximately 20 000 tonnes. To diversify its activities, the processing industry there is looking at other potential products such as black scabbardfish. In Madeira, the processing industry consists in a group of small firms processing mainly tuna, black scabbardfish and Spanish (chub) mackerel, which together account for some 88% of landings.

Cod was once again Portugal's leading fishery import, most of it for the processing industry.

Table III.14.2. **Breakdown of authorized establishments by sub-sector (at 30/06/2008)**

NUTS II regions	Canning		Frozen		Cod		Miscellaneous		Total	
North	7	38.9%	21	18.3%	0	0.0%	2	9.1%	30	100%
Centre/	4	22.2%	29	25.2%	30	66.7%	7	31.8%	70	100%
Lisbon region	3	16.7%	50	43.5%	14	31.1%	4	18.2%	71	100%
Alentejo	1	5.6%	5	4.3%	0	0.0%	1	4.5%	7	100%
Algarve	3	16.7%	10	8.7%	1	2.2%	8	36.4%	22	100%
Total	**18**	**100.0%**	**115**	**100.0%**	**45**	**100.0%**	**22**	**100.0%**	**200**	**100%**

Outlook

In line with responsible and sustainable resource use, fisheries policy will be aimed at:

- Stepping up resource monitoring and the integrated study of marine ecosystems in order to adjust fishing effort and achieve resource sustainability.
- Reinforcing scientific research within an ecosystem framework, innovation with regard to methodology and technologies, and outreach to other spheres.
- Promoting a revamped organisational model in the industry that will be more representative and encourage the active involvement of associations and producer organisations in the production and marketing chain.
- Enhancing the value and dignity of human capital and the fishing-related industry, so as to adapt the technical and vocational profile of the workforce to developments in the sector.
- Using integrated policies to foster compatibility between the various uses of the national coastline.
- Fostering regional and local development and thereby promoting the diversification of job opportunities and the economic and social stability of coastal and in particular fishing communities.

PART III

Chapter 15

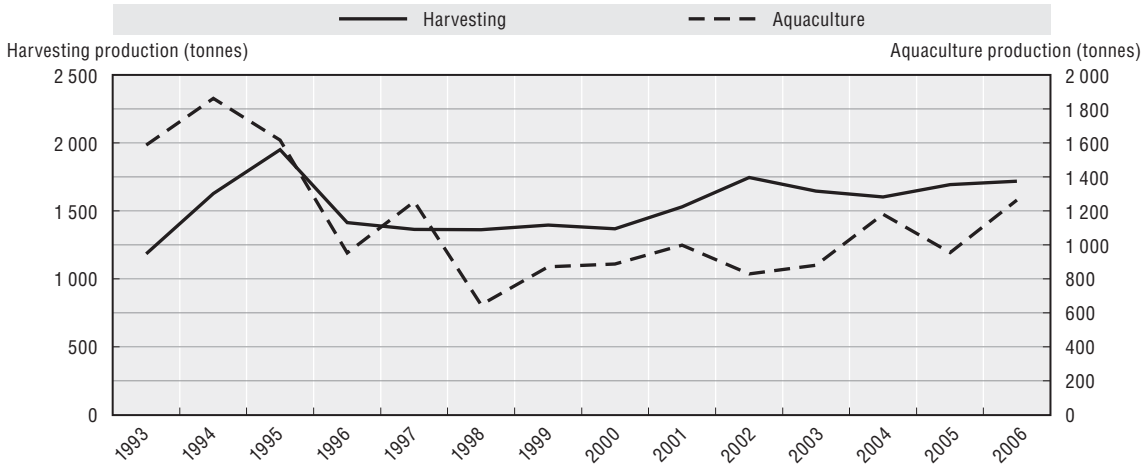
Slovak Republic

Slovak Republic

Summary of recent developments

- The fisheries sector in the Slovak Republic consists of aquaculture and fish processing. There is no commercial marine and inland capture fishery.
- Total aquaculture production in 2007 was 1 198 tonnes. This is almost comparable to the 2006 production (1 263 tonnes), which increased significantly from 2005 (955 tonnes).
- Recreational fishers caught 1 718 tonnes in 2006, which increased from 1 693 tonnes in 2005 and 1 603 tonnes in 2004. However, the catch decreased slightly to 1 674 tonnes in 2007.

Harvesting and aquaculture production

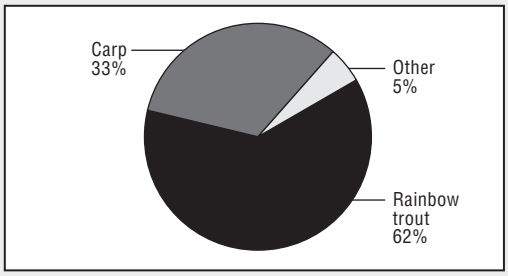


Source: FAO.

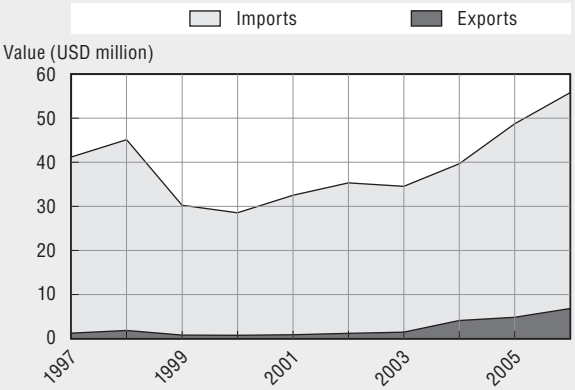
Key characteristics of the sector

- Since the Slovak Rebpulic does not have any commercial capture fisheries, the diagram shows the composition of key species from aquaculture in terms of volume in 2006. Rainbow trout contributes almost 62% of the aquaculture production while the share of carp is 33%.
- In the Slovak Republic, both exports and imports have been increasing since 2000. However, trade in fish and fish products is showing deficit. The trade deficit has been growing constantly in recent years.
- The Slovak Republic has provided GFTs to the aquaculture sector as well as marketing and procession sector. The GFTs have been funded by the Financial Instrument for Fisheries Guidance of the EU after the country joined the EU in 2004.
- The number of fish farmers in the Slovak Republic varies depending on part-time workers, which fluctuates largely from year to year. However, the number of full-time workers has been relatively stable, ranging from 237 to 259 over the last five years.

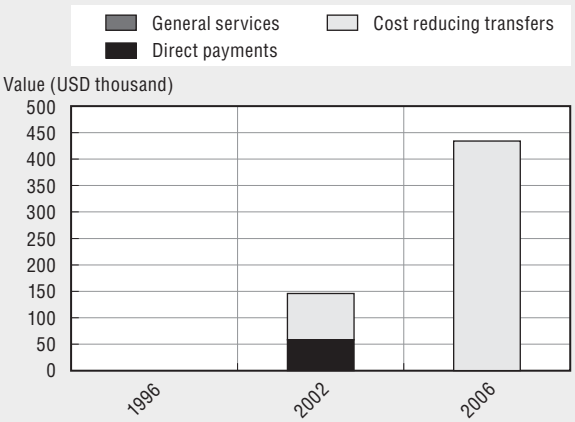
Key species produced by volume in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	2003	2006
Number of fishers	n.a.	n.a.
Number of fish farmers	1 040	313
Total number of vessels	n.a.	n.a.
Total tonnage of the fleet	n.a.	n.a.

n.a.: Not available.

Legal and institutional framework

In addition to the EU Common Fisheries Policy (CFP) of the EU, basic legal instruments dealing with the fishery and related sectors in the Slovak Republic include the Act 194/1998 on breeding of agricultural animals, the Act No. 139/2002 on fishery, the Act No. 39/2007 on veterinary care and the Act No. 364/2004 on water.

Protected predators (especially cormorant) cause increasingly more damage to fish farmers from year to year. The majority of fish farms are not sufficiently equipped against these predators. Compensation for damage in aquaculture is provided by the Act No. 543/2002 Coll. on nature and landscape protection. In reality, however, the recovery from the damage is rather complicated on the grounds that the Act does not provide compensation for the damage occurred to the enterprises operating on rented land.

Aquaculture and fish processing are managed by the Ministry of Agriculture, while recreational fisheries (and water management) belongs to the competences of the Ministry of Environment.

Capture fisheries

The Slovak Republic, as an inland country, does not practice marine fishing nor keeps register of fishing vessels. In addition, it does not have suitable waters for commercial inland fishing at disposal. Therefore, the fisheries sector in Slovakia consists of aquaculture and fish processing.

Recreational fishing

In 2007, organisations authorized by the Ministry of Environment in accordance with the Act on fishery, placed almost 13 million pieces of spawn material of lowland fish species (carp, crucian carp, bighead carp, grass carp, pike, pike-perch and European catfish) in watercourses and 3.47 million pieces of spawn of salmonoid fish. According to data of the Slovak Fishing Association, 109 832 recreational fishermen fished 1 674 tonnes of fish in 2007, which is comparable to previous years.

Aquaculture

Aquaculture in Slovakia can be grouped into two categories (fields): fish pond management and trout rearing. According to the Statistical Office of the Slovak Republic, there are 510 fish ponds used for aquaculture, covering the area of 1 328 hectares. In addition, there are 42 small water reservoirs covering 495 hectares dedicated to rear lowland species. In 2007, the production from fish ponds was 290 tonnes excluding fish fries. Similarly, the production of salmonoids (trout, brook trout, grayling, Danube salmon) in special fish farming facilities (5 192 m^3 of cages) reached 880 tonnes. Large part of fish production in aquaculture is used as spawning materials to restock fish species in Slovak water bodies and this production is not included in official statistics. Regular annual restocking is necessary to maintain ecological balance and biodiversity of original fish species.

Total aquaculture production in 2007 was 1 198 tonnes, which is almost the same as the 2006 production (1 263 tonnes) in spite of a slight increase in salmonoid production (100 tonnes). Production in fish ponds could not justify financial transfers provided by the Financial Instrument for Fisheries Guidance of the EU for the period of 2004 and 2006. Given the characteristics of fish pond production (2-3 years are needed to rear fish fry to market-sized fish), it is expected to see first results of these investments in the following years.

According to the available statistics, there were 1 079 employers in the aquaculture sector in 2007. Among them, 259 people worked full-time and the remaining 820 people worked based on agreement or as seasonal workforce. While data for full-time workers are comparable to previous years, the seasonal workforce increased rapidly due to the change in data collection methods.

Markets and trade

In the Slovak Republic, nine processing plants have been approved for fisheries and aquaculture products. The annual capacity of the processing plants for freshwater fish is 855 tonnes. However, the actually processed volumes do not exceed 350 tonnes. The capacity for sea fish is approximately 22 000 tonnes but the processed volumes range from 14 000 to 15 000 tonnes.

Fish consumption in the Slovak Republic is stable. In 2007, the consumption reached 4.3 kg/capita/year, out of which less than a kilogram came from freshwater fish. Since domestic aquaculture production can cover only around 40% of the freshwater fish consumption, the major part of consumption is met by imports.

In 2005, 1 131 tonnes of freshwater fish as well as 12 994 tonnes of sea fish were imported to the Slovak Republic (including 819 tonnes of live freshwater fish). The Czech Republic was the biggest exporter to the Slovak Republic by exporting 807 tonnes of fish and fish products. On the contrary, Slovakia's exports were less than one-tenth of imports, reaching 1 080 tonnes. Most of them (1 078 tonnes) were sea fish products that were (secondarily) processed and re-exported. Only a limited number of freshwater fish was exported.

PART III

Chapter 16

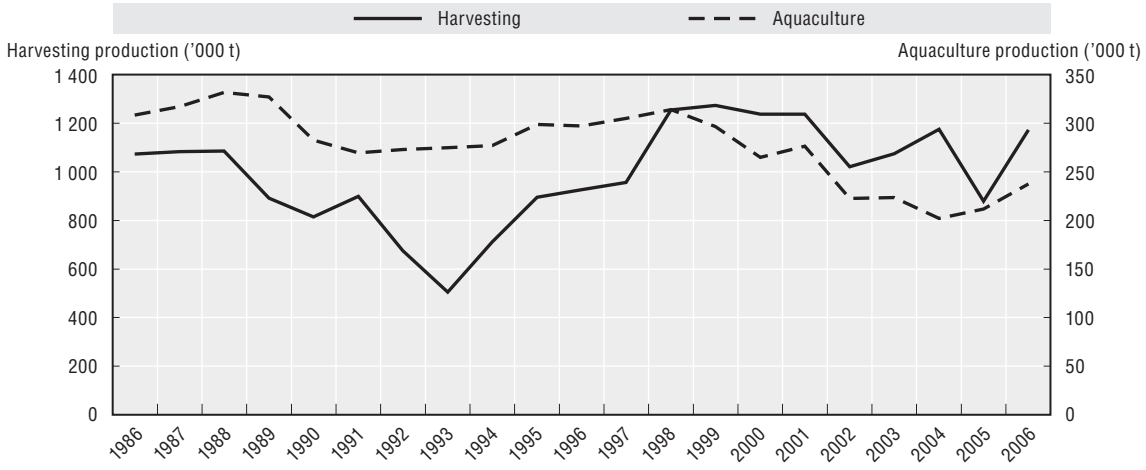
Spain

Spain

Summary of recent developments

- Following the recent ministerial restructuring, which has seen the emergence of a new Ministry of the Environment and the Rural and Marine Environment, Spain will further pursue the consolidation of fisheries as a responsible economic activity in every way, consistent with a marine ecosystem-based approach. Spain will therefore be continuing its initiatives to reinforce measures against illegal, undeclared and unregulated fishing.
- The Spanish government intends to continue its policy to create marine protected areas, as required under EU Directives and international agreements for the protection of the marine environment. Most of the areas under consideration coincide geographically with marine reserves of value to fishing, the leading candidates being the Island of Alborán (Andalusia), Cabo de Palos (Murcia), Cabo de Creus (Catalonia), Canal de Menorca (Balearic Islands), the Columbretes Islands (Valencia), and Banco de Galice.

Harvesting and aquaculture production

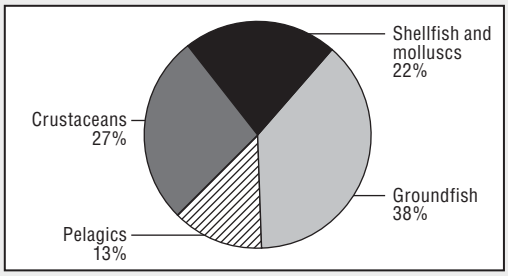


Source: FAO.

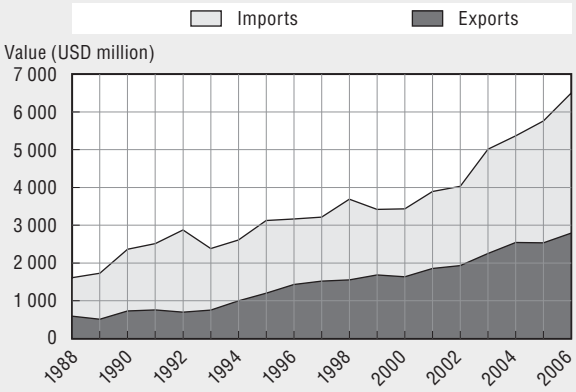
Key characteristics of the sector

- The real consumption of fish in 2006 was 36.66 kg per person per year, broken down as follows: 15.88 kg of fresh fish, 4.52 kg of frozen fish, 11.49 kg of crustaceans and molluscs and 4.77 kg of canned fish.
- Spanish household spending on fishery products amounted to EUR 195.3 per person per year in 2006 and EUR 199.8 in 2007, an increase of 2.3%, and accounted for 14.16% of total food purchases.

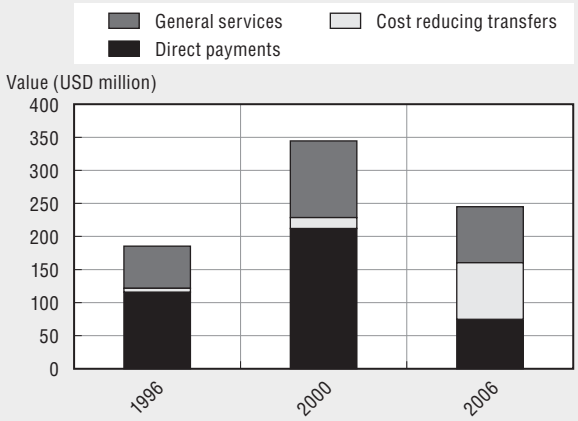
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	67 726	35 236
Number of fish farmers	9 115	8 024
Total number of vessels	18 094	13 400
Total tonnage of the fleet	614 374	480 778

Legal and institutional framework

As Spain is a member of the European Union, the management and conservation of sea fishery resources are subject to EU regulations. Domestic policy in these fields therefore complies with the requirements of the Common Fisheries Policy (CFP), which was reformed in 2002.

With regard to the assignment of domestic responsibilities, the Spanish Constitution defines the respective jurisdictions of central government and the Autonomous Communities. Central government has full jurisdiction in matters relating to sea fishing and hence the relevant legislation and its implementation. With regard to the development of the fishing industry and commercial activity, however, central government only establishes "basic legislation" *i.e.* the fundamental principles governing such activities. The Autonomous Communities, for their part, can adopt provisions that complement legislation in these two areas and proceed to implement them. Furthermore, the 10 coastal Autonomous Communities have sole jurisdiction over "fishing in internal waters, the harvesting of shellfish, and aquaculture".

In April 2008, the Ministry of Agriculture, Fisheries and Food and the Ministry of the Environment were restructured into a new Ministry of the Environment and the Rural and Marine Environment. The General Secretariat for the Sea, which reports to the new Ministry, is the central government administration responsible for marine fisheries. Responsibility for research into fisheries and oceanography lies with the Spanish Institute of Oceanography (IEO), which reports to the Ministry of Science and Innovation.

Capture fisheries

As of 31 December 2007, the Spanish sea fishing fleet comprised 11 282 motor vessels, with a tonnage of 467 872 GT, 70% of which were under 12 m in overall length, and 1 726 small non-motorised vessels, with an overall tonnage of 1 073 GT. Since 31 December 2005, the number of vessels has fallen by 687 units, or 18 194 GT.

Table III.16.1. **Main areas and stocks fished by Spain in 2005/07**

Area	Stocks
EU Atlantic Waters[1]	Hake, anglerfish, megrim, Norway lobster, poutassou, anchovy, sardine, mackerel and Atlantic horse mackerel
Mediterranean Sea	Hake, mullet, prawn and anchovy
Waters of North-West Africa and the Canary Islands	Cephalopods, hake, prawn, sardine and Sparidae
Atlantic Ocean, Mediterranean Sea and Indian Ocean	Bluefin tuna, white tuna, albacore, bigeye tuna, skipjack and swordfish
North Atlantic and Arctic Ocean	Cod, redfish, deepwater prawn
Namibia	Deepwater resources
Mozambique	Crustaceans on the continental slope
Falkland Islands	Cephalopods and hake
Newfoundland	Cod, Greenland halibut, American plaice, yellowtail flounder, redfish, deepwater prawn, plaice

1. From western Scotland to the Straits of Gibraltar.

The number of inspections and offences in 2007, compared with 2006, was as follows (Table III.16.2):

The leading initiatives in terms of monitoring, inspection and surveillance conducted over the past two years include campaigns focusing on albacore tuna, Mediterranean bluefin tuna, inspection campaigns in NAFO and NEAFC waters, and the ICCAT Port Inspection Scheme.

Table III.16.2. **Number of Inspections and offences in 2006 and 2007**

	2006		2007	
	Inspections	Offences	Inspections	Offences
Land	3 597	684	2 689	525
Sea	2 612	955	2 079	789
Air	3 411[1]	159	4 869[1]	115
Total	**9 620**	**1 798**	**9 527**	**1 403**

1. Air surveillance of fishing vessels.

In 2007, in accordance with EU regulations whereby each member state must set up a satellite monitoring system for fishing vessels over 15 metres in overall length, Spain's Fisheries Monitoring Centre handled 8 749 341 reports from 2 540 Spanish and 436 foreign vessels (compared with 7 057 423 similar reports in 2005, from 2 675 Spanish and 441 foreign vessels).

Management

For management purposes, Spanish sea fishing is divided into four distinct groups, depending on the zone of activity: fishing in territorial waters, fishing in Community waters, fishing in third country waters, and fishing in international waters whether regulated by multilateral organisations or not.

In territorial waters, the main initiatives launched over the period 2006-2007 were as follows:

- A Comprehensive Management Plan for the Conservation of Fishery Resources in the Mediterranean was adopted in January 2006 and extended to 2008.
- In the Gulf of Cadiz, biennial plans for the conservation and sustainable management of trawler and purse-seine fisheries were adopted in 2007. They focus mainly on reduced fishing effort and biological rest periods of 60 days each year.
- In the Cantabrian and Northwest fisheries, the 10-year Hake and Norway Lobster Recovery Plan drawn up in 2005 by the EU is based on annual 10% reductions in fishing effort for hake, besides special control measures. As for Norway lobster, there is now a closed area to the west of Las Rías Bajas (south-west Galicia).

Bilateral fishing agreements with third countries are negotiated by the European Commission. The only bilateral agreement negotiated directly by Spain is with South Africa, an agreement renewed annually with the authorisation of the Council of the EU.

As well as the mandatory presence on board of international observers as required by RFOs such as NAFO, CCAMLR, IATTC and ICCAT, the Spanish authorities require fleets operating in certain international zones to carry scientific observers on board; these arrangements are planned and controlled by the Spanish Institute of Oceanography (IEO) and the aim is to monitor fisheries, assess stock status and obtain other biological and environmental data. The IEO also conducts experimental fishing schemes with a view to enhancing fishing-gear selectivity.

Recreational fishing

Recreational fisheries are regulated by central government, with the exception of inland waters, regulated by the Autonomous Communities. In 2007, central government departments issued 1 895 licences for vessels harvesting species subject to differentiated protection measures.

Aquaculture

Under a co-operation agreement to produce a series of "Guides for the Sustainable Development of Mediterranean Aquaculture", signed in 2006 by the General Secretariat for Fisheries and the IUCN Centre for Mediterranean Co-operation, the first guide was published in 2007, on aquaculture and the environment, and another is under way on site selection.

In March 2007, the Advisory Committee on Marine Aquaculture held a meeting on sea cages, which provided an opportunity to present the main conclusions of work in this field on subjects such as the vulnerability of cages and sustainable aquaculture.

Throughout 2007, the Spanish Aquaculture Observatory (OESA), which seeks to increase the synergy between enterprise and research, paved the way for the establishment of the Spanish Aquaculture Observatory Foundation. This management structure will help to speed up decision-making on economic, administrative and technical issues.

Fisheries and the environment

IEO researchers monitor marine contamination on an ongoing basis via a network of locations throughout Spanish waters, and also study red tides to check the safety of sea fishery products. The IEO continuously gathers data on incidental catches of cetaceans, turtles and birds via a scheme whereby scientific observers are posted on board commercial fishing vessels. In addition, a system has been set up to monitor the incidental capture and killing of cetaceans, and research and conservation measures have been adopted to ensure that incidental capture or killing does not have a significant impact on these species.

The General Secretariat for Sea Fisheries was the first partner involved in the funding of the LIFE project on "Cetaceans and turtles in Murcia and Andalusia" (2003-2006), co-ordinated by the Spanish Cetacean Society (SEC), the ultimate aim being to draw up management plans for the species listed in the Habitat Directive and present in the area (porpoise, bottlenose dolphin and loggerhead sea turtle), together with schemes to mitigate the impact of fishing.

Following an initial scientific campaign to Hatton Bank in October 2005, conducted jointly with the IEO on board the research vessel *Vizconde de Eza*, to map out the sea floor and focus more specifically on seamounts, cold-water corals, sponges and other benthic invertebrates, the exploration of the area was completed during the second phase of the campaign, in October 2006. Scientists from other countries were invited to participate and the findings were also analysed by ICES. Following the recommendations made by ICES, the North East Atlantic Fisheries Commission (NEAFC) drew up a list of fisheries in which the use of bottom gear was banned. Similarly, a series of campaigns was launched in 2007 in the Southwest Atlantic to identify potentially vulnerable habitats requiring protection.

In 2007, a new marine reserve of value to fishing was opened at Cala Ratjada-Llevant de Mallorca. The Ministry of Agriculture, Fisheries and Food has now opened ten reserves, five of them run entirely by central government: Masía Blanca (Catalonia), the Columbretes Islands (Valencia), Cabo de Gata-Níjar (Andalusia), the Island of Alborán (Andalusia) and the Island of Palma (Canary Islands), while the management of a further five is shared with regional governments: the Island of Tabarca (Valencia), Cabo de Palos-Hormigas Islands

(Murcia), the Island of Graciosa (Canary Islands), Punta de la Restinga-Mar de las Calmas (Canary Islands) and Cala Ratjada-Llevant de Mallorca (Balearic Islands). Annual expenditure on these ten reserves amounts to approximately EUR 7.5 million, most of which goes to surveillance but also to monitoring studies, infrastructure and extension campaigns.

In March 2008, the Spanish Cabinet approved an agreement to adopt measures aimed at protecting the marine area El Cachucho. This was the first step in the process to declare it a Marine Protected Area (MPA), as required under the EU Habitats Directive and the OSPAR Convention. The El Cachucho bank, in the Cantabrian Sea, is a seamount of great ecological value 65 km off the Asturian coast and featuring some 600 species, two of them previously unknown to science. It is a highly sensitive ecosystem of great importance to the reproduction of species of value to fishing. These waters contain cold-water coral reefs, sponges and gorgonians.

Government financial transfers

For the period 2007-2013, support for the fisheries sector in the EU will be funded via the new European Fisheries Fund (EFF). The EFF Operational Program for Spain was approved by the EU Commission in December 2007. There are no data on EFF payments as of 31 December 2007.

The support awarded in 2006 and 2007 amounted to EUR 338 million in 2006 and EUR 265 million in 2007 (provisional data). Most transfers took the form of support co-financed by the Financial Instrument for Fisheries Guidance (FIFG), amounting to a total of EUR 334 million in 2006 and EUR 258 million in 2007. The specific EU measure relating to Morocco came to an end, and the final payments were in fact reimbursements. EU support awarded by EAGGF-Guarantee amounted to EUR 1 674 million in 2006 and EUR 4 159 million in 2007. Also included is the support awarded by Spain for training, amounting to EUR 2 914 million each year.

In 2006 and 2007, support for permanent withdrawal was awarded to a total of 203 fishing vessels, reducing the overall tonnage of the fleet by 18 502 GT.

Post-harvesting policies and practices

In accordance with the basic market regulations, producer organisations presented 30 and 31 new operational programs during the 2006 and 2007 campaigns, respectively, to promote rational and sustainable resource use and market-oriented production to optimise catches. The mandatory sales notes for first-sale aquaculture products have been replaced by monthly reports on the marketing activities of aquaculture facilities.

The General Secretariat for Sea Fisheries provides technical assistance on food safety to countries exporting fish to the EU, notably developing countries in Africa and Latin America, to improve inspection and monitoring of fish at source, in accordance with EU requirements on food safety and traceability. The initiatives developed in 2006 and 2007 benefited Mozambique, Morocco, Mexico, Peru, Mauritania, Panama, Guatemala, El Salvador, Guinea Bissau, Poland, Russia and Turkey.

Markets and trade

A study in 2007 on the purchase, conservation and consumption of fishery products by the Spanish population, drawn up by FROM (Fund for the Regulation and Organisation of

the Market in fish and marine culture products), shows that health concerns are the main reason for the consumption of fishery products (76% of those surveyed) and that interest in product information had risen from 59% in 2005 to 64% in 2007 (consumers who read the labels of fresh fishery products).

Supermarkets have gained ground from larger and smaller stores in terms of the purchase of fresh fishery products (from 24% in 2003 to 40% in 2007), convenience being cited as the main reason (61% of those surveyed).

The promotion programs of FROM (fund for the regulation and organisation of the market in fish and marine culture products) for financial years 2006 and 2007 consisted in generic campaigns to promote the responsible consumption of fishery products, consumer information via labelling, and encouragement for young children to eat fishery products; there were also specific campaigns focusing on traditionally caught albacore tuna, marine aquaculture, farmed trout, mussels, canned fish, frozen fishery products and bluefish. It should also be mentioned that FROM attends both domestic and international fishery exhibitions and fairs.

PART III

Chapter 17

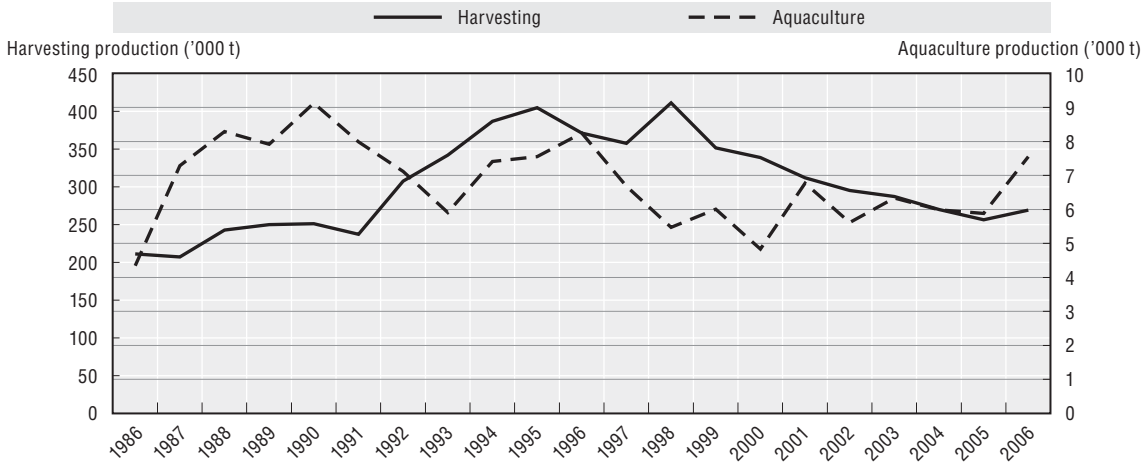
Sweden

Sweden

Summary of recent developments

- At the beginning of the 21st century, both revenues and profitability decreased in the Swedish saltwater fisheries: between 2002 and 2005 the value of landings dropped by nearly 25%, and between 2005 and 2007 the volume of landings decreased by 8%. However, the value of landings increased during 2005 and 2007 by 22% as a result of increasing fish prices.
- Overcapacity in the Swedish fleet is further augmented by increasing fuel prices as the segment is very fuel intense. If the fuel price remains at a high level, it can be expected that many fishing vessels will be forced to leave the fleet.
- An inquiry on the Swedish law of fisheries has been formed and is expected to finish its work in the end of March 2009. The inquiry is supposed to put forward proposals for a reformed fisheries law that gives the requirements for a sustainable use of resources in order to promote the fishing industry, recreational fishing and biodiversity. It is also supposed to make rules easier for the stake-holders to live by as well as make the legislation more efficient in taking legal proceedings against those not following the legislation.

Harvesting and aquaculture production

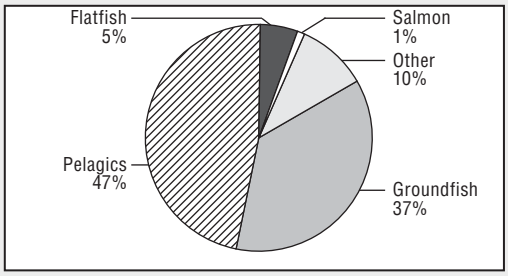


Source: FAO.

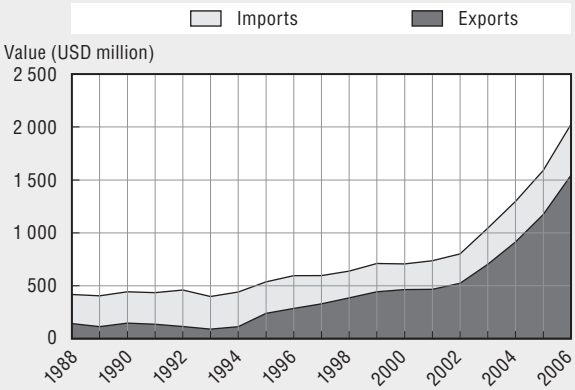
Key characteristics of the sector

- Total production value was SEK 3 862 million (EUR 400 million) in 2005. However, profits in the processing industry decreased by about 30% per company generally speaking, even though gross value added and gross revenue have been relatively stable.
- In 2006, about one million of the 6.7 million Swedes between the age of 16 and 74 participated in recreational fishing at least once. The total number of fishing days was 13.8 million. The total catch weight was about 18 000 tonnes, of which about half was caught in the sea. In 2006 there were about 1 300 recreational fishing enterprises in Sweden.
- Employment in the fishing sector as a whole is decreasing year by year. Total employment in all of the fisheries sector is about 4 000, approximately 0.1% of the total Swedish workforce.

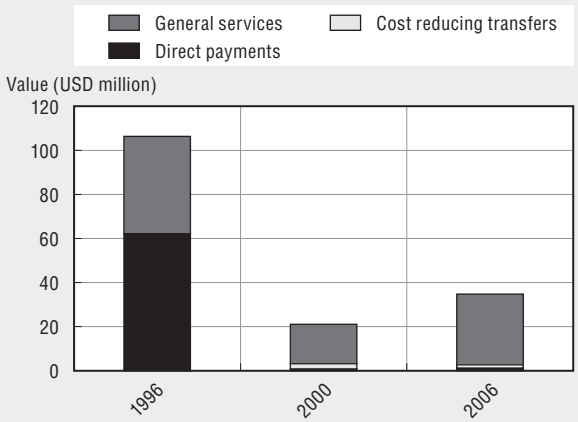
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	6 000	1 880
Number of fish farmers	2 823[1]	n.a.
Total number of vessels	1 769	1 551
Total tonnage of the fleet	51 134	43 768

1. Fishers in 1998.
n.a.: Not available.

Legal and institutional framework

Sweden is a member of the EU and the fisheries sector is managed within the framework of the

Common Fisheries Policy (CFP). The general principles governing national fishery policy are established in a Parliamentary Act. This Act authorizes the government to issue legal acts in order to supplement EU legislation and to regulate fishing outside of EU legislation. The government has delegated this authorization to the Swedish Board of Fisheries (SBF), together with some general principles and guidelines. The principal management instruments used are those stated within the CFP. As regards foreign access and foreign investments, the rules of the CFP are followed.

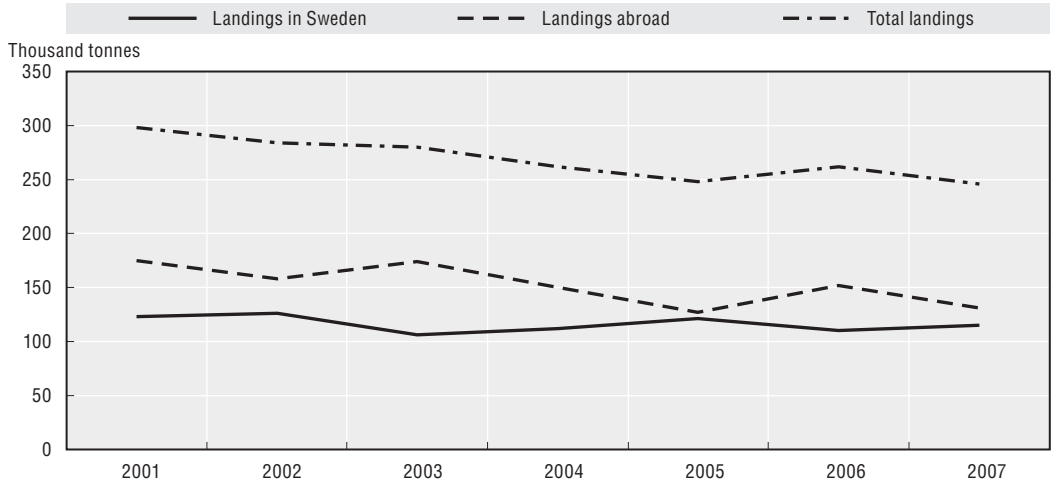
Capture fisheries

Swedish fishing vessels landed 246 000 tonnes of marine species valued at SEK 1 083 million (EUR 113 million) in 2007. Landings abroad were dominant, representing 53% or 131 000 tonnes. The landings occurred mainly in Denmark (consisting mostly of sprat and herring for reduction purposes). Even though landings abroad are larger by volume, domestic landings represent the larger value (65% of total value), mostly due to higher price species such as cod, nephrops and shrimp. Total landed value is approximately 0.04% of the total Swedish GDP. Volume and landings in 2001-2005 are shown in Table III.17.1.

Table III.17.1. **Landings**

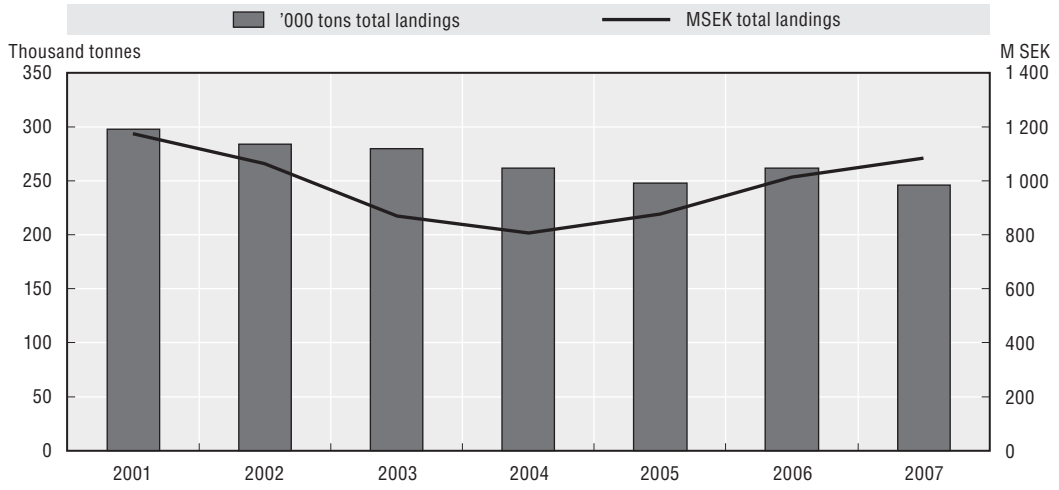
	Landings in Sweden			Landings abroad			Total landings		
	000 tonnes	M SEK	M EUR	000 tonnes	M SEK	M EUR	000 tonnes	M SEK	M EUR
2007	115	705	76	131	379	41	246	1 084	117
2006	110	683	74	152	330	36	262	1 013	109
2005	121	608	66	127	269	29	248	877	95
2004	112	564	61	150	243	27	262	807	88
2003	106	590	65	174	280	30	280	870	95
2002	126	721	79	158	343	37	284	1 064	116
2001	123	741	97	175	433	51	298	1 174	138

Figure III.17.1. **Swedish landings by volume 2001-2007, divided by domestic landings and landings abroad**



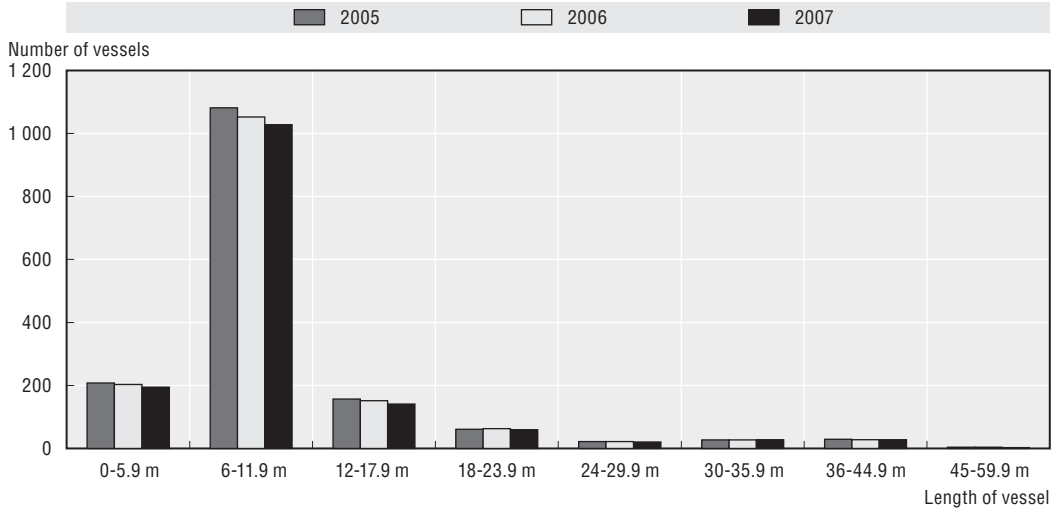
Total value of landings decreased between 2001 and 2004 before the trend turned upwards. Each year since 2004, total value has risen despite the downward trend in landed volume during the same period of time (see Figure III.17.2).

Figure III.17.2. **Swedish landings by value (SEK million) compared to volume 2001-2007**



The marine fishing fleet included 1 504 vessels with a total capacity of 43 929 GT and 210, 877 kW by the end of 2007 (Table III.17.2). From 2001 to 2007, the number of licensed vessels was reduced by 19%, while capacity, in terms of gross tonnage, decreased by 9% which indicates that the median vessel leaving the fleet is smaller than average. The Swedish fleet is still dominated by small vessels as can be seen in Figure III.17.3.

Figure III.17.3. **The Swedish fishing fleet by length of vessels**



Fish for reduction purposes accounted for 20% of the total value, followed by herring for human consumption (19%) and cod (19%), nephrops with 13%, and northern prawn (*Pandalus borealis*) with 10%.

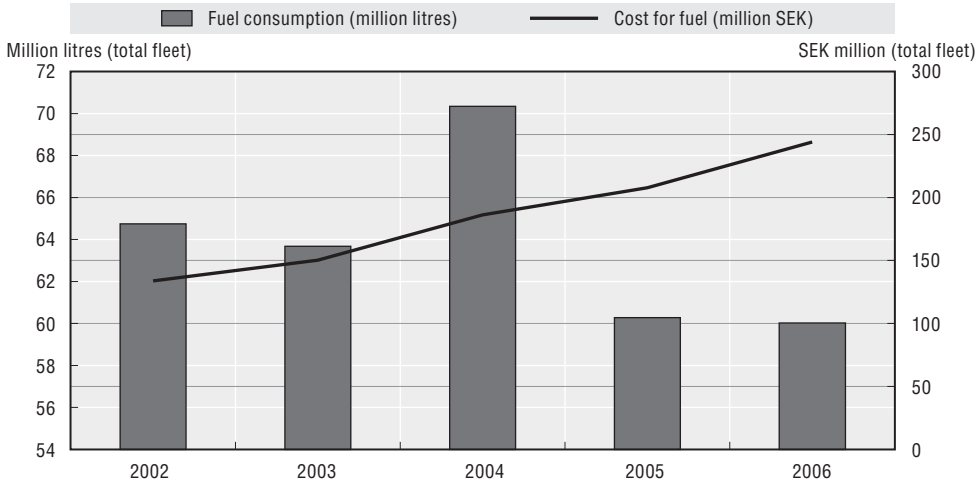
Table III.17.2. **Fishing fleet structure in 2001-2007**

	2001	2002	2003	2004	2005	2006	2007
Number of vessels	1 848	1 818	1 715	1 597	1 589	1 551	1 504
Total GT	47 300	45 908	44 762	44 447	44 105	43 768	42 929
Total kW	229 478	224 731	220 969	222 800	216 965	215 774	210 877

The large pelagic vessels accounted for more than 40% of the total national landed value and 80% of landed volume in 2006. This segment sustained heavy losses in 2004 but has managed to increase its profitability in spite of increasing fuel prices. Since 2007, a new management system has been introduced for the pelagic segment consisting of individual vessel quotas giving vessels increased possibilities to manage and plan their fishing as they see fit during the year. Fish prices for the pelagic species have also increased at the same time.

The profitability in the segment targeting northern prawn (*Pandalus borealis*) is not satisfactory but the segment is managing. One of the reasons to this is that the vessels used are among the oldest in the Swedish fleet and their loans are in many cases paid off. Vessels targeting nephrops had a bad year in 2004 but have since then improved considerably due to increased prices and landings. The profitability of the fresh water fishery in lakes and rivers has improved during the last years.

Figure III.17.4. **Fuel consumption and fuel costs during 2002-2006 for the total Swedish fishing fleet**



Total fuel consumption for the fleet has gone down from a maximum of over 70 million litres 2004 to under 60 million litres 2006. This is a direct result of vessels changing their fishing behaviour due to the fuel price shock in 2005. The lower consumption has, however, not been able to cover for the rise in fuel prices. The total cost for fuel for the total fleet have gone up from SEK 130 000 in 2002 to SEK 240 000 in 2006, with demersal trawlers being the segment who had the highest increases in fuel costs. The profitability in the Swedish fisheries is already low and vessels are managing by reducing crew members to a minimum and by reducing salaries.

Management

The SBF handles the management of commercial fishing. In addition to regulations decided by the SBF, the Swedish Fishermen's Federation imposes supplementary regulations for its members in some exceptional cases. Fishing for northern prawn in the North Sea and the Skagerrak is one example of this voluntary regulation, where the national quota is divided between vessels according to the number of crewmembers.

For most fisheries there are national quotas and technical restrictions relating to, for example, fishing technique, geographical areas, fishing seasons, maximum landings per vessel and week, minimum landing sizes or limits on by-catches. The technical restrictions are decided nationally or by the EU. Vessels used in commercial fishing have to be licensed and at least one fisherman per vessel must hold a personal fishing license.

Since 2007, a new management system of individual vessel quotas have been introduced in the herring- and sprat fisheries in the Skagerrak, Kattegatt and the Baltic Sea, based on a track record. Each vessel gets a special permit which states the yearly quota allocated to that vessel. In total, 80 vessels have been given such a special permit. The system is not yet transferable but there is an ongoing inquiry looking into the possibility of this introduction.

During 2007, a general ban on all eel-fishing was introduced, in order to prepare for a national management plan for eel, planned for 2008. Special fishing permits have been issued to those fishermen fishing more than 400 kg of eel annually during a reference period. This together with higher minimum length requirements and other requirements on traps and nets resulted in a 35% decrease in eel catches during 2007. Special fishing permits were also issued during 2007 for piked dogfish (*Squalus acanthias*), shrimp and fishing for *nephrops* with cages, the first for conservation reasons and the two latter in order to avoid over capacity in those segments of the fishing fleet.

Recreational fishing

The difference between a professional fishers and a recreational fisher is the possession of a professional fishing license. In public waters, professional fishermen may use all types and an unlimited number of gears, if not otherwise stipulated in any conservation regulation. A recreational fisherman may, in public waters, only use a limited number of gears and not all types. An example of the limitation is that the total length of the nets is not allowed to exceed 180 m and the number of pots must not exceed six. When fishing for lobster, the permitted number of pots is 14. There are no restrictions that concern the sale of catches. In private waters, there are no restrictions on the number and types of gears, if not otherwise stipulated in any conservation regulation.

In principle, all waters around the coast and in lakes are privately owned up to 300 m from the shoreline. A fisher is allowed to fish in private waters only with the consent of the owner, with the exception of angling which is permitted along the coast and in the four big lakes, even on private water. Responsibility for conservation and management in these waters rests on the owners. However, in the four biggest lakes and in the coastal waters, the responsibility lies with the SBF. Many private water-owners have, with state support, created fishing management areas with uniform fishing rules and marketing of recreational fishing opportunities for the public. There are, however, some important exceptions to the general rule of the owner's right to sole disposal of the waters. On the western and southern coasts, fishing is allowed in privately owned waters for the public

with a limited number of other gears as well as for professional fishermen. Technical regulations, mesh size, time and area closure, etc. applies equally for recreational and professional fishing.

About one third of recreational fishers are women. Men fished 16 days on average annually and women fished 9 days on average annually. The total number of fishing days was 13.8 million. The total catch weight was about 18 000 tonnes, of which about half was caught in the sea. The most important species by catch weight are perch and pike. Other important species are trout, herring, cod, mackerel, flatfish, common whitefish, grayling, salmon and charr (Table III.17.3).

Table III.17.3. **Catches of fish in the recreational fishery 2006 (tonnes)**

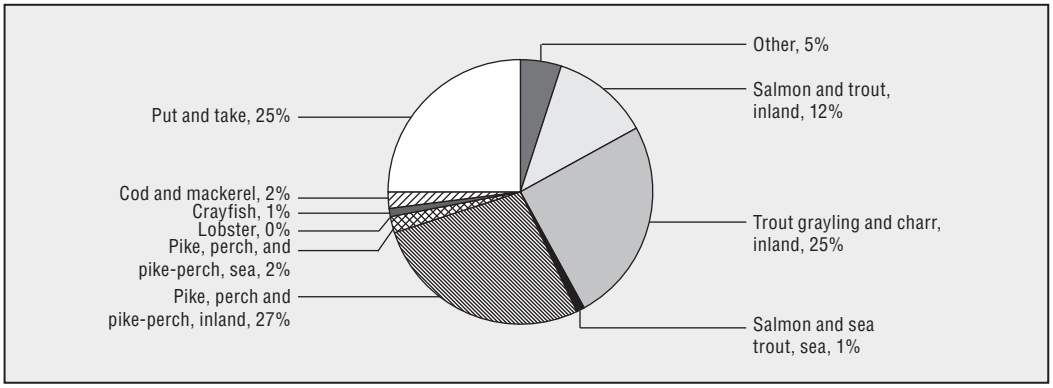
	Anglers fishing with line and rod	Fishers fishing with nets, cages, etc.	Total, tonnes
Pike	2 500	1 000	3 500
Pearch	2 000	1 000	3 000
Herring	600	1 200	1 800
Mackerel	1 100	200	1 300
Trout	800	200	1 000
Roach fishes	500	500	1 000
Common whitefish	200	700	900
Cod	700	200	900
Rainbow trout	580	20	600
Pike-perch	400	100	500
Flat fish	100	400	500
Charr	350	40	390
Salmon	250	140	390
Grayling	270	90	360
Other species	1 800	1 100	2 900
Total	**10 800**	**7 300**	**18 100**

Total expenditures for recreational fishing in 2006 was about SEK 1.7 billion (about EUR 180 million), *i.e.* about SEK 125 per fishing day or about SEK 1 700 per recreational fisher per year. In 2007, a mail survey showed that there were about 1 300 recreational fishing enterprises in Sweden in 2006. However, a follow up study showed that the real number probably is about twice that. The enterprises provided a number of services, the most common being food and accommodation, guiding, boats and fishing waters. The most common fish were pike, perch and pike-perch or trout, grayling and charr. Very few of the fishing days took place at sea (5%).

Recreational fishing enterprises' total revenues were about SEK 2.1 billion (EUR 230 million) in 2006, of which about SEK 500 million was generated from recreational fishing activities. The recreational fishing activities in the enterprises generated about 1 000 full time job equivalents. Many of the people in the business are only working part time or during certain seasons, hence the number of people working in the recreational fishing enterprises is much greater.

About half of the enterprises believed that their revenue would increase during the three coming years, while only 7% believed that it would decrease. About one quarter of the enterprises planned to increase their business regarding guiding-activities and about one fifth had plans to increase their business regarding food and accommodation.

Figure III.17.5. **The share of the recreational fishing enterprises guests fishing days in different recreational fisheries**



In 2006, the SBF released a report on request from the government on recreational fisheries. The proposals that the SBF made are to be considered in an ongoing commission of inquiry on the Fisheries Act. The main proposals from the SBF were to:

- Increase fisheries management knowledge about these stocks.
- Widen the designation of areas of special importance to commercial fisheries so that it also includes other fishing groups.
- Consider whether the amount of gear that is allowed for the general public should be restricted.
- Better supervision should be combined with information activities and other measures to increase availability to recreational fishers.
- Consider whether enterprises could be given a special permit to use more gear than is stipulated for recreational fishing.

The Sami population living on reindeer breeding in the northern part of Sweden has special fishing rights in the areas allocated to their profession.

The SBF have in co-operation with the Swedish Coastguard made a national action plan for fisheries control for the period 2008-2011. The action plan deals with necessary changes in administration, priorities, and highlights obligations on co-operation, and lists total activities under fisheries control.

Aquaculture

n inquiry on Swedish aquaculture has been formed and is expected to finish its work at the end of February 2009. The inquiry is supposed to put forward a list of obstacles for the expansion of aquaculture in Sweden and list proposals for how to eradicate those obstacles.

The tables below give an overview of the present situation in the aquaculture sector in Sweden. The general trend in the sector has been rationalisation and concentration towards bigger companies in order to gain scale advantages and reduce production costs. Nevertheless, only small variations, both in terms of production volumes and values, can be noticed during the last three years. The variations in volume are mostly due to climate factors such as extreme temperatures and precipitation, and in some cases due to outburst of diseases. High price competition from neighbouring countries has also had a negative impact on the sector.

Table III.17.4. **Number of farm sites**

	2003	2004	2005	2006
Rainbow trout	110	103	85	83
Eel	3	2	3	3
Arctic char	15	15	14	11
Blue mussels	15	17	17	16
Crayfish	110	105	93	70
Total	**253**	**242**	**212**	**183**

Table III.17.5. **Production volume – live weight (tonnes)**

	2003	2004	2005	2006
Rainbow trout	4.886	4.851	4 210	5.183
Eel	194	158	200	172
Arctic char	324	329	372	444
Blue mussels	1.742	1.435	1 069	1 791
Crayfish	7	0	6	5
Total	**7.153**	**6.773**	**5.857**	**7.595**

Table III.17.6. **Production value (Million SEK/EUR)**

	2003		2004		2005		2006	
	M SEK	M EUR	M SEK	M EUR	M SEK	M EUR	M SEK	M EUR
Rainbow trout	116.9	12.8	111.7	12.2	113.5	11.8	157.5	17.0
Eel	11.1	1.2	11.3	1.2	17.3	1.8	16.2	1.7
Arctic char	14	1.5	13.7	1.4	19.2	2.0	20.4	2.2
Others	8.8	1	7.0	0.7	5.7	0.6	11.2	1.2
Total	**150.8**	**16.5**	**143.7**	**15.7**	**155.7**	**16.2**	**205.3**	**22.2**

Fisheries and the environment

Sweden has adopted 16 environmental quality objectives for environmental quality that describe the qualities that the environment and common natural and cultural resources must have in order to be ecologically sustainable. The overriding aim is to solve all the major environmental problems within one generation. The objectives are specified with short- and long-term goals and timeframes. The targets include *inter alia* long-term protection by establishing marine protected areas, adopting a strategy for the preservation and use of the cultural heritage and agricultural landscape in coastal and archipelago areas, introduction of action plans for endangered marine species and fish stocks and reduction of by-catches of marine mammals and reduction of catches of fish juveniles.

In 2006 and 2007, the responsible authorities carried out a range of projects linked to the targets including:

- A survey of 20 offshore marine banks to provide a better picture of the distribution of valuable marine environments and improve their management.
- The designation of the waters around Gotska Sandön as a no-take zone. The ban on fishing came into force on 1 May 2006, and an evaluation of the effects is to be carried out by the end of 2010.
- An observer scheme for porpoises and dolphins, with the aim of monitoring 5% of pelagic trawl and gill-net fishing effort by vessels over 15 m in length.

- Investigations of new designs for seal-proof fishing gear and of the use of acoustic seal deterrents to close off entire bays and inlets along the Baltic coast.

More detailed information and annual progress reports on the overall work with national environmental objectives can be found at: *www.naturvardsverket.se/en/In-English/Menu/Swedens-environmental-objectives–for-a-sustainable-society* and *www.miljomal.nu*.

Government financial transfers

Transfers to the sector are in accordance with EU regulations. There is hardly any financial support to the sector outside this framework. The administration of the support is shared between the SBF and the Regional County administrations. The SBF has the responsibility for the distribution of these transfers, and issues general guidelines to the different County administrations, which have responsibility for granting aid for some of the measures. The SBF is responsible for the remainder of the measures as well as for control and surveillance.

Table III.17.7. **Overview of government financial transfers divided into target areas (general services not included)**

(Million SEK)

Target area	2005		2006		2007	
	National co-financing	EU – FIFG	National co-financing	EU – FIFG	National co-financing	EU – FIFG
Catching sector	19.4	44.5	6.2	13.6	17.4	24.8
Aquaculture	0.7	3.1	0.4	2.0	0.4	2.0
Processing industry	4.7	15.1	5.7	18.2	5.0	16.4
Others	49.5	49.7	37.4	39.6	50.0	62.8
Total	**74.3**	**112.4**	**49.7**	**73.4**	**72.8**	**106.0**

Table III.17.8. **Overview of government financial transfers classified into direct payment, cost reducing transfers and general services**

(Million SEK)

	Direct payments	Cost reducing transfers	General services	Total	% of total landing value
2005	24.8	67.9	209.5	302.2	34
2006	9.3	60.4	236.5	306.2	30
2007	32.6	56.8	266.4	355.8	33

Market support payments amounted to SEK 1.7 million in 2007 (SEK 1.4 million in 2006).

There is a special unemployment fund for fishermen. As a general rule, the unemployed person must be at the disposal of the labour market. It is possible for a fisherman to receive unemployment benefits in certain circumstances. In total SEK 27.4 million (EUR 3 million) was paid to fishermen in 2007, compared to SEK 28.1 million 2006.

Markets and trade

There were about 211 companies with 221 processing plants and a total production value of SEK 3 862 million (EUR 400 million) in 2005. The total number of employees was 1 746. Production is mainly directed towards herring and cod, but also, to some degree, prawn, salmon, cod roe and mackerel. The number of companies has increased by 2% compared with 2004. Profits went down by 30% per company, even though gross value added and gross revenue have been relatively stable.

Concerning the secondary industry a large part of the raw material is imported. Most of the import originates from Norway. The secondary industry is, compared to the primary, less dependent on Swedish landings but more dependent on the market regulations especially the tariff and the free trade agreements.

The consumption of chilled fish fillets has varied between 2.7 kilos and 3.1 kilos per person during the years 2004-2005. The consumption of prepared or preserved fish, crustanceans and molluscs has increased and amounted to 9.3 kg per person in 2005. Since the year 2000, no statistical calculations are made for the consumption of fresh fish since the underlying data is estimated to not be reliable.

EC legislation sets minimum hygiene standards for the production and marketing of fish and fish products. Thus Swedish legislation in this is area is essentially the same as that in the rest of the EU. The National Food Administration (NFA) is the responsible authority when it comes to food safety and food safety continues to be an important topic in Sweden.

There is an increasing public stand for products produced under environmentally friendly or sustainable conditions, especially concerning Baltic Sea cod. Several producers have not been able to sell cod from the Baltic Sea in Sweden. When new maximum levels for certain contaminants in foodstuffs were set by the Community in 2006, Sweden and Finland were granted an exception from the set maximum levels for dioxin and dioxin-like PCBs until 31 December 2011. The derogation implies that salmon, Baltic herring, lamprey, trout, artic char and vendace roe can be sold on the internal market even if maximum limits are exceeded and on the condition that there is sufficient information to the consumer.

KRAV is an incorporated association and is a key player in the organic market in Sweden. Since 2001, KRAV has been engaged in a project to develop standards, inspection and certification for sustainable fisheries in Scandinavian waters. In February 2004, KRAV decided upon the criteria for ecolabelling of marine captured fish. The rules and the control and certifying system were developed within a project financed by KRAV, the Swedish Ministry of Agriculture, different county administrative boards and the SBF, among others. Today there are eco-labelled shrimps and herring from the Skagerrak and the Kattegatt on the market.

Outlook

The capture fishery is expected to be under continued economic pressure due to large fishing capacity in relation to available resources. Increasing fuel costs will put an additional burden on the whole sector, creating a shift in relative compatibility between segments of the fleet. Increasing interest rates will also add to the burden, especially for those segments of the fleet that have large loans.

Management will continue to look closely at vessel quotas and the possibility to make them transferable. The new programming period with the European fisheries fund (EFF) and subsidies for scrapping will be able to play a part in reducing over capacity. The processing industry will probably continue to reduce its number of employees due to normal automation and outsourcing to low cost countries. The processing industry will also be affected by higher interest rates, as well as market developments over the next few years.

The aquaculture sector still has considerable problems with international competition. A small number of pilot projects have started with new species and new technologies, which will be evaluated during the next few years. There are some signs of an increased blue mussel production.

PART III

Chapter 18

United Kingdom

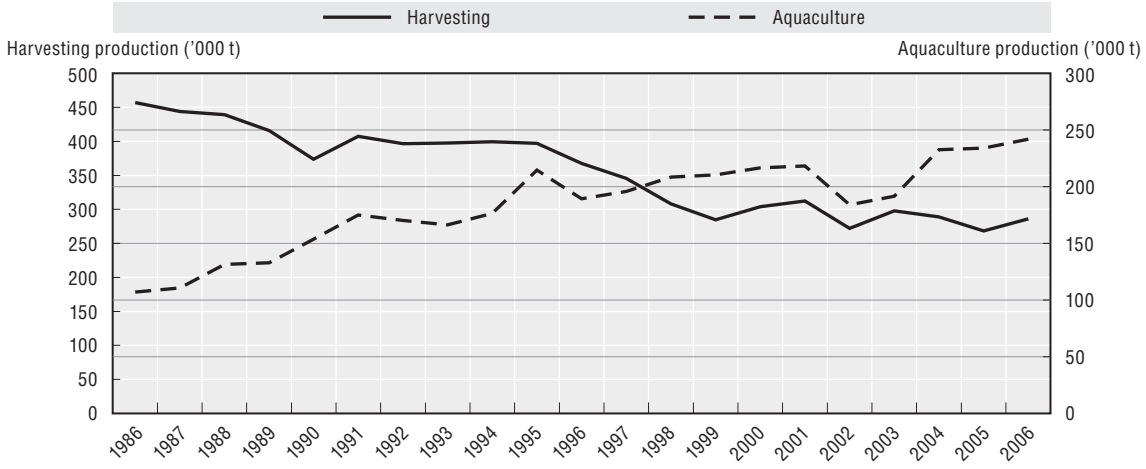
United Kingdom

Summary of recent developments

- The UK continues to develop its policy strategy both domestically as well as pushing forward the global agenda on lllegal, Unregulated and Unreported fishing (IUU). In 2007, a 20-year strategy called Fisheries 2027 was published to guide future fisheries policy and provide direction for everyone with an interest in marine fisheries. Defra also published a draft implementation plan in October 2007 called *Delivering Fisheries 2027* which it is developing with stakeholders into a shared long-term contract to achieve sustainable fisheries.* The UK has also spent over GBP 1 million on follow up activities to the High Seas Task Force (GBP 500 000 from Defra and GBP 600 000 from the Department for International Development), particularly for activities in Southern Africa. The UK has also agreed new exchange of information systems with authorities such as Russia which significantly reduces the risks of blackfish landings to UK ports.
- The UK also assisted in the financing (with Australia) of a Food and Agricultural Organisation Expert Workshop on a Global Record of Fishing Vessels.
- In August 2007, funding provided by Australia, Canada, New Zealand and the UK, enabled the Royal Institute for Policy Studies to publish a best practice model to help create new Regional Fisheries Management Organisations and self-evaluation processes for existing ones.

* These policy initiatives relate to policy in England and within British Fisheries Limits adjacent to England.

Harvesting and aquaculture production

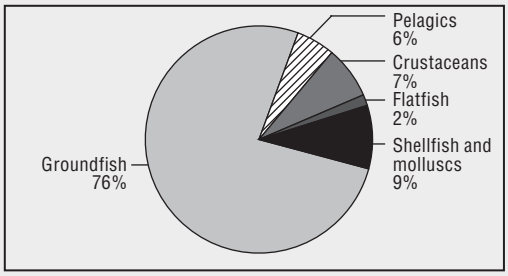


Source: FAO.

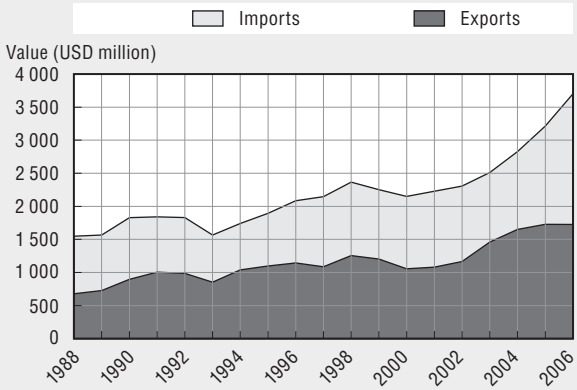
Key characteristics of the sector

- During 2006 the total supply of fish available for domestic use remained constant at 737 000 tonnes from 734 000 tonnes in 2005. The volume of total landings by UK vessels in domestic ports fell from 492 000 tonnes in 2005 to 417 000 tonnes in 2006. Despite the increase in the value of fish landed, profitability remained poor in many sectors (particularly the white fish fleet) given the increases in the price of fuel.
- Between 1997 and 2006 total imports of fish and fish preparations increased from 503 000 tonnes to around 753 000 tonnes (an increase of approximately 49%). In value terms, total imports rose in 2006 to GBP 1.9 billion, a 13% increase on 2005. In 2006, total exports of fish and fish preparations amounted to 416 000 tonnes product weight, a decrease of 10% on 2005. Though in terms of value, total exports remained constant at GBP 944 million in 2006, compared to GBP 939 million in 2005.
- Provision of government aid to the fishing industry in the UK was under the EU 2000-2006 Financial Instrument for Fisheries Guidance (FIFG) Program. The European Fisheries Fund (EFF) will replace the FIFG fund from 2008 to 2013. The EU's EFF provides CFP-funding for structural measures covering the industry as a whole.
- In 2006, 12 934 people were employed in the fish catching sector, 103 more than in 2005. This fall was accounted for by an increase of 237 mployed as part time fishers and a drop of 134 employed as full time fishers. In 2004 there were 13 453 people employed in the sector: 331 more than in 2003. At the end of 2006, 6 345 active vessels were in the UK (excluding the Isle of Man and Channel Islands) fishing fleet, 33 more than at the same time in 2005.

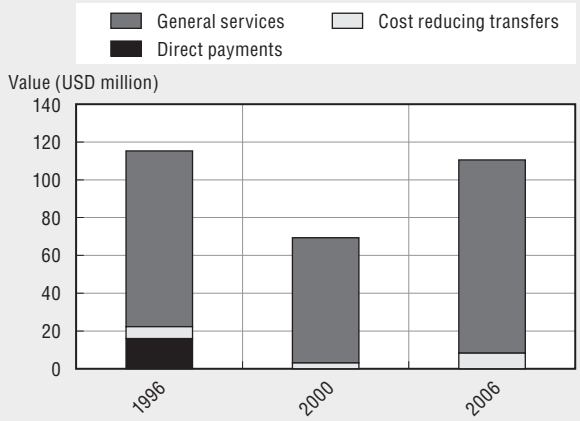
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	19 044	12 934
Number of fish farmers	n.a.	n.a.
Total number of vessels	8 648	6 758
Total tonnage of the fleet	251 761	214 587

n.a.: Not available.

Legal and institutional framework

Responsibility for fisheries in the United Kingdom lies with the Secretary of State for Environment, Food and Rural Affairs, Scottish Ministers, the Minister of the WAG and Northern Ireland Ministers. The principal powers governing the regulation of fisheries are set out in the Sea Fish (Conservation) Acts 1967 and 1992; the Sea Fisheries Act 1968; the Fishery Limits Act 1976; the Fisheries Act 1981; the Sea Fisheries (Shellfish) Act 1967 and the Fisheries Act 1966. Responsibility for these functions in relation to Scotland, Wales and Northern Ireland were transferred to the SE, Welsh Assembly and the DARDNI, respectively, by virtue of the Scotland Act 1998, the government of Wales Act 1998 and the National Assembly for Wales (Transfer of Functions) Order 1999 and the Northern Ireland Act 1998.

Any person wishing to fish under the British flag and against UK quotas may do so only with a fishing vessel which is both registered and licensed by the UK authorities. In order to register a fishing vessel, the owners should be UK citizens, EU citizens established in the UK or companies incorporated within the EU with a place of business in the United Kingdom. As a condition of registration all fishing vessels must be managed, controlled and directed from the UK. A restrictive licensing scheme operates and no new licences are issued by the UK authorities. Anyone wishing to fish for profit must acquire a licence from an existing fishing vessel. Owners of all vessels fishing against the UK's quotas have to maintain a genuine economic link with the UK. This may be achieved through landing quota catches into the UK, employing crew resident in the UK or other measures sufficient to ensure that a satisfactory economic link is achieved.

In the UK over 95% of quotas in EU waters are allocated through Producer Organisations (POs) ("the sector"). The remaining quota is divided between the "non-sector" (vessels over 10 metres in overall length but not members of a PO) and the under 10 metre fleet.

Capture fisheries

The volume of total landings by UK vessels in domestic ports fell from 492 000 tonnes in 2005 to 417 000 tonnes in 2006, though the value of landings increased by 8% from GBP 456 million in 2005 to GBP 494 million in 2006. The gross tonnage of the fleet fell by just over 2.5% to 208 991 tonnes in 2006. There were 449 active vessels of less than 10 m in length in 2006 (1.3% more than in 2005) and the number of active vessels of over 10 m in length went down by around 2% to 1 496.

In 2006, demersal species accounted for 37% of all landings by value, pelagic fish 15%, crustaceans (including lobster and shrimp) 36% and molluscs (including scallops, mussels and squid) 12%. By value, the key species listed below accounted for around two thirds of all landings by UK vessels in to the UK. Of the flatfish, sole and plaice are the two key species. Landings of sole by UK vessels into UK ports increased by 9% to 1 940 tonnes in 2006 compared to 2005, the value of these landings also increased to GBP 15 million in 2006 from GBP 12.5 million in 2005. The quantity of plaice landed in the UK increased by 12% though the value of landings also remained the same at around GBP 4 million. Of the groundfish, cod and haddock are the two key species. The quantity of cod landed declined by 7% to 12 854 tonnes in 2006, whilst the value of the landed fish was only 5% lower at GBP 20.8 million Compared to 2005, landings of haddock decreased by 18% to 38 860 tonnes in 2006 but the value of haddock landed increased by 17% to GBP 45.2 million. Mackerel and herring are the two key pelagic species. The quantity of mackerel landed declined by over 41% to 70 400 tonnes in 2006, the value of landings also decreased by more than 29% to

54.9 million in 2006. Unlike previous years, the price of herring has declined: the quantity of herring landed decreased by 19% to 62 095 tonnes in 2006 whilst the value of landings decreased by 9% to GBP 14.5 million. Nephrops and lobster are the two key crustacean species. Landings of nephrops increased by 21% to 40 985 tonnes in 2006 whilst the value of landings increased by nearly 36% to GBP 114.2 million. The value of lobster landed vastly increased by 118% to GBP 26.6 million in 2006 with the landing in 2006 increasing 75% to 2 320 tonnes in 2006. Scallops are the key species of mollusc. While the quantity of scallops landed declined by 8% to 19 036 tonnes in 2006, the value of landings increased slightly to just less than GBP 34 million.

Landings by UK vessels into foreign ports decreased by 8.5% from 216 139 tonnes in 2005 to 197 670 tonnes in 2006, though the value of these landings increased slightly from GBP 115 million in 2005 to GBP 116.5 million in 2006. Between 2005 and 2006, landings by foreign vessels into domestic ports decreased by more than 13% to around 127 900 tonnes; the value of these landings also decreased by nearly 34%. This decrease was largely due to the increase in cod landings in 2005.

Management

During 2005 and 2006, the government continued to operate a restrictive licensing scheme in which licences were used to control the number of vessels fishing and stocks caught. Capacity reduction penalties were applied where licences were transferred or aggregated. These licence arrangements contributed to the UK's MAGP objectives.

In February 2008, the SG established a Conservation Credits Scheme that rewards fishermen who sign up to a number of measures which have an appreciable impact on the conservation of fragile fish stocks, including a one-net rule and the use of a Square Mesh Panel. The scheme also expands the innovative Real Time Closures scheme on which Scotland led last autumn, protecting spawning and juvenile stock aggregations in the North Sea. In return for the respect of these conditions, vessels receive a credit maintaining their allocation of days at 2007 levels. They are also eligible to operate under hours- rather than days-at-sea.

In July 2004, a Council Decision was adopted for the establishment of Regional Advisory Councils (RACs). This was in response to criticism that the Common Fisheries Policy (CFP) did not allow for effective stakeholder engagement. The purpose of the RACs is to provide stakeholders' advice to the Commission and member states on any aspect of fisheries management under the CFP. Their aim is to bring together fishermen, scientists and all those with an interest in fish stocks and their exploitation and help develop ways forward to which all parties can subscribe. As such, they are stakeholder bodies made up of representatives of the fishing sector (two thirds) and interested parties (one third) such as angling and Environmental Non-Governmental Organisations (ENGOs). Between July 2004 and June 2007, six of the seven RACs were established, including the North Sea, Pelagic, North-Western Waters, Baltic, Long-Distance Fleet and South-Western Waters. The Mediterranean RAC is not yet in place. In 2007, and while RACs were still being established, the Commission amended their financial regime as it became apparent that RACs needed financial stability to pursue effectively their advisory role within the CFP.

United Kingdom government funding of marine fisheries R&D was GBP 6.5 million in 2007-08 compared to GBP 5.3 million in 2006-07. Funding for fisheries monitoring was GBP 15.2 million in 2007-08 compared to GBP 12.7 million in 2006-07.

United Kingdom Fisheries Departments continue to give high priority to fisheries control and enforcement and in 2007 spent some GBP 24 million on an integrated program of aerial, surface and port surveillance. In 2007, the UK took part in eight successful North Sea joint deployment plans (JDP) in areas which showed high incidence of cod catches. All member states involved shared vessel monitoring scheme data (satellite position reports), inspectors were exchanged in port and on patrol vessels to allow vessels to work in any waters. This greatly improved the effectiveness of the inspections and resulted in a higher infringement detection rate than normal.

Aquaculture

Aquaculture production in the UK is concentrated on Atlantic salmon, rainbow trout and mollusc shellfish, such as mussels and Pacific Oysters. There is limited production of other species, such as carp, brown trout, turbot, halibut, cod and Arctic char. There are also emerging species such as tilapia, barramundi, bass and bream. Scallop farming has been successful for many years and trials on scallop hatchery work have also proved to be successful. With the exception of some new fish farms based on re-circulation, technology and production facilities have changed little since 1997. In 2006 there were 431 fish and shellfish farming businesses in the UK, directly employing some 3 000 people with a total industry turnover in 2006 of some EUR 744 million.

Overall production of aquaculture products for 2006 was nearly 171 848 tonnes. The main finfish species farmed were salmon (132 000 tonnes produced in 2006) and rainbow trout (13 000 tonnes). Farmed shellfish production was around 25 600 tonnes in 2006.

Fisheries and the environment

Since 1999, the only type of waste that is routinely considered for disposal at sea round the coast of the UK is material dredged from ports and harbours and small quantities of fish waste. Strict licensing controls operate under the Food and Environment Protection Act (FEPA). The purpose of this licensing regime is to protect the marine environment and to prevent interference with other uses of the sea (including fishing). Before issuing a licence for sea disposal, the licensing authority is required to have regard to the practical availability of any alternative ways of dealing with the material and applicants are required to investigate the possibility of using some or all of the material beneficially, for instance, for beach replenishment or for salt marsh regeneration. Sea disposal is also considered only after a rigorous scientific assessment of the impact of the material on the marine environment.

FEPA also controls a wide range of construction works undertaken at sea. These controls are central to the application of the UK government's policy of sustainable development in the marine sector. When considering an application for consent, the licensing authority has to weigh the perceived socioeconomic benefits of the project against the potential impact upon the environment and loss of natural resources and other assets, including fishing. Schemes to offset rising sea levels and to produce renewable energy (offshore windfarms) are examples where detailed scientific evaluation is necessary to minimise any adverse environmental effects upon fisheries and indeed may even offer stock enhancement opportunities.

The discharge of radioactive waste to the marine environment is also strictly controlled by national legislation. Sites are regularly inspected and authorisations reviewed to ensure that discharges are kept as low as is reasonably achievable.

In June 2008, the government banned damaging types of fishing in 60 square nautical miles of sea off the South West coast of England to protect threatened sea life. About ten per cent of Lyme Bay will be permanently closed to scallop dredgers and bottom trawlers which drag nets along the seabed, to safeguard the area's rich marine life and habitats. Lyme Bay is home to world-renowned reefs as well as important species including pink sea fans, sunset cup corals and several rare sponges. After public consultation and a full assessment of the impacts, the government ordered that the area be closed from early July.

Following a consultation in July 2006, the UK decided to introduce measures to protect tope, a vulnerable European continental-shelf and coastal shark species. The Tope (Prohibition of Fishing) Order 2008 (SI 2008/691) prohibits fishing for tope other than by rod and line and sets a 45 kg per day tope by-catch limit in commercial fisheries targeting other species.

No significant environmental issues arose in connection with aquaculture in 2006-07. The report *Scotland's Seas: Towards Understanding their State*, an assessment of the environmental impact from aquaculture concluded that overall, despite the dramatic rise in the production tonnage in the last two decades, the control measures in place by regulatory authorities address the main processes by which aquaculture may adversely affect the surrounding environment. In April 2007 planning controls for marine fish farms transferred to local authorities in Scotland.

The Surface Waters (Shellfish) (Classification) Regulations 1997 and the associated Directions and Notice transpose Directive 79/923/EEC into UK law. These regulations prescribe a system for classifying the quality of controlled coastal or brackish waters which need protection or improvement in order to support shellfish life and growth.

The Marine Strategy Framework Directive, which came into force on 15 July 2008, requires all member states to achieve Good Environmental Status in their marine waters by 2020. In implementing this Directive the UK will need to consider whether additional fisheries management measures are necessary in order to deliver Good Environmental Status in UK waters.

Government financial transfers

In April 2007, the Grants for Fishing and Aquaculture Industries Regulations 2007 were introduced providing for national back-up aid in England to enable the industry to obtain funding for measures set out in the UK's Sectoral Plan. This indicated that aid would be available for a range of measures such as vessel modernisation (quality improvements, selective fishing methods), safety training for fishermen, decommissioning, protection and development of aquatic resources, improvement of fishing port facilities, processing and marketing of fishery and aquaculture products, and other projects for the collective benefit of the fishing industry. The regulations provide for the implementation of the UK's Operational program for implementing EFF which is due to be adopted by the Commission in August 2008. Similar regulations were introduced in Scotland, Wales and Northern Ireland.

In 2006, public bodies invested around EUR 10 million per annum in aquaculture research, particularly on fish health. These bodies and the aquaculture sector jointly sponsor research to promote the sustainable development of the aquaculture sector, the maintenance of high fish health status of farmed and wild fish stocks, and the evaluation of alternative species for cultivation.

Post-harvesting policies and practices

In 2005, UK Fisheries Administrations initiated the Quota Management Change Program, with the aim of delivering the benefits of individual quota holdings and transferability, in particular increased certainty about individual fishing rights and improved transparency in quota trading. The Access to Fisheries project has been developed subsequently, to incorporate these objectives with a wider set of work-strands to deliver long term reform of the fishing industry. As part of the Access to Fisheries project, in February 2008, Defra consulted on initial proposals to assist the English inshore (under 10 metre) fishing fleet. In August 2008, Defra began consulting on more detailed proposals to achieve long-term reform, including a licence capping scheme and decommissioning scheme designed to achieve a more sustainable fleet fishing from the under 10 metre pool.

In 2005, the SG published *The Sustainable Framework for Scottish Sea Fisheries*, setting out a strategy for the sea fisheries industry in Scotland. This strategy has now been subsumed within the work of the Scottish Fisheries Council, established in January 2008. Also in June 2008, Defra published its Marine Program Plan for 2008-09 which includes a sub-program of projects and activities to achieve sustainable fisheries through implementing *Fisheries 2027*. In January 2006, under the Restrictive Shellfish Licensing Scheme, all vessels under 10m in England and Wales are now required to complete a monthly shellfish activity return, while in May 2008, the SG launched a consultation on safeguards on fishing rights and the future of quota management and licensing in Scotland.

Markets and trade

The National Statistics publication, *Family Food* in 2005-06, show that UK household purchases of fish increased from 158g per person per week in 2004-05 to 167 g per person per week in 2005-06, an increase of 5.7%. Expenditure has increased by over 5% from GBP 0.99 per person per week in 2004-05 to GBP 1.04 in 2005-06. This is accounted for by a 19% rise in purchases of fresh, chilled and frozen herrings and other oily fish, and a 14% rise in fresh chilled or frozen salmon. Purchased quantities of fish-based ready meals, rose by 9.6% from 45 to 49 grams per person per week.

Under EU support arrangements, if a member of a PO puts fish up for sale for human consumption but cannot find a buyer, at or above the pre-set withdrawal price, the fish must be permanently withdrawn from the human consumption market and a claim for aid made by the PO. The Rural Payments Agency reported that from April 2005 to the end of March 2006, payments were made for UK withdrawal claims to a value of GBP 253 000 compared to GBP 573,000 in the same period in the previous year. There was therefore a 56% reduction in withdrawal payments in 2005 compared to the previous year. 98% of the withdrawal claims were for catches of cod, herring, mackerel, hake or haddock.

European Regulations provide the standards to ensure the safety of public health in relation to the production of fishery products and live bivalve molluscs. EC Regulation 178/2002 lays down the general principles and requirements of food law. EC Regulation 852/2004 establishes basic hygiene rules and includes the implementation of HACCP principles. Regulation 853/2004 establishes more detailed hygiene rules for specific foods and includes standards for the production and marketing of fish and shellfish. These specifically require live bivalve molluscs, other than wild Pectinidae, to be harvested from

waters classified according to their microbiological quality and prescribe how they can be placed on the market for human consumption. Fishery products and live bivalve molluscs must meet the microbiological criteria set down in Commission Regulation 2073/2005, biotoxin limits as set down in Regulation 853/2004 and contaminants limits as set down in Regulation 1881/2006. Additionally Regulations 882/2004 and 854/2004 lay down rules for the official monitoring of controls by the Competent Authorities and includes the monitoring of harvesting areas for the presence of marine biotoxins and chemical contaminants.

PART III

Chapter 19

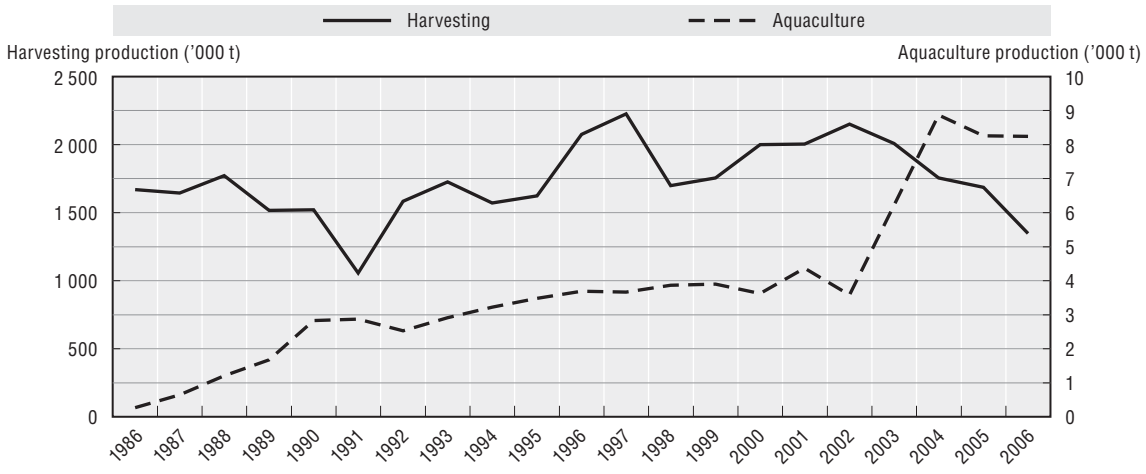
Iceland

Iceland

Summary of recent developments

- The Ministry of Fisheries and Agriculture decided in 2007 to follow the recommendations of The Icelandic Marine Research Institute and cut cod quotas by 30% to 130 000 tonnes for the next 1-2 years, so as to expedite the growth of the stock, especially in view of the enhanced likelihood of stronger recruitment in the years to come. This decision will be a painful one in the short term. However, it is considered important to protect the long-term interests of all who benefit from the exploitation of the cod stocks near Iceland. It is also consistent with responsible fisheries management and is an element in guaranteeing the sustainability of the fish stocks.
- The depreciation of the Icelandic Krona, however, also adversely affects those parts of the fishing and processing industry who have substantial loans in foreign currency, not to mention how it exacerbates the effects on fisheries of rising global oil prices. The Icelandic authorities do not consider subsidies as either a short or long term solution to the oil price rise. It remains to be seen how and to what extent Icelandic vessels and producers are able to rationalize their production methods, which could include uses of alternative fuels or adopting fishing gear and transport methods of products to foreign markets.

Harvesting and aquaculture production

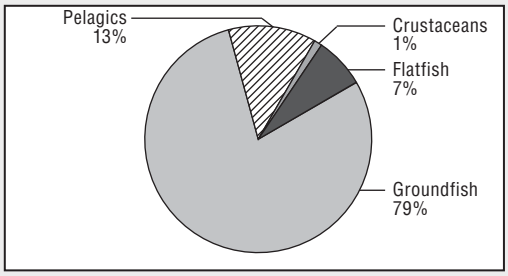


Source: FAO.

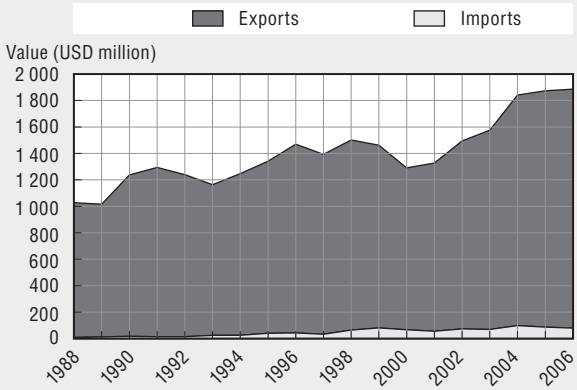
Key characteristics of the sector

- Total Icelandic catches of fish, shellfish and crustaceans were 1.396 million tonnes in 2007, a 5.4% increase from 2006. Pelagic catches increased by 13% from 2006 to 2007, and shellfish catches also increased slightly. Demersal catches on the other hand decreased by 6.2% from 496 000 tonnes, with the largest decrease coming from cod catches.
- The total value of landed catches amounted to around ISK 80 billion in 2007, an ISK 4 billion rise from the previous year. Landed value has risen over the past years from a 2003-2005 average of ISK 68 billion.
- The value of exported marine products in 2007 was approximately ISK 127 billion, compared with 124 billion the previous year. The European Economic Area is the most important market area for Icelandic marine products and in 2007 the export value for this category of products to EEA amounted to ISK 102 billion or 80% of the export value.
- Net earnings of the fisheries sector as a proportion of income have been rising from 5.9% in 2004 to 8.4% in 2005 and 16.9% in 2006, which is the latest available figure from Statistics Iceland. The highest profits are to be found in the demersal fishing and processing 18.5% in 2006, while the pelagic industry profits fell to 1% in 2004-5 but are up to 8.9% in 2006.

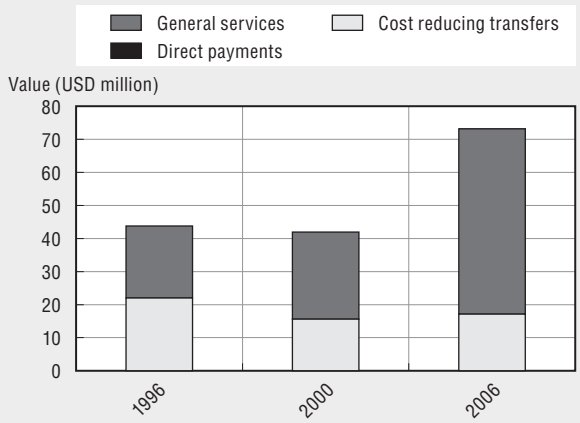
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	6 000	4 300
Number of fish farmers	n.a.	n.a.
Total number of vessels	2 261	1 344
Total tonnage of the fleet	139 414	167 842

n.a.: Not available.

Legal and institutional framework

The Fisheries Management Act of 1990 remains the cornerstone of the present fisheries management system, although it has undergone a series of subsequent adjustments. This Act provides for a system of individual transferable quotas (ITQs) in all commercially important stocks that are allocated to individual fishing vessels. In accordance with this Act, each fishing year begins on 1 September and concludes 31 August the following year. The Minister of Fisheries determines the Total Allowable Catch (TAC) for individual species annually on the basis of scientific advice from the Icelandic Marine Research Institute (MRI).

The size of each vessel's annual catch quota in a specific fishery is a simple multiple of the TAC for that fishery and the vessel's quota-share. Thus, the annual vessel catch quota is denominated in volume terms. Both the permanent quota-shares and the annual catch quotas are transferable, subject to certain restrictions, and perfectly divisible. This means that any fraction of a given quota may be transferred. Some 98% of catch landed is subject to TACs.

Capture Fisheries

Icelandic catch from all fishing in 2007 was 1 396 000 tonnes, a slight increase from 2006 catches of 1 323 000 tonnes, around 72% of volume from Icelandic fishing banks. While demersal catches remain fairly stable (usually between 450-500 000 tonnes per annum), pelagic catches can vary considerably. The highest catch year still remains 1997, when total Icelandic catches reached 2 200 000 tonnes with total pelagic catches reaching 1 613 000 tonnes, mostly capelin. Of the demersal species, cod contributes almost 40% of the volume. Cod quotas have been cut considerably over the last two years (Table III.19.1). Most other demersal species have been on the increase and have partially compensated for the lower volume of cod landings.

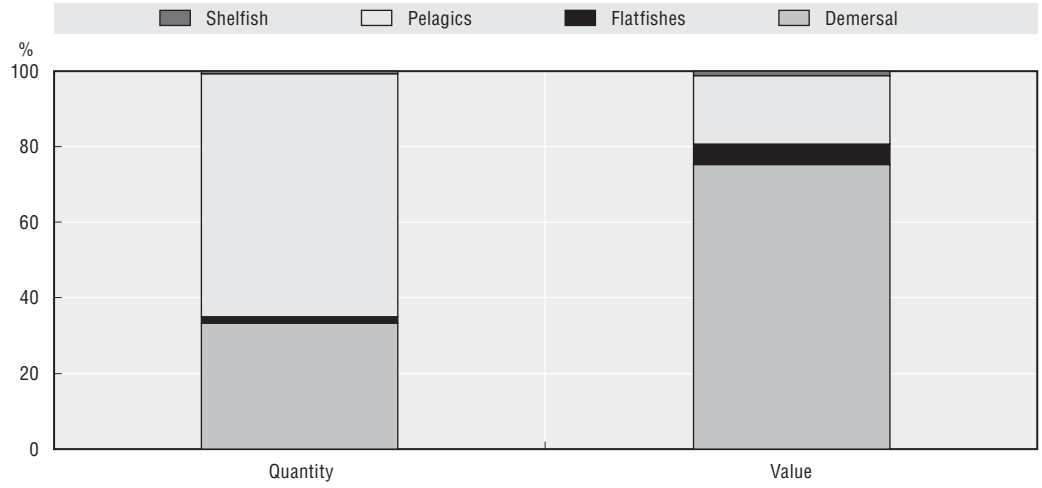
Table III.19.1. **Icelandic marine catches 2005-2007 (000 tonnes)**

	2005	2006	2007
Total catches	**1 669**	**1 323**	**1 396**
Total demersal	**491**	**496**	**466**
Cod	212	199	174
Haddock	97	97	109
Saithe	78	83	75
Catfishes	18	20	19
Ling/blue Ling	6	8	9
Tusk	4	5	6
Monkfish	3	3	3
Other demersal	6	7	6
Flatfishes	**27**	**25**	**22**
Total pelagics	**1 136**	**795**	**899**
Herring	265	291	320
Capelin	605	184	307
Blue whiting	266	315	235
Other pelagics	0	4	37
Shellfish	**14**	**6**	**9**

The total first-hand value of the Icelandic catch in 2007 amounted to ISK 80 billion, in current prices, an increase from ISK 76 billion in 2006. Demersal catches are more valuable than pelagic species, despite the higher landed volumes of demersal species. While pelagic

landings represent less than 20% of the total catch, they represent 75% of the volume. With 75% of the landed volume, demersal species only represent less than 20% of total catch. This catch *versus* price relationship reflects the different processing of the raw material: while demersal catch is mostly sold fresh, frozen or salted, a large part of the pelagic catch is used for fish meal or oil processing.

Figure III.19.1. **Percentage quantity and value of the Icelandic catch in 2007**



Direct foreign investment in companies engaged in fishing within the Icelandic territorial waters is restricted. Under certain conditions indirect foreign investment is allowed. The same applies for foreign investment in primary fish processing (*i.e.* excluding retail packaging and later stages of preparation of fish products for distribution and consumption). No vessel owned or operated by a foreign party may engage in fishing or fish processing in Icelandic waters, apart from those authorised under bilateral fishing agreements. Only the following may conduct fishing operations within the Icelandic fisheries jurisdiction according to existing laws on Fishing Rights within the Icelandic Territorial Waters, or own or run enterprises engaged in fish processing:

a) Icelandic citizens and other Icelandic persons.

b) Icelandic legal persons which are wholly owned by Icelandic persons or by Icelandic legal persons which:

1. Are controlled by Icelandic entities.
2. Are not under more than 25% ownership of foreign residents calculated on the basis of share capital or initial capital. However, if the share of an Icelandic legal person conducting fishing operations in the Icelandic fisheries jurisdiction or fish processing in Iceland is not above 5%, the share of the foreign resident may be up to 33%.
3. Are in other respects under the ownership of Icelandic citizens or Icelandic legal persons controlled by Icelandic persons.

c) The current fishing fleet consists of several vessel types. The official statistics (Statistics Iceland) divides the fleet into three main categories:

1. Trawlers: These are relatively large fishing vessels usually between 200 and 2 000 GT (gross mt) and between 130 and 300 feet in length. They are almost exclusively engaged in the demersal fishery employing bottom and occasionally mid-water trawls.

2. Decked vessels: The class of decked vessel covers many different types of vessels and a wide size range. Decked vessels include specialized scallops draggers, longliners and purse seiners as well as unspecialized vessels. They range in size from 10 GT to over 4 500 GT.
3. Undecked, small vessels: This class of fishing vessel covers numerous vessels of sizes up to 10 GT although most are under 6 GT. Most of these vessels are technologically advanced and driven by powerful engines.

The official measurement unit for the fishing fleet was changed from GRT to GT in the mid 1990s. The old official measurement is partly still in use, but not universally applicable. This results in a break in the long term time series for the fleet, and makes it difficult to interpret long term or gradual changes in the fleet composition, especially looking to the fact that the Icelandic quota system has been in force from 1984, gradually encompassing the whole fleet. As there are a relatively low number of vessels in the larger categories, just one or two large vessels entering the fishing fleet can cause noticeable changes in the series (Table III.19.2).

Table III.19.2. **The registered fishing fleet by type of vessel 2005-2007 (end of year)**

		2005	2006	2007
Total Number of vessels		**1 752**	**1 692**	**1 642**
	Undecked vessels	825	777	744
	Decked vessels	862	852	834
	Trawlers	65	63	64
Total GT		**181 530**	**178 835**	**169 279**
	Undecked vessels	3 915	3 721	3 556
	Decked vessels	96 679	96 866	91 656
	Trawlers	80 936	78 248	74 067
Average GT	Undecked vessels	5	5	5
	Decked vessels	112	114	110
	Trawlers	1 245	1 242	1 157

Source: Statistics Iceland.

Not all registered fishing vessels participate in the Icelandic fisheries. Some lie idle while some do not have a fishing licence in Icelandic waters and fish instead in distant water fishing grounds or, in the case of the undecked vessels, used as recreational vessels. Overall, only about 80% of the registered fishing vessels in Iceland fished commercially in 2006 and 2007. The importance of the different sub-fleets in the fishery in terms of catch volumes and values also varies greatly. In spite of their relatively large number, the undecked vessels are negligible in terms of aggregate harvest volume and quite small in terms of harvest value. The decked fleet dominates in harvest volume. This is because of the large volumes of the purse-seine pelagic fleet. When it comes to value, however, the trawlers account for almost as much as the decked fleet. This is further illustrated in Figure III.19.2.

Based on domestic advice, the national TAC for cod in the quota year 2007-2008 was set at 130 000 tonnes, compared to ICES advice of 152 000 tonnes. In recent years, landings have marginally exceeded ICES advice. Mean weight at age has decreased considerably in recent years. The decline in weight at age is most likely due to lower capelin abundance in recent years. The spawning stock has been relatively small in the last 35 years. It reached a

Figure III.19.2. **Quantity and Value of Iceland Catch by Vessel Type 2007**

historic low in 1993 (120 000 t), but has since increased and is currently estimated to be about 230 000 tonnes. The seven most recent year classes have been below average. Poor recruitment, in addition to the status of weight at age, means that the productivity of the stock is at present very low. The exploitation rate has been 30% in the last five years; a significant reduction from the 40% before the implementation of the Harvest Control Rule in 1995. With the current constraint in TAC, it is expected that exploitation will be further reduced to approximately 22% in 2008. By following a 20% exploitation rule in the medium term, it is unlikely that the biomass of fish 4 years and older (B4+) will fall from its current status, and likely that the size of the spawning stock will increase over the next four years.

The advice for the fishing year 2007-08 was 95 000 tonnes and the TAC was set at 100 000 tonnes for haddock. Predictions for mean weight at age were made by assuming growth in 2008 and 2009 will be identical to that in 2007, when haddock grew very slowly. This assessment takes into account the lower rate of recruitment to the fishery of slow growing cohorts. Landings in 2008 are predicted to be 100 000 tonnes. The biomass of age 3 and older haddock was estimated to be 260 000 tonnes at the beginning of 2008. The mean fishing mortality is estimated at 0.55 in 2007 and 0.43 in 2008. Results of short term predictions show that the stock size of haddock will fall in coming years when the 2003 year class, which accounts for a large part of the landings, disappears from the stock. The fishable stock is estimated to be 199 000 tonnes, 10% lower than that estimated in 2007. Estimates of the 1998-2000 and 2002 cohorts indicate they are well above the long term average, while the more recent year classes seem to be small or below the long term average. The MRI recommends that the TAC should not exceed 50 000 tonnes in the quota year 2008-2009. This yield is likely to correspond to a stable fishing mortality (F4–9) close to 0.3, which is considered precautionary.

In 2007, 39 500 tonnes of golden redfish were landed; 2 000 tonnes less than in 2006. Effort has remained relatively stable at low levels in recent years. CPUE has decreased in recent years after an increase to a record high in 2004. Survey indices of the fishable part of the stock declined to a record low in the mid 1990s, but have since increased to about 55% of the observed maximum due to increased recruitment to the fishable stock. In 2007, about 16 000 tonnes of demersal redfish were landed, compared to 17 000 tonnes in 2006 and on average 33 000 tonnes from 1996 to 2000. In 2007, an estimated 64 000 tonnes of

pelagic redfish were caught, compared to 82 000 tonnes in 2006. The Icelandic fleet caught about 17 000 tonnes in 2007 compared to 22 000 tonnes in 2006. About 85-90% of the Icelandic catch has, in recent years, been caught within the Icelandic 200 mile EEZ.

The spawning stock of summer-spawning herring was estimated to be 650 000 tonnes in 2008. It is predicted that the 1999, 2000 and 2002 year classes will continue to be the most abundant cohorts in the catch during the 2008-2009 fishing year. In 2007, around 174 000 tonnes of Atlanto-Scandian herring were landed by Icelandic vessels, with international landings totalling about 1 300 000 tonnes. According to the international agreement reached in January 2007, Iceland will have a quota of 220 000 tonnes in 2008.

In the 2007/2008 season, the total international landings of capelin were 203 000 tonnes. Icelandic landings amounted to 149 000 tonnes (preliminary numbers). The fishable capelin stock has been at a low level during the last 3 years. In order to predict the fishable stock size for the 2008-2009 fishing season, data on the abundance of immature capelin of the 2005 and 2006 year classes in autumn 2007 are needed.

Management

Cod is the most important fishing stock in Icelandic waters and a specific catch rule has been used to determine the TAC since 1995. The catch rule for cod, revised in 2000, stipulates that the annual quota may not exceed 25% of the fishable stock. In addition to the TACs, various rules encourage the optimal exploitation of fishing stocks. These include closures of fishing areas, division of fishing areas according to the type of vessel and fishing gear, and measures to encourage introduction of fishing gear with increased selectivity. As provided for by the current catch rule, total allowable catch in cod was lowered from 193 000 tonnes for the 2006-2007 fishing year to 130 000 tonnes for the fishing year 2007-2008 and 2008-2009. The TAC for haddock is now around 100 000 tonnes, a considerable increase from last decade's average of around 50 000 tonnes. See Table III.19.3 for TACs of other species.

All catches by Icelandic vessels must be weighed and recorded at the port of landing by the local port authorities. The ports of landing are then required to send information on a daily basis directly to the Directorate of Fisheries database. This means the Directorate always has up to date figures on catches and can conduct its management and surveillance of fisheries promptly and effectively. The information is publicly available on the web, which ensures transparency.

In 2002, the *Fisheries Management Act* was amended to include a special fishing fee. This bill introduced into government policy the principle that parties granted rights to utilise natural resources should pay a fair price for such rights. This fee, which was made effective as of the 2004-2005 fishing year, is imposed on annual quota allocations or landed catches but is calculated as special fee on the calculated aggregate profits of the fishing industry amounting initially to 6% of these calculated profits and increasing to 9.5% in 2009. When fully in effect, this charge could, at current operating conditions, amount to an additional 2% of the gross revenues of the fishing sector.

In 2003 the Fisheries Management Act was amended to the affect that in the years of 2004 to 2006 small boats fishing with hook and line for a limited number of effort days be taken into the ITQ system and allocated individual quota shares based on their catch experiences. This means that from the beginning of the fishing year, starting 1 September 2006, all boats and vessels in the Icelandic fishing fleets were subject to the ITQ system.

Table III.19.3. **TACs for the fishing years 2006-09 (000 tonnes)**

	2006/07	2007/08	2008/09
Atlantic cold	193.0	130.0	130.0
Haddock	105.0	100.0	93.0
Saithe	80.0	75.0	65.0
Redfish	57.0	57.0	50.0
Tusk	5.0	5.5	5.5
Ling	5.0	7.0	7.0
Catfishes	13.0	12.5	13.0
Greenland halibut	15.0	15.0	15.0
Angler	3.0	2.5	3.0
European plaice	6.0	6.5	6.5
Witch flounder	2.4	2.4	2.2
Common dab	2.0	1.5	1.0
American plaice	1.5	1.0	1.0
Lemon sole	2.0	2.2	2.2
Icelandic herring	130.0	150.0	150.0
Offshore shrimp	7.0	7.0	7.0
Inshore shrimp	0.0	0.0	0.0
Lobster	1.8	1.9	2.2

Source: Directorate of Fisheries.

Iceland participates in a number of international organisations concerning the management of high seas stocks. Oceanic redfish is caught in the jurisdictions of Iceland and Greenland and managed by NEAFC. Catches by Icelandic vessels were 20 000 tonnes in 2007, as compared to 25 000 tonnes the previous year. Most of the Icelandic catch is caught within Icelandic grounds. A new agreement on quota shares for this stock has not been reached, however improved management measures were agreed upon for 2008. Icelanders caught 235 000 tonnes of blue whiting in 2007 compared to 315 000 tonnes the previous year. A coastal state agreement on the management of blue whiting was reached in 2005 and followed by an agreement by all states involved in the fisheries. In 2007, Icelandic vessels caught 176 000 tonnes from the Atlantico-Scandic herring stock. An agreement has been in place for this stock since 2007, but no agreement had been in place between 2003 and 2007, as an arrangement reached in 1996 was not renewed. Iceland acceded to the ICCAT convention in 2002 and was subsequently allocated quotas for bluefin tunas. The Icelandic quota for 2006 and 2007 was around 50 tonnes.

A bilateral fisheries agreement is in force between Iceland and the EU. The contracting parties meet each year to review the agreement. The agreement provides a capelin quota for Iceland of 30 000 tonnes from the EU in exchange for a redfish quota of 3 000 tonnes, which the EU may catch within Icelandic waters. An agreement in force from 2003 between Iceland, Norway and Greenland provides for the utilisation of the capelin stock between Iceland and Jan Mayen. An agreement has been in force since 1999 between the governments of Iceland, Norway and the Russian Federation concerning certain aspects of co-operation in the area of fisheries. When this agreement was concluded, the total allowable catch in the Barents Sea was 480 000 tonnes of cod, of which Icelandic fishing vessels were allowed to catch 8 900 tonnes in Norwegian and Russian jurisdictions. Iceland's proportion of the total catch quota remains constant despite changes in the TAC, unless the TAC falls below 350 000 tonnes, in which case the Icelandic quota is suspended. The agreement provides a capelin quota for Norway that can be caught within Icelandic jurisdiction, as well as 500 tonnes of ling and tusk. If the Icelandic quota is suspended, these quotas are also suspended.

Iceland has issued one permit this year authorising the permit holder to engage in sustainable minke whaling in the year 2008. The permit sets out numerous restrictions and condition, including that the total catch will not exceed 40 minke whales.

Recreational fisheries

Leisure fishing for personal consumption is authorised without a special permit. Such fishing may only be pursued with hand lines without automatic jiggers. Catch may not be sold nor used for financial gain by any other means. The Minister of Fisheries may each year decide that at a specific number of public ocean rod and reel fishing derbies, the catch shall not be included in the catch quotas, provided the catch is not used for financial gain but only to pay for the cost of the competition.

Aquaculture

In the period 2006-2007, there were between 40-50 aquaculture stations in Iceland. After an increase in production in most farmed species there is a current decrease in total quantity between 2006 and 2007, mainly due to a drop in Atlantic salmon farming.

Table III.19.4. **Production of main farmed fish species 2005-07 (tonnes)**

	2005	2006	2007
Total	**8 415**	**9 931**	**4 881**
Atlantic salmon	6 094	6 895	1 158
Arctic charr	977	1 426	2 145
Rainbow trout	50	10	10
Halibut	129	141	31
Turbot	115	47	70
Cod	1 050	1 412	1 467

Source: The Icelandic Aquaculture Association, TIAA.

In line with the lower production volume the exports value of farmed fish was around ISK 2.2 billion in 2007, down from ISK 3.8 billion in 2006.

Government financial transfers

There are no direct transfers to the fishing or processing sector and no social assistance is provided to fishermen or fish-processing workers in Iceland. However, fishermen do enjoy a special income tax deduction linked to the number of days spent at sea. The government funds general services, such as the Marine Research Institute, and a part of activities of the Directorate of Fisheries as well as the Icelandic Fisheries Laboratories. The government also funds the Coast Guard; 75% of its total cost is estimated to result from offshore fisheries surveillance.

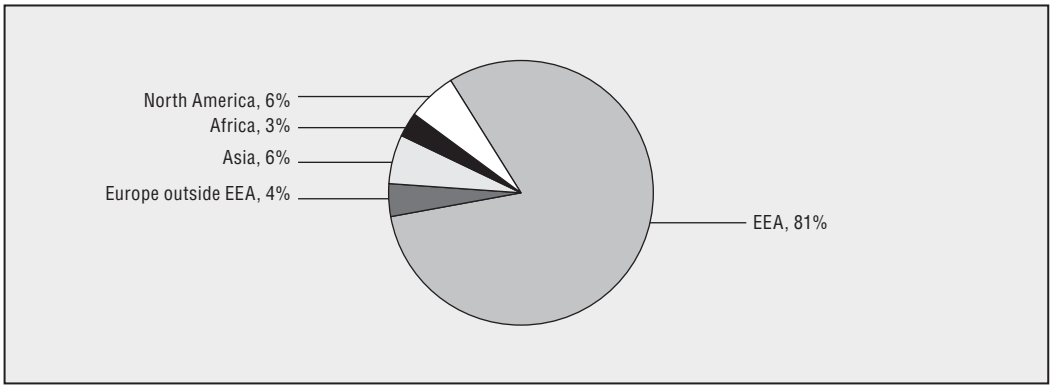
These sectors pay for some services they receive, *e.g.* from the Directorate of Fisheries. The harvesting sector also pays a surveillance fee to the Directorate as well as a fishing fee. The fee is imposed on annual quota allocations or landed catches but is calculated as a special fee on the calculated aggregate profits of the fishing industry amounting initially to 6% of these calculated profits and increasing to 9.5% in 2009. Government grants are not provided to marine product processing enterprises. However, the Ministry of Fisheries, in co-operation with associations of employers and employees in fish processing, has supported occupational training for workers in fish processing. In 2006 and 2007 the Ministry allocated to this project a contribution of ISK 12 million.

Markets and trade

Following market changes, many producers are focusing more on the market for fresh fish, mainly fillets, and moving away from the market for frozen products (Figure III.19.3). Because of this, factory trawlers are bringing fresh fish to land-based production. Also, lower catches and low prices for shrimp have led to restructuring in the shrimp industry, where a number of factories have been closed down and production relocated.

In 2007, export of marine products amounted to 620 000 tonnes and the total value to ISK 127.6 billion. Export decreased in quantity by 6.3% but increased in value by 2.6% from 2006. Frozen products generated about half of the value of exported marine products, but the highest export revenues were from uncured salted cod.

Figure III.19.3. **Icelandic marine exports 2007 by market area**



The Ministry of Fisheries in Iceland initiated active consultation and co-operation with national stakeholders as well as the other Nordic countries to analyze trends in ecolabelling as well as to find the best way to respond to requirements from buyers for additional information on the use of marine resources. An ecolabel for fisheries products of Icelandic origin has not been made specifically. Demands for information on sustainable use differ between markets – it has, to date, been sufficient to have a transparent management and decision making in the sector to satisfy customers buying Icelandic seafood. Since the adoption of the guidelines a need has emerged to have information on ecolabelling schemes accessible on the web for sellers and buyers of fisheries products as well as for consumers. The European Commission, with a contribution from Iceland as regards content, made a web page for this purpose: *http://ec.europa.eu/fisheries/cfp/market_policy/ecolabel/definition_en.htm*. It is foreseen that as the debate develops, further information will be posted, example for criteria and traceability systems.

Outlook

The TAC for the 2008-2009 fishing year is slightly lower in terms of cod equivalents, to that for the 2007-2008 fishing year. From an economic point of view, cod is by far the most important fish stock for Iceland. Substantial capital has been invested in cod research in the past few decades, and the cod fishery is generally the most important focus of the fisheries management system. In line with lower total TACs, exports of marine products are expected to be slightly lower in 2008 to those of 2007 in terms of quantity but will be reasonably higher in value because of the depreciation of the ISK and higher market prices.

PART III

Chapter 20

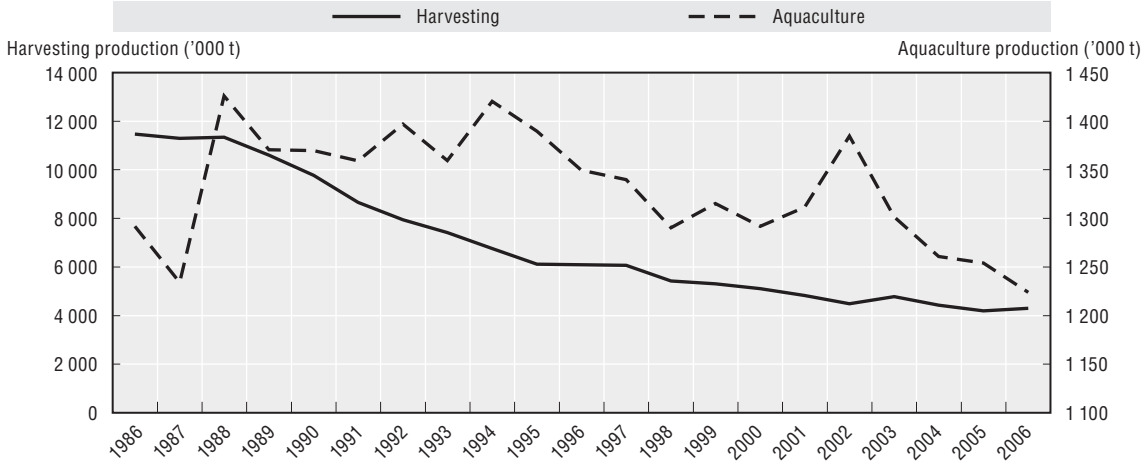
Japan

Japan

Summary of recent developments

- In 2007, Japan amended its Basic Fishery Plan, originally established in 2002, in order to take into account changes in Japanese fisheries and food supply. Under the broad guideline of the Basic Plan, Japan has developed and implemented resource recovery plans on various species and fishing types. The number of resource recovery plans has increased rapidly in recent years. As of February 2008, 51 plans have been established or under development.
- Japan has actively participated in international efforts to conserve fisheries resources. In line with this, Japan hosted the Joint Tuna RFMO Meeting in 2007 in order to facilitate and co-ordinate tuna RFMO's activities from a global perspective. In addition, Japan ratified the United Nations Fish Stock Agreement in August 2006 and acceded to the Convention for the Strengthening of the Inter-American Tropical Tuna Commission in July 2008.
- Japan's fisheries production has constantly decreased over the last two decades. Capture fishery production fell from 11.46 million tonnes in 1986 to 4.3 million tonnes in 2006 while aquaculture production dropped from 1.29 million tonnes to 1.22 million during the same period, although there have been significant fluctuations in aquaculture production. However, capture fishery production has remained relatively stable over the last 5 years at around 4.2-4.7 million tonnes. Aquaculture production has seen a sharp decrease since 2002, when production was 1.39 million tonnes.

Harvesting and aquaculture production

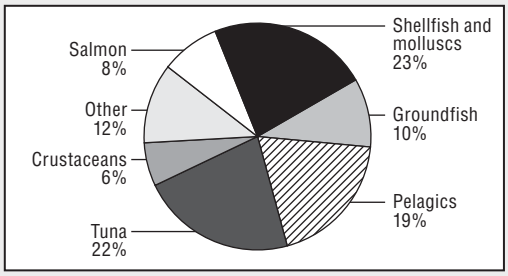


Source: FAO.

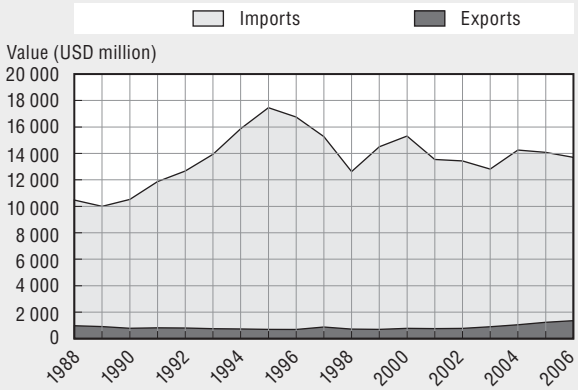
Key characteristics of the sector

- The most important species landed in 2006 in terms of value included: squid (JPY 90 billion) and scallop (JPY 40 billion) in the shellfish and molluscs category; skipjack (JPY 62 billion), bigeye (JPY 55 billion) and bluefin tuna (JPY 39 billion) in the tuna category; sardine (JPY 54 billion), mackerel (JPY 41 billion) and horse mackerel (JPY 40 billion) in the pelagic category.
- Japan is one of the major fish and fish product importing countries while Japan's exports are less than one tenth of imports. However, since 2000, exports have been increasing while imports have been slowing down although the trade deficit in fish and fish products remains significant. In 2006, Japan exported fish and fish products worth USD 1.3 billion, while importing USD 12.7 billion of fish and fish products.
- Government Financial Transfers (GFTs) have been reduced over time in Japan. In 2006, GFTs in Japan reached USD 1.9 billion, which was a slight decrease from the previous year. Most of the GFTs (99%) were spent on general services, particularly to construct public infrastructure such as fishing ports, breakwaters, navigation routes, coastal community roads and sewerage systems.
- The number of fishers and fish farmers has declined over the last decade. Due to Japan's fishery management measures and resource recovery plan, the number of fishing vessels and total tonnage of the fleet have also been reduced.

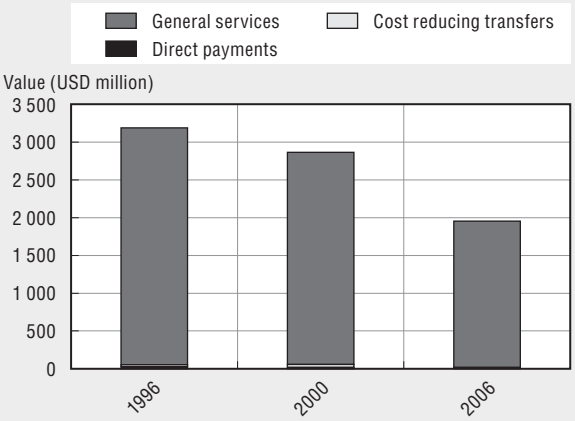
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	287 380	212 470
Number of fish farmers	62 550	51 315[1]
Total number of vessels	378 431	321 017
Total tonnage of the fleet	1 632 000	1 286 000

1. Fish farmers in 2003 census.

Legal and institutional framework

The government of Japan enacted the *Basic Law on Fisheries Policy* in June 2001 that provides guidelines for fisheries policies, replacing the *Coastal Fishery and Others Promotion Law* of 1963. The Basic Law on Fisheries Policy has two basic concepts. The first is to secure a stable supply of fishery products. The second is to ensure the sound development of the fishing industry by promoting the appropriate conservation and management of marine living resources. It also establishes the basic direction for management measures under these concepts.

In addition to the Basic Law, there are other principal laws that support fisheries policies, including the *Fisheries Law*, the *Living Aquatic Resources Protection Law* and the *Law Concerning Conservation and Management of Marine Living Resources*. These laws have been amended in keeping with the concept of the Basic Law on Fisheries Policy.

Capture fisheries

Fisheries production (including marine fisheries, inland-water fisheries and aquaculture) has decreased in quantity since 1989. Production amounted to 5 735 000 tonnes in 2006 and then slightly decreased to 5 696 000 tonnes in 2007 (a fall of 0.7%). There are several reasons for this decrease such as a change in Japanese sardine stock's influence on other species, the deterioration of individual stock status, and a reduction in fishing effort. On this note, there has been a more obvious decreasing trend in distant water fishing and inland water fishing than offshore fishing, coastal fishing and marine aquaculture. The value of fisheries production in 2005 was JPY 1 580 billion, which had slightly increased to JPY 1 587 billion in 2006.

The condition of the main fish stocks has been monitored for the past 20 years. In 2004, resource levels of 12 stocks, including saury, common squid and sea bream, were high while the levels of 49 fish stocks, such as common mackerel, sardine, Alaska Pollock, and snow crabs, were low. Another 30 stocks, including Jack mackerel and sand fish, were middle of the range.

The number of the Japanese fishers has continuously decreased in recent years. The number in 2007 was 204 330, which was 35% lower than the level in 1994 (312 890). Male fishers of 65 years of age and above accounted for 34% of the total male fishing workforce in 2004, which is 13 percentage points higher than ten years ago. The ageing of the Japanese workforce in the fishing sector over the past decade has been noticeable.

The number of Japanese fishing vessels has continuously decreased since 1980. The total number of registered fishing vessels in 1980 was 410 354. This figure dropped by approximately 20% over two decades to 325 229 in 2002. In terms of fishing capacity, significant reduction has been observed in larger fishing vessels. The number of registered vessels with 10 tonnes or more has been reduced to less than half over the past two decades, leaving 13 269 in 2002. The number of fishing vessels actively engaged in fishing operations is significantly less than that of registered fishing vessels. In 2005, the total number of working vessels was 192 507, of which 95% (182 239 vessels) were less than 10 tonnes or vessels without engines. Only 1 813 vessels were 20 tonnes or greater in 2005.

Management

Japan manages its fisheries through fishing effort regulation such as limitations on the number of licenses issued and restrictions on fishing methods as well as output controls,

i.e. the Total Allowable Catch (TAC) system. Seven fish species are subject to the TAC system, covering 1 356 thousand tonnes (or about 31% of total capture fishery production) in 2007. The Total Allowable Effort (TAE) system was established in 2003 as a means to manage total fishing efforts in accordance with the amendment of the *Law Concerning Conservation and Management of Marine Living Resources*.

Furthermore, Japan established a framework to implement the necessary measures to rebuild fishery resources in a comprehensive and planned manner. Examples of the specific measures include a reduction of TAE (a decrease in the number of boats, suspended operations, improved fishing gear, etc.), active resource enhancement (releasing fry, etc.) and the preservation and rehabilitation of fishing grounds (sea grass beds, tidal flats, etc.). Under the framework, either national or prefecture governments assume a role in formulating specific resource recovery plans according to the nature of the stock or fishery in question.

As of February 2008, 51 plans for specific fish species and 20 comprehensive plans for areas and fishing type have already been developed or are under development by the central government or prefecture governments. The total number of the plans has been increasing and the areas covered by the plans have been widely extended throughout Japan.

The agreements between governments permitting Japan's fishing vessels access to fishing in foreign waters are as follows (as of 2008): Australia (since 1979), Canada (since 1978), China (since 1975, new agreement since 2000), France (since 1979), Kiribati (since 1978), Republic of Korea (1965, new agreement since 1999), Marshall Islands (since 1981), Morocco (since 1985), Russia (since 1984), Solomon Islands (since 1978), Senegal (since 1992), Tuvalu (since 1986). Among these countries, Japan has mutual access agreements with Russia, China and Korea.

There are private sector-based agreements permitting Japan's fishing vessels to fish in foreign waters, which include: Cape Verde, Cote d'Ivoire, Equatorial Guinea, Fiji, Gabon, Gambia, Guinea, Guinea Bissau, Madagascar, Mauritania, Mauritius, Micronesia, Mozambique, Nauru, Palau, Papua New Guinea, Sao Tome and Principe, Seychelles, Sierra Leone, St Helena and Tanzania. Most of the above agreements are related to tuna fisheries. Terms and conditions of the access agreements vary from country to country.

Operations by foreign vessels in the Japanese EEZ are prohibited unless permitted under a bilateral fisheries agreement. Since fisheries agreements between Japan and Korea and between Japan and China entered into force, Japan has implemented marine living resource management measures in its EEZ in accordance with the United Nations Convention on the Law of the Sea (UNCLOS). Japan has also taken enforcement measures such as the seizure of illegal fishing gear of foreign fishing vessels licensed by Japan to operate in its EEZ.

Japan is a member of several international organisations to conserve and manage tuna stocks in a sustainable manner such as ICCAT, IATTC, CCSBT and IOTC. Japan joined the Western and Central Pacific Fisheries Commission (WCPFC) in July 2005. In January 2007, Japan hosted the Joint Tuna RFMO Meeting in Kobe city in order to facilitate and co-ordinate each tuna RFMO's activities from a global perspective. Japan continues to take measures against Illegal, Unreported, and Unregulated (IUU) fishing. It started a new global trade monitoring and controlling system in November 2003, based on the ICCAT, IOTC, and IATTC positive listing schemes. Only tuna products caught by Large Scale Tuna Long-line Vessels (LSTLVs) listed in the positive lists are allowed to enter the Japanese market.

Recreational fisheries

Based on the provisions of the *Fisheries Law* and the *Living Aquatic Resources Protection Law*, prefectural governors may issue regulations to control recreational fishing. These provisions regulate recreational fishing gears and methods. Prefectural governors may also establish restricted zones and fish size limits. In general, the total catch by recreational fishers is marginal. The estimated catch by recreational fishers who employed professional guides in marine boat fishing was 29 300 tonnes in 2002, accounting for 2% of the commercial catch in the coastal area.

The number of persons engaged in marine recreational fishing with guided boat services reached 4 487 thousand man-years in 2002. As recreational fishers and the commercial fishing industry use the same waters, conflicts between them are reported concerning the use of fishing grounds, water resources and moorage for vessels. Each prefecture has taken measures to resolve these conflicts. For example, some prefectures have held meetings to discuss and set up a rule on utilising the marine area concerned on a local basis.

Aquaculture

The aquaculture sector in Japan suffered from the environmental deterioration of aquaculture grounds due to intensive stocking and over-feeding to increase production as well as environmental pollution. There was a movement to diversify farmed species, leading to more imports of yellowtail seed and similar species, *e.g.* "kanpachi". As a result, the possibility of inflow of exotic infectious disease from foreign countries is increasing. In order to resolve these problems, the *Law to Ensure Sustainable Aquaculture Production*, established in May 1999, provides a framework for secure and sustainable aquaculture. The law includes procedures for fishers' co-operatives to promote the development of voluntary plans to maintain and improve the environment of farming grounds and prevent specific fish diseases related to aquaculture.

The value and quantity of aquaculture production increased steadily until the mid-1990s, responding to increasing consumer demand for high-value fish products. However, production has been levelling off recently due to the limited availability of suitable aquaculture sites and to lower market prices resulting from the over-supply of farmed fish. The amount of aquaculture production has been relatively stable for the past 10 years with an annual output of 1.2-1.4 million tonnes. In 2006, the quantity of aquaculture production was 1 224 000 tonnes (preliminary), a slight decrease from 1 253 806 in 2005 and equal to 24% of the total quantity of fisheries production in Japan in 2006.

However, the total value of aquaculture production has decreased continuously due to the general price decrease of fish and fish products in Japan. In 2006, the value of marine aquaculture amounted to JPY 430 billion, which contributed to 27% of total fisheries production value in Japan.

Fisheries and the environment

The natural condition of the seashore (seaweed beds, tidal lands and sand beaches) has deteriorated rapidly due to coastal development and other human activities, as well as natural factors including the rise of sea water temperatures. 65 156 hectares or approximately 30% of the seagrass beds in Japan disappeared from 1978 to 1998. In addition, 33 241 hectares or around 40% of the tidal lands in Japan vanished between 1945 and 1998.

Recently, the government of Japan has strengthened its efforts to improve marine environments by removing sediments and releasing seagrass spores. Fishers frequently organize beach clean-up activities. Government statistics show that more than 90% of fishing communities were engaged in beach clean-ups in 2003. Fisheries organisations have also frequently been involved in the planting of trees in their own basin areas (*i.e.* upstream mountains). This is because members of coastal communities generally share the view that forests, rivers and coasts constitute one integral ecosystem. The annual national report of fisheries in 2007 (*suisan-hakusyo*), highlights these nation-wide bottom-up movements.

Some attempts have been made to improve the energy efficiency of fishing operations. These efforts included the introduction of Light-Emitting Diodes (LEDs) as a substitute for traditional electric bulbs providing on-board lighting squid jiggers operating at night. Substantial increases in oil prices occurred during the first half of the year in 2005, further promoting these attempts. The price of vessel fuel in 2008 was three times that of the fuel price in 2004. The rise of fuel costs brought adverse effects to the financial situation of fishing entities, as they were generally unable to recover costs due to the current weak selling price of fish and fish products.

Government financial transfers

Government financial transfers in Japan declined from JPY 238 billion (around USD 2.35 billion) in the fiscal year 2005 to JPY 227 billion (around USD 1.95 billion) in 2006.

Japan does not have government payments for fisheries products, investments in new vessels or access fees to foreign waters. The only one direct payment program in place is to reduce the fishing fleet, which started in 1981. A total of 1 615 mid- to large-scale fishing vessels were scrapped under this program between 1981 and 2004. In addition, from 2005 to 2007, 25 vessels of several types were scrapped. The type of vessel included, but was not limited to, high sea driftnet fishing vessels, large and medium-sized purse seines, large trawlers, large and medium-sized squid jiggers and pelagic tuna long liners. In implementing this scheme, all of the vessels were completely scrapped (body panels must be dismantled and the engine shaft must be destroyed) to become eligible for the government payment. Moreover, all fishing licenses of the scrapped vessels were revoked. In this context, any resale, reuse or export of the vessel is prevented. The vessel owners are required to share substantial part of the scrapping costs* and the rest of the amount is to be paid by the government under this program.

The major form of cost reducing transfer in Japan is the interest subsidy. The interest subsidy program is designed to assist structural adjustment of small and medium-sized vessels under certain conditions. Its main purpose is to contribute to the introduction of advanced fisheries management for the structural adjustment of coastal fisheries. The actual difference between the commercial interest rates and the subsidized interest rates were within a range of 1.25% to 0.01% in the fiscal year 2000. The renewal of small fishing boats and equipment was supported by this program in an effort to facilitate the improvement of worker safety on family-owned coastal boats. This program does not contribute to the increase of fishing capacity as a whole as Japan restricts the number of fishing vessels as well as the size of each vessel through the government's licensing scheme.

* Approximately 33-56% of the costs are shared by vessel owners.

The most significant general services expenditure is the construction of public infrastructure, including fishing ports, breakwaters, public wharves, navigation routes, coastal community roads, community water supplies, sewage systems and park facilities around ports. This accounts for approximately 70% of government financial transfers in the fisheries sector. As of 2006, there were 2 921 fishing ports in Japan, located in geographically disadvantaged areas. This expenditure does not constitute payments to the fishing industry but rather to the construction sector. General services other than coastal infrastructure construction include a wide variety of government transfers, including: 1) Government costs for monitoring, surveillance and control of fishing operations; 2) Official development assistance for foreign countries in the fishing sector; 3) Domestic education and information dissemination services related to fisheries; and 4) Research and development including the operating costs of the National Institute for Fisheries Research and the National Fisheries University.

Post-harvesting policies and practices

Food hygiene inspectors appointed by local governments conduct surveillance on bacteria numbers, anti-bacteria substances, environmental pollutants in food and the proper utilisation of food additives. They conduct this surveillance by sampling wholesale markets, cold storage facilities, retail stores, etc., based on the *Food Hygiene Law*. All marine products (domestic products or imported products) are subject to the surveillance.

Large fish processors have introduced the Hazard Analysis and Critical Control Points (HACCP) system for quality and sanitation control purposes. In some cases, firms have to invest in these facilities. These requirements make it difficult for small and medium-sized processors to adopt HACCP. To resolve the problem, the Japanese government has provided loans for the introduction of the HACCP system and developed manuals for quality management of fish products.

Consumer's interests and concerns regarding the freshness and safety of food are increasing. Consumers want information on food safety necessary for their own decisions on purchases. Under the *Law Regarding the Adjustment of the Standardisation and Quality Display for Agriculture and Forestry Goods*, revised in 1999, all unprocessed sea foods and several processed sea foods are now required to display necessary information such as the origin of the food.

The number of fish processors has recently decreased to a total of 9 276 in 2006. Small-scale operators, who employ less than 20 people, account for three quarters of the total number of processors.

Markets and trade

In Japan, demand for fish products for human consumption has decreased by 10% over the last decade. Total demand was 7 861 000 and 7 358 000 (preliminary) tonnes in 2005 and 2006 respectively. Diminishing demand can be partly explained by a change in lifestyle and consumer preferences for food, particularly those of younger generations in Japan.

Demand for fish products for non-human consumption peaked in 1989 at 4 436 000 tonnes but it fell to 2 462 000 tonnes in 2006. The demand decrease was a result of a reduction in production of sardine and a shift in aquaculture feed to compound feeds.

The principal marketing channel for fisheries products in Japan is as follows: after landing, prices are set and products are sorted according to destination at the wholesale

market in production areas; fish is supplied to retailers through the wholesale market in consuming areas; and final retail sales for consumers are made through supermarkets or traditional fish mongers.

In Japan, supermarket and retailer sales are increasing. 68% of consumers selected large supermarkets as a place to purchase fish products in 2003. This was a remarkable increase compared with the figure of 49% in 1993. Convenient location and price competitiveness in supermarkets were the main reasons. Consequently, the share of traditional fish mongers decreased to 15% in 2003. In the meantime, direct purchases and imports by retailers (*e.g.* supermarket and restaurant chains) have increased. In addition, final consumers purchase more fish products directly from producer organisations via the Internet or other means, which means that more fish products are sold outside wholesale markets.

Japan's imports of fish and fish products were relatively stable in 2005 and 2006. Imports were 3.34 million tonnes and 3.15 million tonnes in 2005 and 2006 respectively. The value of imported fishery products in 2004 was JPY 1 637 billion, a 4% decrease from 1994. The values of the imports in 2005 and 2006 were JPY 1 669 billion and 1 707 billion respectively. Shrimps and prawns have the largest value among imported fishery products, followed by tuna and tuna-like species, salmon and trout, crab, and eel products. Currently, China is the largest source of Japan's imports of fish products.

Japan's exports of fish and fish products are less than one tenth of its imports. In 2006, the quantity of the exports was 0.59 million tonnes, an increase of 0.32 million from 1996 levels. In 2006, the value of exports was JPY 204 billion, an increase of JPY 70 billion from 1996. The level of increase both in quantity and value in current years is remarkable compared with those of past years. This positive trend is accounted for by the growing international reputation of Japanese food as well as the economic development of several Asian nations.

In August 2006, Japan ratified the United Nations Fish Stock Agreement, which complements the provisions of UNCLOS with respect to the management of straddling stocks and highly migratory species. In July 2008, Japan acceded to the Convention for the Strengthening of the Inter-American Tropical Tuna Commission established in 1949 by the Convention between the United States of America and the Republic of Costa Rica (Antigua Convention). The Antigua Convention is expected to enter into force in the near future, replacing the existing 1949 IATTC Convention.

To promote international co-operation in resource management and to comply with ICCAT recommendations, Japan has prohibited imports of Atlantic bluefin tuna from certain countries. Nevertheless, a large amount of tuna caught by IUU or flag of convenience (FOC) vessels is still imported to Japan by those circumventing international measures, which consequently encourages disorderly fishing operations. Since 1999, the government of Japan has required tuna importers to report the name of the fishing vessel when importing tuna into Japan in accordance with the provision of the *Law Concerning Special Measures to Strengthen Conservation and Management of Tuna Resources*. The government has also requested importers to refrain from importing fish caught by FOC fishing vessels.

Outlook

Japanese fisheries are faced with falling production partly due to declining stocks in Japanese waters, decreasing fisher numbers and further ageing of fishers. Taking account

of other socio-economic factors surrounding fishing and its related industries that are not always favourable for primary industries in developed nations, it is clear that Japan's fishery is at a turning point.

The Japanese government and fisher efforts will be reinforced to recover fishery resources and conserve the natural environment. There is further potential for export expansion of Japanese fish products in addition to firmly sustained domestic consumer demands for fish and fish products. Moreover, further attempts will be made to operate fisheries more efficiently in terms of cost, energy and labour. These facts suggest that fisheries continue to be a viable economic activity in Japan. Achievement of sustainable fisheries with adequate public policies not only activates coastal communities but also contributes to the welfare of Japanese nationals as a whole.

PART III

Chapter 21

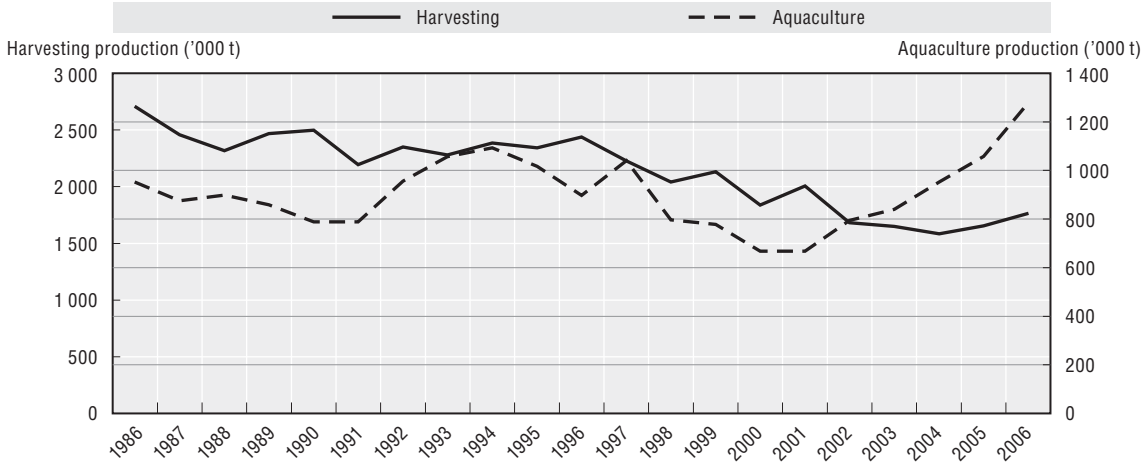
Korea

Korea

Summary of recent developments

- In order to achieve responsible fisheries, Korea established a 10-year stock recovery plan in 2005. The plan was applied to four species in 2006 and expanded to seven species in 2007. Korea has started to mange squid resources under the TAC system and 10 species are currently managed by that system. In addition, a special law was legislated in 2004 to root out illegal fishing by small bottom trawl boats and 2 468 boats were scraped in 2005 and 2006 according to the Act.
- To take part in international efforts to manage fishery resources in a sustainable manner, Korea became the 68th party to the United Nations Fish Stock Agreement in 2008. Korea also enacted the Distant Water Fishery Act in 2007, which provides a legal basis to comply with conservation and management measures of international fisheries management organisations.
- Korea has focused on increasing food safety in the fisheries sector. As a result, the Aquatic Animal Disease Management Act was legislated in 2007 in order to establish an efficient response system against cultivated fish disease and to secure the safety of imported fishery products.

Harvesting and aquaculture production

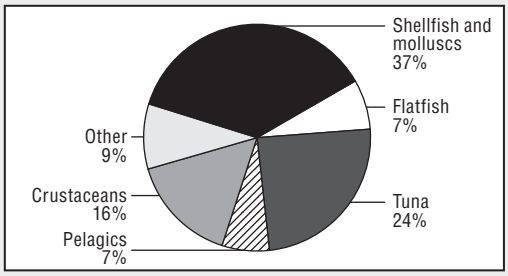


Source: FAO.

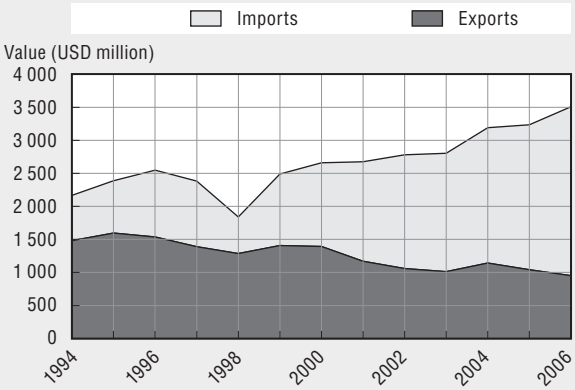
Key characteristics of the sector

- Capture fishery production in Korea increased from 1.58 million tonnes in 2004 to 1.76 million tonnes in 2006. Aquaculture production has constantly increased since 2000 and reached its highest level of 1.28 million tonnes in 2006.
- Shellfish and molluscs were the main contributors to capture fisheries production in 2006, with squid (USD 549 million) being the most important species. Other main species were bigeye tuna (USD 259 million), skipjack (USD 232 million), shrimp (USD 144 million), mackerel (USD 155 million) and plaice (USD 150 million). In the aquaculture sector, flatfish (USD 482 million), seaweed (USD 264 million), oyster (USD 138 million) and eels (USD 120 million) were the major species farmed.
- Korea's exports of fish and fish products have decreased gradually while imports have significantly increased in recent years. As a consequence, trade deficits have increased since 2001 when Korea experienced a trade deficit (USD 336 million) for the first time. Since then, the deficits have increased to USD 1 603 million in 2006
- Korea reported that its GFTs were USD 644 million in 2006. Most of them were devoted to construct and maintain fishing ports and to recover fishery resources.

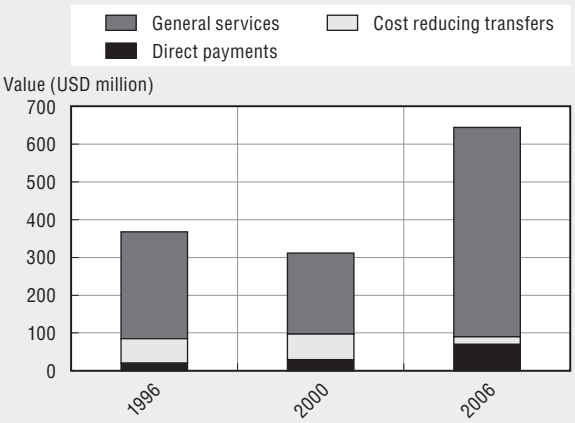
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	191 365	90 954
Number of fish farmers	63 106	45 524
Total number of vessels	75 244	86 113
Total tonnage of the fleet	971 808	673 719

Legal and institutional framework

Korean fisheries management is based on the Fishery Act together with many related acts and regulations. According to the Act, the Ministry for Food, Agriculture, Forestry and Fisheries (MIFAFF)* is largely responsible for fishing vessels in offshore and coastal waters and foreign-flagged vessels fishing within the Korean EEZ, while local governments at province and city levels are mainly responsible for fishing licenses of vessels operating in the coastal areas.

Fisheries resources have been protected mainly through governing the mesh size of fishing nets, fishing grounds, fishing seasons, etc. The TAC system was introduced in 1999 and has been implemented for 10 species since 2007.

The Korean government also started a fishermen-oriented Community Based Fisheries Management (CBFM) program for more effective implementation of responsible fisheries in 2001. Under this system, organisations of fishermen such as a fishery corporation or a group of fishermen in fishing villages establish self-regulation in line with appropriate fishery-related laws and regulations, with the endorsement of the local government. The CBFM is designed to enhance the sense of responsibility of the fishermen and to prevent illegal fishing.

With respect to aquaculture, the Culture-based Fishery Promotion Act was established on 14 January 2002. In accordance with this Act, the government established a 5 year-basic plan to promote culture-based fisheries.

Capture fisheries

Total catches from capture fisheries amounted to 1.77 million tonnes (valued at KRW 3 843 billion) in 2006, a small increase from 1.67 million tonnes (KRW 3 709 billion) in2005.

In coastal and offshore fisheries, the production in 2006 totalled 1.11 million tonnes, nearly unchanged from 2005 (1.10 million tonnes). The major species in coastal and offshore fisheries were anchovy, squid, mackerel and hairtail. In particular, the catch for anchovy, which accounted for the largest proportion of the total catch, amounted to 265 346 tonnes in 2006, a 6.6% increase from 249 001 tonnes in 2005. The production of mackerel was 101 427 tonnes in 2006, a 25% decrease from 135 596 tonnes in 2005. The production of squid was 197 804 tonnes in 2006, an increase of 4.2% from 189 126 tonnes in 2005.

In distant water fisheries, production in 2006 totalled 639 000 tonnes, an increase of 15.7% from 552 000 tonnes in 2005. The number of fisheries households dropped by 4% from 79 942 in 2005 to 77 001 in 2006. The number of fisheries households can be broken down to 46.9% with fishing vessels, 22% without fishing vessels, and 31.2% in aquaculture.

The number of fishing vessels decreased by 4 622 from 90 735 vessels (700 810 GT) in 2005 to 86 113 vessels (673 719 GT) in 2006. The decrease in number and gross tonnage was the result of the government's fleet reduction program.

Culminating in the mid 1980s at 1.7 million tonnes, fishery production in the coastal and offshore waters decreased to 1.08 thousand tonnes by 2004, but the trend was reversed in 2005 and the production increased to above the 1.1 million tonnes level in 2006. Overall,

* The Ministry for Food, Agriculture, Forestry and Fisheries was established in March 2008 by merging the Ministry of Agriculture and Forestry and the Ministry of Maritime Affairs and Fisheries as a result of the restructuring of government organisations in Korea.

pelagic species such as Alaska Pollack are on the downward trend and hairtail and Japanese Spanish mackerel are increasing. Catch per Unit Effort (CUPE), a stock indicator, has been increasing since 2000 and catch per vessel horse power has also been on the recovery since 2003. In particular, the production of seven species targeted under the resource recovery system has increased by 49.5% since 2005.

Management

Major management instruments in coastal and offshore areas include: maximum number to be licensed, minimum mesh size of nets, regulation on fishing grounds, fishing seasons and size of fish, etc.

The TAC system has been in operation since the 1999-2000 trial period that covered four species (mackerel, sardines, jack mackerel, red snow crabs). In 2007, catches of the 10 species managed by the TAC system were 266 975 tonnes out of 381 930 tonnes of total quotas. To operate the TAC system, observers are employed to check the amount of catches at landing places and to collect biological data on the catches. The Korean government will gradually expand the number of species to be covered by the TAC system in order to manage fisheries in a sustainable manner based on high-quality scientific data.

To effectively implement responsible fisheries, the MIFAFF introduced the CBFM in 2001, under which 579 fishing villages and associations fishing vessel owners were registered as of 2007. Through the system, fishers focus on not only preventing illegal fishing and overexploitation of fishery resources, but also on stabilizing their income by setting catch limits, spreading out catch seasons and selling them in a collective way.

In addition, the Korean government established a 10-year stock recovery plan in 2005 in order to manage fishery resources in more comprehensive way. The recovery plan, which adopts an ecosystem approach to fisheries management, clearly defines a goal of stock level, encourages management authorities and fishers to select different management measures for each target species based on scientific advice, and establishes fishery resources management committees at the local level in which representatives of fishers and experts as well as government agencies participate. The plan was applied to four species in 2006 and expanded to seven species in 2007.

Monitoring and enforcement measures are implemented by the MIFAFF, the Korean Coast Guard and local governments. A special law was legislated in 2004 to root out illegal fishing by small bottom-trawl boats and, according to the act, a total of 2 468 boats were decommissioned between 2005 and 2006. As a result, the number of total violations against fishery laws and regulations reported in 2006 was 3 015, a 26% decrease from 4 054 in 2005.

With respect to international co-operation, Korea has bilateral fishery management regimes under the UNCLOS and the EEZ system with neighbouring countries. The Korea-Japan Fishery Agreement and the Korea-China Fishery Agreement entered into force in 1999 and 2001, respectively. As a result, only Chinese and Japanese vessels can gain access to the Korean EEZs on a reciprocal basis. Table III.21.1 presents bilateral fishery agreements between Korea and foreign countries and the status of fishing access to foreign waters.

To take part in international efforts to manage fishery resources in a sustainable manner, Korea is a member of 16 international fisheries organisations including ICCAT, CCSBT, IWC, IATTC and WCPFC.

Table III.21.1. **Korea's bilateral fishery agreements and access to foreign waters**

	Date of effectuation of agreement	Targeted fish species
Japan	22 January 1999	Mackerel, squid
China	30 June 2001	Hair tail, croaker
Tuvalu	18 June 1980	Tuna
Solomon Islands	12 December 1980	Tuna
Kiribati	18 December 1980	Tuna
Russia	22 October 1991	Alaska pollock, saury, cod, squid
Papua New Guinea	15 April 1992	Tuna

Recreational fishing

The recreational fishing business is popular in Korea. Typically, recreational fishing boats of less than 10 GTs can take people to angling locations or allow people to fish on board during the commercial fishing off-season after reporting to local governments. The number of registered fishing boats in 2007 was 4 794.

Aquaculture

The area for aquaculture in 2006 was 135 346 hectares (ha), an increase of 1 487 ha (1.0%) from 133 859 ha in 2005. Aquaculture production in 2006 was 1.28 million tonnes (valued at KRW 1 613 billion), a 21% increase from 1.06 million tonnes (valued at KRW 1 472 billion) in 2005. The number of aquaculture households in 2006 was 23 989, a 0.3% decrease from 24 075 in 2005. Major species in aquaculture are flatfish, jacopever, oyster, short-necked clam, sea mussel, laver and seaweed.

Fisheries and the environment

In Korea, assessments for environmental factors such as water quality, sediments, distribution of benthos, and the status of the use of fishing grounds have been conducted regularly in order to inspect their impacts on fisheries and to estimate environmental capacities for sustainable fisheries.

The Korean government has also been operating an effective system to provide early warning forecasts for red tides to mitigate the damages they cause to coastal and offshore fisheries and aquaculture, mostly in August and September.

In addition, an artificial reef project to restore fishery resources has been extended to cover 191 748 hectares by 2006. Under another project to recover fishery resources, a total of 960 million juveniles of flatfish, jacopever and abalone have been released by 2007. Korea is also implementing sea-ranch projects in designated coastal zones.

Government financial transfers

Total government financial transfers (GFTs) to fisheries in 2006 totalled KRW 613 billion, a decrease of 35 billion from KRW 658 billion in 2005. In 2006, most of the transfers were used to improve fishery infrastructure such as improving fishing port (KRW 270 billion, 44% of total GFTs) and to recover fishery resources (KRW 92 billion, 15%) while KRW 66.5 billion was transferred to the decommissioning program that adjusts coastal and offshore vessels.

Post-harvesting policies and practices

To ensure that seafood is safe and meets international quality standards, the Hazard Analysis Critical Control Point (HACCP) system has been introduced in accordance with the Fishery Products Quality Control Act, which was established in January 2001 and integrates laws controlling fishery product quality. Currently, as a trial run, the HACCP system is in operation for flatfish and eel species in 20 fish farms. Meanwhile, the Korean government introduced a traceability system in 2005 and is currently implementing a pilot project for 13 stocks including eel and trout.

The consumption for fishery products is increasing every year as fish is considered to be a healthy food. However, the total capacity of fishery processing facilities in 2006 was decreased by 10 000 tonnes from 1 560 000 tonnes in 2005. The Korean government is planning to develop the fishery processing industry by building processing facilities adjacent to production areas to meet high-standard and diversified consumer demands.

Markets and trade

The scale of the Korean fishery market in 2006 was 6.2 million tonnes. In terms of supply, total production reached 3 million tonnes (49.0%) while imports recorded 2.7 million tonnes (42.7%). 512 000 tonnes (8.3%) were carried over from the previous year. With regard to demand, domestic consumption recorded 4.6 million tonnes (73.7%) while exports showed 1.1 million tonnes (16.9%). 575 000 tonnes (9.3%) were carried over to the next year. The per capita consumption of fishery products was 48.1 kg in 2005, a decrease of 1.8% from the previous year.

Table III.21.2. **Trend of per capita consumption of fishery product**

	2001	2002	2003	2004	2005
Total (kg/year)	42.2	44.7	44.9	49.0	48.1
Fish and shellfish	35.6	36.3	38.5	41.1	38.5
Seaweed	6.6	8.4	6.4	7.9	9.6

Source: Korea Rural Economic Institute.

Exports of fishery products were USD 952 million in 2006, a decrease of 8.6% from 2005 due to decreasing exports to China. Imports of fishery products in 2006 rose by 16.5% to USD 2 555 million from 2005 due to increasing imports from China and Japan.

Leading export items were tuna, laver, oysters, flatfish and squid while the main import items were Alaska Pollock, yellow corvine, shrimp and hairtail. The main countries for export were Japan (60.6%), the US (8.8%) and China (6.9%), and the leading countries imported from were China (37.3%), Russia (12.5%) and Japan (8.1%).

Korea has recently made Free Trade Agreements (FTAs) with Chile, Singapore, EFTA and ASEAN and a negotiation with the US was completed in 2007. In addition, negotiations with the EU, Canada and Mexico are in progress, which will contribute to expanding fishery-related trade among contracting parties to FTAs.

Outlook

The primary objective of Korea's fishery policies is to improve both fishers' and consumers' welfare by protecting and recovering fishery resources. For fishers, the Koran

government focuses on the following: *a*) expanding fishing vessel buy-back programs; *b*) promoting efforts to recover fishery resources by applying the TAC system and the Fish Stock Recovery Program to other species; *c)* fostering aquaculture activities by focusing on increasing quality and safety of the products; *d*) amending fishery-related institutional arrangements to harmonize with CBFM; and *e*) strengthening enforcement of laws and regulations to eliminate illegal fishing activities. For consumers, the government emphasizes the quality of fishery products and reinforces rules and regulations relating to seafood sanitation such as the expansion of the HACCP system.

The government will invigorate tourism projects linking fishing villages, fishing ports, and fishery resources to boost the incomes for fishermen. Along with such efforts, Korea will do its utmost to adapt itself to the ever-changing fishing environment and participate in international efforts for the optimum management and sustainable use of marine resources.

PART III

Chapter 22

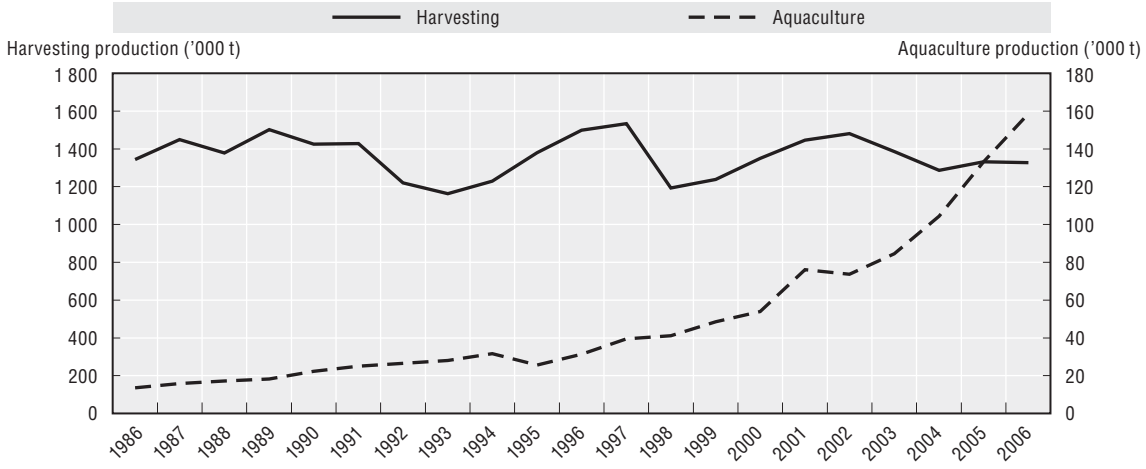
Mexico

Mexico

Summary of recent developments

- The Fisheries and Aquaculture Policy of the Mexican government is based on a long-term vision to promote national development and competitiveness. Key policy documents are the National Development Plan and the Sector Program for Farming and Fishing of the Secretariat of Agriculture, Livestock and Rural Development, Fishing and Food of the United Mexican States.
- In 2007 the General Fishing Law for Sustainable Fisheries and Aquaculture entered into force, replacing the previous code from 1992. The related Regulations are expected to be published in 2009. The new law promotes an integrated long-term approach with emphasis on environmental sustainability and value chain development. An overall administration modernization of the data collection and permit system is envisaged for the new future.
- A Support for Fishing Effort Reduction Program was implemented in 2006 and 2007. MXN 1 million was allocated to remove 306 shrimp vessels. The aquaculture sector on the other hand has received massive investments to increase production and human capacities.
- The Mexican government has invested in promoting domestic seafood consumption through consumer education campaigns and investments in the storage and distribution infrastructure. In addition, the Mexico Supreme Quality was introduced to improve the reputation of Mexican seafood quality in the national and international market.

Harvesting and aquaculture production

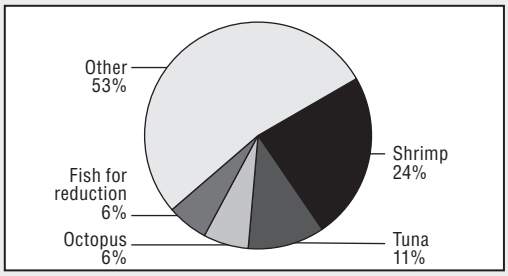


Source: FAO.

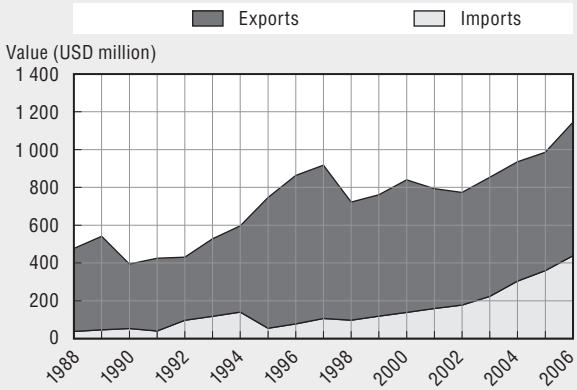
Key characteristics of the sector

- Mexican capture fisheries production has been oscillating around 1.4 million tonnes over the past two decades. The stagnation of the production confirms that most Mexican fish stocks are correctly classified as fully exploited. Aquaculture production on the other hand benefits from public investments. Production doubled from approximately 80 000 tonnes in 2001 to 160 000 tonnes in 2006.
- Shrimp is by far the most valuable species of the Mexican seafood production. It accounts for 24% of the total fishery products in terms of value but only for 4% in terms of volume. Fish for reduction on the other hand represents about one third of the total capture fishery production in terms of volume and only 6% in terms of value.
- The two most valuable seafood categories, shrimp and tuna, lead Mexican fisheries exports. Main export destinations are USA, Japan, Spain and Hong Kong.
- Mexico has recently implemented a vessel reduction program to reduce fishing pressure on its fully exploited stocks and the fleet is expected to be upgraded in terms of fuel efficiency. This policy is reflected in an increase in cost reducing transfers to the industry in 2006.

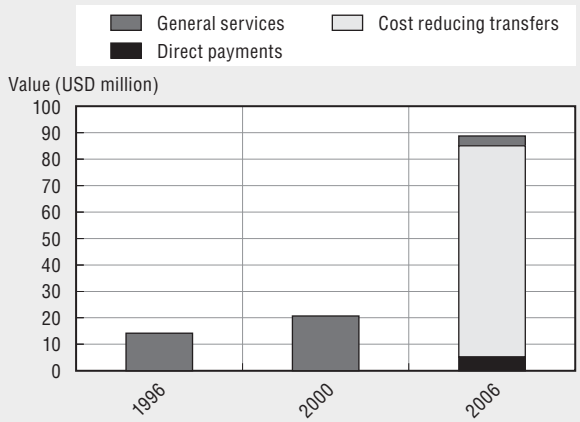
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	235 345	257 940
Number of fish farmers	23 505	24 998
Total number of vessels	77 019	106 225
Total tonnage of the fleet	224 749	240 856

Legal and institutional framework

The National Commission for Aquaculture and Fisheries (CONAPESCA) is a non-centralized federal body of the Secretariat of Agriculture, Livestock, Rural Development, Fishing and Food of the United Mexican States (SAGARPA). The CONAPESCA is in charge of managing fisheries resources and aquaculture. The responsibility is shared with state governments and municipalities.

All Mexican fisheries and any other activity involving living marine resource exploitation are regulated by Article 27 of the Political Constitution of the United Mexican States and by the recent 2007 General Fishing Law for Sustainable Fisheries and Aquaculture (the Law) and the Regulations rooted in its predecessor (1992). The new Regulations in line with the Law are expected to be published in 2009.

The new Law provides an improved legal framework to ensure fishery resources conservation, and sustainable utilization. The Law foresees a close co-ordination between institutions and defines responsibilities at the federation, state and municipality level.

Additionally, there are the Law of Public Administration, the Regulation of the SAGARPA, the Institutional Decree of CONAPESCA (2001), the Operation Rules of the SAGARPA programs (2001), the Official Mexican Standards (NOM) and the Fishery National Letter which are part of the legal framework governing fisheries and aquaculture activities.

The Law recognizes fishery and aquaculture as a priority area for the economic development of Mexico. The role of scientific and technologic research as a fundamental knowledge tool for policy planning and implementation to protect aquatic resources is acknowledged. The National Fishery Letter is a binding instrument in the decision making process. It includes indicators about marine and inland fish stocks to facilitate management and conservation decisions.

The Law recognizes aquaculture as an alternative to counterbalance the process of fish stock overexploitation. Aquaculture contributes to food security and provides employment opportunities. The Law also regulates recreational fishing which is an important element of the tourism sector.

The Law uses an integrated sector development approach and has established the Mexican Fund for the Fishery and Aquaculture Development (PROMAR) as an instrument to promote the sustainable development of aquaculture and fisheries.

The Law establishes that any fishery and aquaculture activity in waters under federal jurisdiction will be managed through permits and concessions. Capture fishery permits are issued for a period of 2 to 5 years, species concessions for periods of 5 to 20 years and for 50 years in aquaculture. The law does not authorize foreign vessels to perform fishing operations within its EEZ. However, foreign vessels can apply for concessions or permits for species surpluses determined by the Fishing National Institute and CONAPESCA.

Other instruments under the Law are programs and policy tools like concessions and permits. In addition to ensuring fishery resource conservation the Law promotes value-added production and community integration.

Foreigners can only operate through joint venture enterprises, legally registered under the Mexican legislation. Foreign investment cannot exceed 49% of the corporate capital. In enterprises dedicated to processing, aquaculture or trade the share of foreign investment can be up to 100%.

Producers are subject to comply with Official Mexican Standards related to fisheries. These standards specify target species, protected species, fishing seasons, authorized capture systems and the respective characteristics (methods, equipment), operation conditions, minimum capture sizes and weight, fishing quotas if applicable and details of the verification processes.

Currently there are 40 Official Mexican Standards: 14 for marine fishing grounds, 19 for continental waters, and 7 related to recreational fishing, food safety, sanctions, satellite monitoring and the use of Turtle Exclusion Devices.

Capture fisheries

The total capture fishery production in 2005 was 1 458 195[1] tonnes (live weight – 235 845 tonnes from aquaculture) and increased by 5% to 1 525 957[2] tonnes in 2006. Main capture fisheries species are shrimp, tuna fish, squid and tilapia.

The fishing fleet decreased as a result of the Fishing Effort Reduction Program from 2 263[3] shrimp vessels in 2005 to 2 202[4] vessels in 2006. It is expected to decrease further.

Sardine stocks are fully exploited. The fishery is mainly concentrated in Baja California B.C.S and Sonora and managed through commercial permits for small pelagic capture, with authorized fishing gears and in specified zones. The intention is to reduce the fishing effort and to implement precautionary principles.

The shrimp fishery is concentrated in the Pacific Ocean, the Gulf of Mexico facing Tamaulipas and Campeche. The fishery as a whole is considered fully exploited. There is an ongoing effort to improve fish excluder devices to reduce by-catch from trawling. Fishing season dates are determined by the appropriate authority. The shrimp fishery has one of the most complete management schemes with respect to management and research.

The tuna fishery zones are jurisdictional waters at both shores and international waters. In Mexico, the tuna fishery is the second largest fishery regarding volume, after sardine and second in value, after shrimp. Yellow fin tuna is fully exploited. Closed seasons for yellow fin tuna and big eye are implemented in areas under the jurisdiction of Mexico and of the Inter-American Tropical Tuna Commission (IATTC).

The oyster fishery is fully exploited. This artisanal fishery has two closed seasons protecting it during recruitment period. To avoid overfishing no more permits for oyster exploitation are emitted.

The clam fishery takes place in the Pacific Ocean shore and in Veracruz. It is overfished in BCS and fully exploited in other three states.

The shark capture area is the Pacific Ocean, Gulf of Mexico, and Caribbean Ocean. This fishery is fully exploited. Since 1993, no permits have been issued for shark, except in the case of vessel replacements. In the last few years this fishery has been organized through permits and new regulations to improve the information system in compliance with the National Action Plan for Management and Conservation for Sharks (2004) and the FAO Action Plan for the Conservation for Sharks (1999).

The crab capture zones are costal lagoons and marine sea waters. The Gulf of California states fisheries are almost fully exploited. In the other states there is development potential. The fishery is subject to a minimum size limit.

Management

During 2006-2007, main management measures included effort reduction, restrictions against destructive fishing practices, quotas for certain species, protected areas, temporary closed seasons, minimum sizes and gear regulations. Artisanal fishing was promoted through individual permits. To properly asses the effective fishing effort a major vessel matriculation campaign took place.

A temporary closed season was implemented for the shrimp fishery in 2006 and 2007 in the Pacific Ocean, Gulf of California and Caribbean Sea. In addition, a Pacific Ocean Shrimp Fishery Management Plan was published.

The Official Mexican Standards were reviewed to improve species targeting and avoid negative impacts on other fishery resources and the overall ecosystem. The Support for Fishing Effort Reduction Program has been implemented. 306 shrimp vessels with an investment of MXN 1 million per vessel were removed.

Within the framework of the IATTC the Mexican tuna fleet operating in the Pacific Ocean joint a long-term program for tuna conservation, including blue fin tuna and swordfish, in line with the 2006-02 ICCAT recommendations of the Program for North Atlantic Swordfish.

The Mexico-Cuba Fishing Agreement is currently the only effective agreement with another country. Since July 1976, Cuban vessels are authorized to operate in the EEZ of the Gulf of Mexico and in the Caribbean to fish sea bass, red snapper, sierra and associated species. Due to declining fish stocks and increasing capacity of the Mexican fleet, the number of permits for Cuban vessels has constantly declined since the establishment of the Agreement.

Between 2006 and 2007, 9 permits per year were granted with a total quota of 830 tonnes. The quota and the average number of authorized permits in the last years represented only 3% and 18.2% respectively compared to 1976. The Cuban vessels have national scientist observers on board and are integrated in the Satellite Monitoring Program in Mexico.

Indigenous Seri or conca' acc communities living along the Sonora central shore, Tiburon Island and other islands like San Esteban move according to fishing cycles to different fishery camps distributed along their territory. Turtle meat is a fundamental part for their rites. The Political Constitution of the United Mexican States establishes that the government is obliged to support indigenous traditions and costumes and the relevant authorities have granted a marine turtle capture limit (2 to 4 marine turtles per year). The limit is enforced by PROFEPA inspectors.

CONAPESCA is in charge of the inspection and surveillance of fishing resources. The Law and its regulations referring to fishery monitoring and surveillance are implemented by State Committees of Inspection and Surveillance. These Committees act as planning, execution and evaluation agencies in line with the Integrated Program of Inspection and Surveillance to fight illegal fishing.

There are other laws which have a direct impact on fishery activities: the Navigation Law, the Ports Act, the Political Constitution of the United Mexican States, the General Law of Ecology Balance and Environment Protection.

Mexico has reinforced its monitoring, control and surveillance, through the following actions:

- better control regarding permits and concessions granting;

- updating of the national fishing vessel register;
- strengthened verification of the legal origin of fisheries products in the ports;
- increasing inspection and surveillance in national waters, implemented by CONAPESCA surface units and the Mexico Marine-Army Secretary;
- implementation of a satellite monitoring system for fishery vessels since 2005. So far a total of 1 649 devices have been installed at both shores (1 238 for the Mexican Pacific Ocean, 411 for the Gulf of Mexico);
- continuity of the Observers Program: 100% of the tuna and shark fleet trips in the Pacific Ocean and long line tuna fishing cruisers in the Gulf of Mexico have a scientific observer on board;
- fishing guide implementation: auxiliary tool for fishing inspection and surveillance to prevent illegal fishing and fisheries product transport; and
- increased participation in international and regional organisms promoting regulations to strengthen monitoring, control and surveillance such as the International Monitoring, Controlling and Surveillance Network, FAO (IUU Plan), IATTC, ICCAT.

With support from APEC and FAO, Mexico has been actively participating in the work towards an Aquaculture Network in America (ANA). The ANA is conceived as a regional mechanism to support the aquaculture sector development in America. Mexico has offered to host the ANA headquarters.

The FAO/INFOPESCA project Improving marketing efficiency of Artisan Fishermen in Central American, Mexico and the Caribbean for 343 fishermen of Laguna de Tamiahua, Veracruz, contributed to the improvement of the seafood supply chain in Central America, Mexico and the Caribbean.

INFOPESCA started to implement the project Improvement of internal markets for sea products in Latin American and the Caribbean in August 2007. The main objective is to improve the internal markets for sea products and to professionalize fishermen and distributors in 11 countries: Argentina, Belize, Brazil, Colombia, Costa Rica, Dominican Republic, Honduras, Mexico, Nicaragua, Uruguay and Venezuela.

FAO supported the development of the Law through the Mexican Fishery Regulations Review Assistance project.

Mexico carried out evaluations of provisions of the High Seas Agreement at the national and regional level to make proposals for revisions to facilitate access for new members.

Within the Latin-American Organization for Fisheries Development (OLDEPESCA) Mexico has been supporting the use of eco-labels in fisheries, the development of quality systems to facilitate trade, the creation of a virtual platform for the Aquaculture Iberoamerican Observatory and the project Development of fishing technologies for small pelagic in the provision of food to Latin American and the Caribbean. Cuba, Ecuador, Guyana, Mexico, Peru and Venezuela met in 2007 to draft a regional shark strategy.

Mexico participated in the regional OLDEPESCA seminar on security in international fishing. The government of Mexico has been participating in the Regional Program for the Conservation and Ordination of Sharks. CONAPESCA supported the formulation of national programs by other OLDEPESCA members.

To limit by-catch and discards the National Fishing Institute works on technological changes in equipment and fishing gears within its Experimental Fishing Programs.

NOM-061-PEC-2006 was included in the Official Mexican Standards in 2007. It regulates the use of Turtle Exclusion Devices used in the drag fleet shrimp fisher.

The 2007-2012 National Plan of Development establishes the national objectives, strategies and priorities. Environmental sustainability is a key element of this plan. The 2007-2012 Sector Program of Farming and Fishing of the SAGARPA is based on the National Development Plan and the Vision of Mexico 2030. The Program has an integrated long-term vision and includes performance indicators for goals and target beneficiaries to facilitate monitoring and evaluation. The main objectives of the program are to improve competitiveness and transparency of the national fishery sector and to:

- increase the human and patrimonial development of Mexican citizens living in rural and coastal areas;
- supply the internal market with high quality seafood;
- improve the income of producers through value added seafood products;
- diminish negative impacts on the ecosystem; and
- promote sustainable participatory rural development.

The CONAPESCA Sector Program of Fishing and Aquaculture had the objective to supervise the national and international policies through SWOT and PEST analysis. This program is an instrument to articulate, formulate and pursuit the national public policy in aquaculture and fishery. This instrument has short, medium and long term objectives in order to consolidate a modern and competitive aquaculture and fishery sector. It includes:

- co-ordination between institutions dealing with marine security, inspection, surveillance and social development;
- updating of the legal framework in a responsible and dynamic way;
- establishment of actions that guarantee technological efficiency; and
- generation of strategic actions to consolidate a modern and competitive sector.

The regulations of SAGARPA cover production improvement, agriculture feed and value chain integration, paying attention to critical factors, groups, and priority regions.

In 2006-2007, the Aquaculture and Fishing Program supported 2 233 production support projects for a total amount of MXN 1 138.8 million. The program invested in 351 infrastructure and modernization projects. Other investments supported the production of key species (shrimp, lobster, squid, calamari, catfish, tilapia, trout) with innovation and technology to develop markets, services, knowledge and capacities. MXN 31.5 million were allocated to the shrimp sector in 2006. The Productive Reconversion Project in the Gulf of Mexico (FIFOPESCA) allocated MXN 50 millions in 2006 to develop aquaculture production, processing and trade.

In 2007, the implementation of the Aquaculture and Fishing Program of the Alliance for the Country Program was integrated in the Acquisition of Productive Assets Program. MXN 281 million and MXN 419.5 million were allocated to 31 federal entities and districts to implement the program activities. In 2007, training, technical assistance, research activities and equipment was funded with MXN 43 million through the Production Systems Committee.

During 2006 and 2007 CONAPESCA developed the Production Training Program and the Fortification of Production Systems Committee Program with MXN 33 million to develop the technical and management skills of producers. In 2007, 2 246 fishermen and producers were trained as part of the human capacity development strategy.

The Law delegated food hygiene and safety issue to the National Service for the Safety and Quality of Agro-alimentary Products (SENASICA), a body of SAGARPA.

CONAPESCA in co-ordination with the National Institute for Capacity Development of the Rural Sector (INCA RURAL) developed a Regional Strategic Project for trout farming in the states of Michoacán and Mexico and a Regional Strategic Project for good practices in squid in Yucatán and shrimp in Sinaloa. These projects promote better practices to enhance seafood quality. In 2007 CONAPESCA and INCA RURAL trained 169 people to serve the fisheries and aquaculture sector.

In 2006-2007 the federal government developed three strategies in co-ordination with SAGARPA and the Secretary of Economy to differentiate production units with the label "Mexico Supreme Quality". The label requires assurance systems for food hygiene and safety in fishery production processes, including risk analysis and critical point analysis. The strategies were *i)* an increase of the consultant network to promote the "Mexico Supreme Quality" label for trout and tilapia *ii)* consultancies on certification for 20 trout and tilapia production plants, *iii)* briefing of 84 producers about the direct benefits and requirements of the certification.

The Value Networks Strengthening and Construction Program has been implemented with the purpose to consolidate more competitive fishery and aquaculture production plants. The strategies of this program are:

- to establish Production System Committees at the state, regional and national level acting as planning, communication and permanent mechanism among all economic members of the value chain;
- provide resources and guidelines necessary to implement master programs in each Production System Committee; and
- to link, assist with, guide, and propose alternatives to issues determined by the Production Systems Committee.

The Production System Committee is supported by research centres, universities and institutes, federal, state and municipal government, input and service suppliers, producers, processors and traders. 45 state committees, 8 national committees and one regional committee for species production systems have been established so far.

In addition, CONAPESCA has facilitated the establishment of 34 producer associations, 30 state master programs and 8 national master programs as major planning instrument to develop strategic actions for the value chain.

Recreational fishing

CONAPESCA is responsible for the management and administration of recreational fisheries. Recreational fishing is subject to gear and location restrictions. Highly migratory species reserved for recreational fishing are Blue marlin (*Makaira mazara*), striped marlin (*Tetrapturus audaz*), black marlin (*M. indica*), short needle fish (*T. angustirostris*), sail fish (*Istiophorus albicans*) and sword fish (*Xiphias gladius*), dolphinfish (*Coriphaena* spp.), shad (*Megalops atlanticus*) and rooster fish (*Lachnolaimus maximus*). Based on scientific data, maximum capture limits, size and weight limits are established in the NOM-017-PESC-1994.

Recreational fishing generated 30 000 direct jobs and 16 000 fishing vessels are registered for this activity. 18 000 foreign recreacional fishing vessels operate in Mexico.

Permits for a total value of USD 6.8 million have been granted in 2007. A new system adopted in 2006 makes the permit allocation process more efficient.

The CONAPESCA National Program of Sport Fishing 2008-2012 aims at a rational and sustainable resource utilization. Its activities are designed to:

- promote Mexican recreational fishery nationally and internationally;
- achieve an integrated and sustainable recreational fisheries administration backed by biological research projects for relevant species;
- promote improved institutional performance in relation to recreational fisheries; and
- pursue a new legal framework to promote the development of recreational fisheries.

This national program is the outcome of a participative approach involving 21 000 members of associations grouped in the National Federation of Recreational Fishing in Mexico. More than 50% of the world's records registered by the International Game Fish Association (IGFA) have been fished in Mexico.

Aquaculture

Aquaculture development is one of the priorities of the Mexican fisheries policy. The National Program of Rural Aquaculture (PRONAR) is included in the Acquisition of Productive Assets Program of SAGARPA and develops small scale investment projects in poor areas. This program has created competitive and profitable aquaculture production units, which will contribute to improving social and economic conditions in rural areas.

In 2007, MXN 1.5 million were allocated to support 17 aquaculture centres, mainly for equipment, infrastructure, and inputs improvement. MXN 10.4 million was allocated in Chiapas, Colima and Yucatán to develop 60 investment projects with direct benefit for 759 households. MXN 22.6 million were allocated in Campeche, Colima, Chiapas, Chihuahua, State of Mexico, Hidalgo, Guerrero, Jalisco, San Luís Potosí, Tamaulipas and Tlaxcala, developing 102 investment projects benefitting over 900 households. A collaboration agreement with UAM-Xochimilco provides MXN 9.16 million for a network for aquaculture health diagnosis. Six collaboration and co-ordination agreements between national research institutes and the state were signed in 2006.

Seven technological development projects were funded with MXN 6.50 million. Sole cultivation takes place in the Center of Scientific Research and Superiors Studies of Ensenada, Baja California (CICESE). Sardines and horse mackerel farming is studied at the Center of Biologic Research (CIBNOR), bass farming in the Research Center of Alimentation and Development (CIAD) and in the Center of Technologic Development of Marine Species of the Jalisco State (CEDETEM); clam farming at the University of Baja California (UABC); and abalone farming by the Regional Federation of co-operatives Societies in the Fishery Industry in Baja California.

In 2007, CONAPESCA operated and supervised 38 Aquaculture centres in 24 states of the country. Main cultivated species are: catfish, carp, prawns, bass, tilapia and trout. Tilapia accounted for almost 50% of the total aquaculture production, followed by carp. In 2007 the fingerlings were distributed to 32 farms in the country, beneficing 375 localities of 244 municipalities. 45% of the total production was allocated to the most marginalized localities.

The revenue from fingerlings was MXN 1.47 million collected by the Treasury of the Bund (TESOFE). Aquaculture centres contribute to the professional development of national aquaculture. They provided 205 technical assistance services, organized 9 training courses for 306 people and carried out 214 guided tours for 3 538 participants.

Markets and trade

Eighty per cent of the domestic fisheries products are fresh and frozen products. In 2005 the average annual per capita consumption was 9.77 kg, mainly tuna, squid, tilapia, and sardine. Consumption in urban areas is higher than in rural areas.

The storage and distribution infrastructure for seafood in Mexico is rather limited with only to centres in Mexico City and in Jalisco. In 2006 the Federal government designed the Mercamar Project to develop strategic storage and distribution centres to improve product quality. This project is in its first phase (economic, social, technical, market evaluation). To increase fishery and aquaculture products consumption, seafood promotion campaigns have been carried out in collaboration with the private sector. In 2006, CONAPESCA carried out its "A todo mar" campaign during which 80 000 recipe flyers were distributed. Since 2004 the national Production System Committees have been developing marketing strategies.

During 2006 and 2007, MXN 36 million where invested in promotion, public relations, market research projects, fairs, tasting events, and other media. The government is developing strategies to educate future generations and to increases the internal consumption of fish and sea food. The Mexican Council of Promotion of Fishing and Aquaculture carried out a sardine promotion in schools.

In 2007 CONAPESCA organized PESCAMAR, a commercial event for representatives of the Production System Committees to display products. CONAPESCA arranged meetings with the most import retail chains, hotels and restaurants of the country to facilitate trade linkages.

The fisheries trade balance in 2007 registered (preliminary data) a USD 32.2 million surplus[5]. In 2007 exports totalled 189.47 million tonnes for a value of USD 792.46[6] million. Tuna and shrimp are the most important export species. Main export destinations are the United States, Japan, Spain, Hong Kong, Taiwan and Malaysia. 157.18 million tonnes for a total value of USD 410.14 million were imported, mainly from China, the United States, Chile, Taiwan and Guatemala.

The Mexican government is particularly attentive to fisheries-relevant regulations in existing and agreements and in ongoing negotiations, in particular in relation to:

- tariff and non-tariff barriers: tax and import obstacle elimination;
- quotas and permits: eliminate prohibitions and quotas for fishery imports;
- technical standards and sanitary and phyto- sanitary measures: avoidance of standards restricting fishery trade; establishment of mechanisms to adopt international standards; achievement of mutual recognition of verification and sanitary certification systems;
- safeguard: avoidance of discriminatory protection;
- rules of origin: insure benefits will apply to fresh and/or legally processed products, with flag and registration in jurisdictional waters of any party country; and
- dispute settlement: establishing agile mechanisms for the interpretation of free trade agreements.

Outlook

Mexico will further promote the competitive development of the fisheries and aquaculture sector through the Production System Committees, value chain integration, management and technical skills development and strategic project implementation. The increase of domestic consumption will be promoted through campaigns and current seafood consumption patterns will be analysed. The PROMAR Project of the General Fishing Law for Sustainable Fisheries and Aquaculture is a fund to guarantee the financial operations and services for fisheries projects until 2009.

Additional resources will be allocated to the National Rural Aquaculture Program to expand its coverage. Encourage savings with the end to consolidate guaranty funds, which allow future projects financing.

Regulation NOM-062-PESC-2005 on satellite monitoring systems for fishing vessels will be included in the Official Mexican Standards and support the inspections and surveillance measure implementation. A proposal to formalise illegal shrimp fishing and trade as a crime in the penal code will be tabled. The PROFLOTA Project will invest in the renewal of the fishing fleet to reduce pollution and operational costs and a proposal for fuel subsidies for fishing fleets will be submitted.

The rehabilitation of the lagoons systems will contribute to improve the water quality and fishery productivity. Improved infrastructures will facilitate sustainable fisheries and aquaculture development in rehabilitated lagoons in rural areas.

The Strategic Projects of CONAPESCA will create additional employment opportunities, reduce poverty and promote competitiveness and sustainable development in Mexico. A national survey will be used to identify the real needs and guarantee adequate project design. The CONAPESCA website will host a business simulator to facilitate the identification of potential investment areas.

CONAPESCA itself will be reorganized and incorporate the fishery sub-division of SAGARPA. There is the intention to update the Mexican fisheries and aquaculture data collection and management system and to digitalize the fishing permit system to allow electronic processing and direct access to information on the CONAPESCA website.

CONAPESCA will collaborate with INCA Rural and the Mexico Supreme Quality Civil Association in providing training relating to: *i)* the accreditation process of technical assistance and training providers; *ii)* seafood trade; *iii)* fishery and aquaculture organisation finance; *iv)* project design and management; and *v)* good practices in fishery. These training activities will be supported through broadcasts at the national Edusat Network.

Notes

1. *Anuario Estadístico de Pesca 2005*.
2. Preliminary data for 2006.
3. *Anuario Estadístico de Pesca 2005*.
4. Preliminary data for 2006.
5. Preliminary data of the "General Direction of Customs", through the SIAP.
6. Preliminary data of the "General Direction of Customs", through the SIAP.

PART III

Chapter 23

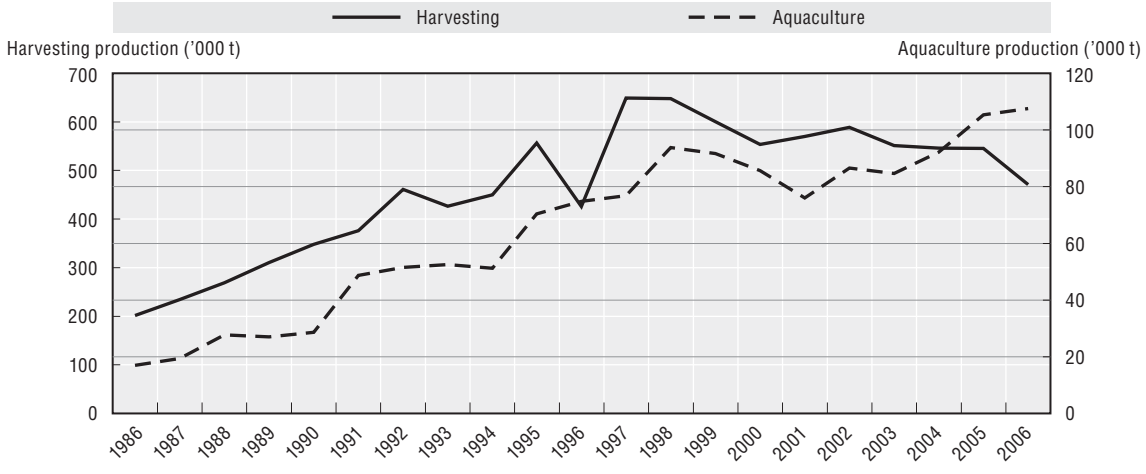
New Zealand

New Zealand

Summary of recent developments

- Fisheries policy activities in 2006 and 2007 included the development of an objectives-based approach to fisheries management through fisheries plans. These will state what is needed to be achieved for a fishery (objectives) and the implementation strategies to achieve those objectives-including research, regulations, and compliance.
- There is an ongoing effort to improve the engagement between the New Zealand government and commercial, recreational and customary interests through *i)* joint working groups with industry dealing with issues such as strategic compliance, deemed values, and the paua fishery, *ii)* regional recreational fisheries forums and the recently established recreational fishing ministerial advisory committee and *iii)* customary Maori regional forums.
- At the international level, New Zealand is negotiating an agreement to establish the South Pacific Regional Fisheries Management Organisations (SPRFMO) and signed the South Indian Ocean Fisheries Agreement. New Zealand participates in the FAO co-ordinated development of International Guidelines on the Management of Deep-Sea Fisheries in the High Seas, the negotiation of a binding port State measures agreement and the WTO negotiations to end fishing subsidies.
- To pursue the sustainability of the fishery, New Zealand is implementing a proposal by the fishing industry to close 30%, or 1.2 million square kilometres, of New Zealand's EEZ, and some areas beyond the EEZ, to bottom trawling and dredging. The government also released the Marine Protected Areas Policy and Implementation Plan (MPA Policy).

Harvesting and aquaculture production

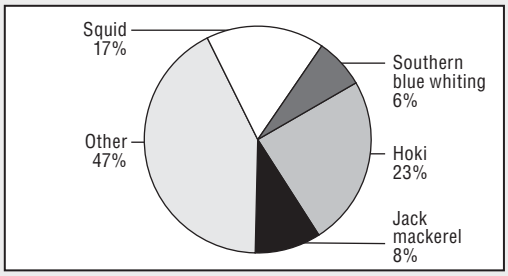


Source: FAO.

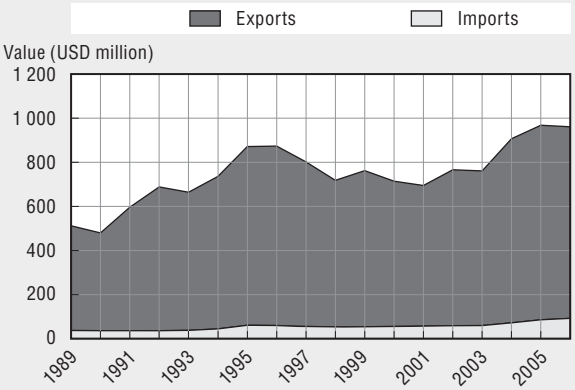
Key characteristics of the sector

- New Zealand's capture fisheries declined to 471 000 tonnes in 2006, mainly due to decreases in hoki and squid catches. This has been somewhat counterbalanced by increases in farmed greenshell mussel production which also became the key export species.
- A strengthening of the New Zealand dollar against the US dollar and a continued increase in the cost of fuel had put pressure on the capture industry. Despite this, fishery exports kept increasing, again mainly to increased greenshell mussel production. New Zealand exports 90% of its total production and a Free Trade Agreement signed with China in 2008 is expected to further spur exports in the future.
- The government Financial Transfers have been affected by a change in the administration in 2006/2007. Regulatory management and Fisheries Access services were combined into a new Fisheries operations service and the Enforcement of fisheries policies and Prosecutions services were combined into a single Fisheries Compliance service. New Zealand is continuing its cost recovery effort by applying levies to the users of the various fisheries. The total net government financial expenditures in support of the fishery sector were 4.9% of the total export value in 2006/2007.

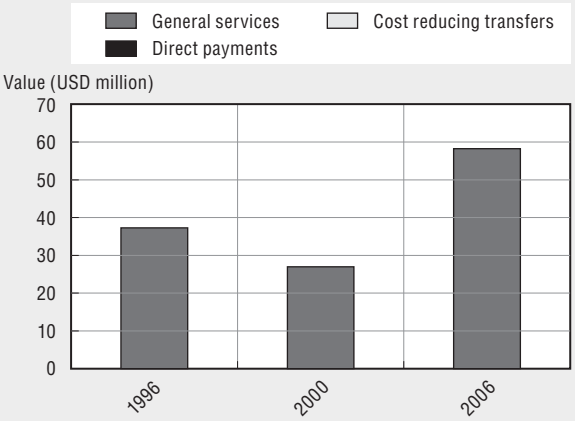
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	4 918	1 495
Number of fish farmers	n.a.	770
Total number of vessels	2 126[1]	1 582
Total tonnage of the fleet	n.a.	154 095

1. Vessels in 1998.
n.a.: Not available.

Legal and institutional framework

The Fisheries Act 1996 provides the framework for fisheries management in New Zealand. Its purpose is to provide for the utilisation of national fisheries resources while ensuring their sustainability and avoiding, remedying, or mitigating any adverse environmental effects. The Act and the subordinate fisheries regulations provide for the fishing interests of commercial, recreational, and customary Maori fishers. The Act is administered primarily by the Ministry of Fisheries. Key decisions are made by the Minister of Fisheries and the Chief Executive of the Ministry of Fisheries.

Commercial fisheries are managed through a Quota Management System (QMS) based on Individual Transferable Quotas (ITQs). The total quantity of fish that can be taken for each QMS fishery is the Total Allowable Catch (TAC). From the TAC an allowance is made to provide for recreational fishing, customary Maori uses and other sources of fishing-related mortality. The remainder is available to the commercial sector as the annual Total Allowable Commercial Catch (TACC).

Within the commercial catch limit, access is determined annually by ownership of Annual Catch Entitlement (ACE) and the possession of a fishing permit. ACE is generated in proportion to the amount of quota owned by a person at the start of each fishing year. ACE is the tonnage equivalent of the quota share. For example, if a quota owner owns 10% of the quota for a stock, and the TACC is set at 200 tonnes, that quota owner receives 20 tonnes of ACE. The quota owner may choose to fish the ACE or trade it. ACE provides the right to harvest a specific amount of a particular species in a defined area. As with quota, there is a register of ACE holdings and transactions.

Commercial fishers must ensure that all of their catch of QMS fish stocks is covered by their catching rights (or ACE). This system is known as the catch balancing regime which aims to ensure that the commercial catch limit is not overfished. This is achieved through the use of deemed values. If a fisher does not hold sufficient ACE, they incur a financial cost – the deemed value – for taking the fish. The deemed value is set at a rate that eliminates any financial benefit that the fisher may receive from landing the fish and acts as an incentive for fishers to cover all their catch with ACE.

Restrictions between 10% and 45% are placed on the amount of quota that can be held by any one person, including their associates. There are no aggregation limits on the ownership of ACE. Foreign ownership of quota or ACE is not allowed unless a specific exemption is granted by the Minister of Fisheries and the Overseas Investment Commission. To receive the exemption, a foreign company must demonstrate that New Zealand will benefit from the ownership. If New Zealand ceases to benefit, the ownership or interest in quota or ACE can be taken away from foreign companies without any compensation being offered.

Commercial fishing vessels must be registered under the Fisheries Act 1996. Vessel numbers are not restricted. New Zealand commercial fishers can charter foreign flagged fishing vessels to harvest fish. To do so, consent is required from the Ministry of Fisheries and the vessel must be registered. Other sustainability measures include controls to avoid or mitigate bycatch of protected species and technical measures, such as area closures and input controls like gear restriction.

The basic legal right underpinning recreational fishing is an access right to go fishing for personal use and is recognised in the Fisheries Act 1996. The public access right is subject to restrictions under the recreational fishing regulations such as daily bag limits,

method restrictions, size limits and seasonal closures. Recreational catch cannot be sold and there are no reporting requirements for recreational fishing.

In 1992 an Act of Parliament recognised that the Crown has an obligation to recognise Maori customary non-commercial fishing rights and management practices. The Crown is also obliged to consult with tangata whenua about policies to help recognise, use and management practices of Maori in the exercise of non-commercial fishing rights. The Fisheries Act provides all the customary (commercial and non-commercial) fisheries management tools and processes that are available to Maori in recognition of customary rights. Customary fishing regulations recognise and provide for customary food gathering by Maori. Customary fishing must be authorised and the catch cannot be sold.

Capture fisheries

New Zealand's seafood industry sustainably harvests approximately 625 000 tonnes annually from capture fisheries and aquaculture. The catch value ranges from NZD 1.2 to NZD 1.5 billion per year. The aquaculture industry contributes about NZD 226 million of this value. Seafood exports have consistently ranked as New Zealand's fourth or fifth largest export earner but dropped to eighth in 2007.

There are about 130 species fished commercially in the exclusive economic zone. 70% of capture fisheries takes place in deepwater (squid, hoki, ling, oreo dories, orange roughy, silver warehou). Important inshore and shellfish species include spiny rock lobster, paua, and snapper. New Zealand's most valuable capture fishery species on a weight and export value basis is hoki.

Table III.23.1. **Top capture species landed by weight in fishing year 2006-2007**

	2006/2007 total live weight kg
Hoki	103 054 613
Squid	69 864 958
Jack mackerel	37 685 082
Southern blue whiting	36 479 365
Barracouta	28 660 356
Ling	16 469 173
Orange roughy	15 186 257
Silver warehou	14 223 589
Skipjack tuna	13 093 429
Oreos	12 068 435

Exports provide approximately 90% of earnings. In 2006, 321 576 tonnes of fish were exported earning NZD 1.35 billion. In 2007, 315 365 tonnes of fish were exported earning NZD 1.25 billion.

Currently 629 individual stocks are managed through the QMS. With limited exceptions (*e.g.* highly migratory species), quota is allocated by a tender process; any previous catch history will not be taken into account. The legislation requires qualifying years for catch history to be designated prior to introduction of the species into the QMS.

The employment levels in the harvesting, processing and aquaculture sectors for 2006 and 2007 are provided in the table below.

Table III.23.2. **Top export species[1] 2006-2007**

	2006		2007	
	Tonnes	Export value in NZD million	Tonnes	Export value in NZD million
Squid	56 800	118	56 400	86
Hoki	41 600	156	40 100	141
Rock lobster	2 400	127	2 300	122
Orange roughy	7 300	84	6 900	57
Abalone/Paua	762	54	881	58

1. Excluding mussels which are included in the aquaculture export statistics.

Table III.23.3. **Employment[1] in fisheries 2006-2007**

	2006	2007
Marine fishing	1 516	1 476
Seafood processing	6 660	6 490
Marine aquaculture	790	750
Total	**8 966**	**8 716**

1. In 2004, Statistics New Zealand changed their employment measure from FTEs to Employee Count (EC). The nature of the EC measure means that it can result in an undercount of total employment because it excludes non-employee working proprietors.

As of 1 October 2007 there were 97 species and 629 fish stocks in the QMS. There are 67 stocks of known status comprising over 52% of the total landed catch. Over 82% of these stocks are at, or near, target level. It was estimated for the 2006–07 fishing year that *i)* 29 stocks were almost certainly near or above their target biomass, *ii)* 14 stocks were probably near or above their target biomass, *iii)* 12 stocks were possibly near or above their target biomass and *iv)* 12 stocks were almost certainly below their target biomass. In December 2005, the Ministry of Fisheries launched a website containing information on the status of New Zealand's fish stocks (*www.fish.govt.nz/en-nz/SOF/default.htm*).

Management

The most significant recent change in fisheries management is the development of an objectives-based approach to fisheries management using "fisheries plans". The Ministry is working with tangata whenua and stakeholders to develop 26 management plans covering all of New Zealand's 618 different fisheries management units or "fish stocks".

Fisheries plans will improve the prioritisation of the Ministry of Fisheries resources and provide a clear basis for monitoring performance of each fishery. Fisheries plans will describe how to get the best value from fisheries within environmental limits, or standards, set by the government. Fisheries plans will *i)* set objectives for a fishery to get best value; *ii)* identify the value obtained by different stakeholders from the fishery; *iii)* specify government-set standards within which fisheries should be managed; *iv)* design the management of the fishery to achieve the objectives; and *v)* make fisheries management more transparent.

The Ministry of Fisheries is developing a number of standards (mandatory minimum performance levels to meet outcomes) and organisational procedures to support fisheries plans and ongoing fisheries management. So far the Minister has approved the Deemed Value and QMS introduction standards. The Harvest Strategy, Seabird Standard and Benthic Impact Strategy are under development.

To secure long-term access and market position in key international markets, the Ministry of Fisheries support the seafood industry in achieving environmental certification of New Zealand seafood products. Budget 2007 allocated NZD 4.6 million over four years for this program.

While foreign licensed access is provided for in the Fisheries Act, continuing expansion of New Zealand's catch capacity in relation to the available stock size has minimised the opportunity for surplus allocations to other States. Permission must be granted by the Minster of Fisheries and the Overseas Investment Commission for an overseas person to own fishing quota in New Zealand. Foreign owned fishing vessels operate in New Zealand waters under a national permit holder as chartered fishing vessels.

Following the comprehensive settlement of Maori fisheries claims against the Crown in 1992, and the passing of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992, Maori have become the biggest player in the commercial fishing industry, controlling over 50% of all commercial fishing quota. The Maori commercial fishing asset management is changing with the introduction of a Maori Fisheries Bill as a culmination of a process to settle Maori claims to commercial fishing. At the time of the aquaculture reforms a settlement was negotiated with Maori for grievances regarding commercial aquaculture interests since 1992[1]. Under the Maori Commercial Aquaculture Settlement Act 2004, Maori have the rights to 20% of marine farming space that has been developed since September 1992.

In June 2003 the Treaty of Waitangi Fisheries Commission's proposal for allocating fisheries settlement assets to iwi for the benefit of all Maori was accepted. In September 2004 the Maori Fisheries Act was passed by the Parliament. It contains provisions relating to *i)* governance regimes for 58 iwi or iwi groups, *ii)* the allocation and distribution of quota, cash and company shares, *iii)* establishing Te Ohu Kai Moana (TOKM – a trust to ensure assets are distributed to iwi and benefits of the settlement can ultimately benefit all Maori), *iv)* two further trusts administered by TOKM (one to benefit Maori living away from traditional areas, one to develop freshwater fisheries) and *v)* establishing a commercial asset holding company, Aotearoa Fisheries Limited (AFL) to manage the commercial company assets.

A regulatory framework provides for Maori customary non-commercial fishing to be managed by Maori communities at a local level. The regulations set up a framework for Kaitiaki (guardians) to issue authorisations to gather seafood for customary purposes. The regulations also recognise the special relationship between Maori and their traditional fishing grounds by providing for the establishment of mataitai reserves managed by local Maori through the making of bylaws.

Maori may also seek the establishment of taiapure-local fisheries areas for areas of special significance to tangata whenua which are managed by a management committee appointed on the basis of nominations from the local Maori community. Taiapure management committees may recommend the making of general fisheries regulations to the Minister of Fisheries for the management of fish within the taiapure area, including regulations relating to commercial, recreational or customary fishing. Seven taiapure-local fisheries areas have been established to date.

In the past few years New Zealand has been undertaking projects to upgrade its ability to perform monitoring and surveillance of New Zealand fisheries waters and approaches to those waters and the Pacific region. New maritime patrol vessels and upgraded aircraft surveillance systems are being integrated into fisheries monitoring and enforcement activity as the assets become available. The necessary enhancements to Ministry

procedures and systems including patrol targeting, personnel training and information collection and management to maximise the benefits from these assets are being developed as experience with new capabilities grows.

The Ministry is working with a range of New Zealand civilian law enforcement agencies to co-ordinate the collection and sharing of law enforcement related information about vessels and their activity on approaches to, and in, New Zealand fisheries waters. A review of intelligence needs is currently being undertaken to maintain currency with changes to the structure of high seas fishing operations. The Ministry is continuing work on a project to develop a methodology to estimate the extent of illegal fishing.

"Coastwatch" programs in communities to monitor activity in recreational fisheries and the development of targeted programs in schools and immigrant communities provide information on fishing rules and why they are important.

Improved co-ordination between New Zealand maritime security agencies and outreach programs to Pacific Island countries is leading to improved targeting of patrolling of high seas areas in the Pacific and the EEZ's of Pacific Island countries. The Ministry of Fisheries is improving ability to assess the effectiveness of its monitoring and enforcement (compliance) approaches.

During 2006-2008, New Zealand has participated in two the FAO led initiatives, the Development of International Guidelines on the Management of Deep-Sea Fisheries in the High Seas and the Negotiation of a binding port State measures agreement, initiated in June 2008.

New Zealand is a member of the following RFMOs – the Western and Central Pacific Fisheries Commission, the Commission for the Conservation of Southern Bluefin Tuna, and the Commission for the Conservation of Antarctic Marine Living resources. New Zealand participated in negotiation of the South Indian Ocean Fisheries Agreement which was signed by New Zealand in July 2006.

Since February 2006, New Zealand has participated in five international meetings to negotiate a legally binding agreement to establish the South Pacific Regional Fisheries Management Organisation. It was agreed to a set of interim conservation and management measures for bottom fisheries and pelagic stocks. The interim secretariat is hosted by New Zealand. The SPRFMO aims to fill the fisheries governance gap that exists on the high seas of the South Pacific Ocean (*www.southpacificrfmo.org/*).

The Strategy for Managing Environmental Effects (SMEEF), released in 2005, provides for the co-ordination of the various environmental obligations under New Zealand legislation. The SMEEF should assist to meet international obligation to implement an ecosystem approach to fisheries (*www.fish.govt.nz/en-nz/Publications/State+of+our+fisheries/Fisheries+and+Their+Ecosystems*).

Limits around acceptable environmental effects of fishing will be the subject of lengthy consultation with stakeholders and final approval by the government. The standards will provide more transparency and certainty to fisheries managers and stakeholders about the minimum level of environmental performance required in fisheries by the government. Fisheries managers will need to meet all relevant standards. The Ministry of Fisheries will monitor standards and where a fishery fails to meet a standard, the fishery manager and the government will be responsible for ensuring appropriate measures are put in place to ensure the environmental performance of a fishery is improved.

In January 2006 the New Zealand government released the Marine Protected Areas Policy and Implementation Plan (MPA Policy). The objective of the MPA Policy is to "protect marine biodiversity by establishing a network of MPAs that is comprehensive and representative of New Zealand's marine habitats and ecosystems". The MPA policy outlines a range of management tools that may be used to protect marine habitats and ecosystems along with Network Design and Planning Principles to aid in the selection of potential MPA sites. The government is currently in the process of describing which habitats are protected in existing MPAs to deduce the priorities for future protection. Regional forums are also assisting the government to select appropriate candidate sites and management tools. The MPAs will then be finalised in legislation.

In 1975 New Zealand established its first marine reserve – one of the world's first "no take" marine reserves. There are currently 31 marine reserves ranging from 0.93 km^2 to 7 480 km^2 for a total of of 12 370 km^2. Four marine reserve (526 km^2) proposals are awaiting Ministerial consideration.

In November 2007 the New Zealand government implemented a proposal by the fishing industry to close 30% (1.2 million km^2) within and beyond New Zealand's EEZ to bottom trawling and dredging. The closed areas are based on the Ministry for the Environment's Marine Environment Classification (2005) and have had little or no bottom trawling or dredging in the past. The benthic protection areas are thought to be the largest single marine protection measure ever implemented within a nation state's EEZ.

With the benthic protection areas implemented, New Zealand now protects 32% of its EEZ. In total, this includes 28% of Underwater Topographic Features (including seamounts); 52% of seamounts (underwater mountains over 1 000 m); and 88% of active hydrothermal vents.

In 2004, the Ministers of Conservation and Fisheries released New Zealand's National Plan of Action to reduce the incidental catch of seabirds in New Zealand Fisheries (NPOA-seabirds[2]). It sets out a strategic framework to reduce seabird bycatch to sustainable levels. It establishes agreed codes of practice setting voluntary and regulatory limits on the number of seabird deaths permitted in any one year; placing controls on fishing methods harmful to seabirds; and providing for a future legal response if fishing vessels fail to fulfil their responsibilities.

The NPOA-seabirds addresses all commercial and non-commercial fisheries catching seabird species protected under the Wildlife Act 1953. It is consistent with all New Zealand's international obligations to reduce seabird bycatch, particularly the International Agreement on the Conservation of Albatross and Petrels. Voluntary measures have so far proved effective in some longline fisheries, but have been slow to take effect in some trawl fisheries, leading to the introduction of regulations to deploy seabird scaring devices on trawlers. Government has recently put in place regulations which require defined mitigation measures to be used for the majority of fisheries where seabird mortalities occur. The NPOA-seabirds is currently under review to ensure integration with the standards framework currently being developed by the Ministry of Fisheries.

Specific measures are in place to manage the effects of fishing on a number of marine mammal species. These include *i)* a bycatch limit for New Zealand sea lions in the southern squid fishery, *ii)* an industry code of practice designed to reduce bycatch of New Zealand fur seals in the hoki fishery and *iii)* method restrictions in some inshore areas to reduced bycatch of hectors dolphin and Maui dolphins.

The Ministry of Fisheries and the Department of Conservation are jointly developing a Threat Management Plan to manage human-induced threats to Hector's and Maui's dolphins. As part of the Threat Management Plan, the government has recently announced an additional suite of new fishing rules to better manage the impact of fishing on the dolphins. The new rules place restrictions on set net and trawl fishing in inshore waters around the South Island and the west coast of the North Island. The government also announced the creation of new Marine Mammal Sanctuaries in which rules to manage non-fishing threats *(e.g.,* mining and tourism impacts) will be implemented.

The New Zealand government does not subsidise the fishery sector, but in fact recovers costs from the commercial fishing industry under the principles defined in the Fisheries Act 1996. Since October 1994 the New Zealand government has recovered the costs associated with fisheries management services and conservation services carried out for the benefit of the commercial sector.

Table III.23.4. **Total net government financial expenditures in support of New Zealand's fishery sector (NZD million)**

Nature of transfer	2005/2006	2006/2007
Fisheries policy	6	7
Fisheries information	27	29
Regulatory management	14	0
Fisheries access and administration	6	0
Fisheries operations	–	24
Enforcement of fisheries policies	27	0
Prosecution of offences	4	0
Fisheries compliance	–	30
Aquaculture settlement	1	1
Sub-total	85	94
Cost recovery levels	–31	–30
Total	**53**	**64**
% of total export value	4.2	4.9

In 2006/07, the Regulatory management and Fisheries Access services were combined into a new Fisheries operations service and the Enforcement of fisheries policies and Prosecutions services were combined into a single Fisheries Compliance service. In 2004/05, a new service Aquaculture settlement was introduced to implement the Maori Commercial Aquaculture Settlement Act 2004.

An annual consultation process takes place between the Ministry of Fisheries and stakeholders on the nature and extent of fisheries service to be provided, the costs associated with those services, and their allocation between the commercial sector and the Crown. Levies charged to participants are monthly levies on quota holders, levies for non-ITQ species, levies on individual catch limits, aquaculture levies and conservation services levies.

Recreational fishing

Approximately 20% of New Zealand's population fish recreationally. Recreational fishers catch approximately 40 different types of fish species. The top species are snapper, kahawai, kingfish, blue cod, groper, butterfish, tarakihi, trevally, rock lobster, paua and scallops. The estimated annual catch is approximately 25 000 tonnes. There is no licence requirement but there are some allocation provisions for species in some areas (size limits, daily limits, area closures).

Given the importance of the recreational fishery and its growth, the following initiatives of the Ministry of Fisheries have focused on improving consultations, improving the collection of information and exploring opportunities to share the fisheries resources amongst all harvesters. Seven regional recreational fisheries forum have been established to give local recreational fishers better input to fisheries decision making. An annual National Meeting of Recreational Fishing Forums provides for inter-forum interactions and opportunities to discuss strategic policy issues at the national level. The Recreational Fishing Ministerial Committee Panel was established to provide advice directly to the Minister of Fisheries on strategic matters facing the recreational fishing sector. A charter boat operations registry is developed in close collaboration with charter vessel operators to register catch and effort.

The Minister of Fisheries established a joint stakeholder working group (Te Ohu Kaimoana, the Seafood Industry Council and the New Zealand Recreational Fishing Council) in November 2007. The group develops joint policy proposals on shared fisheries reform.

Aquaculture

Aquaculture is an important contributor to New Zealand's economy making up around 20% of total fisheries value. Aquaculture is based primarily on the farming of greenshell mussels. The mussel farming industry employs an estimated 2 500 people. In 2007, exports of greenshell mussels were valued at NZD 175 million, making them the largest seafood export. The government has developed a work program to support sustainable aquaculture development and the industry's goal of reaching NZD 1 billion in revenue by 2025.

Other important farmed species include salmon, pacific oyster, and abalone. Techniques are being trialed to enable a variety of new species to be farmed (snapper, scallops, kingfish, mullet, seaweed, rock lobster, fresh water crayfish, sponges, seahorses, sea urchin).

In January 2005, aquaculture reforms integrating coastal planning, aquaculture and fisheries management came into effect. These reforms were driven by an overwhelming demand for marine farming space in the 1990s spurred by a growing aquaculture sector-particularly mussel farming. The reforms provide regional councils with greater powers to manage and control the staged development of aquaculture, by requiring new marine farm developments to take place within clearly defined areas called Aquaculture Management Areas.

The new legislation has also streamlined the application and environmental assessment process for new marine farms. Regional councils have to consider the impact of marine farms on the aquatic environment, including the sustainability of fisheries resources, when providing for aquaculture under regional coastal plans. The Ministry of Fisheries assesses the potential effects on existing fishing activities.

Table III.23.5. **Main aquaculture production in 2006-2007**

	2006		2007	
	Tonnes	Value (NZD million)	Tonnes	Value (NZD million)
Greenshell™ mussels	97 000	224	99 500	213
Oysters	2 800	28	3 000	20
Pacific salmon	7 721	95	9 400	92

Markets and trade

Seafood is New Zealand's eighth largest export good. Approximately 90% by value is exported, with an estimated 70% of export returns from value added to seafood post harvest. Export sales were NZD 1.35 billion in 2006 and NZD 1.25 billion in 2007. In 2006 mussels overtook squid and hoki as key species. This is due to increased aquaculture production of mussels and declining wild catches of hoki and squid.

The New Zealand fisheries sector remains under economic pressure due to a strengthening New Zealand dollar against the US dollar and a continued increase in the cost of fuel. This economic pressure has led the industry to further adapt and evolve its operations to maximise economic return. Industry developments in support of maximising economic return have included strengthening relationships with overseas markets, globalising New Zealand's fishing and processing investments, developing co-operative relationships with fishing industries in other countries and using foreign charter vessels to harvest fisheries resources domestically. Furthermore, the industry is increasing fishing on the high seas and researching and developing means of adding further value to processed products.

The domestic market, which is 30% import dependent, consumes less than 10% by value of fish landed or produced domestically. Access to the market is unrestricted, with imports of species unavailable in the domestic fishery, such as shrimps and prawns, or packaged products, such as canned fish. Per capita consumption is relatively stable and growth is largely a function of general population trends.

The New Zealand Seafood Industry Council (SeaFIC) provides overarching representation of the New Zealand fishing industry. It promotes the interests of all sectors of the fishing industry by providing economic information and advice, co-ordination of industry resources, and enhancement of the industry's profile in the community. Promotion of seafood products in domestic and export markets is largely the responsibility of seafood producers.

A characteristic of industry change over the past few years has been the continued emergence of Commercial Stakeholder Organisations (CSOs) which are companies set up to manage matters of relevance to rights owners in particular fisheries. Currently, most commercial fisheries in New Zealand are represented by a CSO. Improved engagement of CSOs has allowed for greater integration of stakeholder views in the management of New Zealand's fisheries resource.

Approximately 90% of New Zealand's seafood production is exported, meaning economic return to New Zealand is heavily dependent on world markets. Key export markets are Australia (18.6%), the European Union (17.4%), Hong Kong (13.8%), and the United States (12.7%) followed by Japan and China. There has been significant growth in the Australian and Hong Kong exports markets since 2005.

In the short term, export earnings are expected to remain relatively stable. The New Zealand dollar is relatively high against the US dollar. The strength of the New Zealand dollar is driven by domestic interest rates which are high compared to other developed countries. This means that it is unlikely there will be large fluctuations in the exchange rate and the return to fishers should be stable.

Food safety of fish and fish products is predominantly regulated under the Animal Products Act 1999, administered by the New Zealand Food Safety Authority (NZFSA). All

fish exports are regulated by the Animal Products Act. As fish sold in the New Zealand market is generally processed through exporting premises, most fish for domestic consumption is also covered by the Animal Products Act.

In general, fish primary processors are required to operate under registered Risk Management Programs approved by NZFSA and are subject to regular performance based audit by NZFSA Verification Authority. However, exemptions allow some primary processors for the domestic market to operate under the Food Act 1981, by either complying with the Food Hygiene Regulations 1974 or implementing a registered Food Safety Program (FSP). Secondary fish processors are not required to operate under a Risk Management Program. Other secondary processors are covered by the Food Act provisions. NZFSA is responsible for administering both the Animal Products Act and the Food Act.

New Zealand regulates food safety and truth in labelling through the Joint Australia–New Zealand Food Standards Code and the Fair Trading Act 1986. The safe disposal of waste from processing is governed at the local level by territorial local authorities under the Resource Management Act. The requirement for fish processors to produce safe food under approved and audited Risk Management or Food Safety Programs have the spinoff of reducing post harvest losses and wastage.

Pre-packaged fish products, in common with all other pre-packaged food products for retail sale or catering purposes, are required to display certain prescribed information (*e.g.* prescribed name/name or a description of the food sufficient to indicate the true nature of the food, lot identification, name/business address in New Zealand or Australia of the supplier, mandatory warnings/advisory statements and declarations, ingredient listing, date marking, directions for use and storage, nutrition information panel, percentage labelling, characterising ingredients and component).

The labelling requirements are common to New Zealand and Australia and are set by the Food Standards Australia and New Zealand (FSANZ). NZFSA is responsible for enforcing these standards in New Zealand. The requirements came fully into force from December 2002.

New Zealand remains committed to the WTO negotiations under the Doha Development Agenda to strengthen disciplines on subsidies in the fisheries sector. Such improvements to the seafood trading environment are likely to reduce pressures on global fisheries and improve the return New Zealand obtains from its seafood exports.

The FTA between New Zealand and China (NZ-China FTA) was signed on the 7th of April 2008. Seafood exports to China have attracted tariffs of over 10%. The FTA will lead to reduction and eventual removal of those tariffs, expanding high value live and chilled seafood product exports to China. New Zealand is currently involved in negotiating FTAs with ASEAN and Australia (AANZFTA), the Gulf co-operation Council (GCC), and Malaysia. Negotiations are expected to be launched with the Republic of Korea early in 2009.

Outlook

Domestically, New Zealand is at a turning point in the management of its fisheries resources. The development and implementation of Fisheries plans is directed at improving the opportunities for those who utilize fisheries resources to contribute to, and participate in the management of the resource. Improvements have been made to the QMS and the majority of stocks with sustainability and management concerns will be introduced into the QMS over time.

An increased environmental focus in the management of fisheries has developed in recent years and is expected to continue developing. This parallels with increasing global focus on environmental issues and an environmentally aware New Zealand public with strong interests in the marine environment.

The addition of seven new patrol vessels and improved use of information and intelligence will help New Zealand develop a clearer picture of how well fishers comply with fisheries legislation and enable better targeting of resources to any problem areas. Allocation rights in shared fisheries remain the most contentious issue domestically and developing a framework to address this issue will be important for New Zealand in the future.

Internationally, New Zealand will continue focussing on the development of new, and strengthening existing, Regional Fisheries Management Organisations and other international fisheries bodies. New Zealand will continue to promote the liberalisation of trade in fish products within the framework of international and regional bodies such as the WTO.

The New Zealand fisheries sector remains under economic pressure due to a strengthening New Zealand dollar against the US dollar and a continued increase in the cost of fuel. This economic pressure will lead the industry to further adapt and evolve its operations to maximise economic return. In the short term, export earnings are expected to remain relatively stable.

Selected priorities for 2008/09 are the progress collaborative development of deepwater, middle depths and inshore Fisheries plans, working with Department of Conservation and communities to implement the Marine Protected Areas Policy and to contribute to economic transformation by facilitating and supporting the development of aquaculture and certification of New Zealand seafood.

Notes

1. Those claims relating to interests prior to 1992 continue to be addressed on an iwi by iwi basis through the historical claims process run by the Office of Treaty Settlements.
2. *www.doc.govt.nz/Conservation/001~Plants-and-Animals/004~Seabirds/002~National-Plan-of-Action-to-Reduce-Catch-of-Seabirds-in-NZ-Fisheries/index.asp*.

PART III

Chapter 24

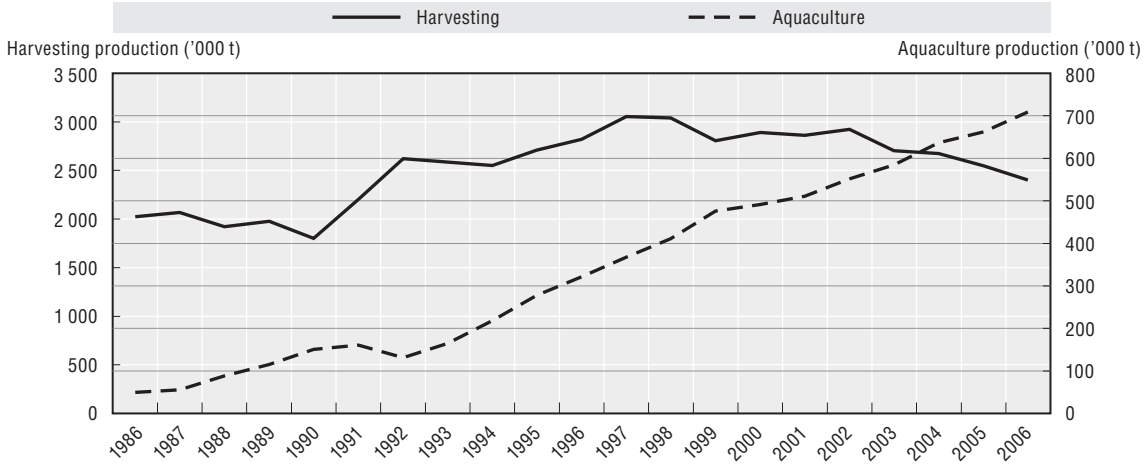
Norway

Norway

Summary of recent developments

- In March 2007 the White Paper titled, "Structural policy for the Norwegian fishing fleet" was presented to the Norwegian Parliament. The paper proposed management instruments to promote efficiency and profitability in the fishing fleet. The proposals in the White Paper were also a continuation of the Structural Quota (SQS) System implemented in the coastal fleet in 2004 and the SQS in the ocean going fleet implemented from 2005, but with some modifications. A time limit of 20 years on the structural quotas was re-introduced (25 years for previously-allocated quotas), and the SQS in the coastal fleet was introduced for vessels between 11 and 15 metres from 2008.
- As part of Norway's efforts to implement the ecosystem approach to the management of its marine resources, a White Paper on Norway's policy on marine mammals was presented to the Parliament in 2004. A further White Paper will be presented to the Parliament by the end of 2008 to report on actions implemented.
- Apart from the cod stock in the North Sea and capelin in the Barents Sea, the state of the most important commercial fish stocks in Norway's exclusive economic zone are considered good. The North arctic cod has been under particular pressure due to illegal, unregulated and unreported fishing (IUU-fishing) in the Barents Sea, but there has been a significant reduction in IUU-fishing of cod and haddock in the Barents Sea since 2005. The reduction is to a large extent due to implementation of measures to combat IUU-fishing, including an entirely new scheme for Port State Control (PSC) within the North East Atlantic Fisheries Commission (NEAFC) area.

Figure 24.A1. **Harvesting and aquaculture production**



Source: FAO.

Key characteristics of the sector

- In 2007, landings of fish by Norwegian registered vessels totalled 2.5 million tonnes, with a total first-hand value of NOK 12 billion. Catches of pelagic species increased from 2006 to 2007, while the prices for important species like mackerel and herring continued to decline. For groundfish, the situation was the opposite: catches have been reduced while prices for important species like cod, haddock and saithe continued to increase.
- The overall value of Norwegian seafood exports in 2007 was NOK 37 billion, an increase of nearly 14% compared to 2006. Seafood products represented approximately 5% of total Norwegian export of goods in 2007. Farmed Atlantic salmon represents the most significant product.
- Aquaculture production of Atlantic salmon and rainbow trout increased from approximately 693 000 tonnes in 2006 to 814 000 tonnes in 2007. The total value of the production of these species was NOK 17.2 billion in 2006 and NOK 17 billion in 2007.
- The General Agreement between the Norwegian government and the Norwegian Fishermen's Association on financial transfers to the capture industry has been reduced significantly, from NOK 1.4 billion (nominal value) in 1990 to NOK 90 million in 2002 and NOK 70 million in 2003. For 2004, the parties did not reach an agreement. However, the Norwegian Parliament decided that NOK 50 million should be allocated to some remaining schemes. The Norwegian government terminated the General Agreement from 2005, but some of the social elements have been prolonged and funding is allocated annually above the national budget. In 2007, NOK 52.5 million was granted over and above the budget.

Figure 24.A1. **Key species landed by value in 2006**

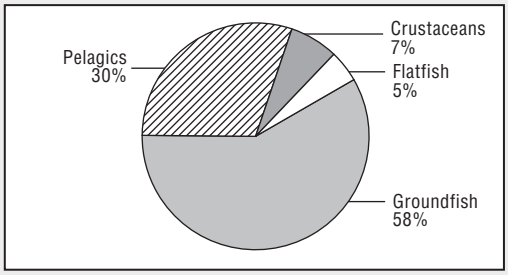


Figure 24.A1. **Trade evolution**

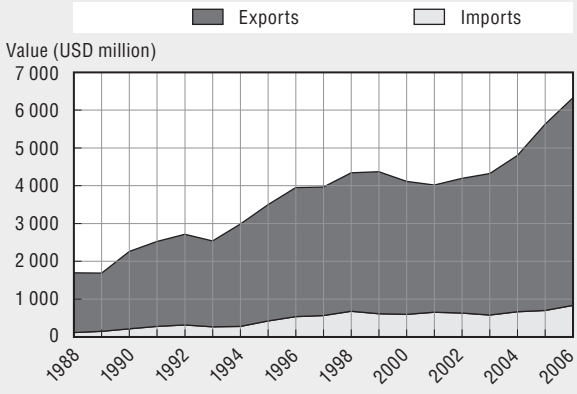


Figure 24.A1. **Evolution of government financial transfers**

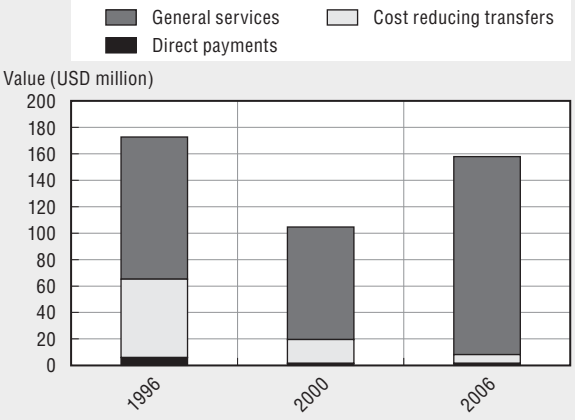


Table 24.A1. **Production profile**

	1996	2006
Number of fishers	23 395	13 753
Number of fish farmers	4 650	4 459
Total number of vessels	13 932	7 301

Legal and institutional framework

The Ministry of Fisheries and Coastal Affairs is responsible for the fisheries and aquaculture industry, ports and sea transport infrastructure. Important areas of activity for the Ministry of Fisheries and Coastal Affairs are:

- Conservation and long-term optimum sustainable utilisation of living marine resources.
- Responsible management of the marine environment.
- Contributing towards a profitable, self-sustained fisheries industry.
- Regulation of the aquaculture industry.
- Food safety and animal welfare.
- Market access for Norwegian fish.
- Contributing to jobs and income opportunities in coastal areas.
- Ensuring the safety and navigability of marine traffic.
- Promoting competitive sea transport.

The administrative measures applied to limit fishing effort in the Norwegian fisheries are licences and annual permits combined with Individual Vessel Quotas (IVQ). Today, all commercial fishing by trawlers and purse seiners requires a license. Long-liners and coastal vessels are regulated through annual permits. Aggregated catch levels are controlled mainly through the Total Annual Catch (TAC), which is set annually and covers approximately 95% of the landed value of fish. Vessels from third countries are subjected to the same rules as Norwegian vessels. All foreign vessels longer than 24 metres are obliged to carry satellite tracking devices on board.

Only fishers are permitted to own fishing vessels in Norway, but dispensations have been granted to allow some industrial corporations to vertically integrate into the catch sector. The right to buy a fishing vessel can only be given to a Norwegian citizen or a body that can be defined as a Norwegian citizen. A company is regarded as having equal rights with a Norwegian citizen when its main office is situated in Norway and the majority of the Board, including the Chair of the Board, are Norwegian citizens and have stayed in the country for the previous two years. Norwegian citizens also have to own a minimum of 60% of the shares and have to be authorised to vote for at least 60% of the votes.

There are no special regulations on foreign investment in the processing industry.

Capture fisheries

Preliminary figures indicate that total Norwegian landings (including seaweed) increased from about 2.4 million tonnes in 2006 to 2.5 million tonnes in 2007. Their total first-hand value increased from NOK 11.8 billion in 2006 to NOK 12 billion in 2007. The composition of the landings is shown in Table 24.A2.

Table 24.A2. **The percentage share of landed value by the Norwegian fishing fleet 2004-2007**

	2004	2005	2006	2007
Groundfish species	49.3	48.6	57.5	56.9
Pelagic fish	40.9	43.9	35.8	35.9
Shellfish	9.6	7.2	6.5	6.9
Seaweed	0.3	0.3	0.2	0.2
Total	**100.0**	**100.0**	**100.0**	**100.0**

The total number of commercial fishermen in Norway was reduced from 13 753 in 2006 to 13 336 in 2007, while the number of fishing vessels registered in the Register of Norwegian Fishing Vessels was reduced from 7 301 vessels in 2006 to 7 041 vessels in 2007. Revision of the register and the introduction of an annual fee for registered vessels resulted in a noticeable numerical reduction of vessels in the register. In particular, this seems to be the case for smaller coastal vessels. As far as the larger vessels are concerned, decommissioning (scrapping) and structural arrangements (Unit quota or Structural quota system) are the most important factors explaining the reduction in the number of vessels.

The average age of the fishing fleet is high and increasing; it was estimated to be 25.4 years in 2006 and 25.8 years in 2007. 83 new fishing vessels were built in 2006 and 61 new vessels in 2007. Most of these vessels were less than 15 metres long.

The annual profitability study of Norwegian fishing vessels (see Table 24.A3) indicated that the profitability in the fishing fleet as a whole was good in 2006. Of a total of 18 vessel groups, 17 vessel groups showed a positive operating profit. The total operating revenues for the fishing fleet longer than 8 metres operating on a whole year basis were estimated to be NOK 10.8 billion, while total operating expenses were estimated at NOK 9.1 billion. Compared to the total catch value of 12 billion, this indicates that the fishing fleet operating on a whole year basis catches some 90% of the total catch value. This resulted in a total operating profit of NOK 1.7 billion in 2006. The total first-hand value was slightly higher in 2007 compared to 2006. At the same time, fuel and lubrication oil costs increased. At this point of time it is, therefore, difficult to estimate the results for 2007. More details are available on the Norwegian Directorate of Fisheries website (*www.fiskeridir.no*).

Table 24.A3. **Performance of the Norwegian fishing fleet 2004, 2005 and 2006**

	2004	2005	2006
Registered vessels	8 188	7 722	7 301
Whole year operating vessels[1]	1 913	1 678	1 652
Total operating revenues (million NOK)	9 405	10 605	10 823
Total operating expenses (million NOK)	8 445	9 024	9 149
Total operating profit (million NOK)[2]	960	1 580	1 674
Operating margin[3]	10.2%	14.9%	15.5%

1. Whole year vessels are defined as vessels which have landed fish at least 7 months in a year, and which have an income from fishing above a specific minimum level (relative to length categories). This covers only vessels more than 8 metres.
2. Total operating profit is the economic result of the activities of the firm; defined as total operating revenues over total operating expenses.
3. Operating margin expresses how much is earned on every NOK 100 in sale. Operating margin is given as (Operating profit/Operating revenues) * 100.

Table 24.A3 (see Annex) gives the latest assessments (Spring 2008) prepared by the ICES Advisory Committee (ACFM) regarding the most important commercial fish stocks in waters under Norwegian fisheries jurisdiction. Precautionary reference points from ICES in 1998 have been implemented into Norwegian fisheries management.

Consultations on bilateral fishing arrangements for 2006 and 2007 were held with Russia, the EU, Iceland, the Faroe Islands, and Greenland. These included exchanges of quotas. The objective of such agreements is to agree a total allowable catch (TAC) and a fair distribution of quotas to develop a reasonable balance in reciprocal fishing possibilities.

Norway is also party to a trilateral agreement with Greenland and Iceland regarding capelin as well as a coastal state agreement on blue whiting with Iceland, Faroe Islands, and the EU. Norway also participates in regional management commission in the Northwest Atlantic (NAFO) and Northeast Atlantic (NEAFC). See Annex for further details on quota allocations.

Management

Most of the key fish stocks in Norwegian waters are shared with other countries. TACs and national quotas for such joint stocks are determined after negotiations between the countries involved. The Norwegian part of the TAC is divided into quotas for each vessel group. Each group quota is shared between vessels within the group. Each vessel is regulated with Individual Vessel Quotas (IVQs) set at a level where the vessel is guaranteed its quota, or at a level which implies moderate competition between vessels. Guaranteed IVQs mainly regulate vessels holding a licence or an annual permit while quotas that involve competition mainly regulate smaller coastal vessels. Tables in the Annex provide additional details.

The Norwegian input control system relates to vessels permitted to join the various fisheries and to persons who are allowed to own fishing vessels. A person must fulfill a number of criteria to be registered as a fisher. These criteria have been established to achieve the political objective that the ownership of fishing vessels and thus the right to exploit Norwegian fisheries resources shall be exclusively given to active fishermen. The law states that only active fishers can own the majority of the assets of a vessel. An example of a criterion is that fishers must have been participating in active fishing for more than three of the last five years in Norwegian fisheries in order to be entitled vessel ownership. When this legislation is being applied to companies, it means that at least 50% of a boat owning company has to be owned by persons who qualify for owning a fishing vessel.

Two basic models (licences and annual permits) are implemented for regulating the number of vessels that can join the various fisheries. While licences are granted for an unlimited time-span, fishing permits are limited to one year at a time. Both by law and in theoretical terms, these are two different conditions. In reality however, annual permits are renewed indefinitely, if the objective criterion are fulfilled each year. Annex Table 24.A5 lists the number of vessels with licenses and the type of license for these vessels. Annex Table 24.A6 lists number of vessels with annual permits and the type of permits they hold.

Starting in 2004, a Structural Quota System (SQS) and a new decommission scheme partly funded by the industry were implemented in the coastal fleet to reduce capacity. Unlike the SQS, there is no time limit for transferred quotas. In 2005, an SQS, based on the principles for the coastal fleet, was implemented in the ocean-going fleet. To avoid concentration of quotas, SQS schemes have been subject to certain limitations. A Quota Exchange System (QES) was also introduced to increase the flexibility in the exchange of quotas between vessels.

A fund for the decommissioning of fishing vessels up to 15 metres in length and holding annual permit(s) was established on 1 July 2003. The scheme was partly funded through a fee on the landed value of every Norwegian fishing vessel. The government has so far transferred NOK 108.25 million to the fund, estimated to about 50% of the contribution from the industry. The fee on the landed value was 0.35% for 2003, 2004 and 2005. In 2006 and 2007, the fee was reduced to 0.05% and the government reduced its contribution. The fee for the first six months of 2008 was 0.18% and the program was

terminated on 1 July 2008. The aim of the fund was to improve the profitability of remaining vessels and so licenses from scrapped vessels were withdrawn and redistributed to the remaining home-based vessels.

Regulation of minimum fish size, minimum mesh size, gear restrictions in certain fisheries, by-catch rules, discard bans, and real time closures and opening of fishing grounds are the most important instruments in use in the Norwegian fisheries to secure a sound management of marine resources. Since 1980, the Directorate of Fisheries has conducted a program of removing nets and other gears on an annual basis. In the period 1983 to 2007, 11 933 nets were retrieved. In addition a substantial amount of anchors, grapnels, trawl wires and line were collected. Most nets were lost in deeper fishing areas between 200 to 800 metres, but also in cod fisheries in relatively shallow waters. In May 2004 new technical regulations were introduced to protect the coastal cod stock. Amongst these are regulations aiming at reducing the loss of nets and a duty on the fishers to report loss of nets and to try to retrieve lost nets.

The control and enforcement system in Norway has three cornerstones: the Coast Guard, the Directorate of Fisheries and Sales Organisations. The most important sources of information, in order to control fishing activity, are logbooks and sales notes. All vessels longer than 13 metres are subject to the logbook provisions while smaller vessels (13 metres to 20.99 metres) are obliged to fill in a simplified version of the logbook. The logbooks are a primary source for the monitoring of a vessel's fishing activity, checking facts such as live weight of catches by species and the exact position and fishing time of each fishing operation. The sales note is a sales contract between the fishermen and buyers. For the authorities, this document is the basis for keeping accounts of catches in relation to quotas. On the basis of the information from sales notes, authorities are able to estimate when a quota is exhausted and stop fishing activity accordingly.

Vessels from third countries are subjected to the same rules as Norwegian vessels when fishing in Norwegian waters *i.e.* with regard to rules for by-catch, discard, logbooks and use of technical devices such as sorting grids. From 2009, Norway plans to introduce a further tightening of the discard regulation. As a condition for obtaining licenses to fish in Norwegian waters, all foreign vessels will need to land all fish caught in Norwegian waters, regardless of which port the boat finally docks in.

Foreign vessels fishing in the Norwegian EEZ and onboard-producing Norwegian vessels are obliged to send regular catch reports to the Directorate of Fisheries. Vessels must include information on the catch onboard, specified by species and what time the vessel entered into the Norwegian EEZ (active code) and when they have completed their fishing activity and are about to leave the Norwegian EEZ (passive code). In addition, the vessels must send catch reports to the Directorate of Fisheries on a weekly basis. The Norwegian fisheries authorities have established 7 checkpoints north of 62 °N and 3 flexible checkpoint areas in the North Sea for the purpose of controlling foreign vessels in the Norwegian EEZ.

Norway requires satellite tracking of all fishing vessels (including foreign) over 24 metres. Currently, a total of 400 Norwegian fishing vessels must have tracking equipment installed on board. However, due to the bilateral agreement between Norway and EU, mutual tracking of vessels above 18 metres has been required from 1 July 2004 and above 15 metres from 1 January 2005. This equipment automatically transmits the vessel's position, course and speed each hour, 24 hours a day, regardless of where in the world the vessel is located.

An increasing number of Norwegian fishing vessels utilise an electronic reporting system called SatRap to transmit reports on activity and catch via the Directorate of Fisheries to the authorities of the coastal state in which the vessel conduct its fisheries. Use of SatRap is now regulated in agreements with the regional fishery organisations NAFO, NEAFC and CCAMLR as well as for specific fisheries in the EU.

Norway actively promotes the work of developing a global binding agreement for port state control in the Fisheries and Agriculture Organisation of the United Nations (FAO). In addition, Norway has endorsed and fully implemented the regional scheme for port state control adopted by NEAFC, and has entered new bilateral arrangements with other countries in the field of resource control in fisheries. In addition to signing new agreements, Norway currently has such arrangements with most European fisheries countries as well as the European Commission; and existing agreements have been revised and expanded. In 2006 and 2007, the ground was laid for an increasing effort on measures against IUU fishing in 2008 and 2009.

Recreational fisheries

Marine recreational fisheries are regulated by the Act of July 3rd 1983 relating to Salt-Water Fisheries. The Act gives the authorities the ability to regulate both sports fishing by foreign tourists as well as recreational fishing by Norwegian citizens. The Act gives fisheries authorities the possibility to introduce other limitations such as quotas for recreational fishers. From 2005, a recreational fisher may realize sales up to a maximum of 2 000 kg of cod. Foreign tourists may only use handlines or rods when fishing. Tourists are not allowed to sell their catch. In June 2006, an export quota on fish and fish products for personal travellers was introduced: the quota limits the amount of fish a person can take out of Norway to 15 kg plus one trophy fish.

As regards recreational fisheries in rivers and lakes, salmon and trout fisheries are regulated by the Act of 15 May 1992 relating to Salmonids and Freshwater Fisheries. Regulations permit fishing for anadromous salmonids in rivers and lakes with rods and handlines during fishing seasons decided by the country governor. There are different fishing seasons for different areas and rivers. In 2003, a 5-year regulatory regime was introduced as a measure to rationalize regulatory procedures and to implement revised guidelines for the management of the salmon fisheries. The regulations of salmon fisheries will be reviewed every year during the 5-year period and adjustments made only for river stocks that have changed category.

Norwegian fisheries authorities acknowledge an obligation to maintain a traditional Sami fishery, which is mainly carried out in coastal areas in the northern parts of Norway. The policy is to fulfil this obligation within the existing fisheries management system. When special measures are taken, the criteria for qualification are therefore geographical or connected to a common boat size among Sami fishermen, rather than an ethnic criterion.

Aquaculture

Farmed fish represents more than 50% of the total export value of fish and fish products in Norway, even though it represents only 21% of total production volume. Atlantic salmon is by far the most important with rainbow trout second, while species like cod, halibut, arctic char and shellfish are beginning to make their way into the industry.

The Aquaculture Act entered into force on 1 January 2006. The main purpose of the Act is to promote and enhance the profitability and competitiveness of the aquaculture industry within the framework of sustainability and to contribute to value creation on the Norwegian coast. In the Aquaculture Act, focus has shifted from regulating ownership of licences to regulating management of the installations. Licences are transferrable and can be mortgaged. This development is a reflection of the evolving aquaculture industry. All farming of fish and shellfish and sea ranching requires a license from the Norwegian authorities. For Atlantic salmon and rainbow trout there is also a system of limited entry. These licences are allocated through special allocation rounds.

The emphasis on environmental and disease-controlling measures has resulted in regulation of the operation and installation of aquaculture facilities. This regulation also restricts the use of antibiotics in fish farming and addresses the handling and disposal of dead fish. The license holders are required to keep logbooks on various elements. In case of disease, the license holder is obliged to keep records on the type of disease, the number of fish infected and the location of the fish.

Veterinary services inspect the existence of fish diseases, and any fish farmer using antibiotics is prohibited from selling fish until approval from the fisheries authorities has been given. The Norwegian Food Safety Authority operates laboratories along the coast to test fish quality and to measure the residues of antibiotics in fish. Introduction of effective vaccines in addition to improving operating routines has nearly eliminated the use of antibiotics in salmon farming, which was reduced from approx 40 tonnes in 1990 to approx 0.6 tonnes in 2007. Within the same time span the salmon and trout production increased from less than 150 000 tonnes to approx 814 000 tonnes.

There are also several measures to prevent escape of farmed fish, one of which is a technical standard for aquaculture installations. The government has also established protected areas where aquaculture activity is limited in the most vulnerable fjords (National Salmon Fjords).

Most Norwegian sea-farms are open cage systems located along the coast. This kind of system has proven to be the most cost-effective. Each salmon and trout licence normally covers two or three locations. The purpose of giving the licence holder more than one location is to reduce the risks of disease and local environmental pollution. There is still room for expansion of the aquaculture industry along the Norwegian coast line. Annex Table 24.A8 and III.24.A9 provide a summary overview of the Norwegian aquaculture industry in 2006 and 2007.

Development in the profitability of the farming of Atlantic salmon and rainbow trout (Table 24.A10) depends on trends in output prices. The profitability of the Norwegian fish farming industry improved greatly in 2006 compared to 2005 and 2004. From 2006 to 2007 there was a significant reduction in profitability compared to the exceptionally high level of 2006. Historically, the Norwegian fish farming industry has displayed considerable increases in its productivity. In 1995, production per man/year was only 152 418 kg while production per man/year in 2007 was estimated to be 445 859 kg. Further details are available on the Norwegian Directorate of Fisheries website (www.fiskeridir.no).

Fisheries and the environment

The socioeconomic importance of fisheries and aquaculture in Norway is reflected in the authorities' efforts to establish policies for securing well functioning marine

ecosystems, both along the coast and within Norway's EEZ. The introduction of ecosystem based management plans is an important part of this. In spring 2006, the government submitted a White Paper to the Norwegian parliament about a new, integrated management plan for the Barents Sea and the areas off the archipelago *Lofoten*. This management plan balances the various interests for use of the area with an aim to secure among others: a sustainable harvest of the marine living resources; biodiversity; safe shipping activities and allow for the exploitation of the oil and gas resources of the area.

Coastal zone management is a high priority for Norway in general. Challenges in the coastal zone are to ensure harvesting of resources and use of the coastal area for a multitude of activities as well as ensuring a healthy environment and resource base for future generations. Each county and local municipality is urged to work out a coastal zone management plan if they regard it as necessary. Fisheries authorities participate in the planning process on the local level.

In 1999, Norwegian fisheries authorities established a regulation for the protection of cold-water coral reefs against damages due to fisheries pursuant to the Salt-water Fisheries Act and the Act related to the EEZ of Norway. So far, five reefs have been given this kind of special protection; the Sula Reef (1999), Iverryggen Reef (2000), the Røst Reef (2003), Tisler and Fjellknausene Reefs (2003). In addition, the world's shallowest known Lophelia-reef, Selligrunnen, rising up to 39 m depth below the surface, has been temporarily conserved pursuant to the Norwegian Nature Conservation Act by the environmental authorities (2000).

An important feature of ecosystem based management is the interaction between fish and marine mammals. Marine mammals are a renewable resource and also an important component of biological diversity in marine ecosystems. They must therefore be included in a coherent ecosystem-based management regime for Norwegian waters.

Government financial transfers

The General Agreement (The Agreement) between the Norwegian government and The Norwegian Fishermen's Association was signed in 1964. The purpose of The Agreement was to ensure that through government financial support, fishermen would reach similar income levels as the average industrial worker. Since 1990, support through this scheme has been reduced significantly, from NOK 1.4 billion (nominal value) in 1990 to NOK 90 million in 2002 and NOK 70 million in 2003. The Norwegian government terminated The General Agreement from 1 January 2005. Some of the elements of the Agreement have, however, been prolonged, including an income support scheme, transportation support and support to the sealing industry. The most important schemes are:

Income support

The minimum wage scheme to fishers was kept during 2006 and 2007. This scheme is established to support fishermen when the income from fishing activities is insufficient, due to reasons beyond the fisher's influence, such as long periods of bad weather, extraordinary ice conditions, etc. The weekly pay depends on how much one has received over this scheme during the past three years, compared to a maximum payable amount. Recipients of funds from this scheme are basically fishers on smaller vessels. In 2006, NOK 5.5 million was paid out through this scheme, while the amount in 2007 was NOK 5 million. The vessels covered by this scheme are characterized as being small and having lower activity levels.

Transportation support

The transportation support scheme is established to reduce cost disadvantages caused by geographical or structural conditions. This support item is important to maintain a differentiated fishing fleet, and to secure supplies to the processing industry in vulnerable regions. Support is given for transportation of fish from areas with excess supply to areas with excess demand and from areas where there are no landing facilities. In 2006 NOK 26.5 million was allocated through this scheme, and in 2007 the amount was NOK 27.5 million.

Support to the sealing industry

Support to the Norwegian Sealing industry is given to improve the profitability of the industry. According to the Norwegian interpretation of an ecosystem-based management regime, sealing is considered a necessity. Hence, a profitable industry is an essential basis for rational and sustainable harvesting of marine mammals, and support is given as an incentive for sealers to catch the current quota. Sealskins are the main income source of sealing. However, prices are insufficient to make the industry profitable. In 2006, 6 vessels participated in the Norwegian sealing, receiving NOK 14 million in support. In addition NOK 2.7 million was allocated to landing facilities and for research and development purposes. In 2007, the figures were NOK 11.6 million and NOK 3.4 million respectively, and 5 vessels participated.

A new fund for the decommissioning of home-based fishing vessels with an overall length up to 15 metres was established in 2003. The scheme was funded through a 0.35% fee on the landing value of every Norwegian fishing vessel in 2003, 2004 and 2005, and then reduced to 0.05% in 2006 and 2007. The program was terminated on 1 July 2008, and the fee for the first six months of 2008 was 0.18%. In 2006 and 2007, the government transferred NOK 5 million to the fund each year, and in 2008 this figure was NOK 11.25 million – estimated to about 50% of the contribution from the industry.

The total cost of fisheries management as a percentage of catch value has increased over the last few years from about 7% in 2005, up to approximately 7.8% in 2008 and 8% in 2007. This is mainly due to stable catch values and increased costs of general services, thus increasing the management cost/catch value factor. The cost of general services related to the catching sector is presented in Annex Table 24.A1.

Post-harvesting policies and practices

Recent international food scandals have put more emphasis on the importance of food safety and quality. Consumers' expectations and demands are increasingly recognized as an important factor in international food trade. It is no longer sufficient to have only a scientific justification that food on the market is safe. Consumers must also perceive the food to be safe and of the right quality in order for them to purchase it. Independent risk assessment and risk communication are important tools to reach this goal. Norway's policy and practice with regard to safety and quality of seafood is largely based on implementation of EU-rules. The Norwegian fish processing industry has implemented self-check systems based on the principles of HACCP as advised by the Codex Alimentarius Commission. Norwegian authorities have used substantial resources to implement this system to ensure the quality of products.

The Norwegian Food Safety Authority, which was established on 1 January 2004, is responsible for seafood safety and quality, as well as fish health and welfare. The Authority was set up following a merger of the Norwegian Animal Health Authority, the Norwegian Agricultural Inspection Service, the Norwegian Food Control Authority, the Directorate of Fisheries' seafood inspectorate, and local government food control authorities.

With respect to labelling, the Norwegian government focuses on the development of international quality standards and conformity assessment systems. It is important to ensure that technical regulations and standards, including packaging and labelling requirements, do not create unnecessary obstacles to international trade. Furthermore, in order not to confuse or mislead consumers, information and labelling need to be clear and trustworthy.

Markets and trade

The domestic market is an important and profitable market for the fishing industry. In 2007, Norwegians consumed 22.5 kg per capita of fish and fish products. This is a slight decrease from 2005 and 2006 when the figure was approximately 23 kg per capita. The age group of 60+ years has the highest consumption of seafood.

Total exports of seafood from Norway increased from 2006 to 2007, and in 2007 total export value amounted to NOK 37 billion, which is an increase of around 4% compared to 2006, despite a decline in prices from 2006. As in previous years, the most important export market for Norwegian salmon was the European Union, with a 63% share of total exports. Asia and Eastern Europe, with Japan and Russia, are the most important markets for Norwegian exporters of seafood products. As regards the main products' share of total export value for seafood, the share of farmed salmon and trout increased 51% in 2007, whilst groundfish accounted for 29% of export value and pelagic products for 16%.

As of 2005, EFTA states have signed free trade agreements with South Korea, Egypt, Colombia, the Gulf co-operation Council and Canada. In the field of fisheries, the agreements ensure improved market access for Norwegian exports of important fish and fish products. Once they enter into force, these agreements will have a positive impact on fish trade and investments in the fishery and aquaculture sector.

Following an anti-dumping and subsidy investigation initiated by the European Commission in the autumn of 2004, a permanent anti-dumping measure was adopted in January 2006. The measure was challenged by Norway under the WTO Dispute Settlement Understanding. A panel report, published in the summer of 2007 ruled in favour of Norway. The measures against Norwegian salmon were terminated in July 2008.

Outlook

The implementation of the WSSD goal of 2002 of an ecosystem-based management by 2010 will include focus on the following areas:

- Strengthening research to improve the understanding of the structure and functioning of marine ecosystems; natural fluctuations, species interactions and how these are affected by fisheries.
- Improving scientific advice to fisheries management, taking ecosystem effects into account.

- Reducing uncertainty in stock assessments.
- Development of long-term management plans for single species *e.g.* Northeast Arctic Cod.
- Improving selectivity and fishing methods to reduce unintended by-catch and disturbance to bottom habitats.

The outlook for the traditional fishing industry seems good, with an improved stock situation for most stocks except for the cod stock in the North Sea and Capelin in the Barents Sea. In addition the IUU-fishing of cod in the Barents Sea is decreasing and the development of a global binding agreement for port state control is in good progress.

New structural adjustment instruments implemented from 2008 will provide for efficiency and profitability and make the fleet robust to handle increased fuel prices. Fuel prices have risen considerably and more expensive fuel will lead to less pressure on stocks, less pressure on the ecosystem and lower emissions of greenhouse gases.

In 2008 and 2009, respectively the decommissioning scheme from 2004 and the introduction of SQS for vessels between 11 and 15 metres will be reviewed. This, in relation to other ongoing processes, will form a basis for the future evolvement and need of regulatory instruments in the fishing fleet.

In 2007 the Ministry of Fisheries and Coastal Affairs published a *strategy for a competitive Norwegian aquaculture industry*.* The report focuses on both challenges and opportunities for the industry, and outlines relevant measures and future policy.

Research, development and education are important to the development of the industry. In recent years, focus has been on environmental interactions, reduction of fish diseases and development of new species for farming. Marketing research on aquaculture species and food quality control will be important in the years ahead. Farming of marine species is developing, though a great effort still has to be put in to scientific and developing activities to establish a commercial industry.

Trade in fish and fish products is one of the most protected sectors in the world trade. Significant barriers such as tariffs and non-tariff barriers still exist. Average tariffs for fish and fishery products are, in many countries and in many important markets for Norwegian exports, considerably higher than tariffs for other industrial goods. Such barriers are important constraints for further growth of the aquaculture as well as the wild capture fishing industry in Norway. As an example of non-tariff barriers, the Norwegian aquaculture industry has gone through anti-dumping cases in the EU and USA.

* *www.regjeringen.no/en/dep/fkd/Documents/rapporter_planer/Planer/2007/strategy-for-a-competitive-norwegian-aqu.html?id=478970.*

ANNEX 24.A1

Table 24.A1. **Status for the most important species in Norwegian fisheries**

	Spawning stock biomass (1 000 tonnes)		Spawning stock reference point (B_{pa}) (1 000 tonnes)	Estimated Fishing mortality		Fishing mortality reference point (F_{pa})
	2006	2007		2006	2007	
Demersal species						
Northeast Arctic cod	579	613	460	0.63	0.40	0.40
Cod in the North Sea and Skagerrak	< 50	< 50	150	0.79	0.64	0.65
Northeast Arctic haddock	242	277	80	0.30	0.31	0.35
Haddock in the North Sea and Skagerrak	307	218	140	0.52	0.42	0.70
Northeast Arctic saithe	928	834	220	0.19	0.20	0.35
Saithe in the North Sea and Skagerrak	280	280	200	0.28	0.25	0.40
Pelagic species						
Norwegian dpring spawning herring	12 327	11 898	5 000	0.10	–	0.15
Herring in the North Sea and Skagerrak	1 252	977	1 300	0.35[1]	0.33[1]	0.12/0.25[2]
Mackerel	2 231	2 231	2 300	0.26	–	0.17
Barents Sea capelin[3]	72	189	[4]	[4]	[4]	[4]
Blue whiting	5 475	4 363	2 250	0.45	–	0.32

1. Age groups 2-6 years.
2. F = 0.12 for age groups 0-1 year, F = 0.25 for age groups 2-6 years.
3. Maturing biomass.
4. Due to its special population dynamics, *i.e.* it dies after spawning, precautionary reference points for the SSB and fishing mortality are not relevant for capelin.

Table 24.A2. **Quotas allocated to Norway specified on different economic zones in 2006 and 2007**

The Agreement (between)	The economic zone of/ Area	Total Norwegian quotas (all species, tonnes)	
		2006	2007
Norway and Russia	Russia	166 000	166 000
Norway and EU	EU North Sea		
	and west of 4°W	669 301	639 324
	Greenland	8 727	8 870
Norway and the Faeroe Islands	Faeroe Islands	28 174	26 348
Norway and Greenland	Greenland	2 735	2 566
Norway and Iceland	Iceland	39 545	39 625
Norway, Greenland and Iceland	Jan Mayen/Iceland/Greenland	58 285[5]	39 125[5]
Norway and EU (Sweden and Denmark)	Skagerrak/Kattegatt	20 425	18 996
NAFO	NAFO (3M)	–	–
NEAFC	Irminger Sea	4 581	3 837

5. Quotas for the 2006/2007 and 2007/2008 seasons.

Table 24.A3. **Quotas allocated to other countries in the Norwegian economic zone and in the fishery zone around Jan Mayen in 2006 and 2007**

Allocated to	Area	Total quotas (all species, tonnes)	
		2006	2007
Russia	North of 62 °N and in the fishery zone around Jan Mayen:	321 315	383 241
EU	North of 62 °N and in the fishery zone around Jan Mayen:	99 304	113 144
	North Sea:	616 771	583 477
Faeroe Islands	North of 62 °N and in the fishery zone around Jan Mayen:	21 631	52 502
	North Sea:	5 680	36 860
Greenland	North of 62 °N:	7 420	9 245
	North Sea:	1 025	1 025
Iceland	North of 62 °N:	4 237	39 490
EU (Sweden and Denmark)	Skagerrak/Kattegat:	140 059	131 195
Sweden	North Sea:	4 355	4 211

Table 24.A4. **TACs and national quotas in 2006 and 2007 for some of the important species in the Norwegian fisheries**

	The economic zone of or area	Agreement between Norway and:	TAC (tonnes)		National quota (tonnes)	
			2006	2007	2006	2007
Cod	North of N62 °N[6, 13]	Russia	492 000	445 000	219 700	199 500
	North Sea	EU	23 502	19 957	3 560	3 011
	Skagerrak	EU	3 315	2 851	108	92
Haddock	North of N62 °N[7, 13]	Russia	121 700	150 000	67 650	76 050
	North Sea	EU	51 850	54 640	6 309	6 950
	Skagerrak	EU	3 189	3 360	134	141
Saithe	North of N62 °N[13, 14]		193 500	222 525	175 500	201 975
	North Sea	EU	123 250	123 250	61 090	61 685
Herring	North of N62 °N[8, 13, 14]	[9]		1 280 000	564 200	780 800
	North Sea West of 4 °W	EU	454 751	341 063	129 915	97 312
	Skagerrak	Sweden, Denmark	81 600	69 360	10 883	9 251
Capelin	North of N62 °N	Russia				
	Iceland, Jan Mayen and Greenland[10]	Iceland, Greenland	370 000	308 000	58 285	39 125
Mackerel	North Sea, North of 62 °N and west of 4 °W[13, 14]	EU	. .	. .	116 245	131 965
Blue whiting	International waters	[11]	2 110 000	1 837 000	637 527	550 670
Redfish	Greenland	EU				
	NEAFC	NEAFC	. .	. .	3 500	3 500
Shrimp	Skagerrak	Sweden, Denmark	. .	. .	5 219	5 415
	Greenland	EU	. .	. .	2 750	3 250
	NAFO	NAFO	. .	. .	1 985	1 985[12]

6. Norwegian coastal cod included.
7. Norwegian coastal haddock included.
8. Norwegian spring spawning herring.
9. Due to disagreement regarding the allocation of the Norwegian spring spawning herring stock, the states involved – EU, Norway, Iceland, Faeroe Islands, Greenland and Russia – have not adopted a management regime for this stock in 2006. In 2007 EU, Norway, Iceland, Faeroe Islands and Russia adopted a coast stat agreement.
10. Quotas for the 2006/2007 and 2007/2008 seasons.
11. Due to agreement between EU, Norway, Faeroe Islands and Iceland.
12. "Days at Sea."
13. Quotas and catches for research and education purposes are included.
14. Quotas and catches for bait are included.

Table 24.A5. **Type of fishing licence, the number of licences and fishing vessels with licence in Norwegian fisheries: 2006 and 2007**

Type of license	Number of licenses	
	2006	2007
Purse seine	84	83
Blue whiting	45	46
Norwegian spring spawning herring with trawl	45	43
Pelagic trawl/North Sea trawl	57	54
Capelin trawl	98	100
Mackerel trawl	36	36
Cod trawl	53	51
Saithe trawl	7	8
Shrimp trawl	76	71
Other licences	38	38
Total number of licenses	**629**	**621**
Number of vessels	**343**	**332**

Table 24.A6. **Type of annual permits, the number of permits and fishing vessels with permits in Norwegian fisheries 2006 and 2007**

Type of annual permit	2006	2007
Northeast Arctic cod/saithe/haddock, vessels < 28 m	2 277	2 223
Northeast Arctic cod/saithe/haddock, vessels > = 28 m	42	43
Northeast Atlantic mackerel	508	497
Shrimp (southern areas)	159	156
Norwegian spring spawning herring	453	452
Saithe seine (northern areas)	172	175
North Sea herring	112	109
Saithe seine (southern areas)	62	61
Cod (southern areas)	58	58
Permits-regulated purse seiners	18	18
Total number of permits	**3 861**	**3 792**
Number of vessels	**2 812**	**2 751**

Table 24.A7. **Current management instruments**[15]

	Management instruments to regulate the fisheries		Management instruments adjust capacity	
Control system	Input	Output	Input	Output
Denomination	Licences annual permits	IVQ	Buy back programs	SQS
Trawlers	X	X		X
Industrial trawler	X	X		X
Purse seiners	X	X		X
Large long-liners	X	X		X
Coastal vessels 11-28 metres	X	X	X[16]	X
Coastal vessels 0-11 metres	X	X	X	

15. 1 January 2008.
16. Valid for vessels up to 15 metres, only until 1 January 2008. From this date, buy-back programs will only be valid for coastal vessels under 11 metres.

Table 24.A8. **Types of licences granted and active licences in the Norwegian aquaculture Industry 2006 and 2007**

Type of licence	Number of licences		Number of active licences	
	2006	2007	2006	2007[17]
Sea-farm, Atlantic salmon and rainbow trout	998	1 007	909	917
Juvenile, Atlantic salmon and rainbow trout	272	292	227	220
Other marine species	688	753	280	278
Shellfish and crustaceans	735	674	374	485

17. Preliminary figures.

Table 24.A9. **Sales (volume and value) and employment in the Norwegian aquaculture industry 2006 and 2007**

Type of Licence	Sale					
	Volume (tonnes)		Value (NOK million)		Employment	
	2006	2007[18]	2006	2007[18]	2006	2007[18]
Sea-farm, Atlantic salmon and rainbow trout	692 590	813 746	17 154	17 004	2 480	2 556
Juvenile, Atlantic salmon and rainbow trout	200 430[19]	223 579[19]	1 536	1 775	965	1 200
Cod	11 087	9 611	261	222	310	265
Other marine species	4 864	4 333	171	138	134	150
Shellfish and crustaceans	3 750	2 512	22	25	570	482

18. Preliminary figures.
19. Numbers are in 1 000 pieces.

Table 24.A10. **Performance of the Norwegian fish farms with production and sale of Atlantic salmon and rainbow trout 2004, 2005, 2006 and 2007**

	2004	2005	2006	2007[22]
Total operating revenues (million NOK)	13 332	15 599	20 492	20 239
Total operating expenses (million NOK)	12 282	12 012	14 314	17 635
Total operating profit (million NOK)[20]	1 048	3 587	6 138	2 604
Operating margin[21]	7.9%	23.0%	30.0%	12.6%
Average production costs per kilo (NOK)	15.15	13.80	14.74	15.81

20. Total operating profit is the economic result of the activities of the firm; defined as total operating revenues over total operating expenses.
21. Operating margin expresses how much is earned on every NOK 100 in sale. Operating margin is given as (Operating profit/Operating revenues) * 100.
22. Preliminary figures.

Figure 24.A1. **Development of the economic transfers to the capture industry under the General Agreement (monetary value adjusted to 2002-prices)**

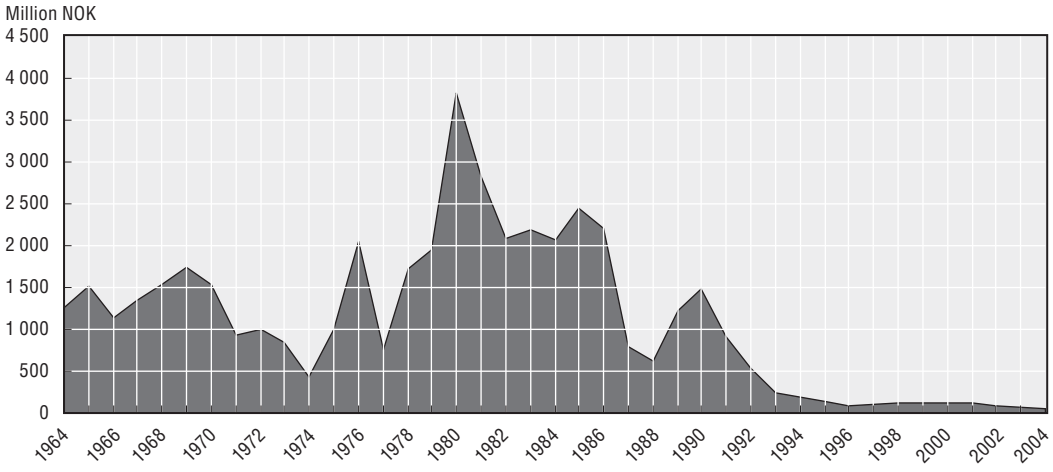


Table 24.A1. **General services – the catching sector**

All figures in thousand NOK

	2003	2004	2005	2006	2007[1]
Ministry of fisheries	31 420	30 127	33 794	37 408	39 880
Membership in international org.	6 145	6 590	7 051	7 564	8 060
Institute of Marine Research	157 674	164 90	149 740	188 107	187 950
Operations of research vessels	169 046	105 981	110 609	107 576	117 100
New research vessel	67 471	0	0	0	0
Directorate of Fisheries	140 700	101 300	84 150	92 050	122 000
Coast guard	389 524	415 792	450 916	485 855	490 000
Total	**961 980**	**823 980**	**836 260**	**918 560**	**964 990**

1. Balanced budget.

PART III

Chapter 25

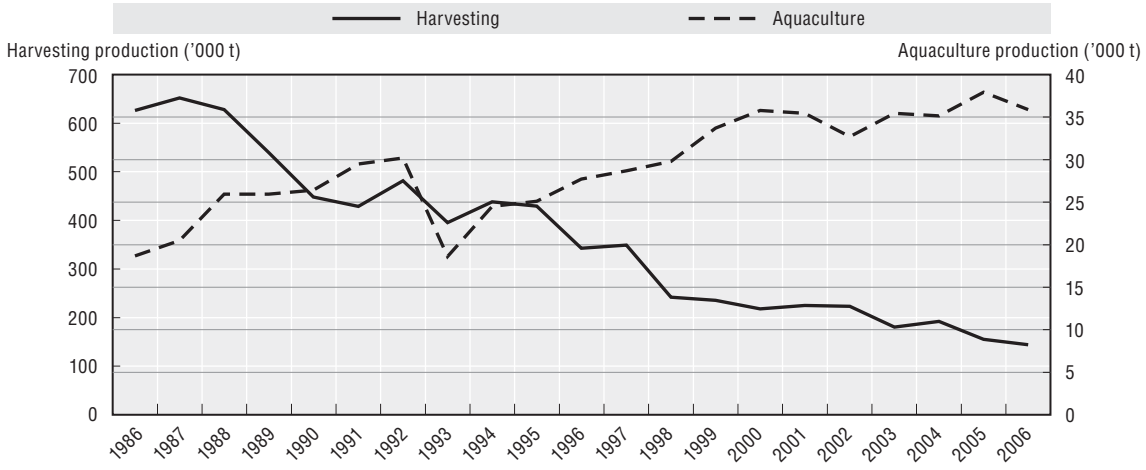
Poland

Poland

Summary of recent developments

- Capture fishery production in Poland has substantially decreased over the last decades and the trend continued in 2007 and 2008. This is the result of a decrease in catches in the Baltic Sea, which contribute about 80% to the total catches. Main species caught by the Polish fishing fleet include sprat, herring and cod.
- Aquaculture production has stabilised since 2000 at the level of 30-35 000 tonnes. Carp and rainbow trout are the most important species farmed in Poland, where freshwater aquaculture is exercised.
- Poland has not reported any major changes in the management system of its fishery resources. The system is in compliance with regulations of the European Council. Withdrawal of excessive fishing potential has begun after Poland's accession to the EU according to the provision of the Sector Operational Plan "Fish and Fish Processing 2004-2006".

Harvesting and aquaculture production

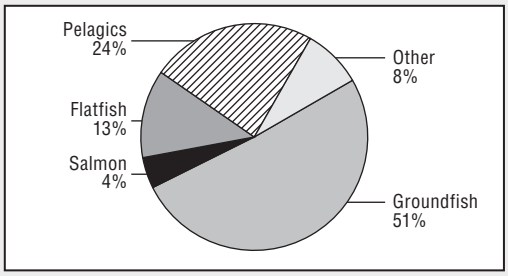


Source: FAO.

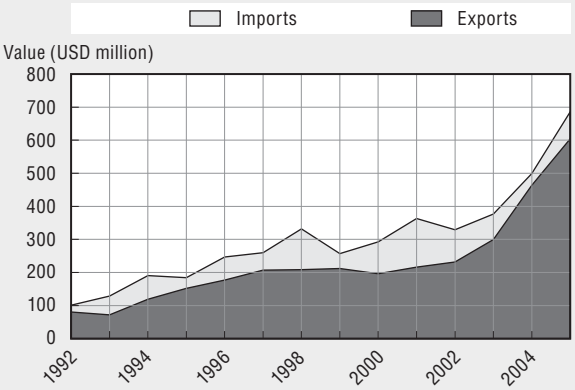
Key characteristics of the sector

- In terms of value of catch, groundfish contributed more than half of the total value in 2006 and cod was the most valuable species in this regard (PLN 80 million). Among pelagic species, second largest group of species, the value of herring was PLN 25.6 million.
- Poland's trade in fish and fishery products has significantly increased in recent years, especially since 2003. The increase of exports was noticeable, resulting in a reduced trade deficit from USD 147 million in 2001 to USD 61 million in 2006.
- In 2006, Poland provided USD 33.6 million of GFTs to the fisheries sector. Direct payments accounted for 77% while general services took the remaining 23%.

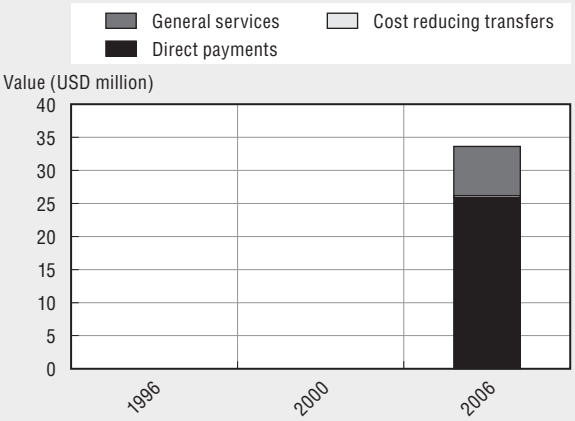
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1997	2006
Number of fishers	8 796	4 340
Number of fish farmers	n.a.	5 000
Total number of vessels	436	881
Total tonnage of the fleet	141 084	31 593

n.a.: Not available.

Legal and institutional framework

Fisheries management in Poland is under the responsibility of the Department of Fisheries of the Ministry of Agriculture and Rural Development. The Department of Fisheries consists of the following units: Inland Fishery; Structural Policy; Fish Market; Baltic Sea Resources Management; Deep-sea Resources Management; and Control, Monitoring and Reporting the Use of Assistance Funds. The Fisheries Monitoring Centre is located in Gdynia.

The Department of Fisheries directly supervises the work of the three Regional Sea Fisheries Inspectorates in Gdynia, Słupsk and Szczecin. The inspectorates supervise fisheries activities at sea and in adjacent waters, monitor landings and fishing gears and manage fishing vessel registers. Inland fisheries are supervised by corresponding local governments.

Capture fisheries

Polish catches in 2008 totalled 123 800 tonnes, a decrease of 9 600 tonnes (7.8%) compared to the previous year. This was the result of a decrease in Baltic Sea catches by 10%.

Sprat was the main species caught by the Polish fishing fleet in 2008, contributing 45.2% of the total catch in terms of volume. Other major species included herring (13.8%), cod (7.5%), krill (6.7%) and flat fishes (7.6%). These species together accounted for 80.8% of the total marine catches.

Table III.25.1. **Polish catches by species (000 tonnes)**

	2007	2008
Sprat	60.1	56.0
Herring	22.1	17.1
Cod	11.0	9.3
Flatfish	10.7	9.4
Salmon	0.1	0.1
Others	29.4	31.9
Total	**133.4**	**123.8**

Catches in 2008 in the Baltic Sea and its lagoons constituted 78% of total catches in comparison to 81% in the previous year. The remainders of the catches were from deep-sea fisheries. The Antarctic sector of the Atlantic Ocean was the most important deep-sea fishing ground while the central eastern Atlantic Ocean played the same role in 2007 by contributing 12% to the total catch of the fishery.

In 2007, it was estimated that 25 011 people were employed in the fisheries sector. This figure is lower than in 2006 by 1 829. A loss of about 800 jobs was observed in the aquaculture sector while 1 000 jobs were lost in the processing sector.

At the end of 2008, the number of the Polish fishing vessels was 837, a decrease of 33 vessels compared to 2007. The number of cutters decreased from 213 in 2007 to 198 in 2008 while deep-sea trawlers increased from 3 to 4. The number of boats decreased from 654 to 635. In terms of gross tonnage, deep-sea trawlers and cutters account for more than 90% of the fleet.

Table III.25.2. **Polish deep-sea fisheries catches by species (tonnes)**

	2007	2008
Cod	821.6	2 475.2
Saithe	1 535.6	1 477.7
Blue whiting	7 572.7	–
Redfish	1 981.2	229.5
Halibut	1 400.0	1 781.0
Horse mackerel	977.5	153.0
Shrimps	247.0	–
Krill	7 861.0	8 390.0
Others	39.6	1 000.4
Total	**22 436.2**	**15 506.8**

Table III.25.3. **Employment in the fisheries sector in Poland, 2006-2007**

	2006	2007
Harvest sector	4 340	4 309
Inland fisheries	1 500	1 500
Coastal marine fisheries	2 660	2 639
Deep sea fisheries	180	170
Aquaculture sector	5 000	4 202
Processing sector	17 500	16 500
Total	**26 840**	**25 011**

Source: Sea Fisheries Institute, Gdynia.

Table III.25.4. **Polish fishing fleet**

	2007		2008	
	Number	GT	Number	GT
Deep-sea trawlers	3	8 737	4	21 363
Cutters (over 15 m)	213	17 127	198	15 713
Boats fleet (under 15 m)	654	4 100	635	4 047
Total	**870**	**29 964**	**837**	**41 123**

Source: Sea Fisheries Institute, Gdynia.

Status of fish stocks

According to a report of the ICES Advisory Committee in 2008, the cod stock in the Western Baltic Sea has historically been much smaller than the neighbouring Eastern Baltic stock. The Eastern Baltic cod stock is biologically distinct from the adjacent Western Baltic stock (Subdivisions 22-24) although there is some migration of fish between areas. Spawning is confined to the deep basins as egg survival depends on oxygen concentrations in the deep saline water layer where fertilised eggs are neutrally buoyant. The total and spawning-stock biomass increased by the end of the 1970s due to the extremely abundant year classes of 1976, 1977 and 1980 and the favourable reproduction conditions in the southern and central Baltic Sea. Recruitment of the herring stocks is rather variable and the stock is highly dependent upon the strength of incoming year classes. The recruitment since the late 1980s has continued to be at a low level, although the year classes 2003 and 2005 are above the recent average.

Sprat has the largest stock assessed in the Baltic Sea. The stock size increased due to the combination of strong recruitment and declining natural mortality (effect of low cod biomass). Since 1998, the stock has been fluctuating between 700 000 tonnes and 1 300 000 tonnes. Most sprat catches are taken for industrial purposes with bycatch of herring.

Herring stocks experienced a high biomass level in the early 1970s, but then declined until 2001. While herring stocks spawning in the southern area and growing to a relatively large size have declined, those spawning in the northern area and growing to a maximum length of only about 18-20 cm dominate the landings of herring. The recruitment has been below the long-term average since the beginning of the 1990s. In addition, mean weight-at-age has decreased by 15-45% across all age groups since 1990 and have stabilized at a low level in recent years. Reported landings might not be precise as this stock is caught together with sprat.

Management of commercial fisheries

Baltic fisheries are managed in compliance with the regulations of the Council of European Union. In order to manage fish resources, the following measures are being taken: imposing catch limits, temporary restrictions for fishing activities and closed regions; and protecting juvenile fish by establishing minimum sizes and net mesh sizes.

After fishing quotas are exchanged with other Baltic countries, the allowable catch in Polish sea areas, as well as its division among fishing vessels, is determined annually by the Minister of Agriculture and Rural Development and is published as a regulation in the Official Journal (*Dziennik Ustaw*).

Since Poland's accession to the European Union, all bilateral agreements on fisheries have been managed by the European Commission.

Recreational fisheries

Inland fisheries are based on the natural production potential of rivers, lakes and dam reservoirs with a total area of almost 600 000 ha. In 2008, there were approximately 36.6 thousand tonnes of freshwater fish production marketed for consumption. Approximately 12.9 thousand tonnes of fish are caught by recreational fishers. The majority of the almost 2 million active recreational fishers in Poland are rod fishers.

Table III.25.5. **Fresh water fish production (000 tonnes)**

	Aquaculture				Capture fishery	Recreational fishery	Total
	Total	Carp	Rainbow trout	Others			
2004	34.8	18.3	14.6	1.8	2.9	15.4	53.0
2005	36.4	18.3	16.2	1.9	2.8	14.9	54.1
2006	35.2	15.6	17.1	2.55	2.8	15.2	55.3
2007	35.0	15.4	17.0	2.6	2.6	13.8	51.4
2008	34.2	15.2	16.0	2.6	2.4	12.9	49.5

Notes: This table includes fresh water fish production marketed for consumption only. Carp includes Common carp, Grass carp and Silver carp
Source: Inland Fisheries Institute, Olsztyn.

Aquaculture

Polish aquaculture is based on freshwater ponds, dams, reservoirs and lakes. Polish law does not make any provision for preferential water access for fish farms. Permits are required to use surface waters, which are the property of the state. The majority of Polish pond production involves two fish species: carp and rainbow trout. Approximately 15 600 tonnes of carp and over 16 000 tonnes of rainbow trout were produced in 2008.

Government financial transfers

Up to 1 of May 2004, the state provided the fisheries sector with the following types of aid: subsidies for purchasing deep-sea fishing licenses for trawlers; subsidized loans for the purchase and storage of raw fish material; VAT and fuel excise tax exemptions for fishing vessels; interest subsidies for investment loans under the Sectoral Program of Fisheries Development in Poland between 2000-2006; and funding the stocking of Polish sea areas and inland waters.

The maximum allowable fishing effort for the Baltic fleet are laid out in the Ministry of Agriculture and Rural Development regulation as the number of fishing vessels permitted to fish in the territorial seas and the adjacent lagoons is limited. New vessels can be put into operation only if a vessel with a comparable fishing capacity is removed. Total vessel length, width and motor power are used to determine the comparability.

Withdrawal of excessive fishing potential has begun after Poland's accession to the EU according to the provision of the Sector Operational Plan "Fish and Fish processing 2004-2006" (Dz. U. No. 197, item 2027).

Markets and trade

Processing and handling facilities

The fish processing sector in Poland has been almost entirely privatized, and, over the past several years, it has become one of the most rapidly developing areas of food processing. The greatest number of fish processing firms, approximately 142 (58%), is located in coastal areas. The main task facing these companies is to comply with EU veterinary and sanitary requirements. At the end of 2008, 244 companies complied with EU hygienic and veterinary standards, and had permits to export to EU countries.

Table III.25.6. **Fish processing in Poland, 2007-2008 (tonnes)**

	2007	2008
Fresh and frozen, whole and gutted	28.1	29.5
Fresh and frozen, fillets	48.5	27.2
Salted fish	20.5	20.3
Smoked fish	67.0	74.5
Canned fish	58.3	60.2
Marinated products	76.4	83.8
Other products	51.0	57.8
Total human consumption products	**349.8**	**353.3**

Note: This table includes fish processing facilities employing over 10 employees.
Source: Central Statistical Office, Warsaw.

Trends in domestic consumption

The estimated supply of fish to the Polish market in 2008 was 484 000 tonnes and average per capita fish consumption was about 13.01 kg in live weight equivalent. These figures are higher than those of the previous year: 455 000 tonnes and 12.91 kg of per capita consumption.

In 2008, Alaska Pollack was the most consumed species with an annual per capita consumption of 3.67 kg, which was slightly higher than the previous year. Other most common species consumed included Pangasus (2.57 kg) and herring (2.07 kg).

Table III.25.7. **Estimated average consumption in Poland, 2007-2008 (live weight equivalent, kg)**

	2007	2008
Alaska pollack	3.2	3.67
Pangasus	2.44	2.57
Herring	2.72	2.07
Mackerel	1.03	0.94
Sprats	0.66	0.74
Tunas	0.45	0.54
Carps	0.45	0.45
Hake	0.32	0.36
Salmon	0.48	0.36
Flatfishes	0.27	0.3
Crustaceans	0.23	0.25
Cod	0.03	0.02
Other	0.63	0.74
Total	**12.91**	**13.01**

Source: Sea Fisheries Institute, Gdynia.

Trade

Volumes and values

Imports of fish and fishery product into Poland in 2008 totalled 394 000 tonnes, an increase of 17 000 tonnes (4.5%) in comparison with the previous year. In terms of value, the imports increased by 8.5%. The Imports are dominated by raw fish materials and semi-processed products such as frozen fish, fillets and fish meat, which require further processing in the country. This stems from Polish deep-sea fleet's limited access to resources and low technological capabilities, and often low quality of Baltic raw materials. The greatest amount of fish (mainly raw fish material) was imported from EFTA countries while imports from China have increased rapidly. Herring was the most important species imported, contributing 22.8% to total imports.

In 2008, total Polish exports of fish and fishery products totalled 217 000 tonnes, which increased by 36.6 thousand tonnes (14.5%) compared to the previous year. The value of exports increased by 6.9%. Over 92% of fish and fishery products were exported to EU countries with Germany being the biggest market. Salmon, cod and herring were the most exported fish species (70%).

Table III.25.8. **Imports of fish and fishery products by species, 2007-2008**

	2007		2008	
	Thousand tonnes	Million EUR	Thousand tonnes	Million EUR
Herring	96.3	98.9	90.0	105.0
Salmon	61.3	225.0	68.0	240.0
Alaska pollock	34.1	48.7	38.0	55.5
Pangasus	40.7	72.8	36.4	56.5
Mackerel	36.6	38.0	34.5	39.0
Cod	19.4	54.7	22.0	64.0
Tuna	10.1	20.5	11,5	26.5
Hake	6.4	13.1	7.7	15.8
Shrimps	6.7	20.5	6.1	21.3
Others	65.7	135.7	80.2	166.0
Total	**377.3**	**727.9**	**394.4**	**789.6**

Source: Sea Fisheries Institute, Gdynia.

Table III.25.9. **Export of fish and fishery products by species, 2007-2008**

	2007		2008	
	Thousand tonnes	Million EUR	Thousand tonnes	Million EUR
Herring	49.6	94.3	55.0	110.0
Salmon	31.0	278.5	36.0	298.0
Sprat	39.1	13.7	32.0	14.4
Cod	18.0	88.8	16.3	90.0
Trout	4.3	33.4	4.0	32.0
Shrimps	2.7	21.6	2.3	23.0
Others	108.4	163.5	70.9	174.6
Total	**253.1**	**693.8**	**216.5**	**742.0**

Source: Sea Fisheries Institute, Gdynia.

PART III

Chapter 26

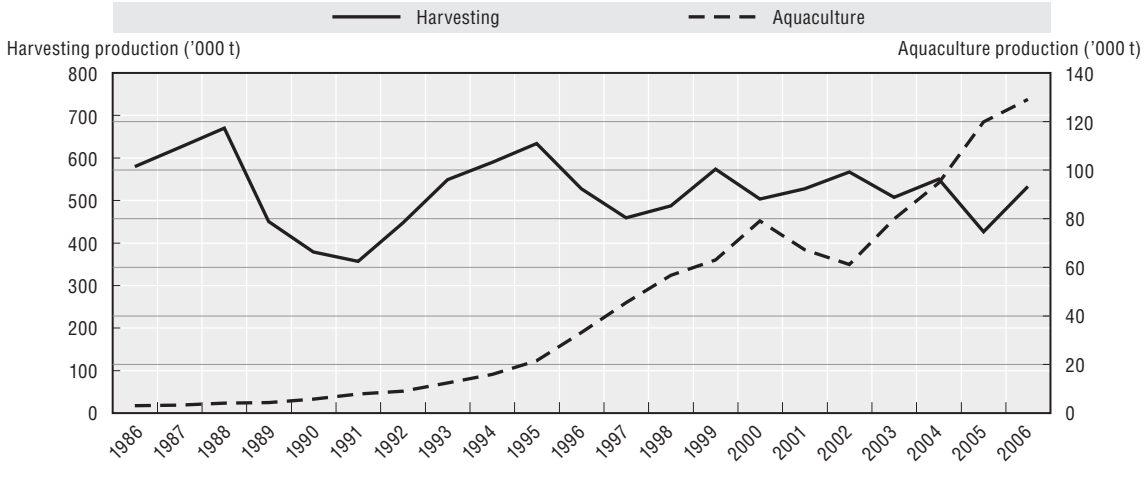
Turkey

Turkey

Summary of recent developments

- In line with Turkey's accession process to the EU, Turkish fisheries policies have been subject to a comprehensive review and new policy instruments have been introduced to create a framework for sustainable fisheries. For example, the Vessel Monitoring System was launched in 2007 for bluefin tuna fishing while the TAC system, currently applied to bluefin tuna and stripped venus clam, is to be extended to other fish species, including anchovy and mackerel.
- A new regulation has been imposed on anchovy fishing by purse seiners in order to increase the effectiveness of controls over fishing. According to the regulation, anchovy fishing is now allowed only from 16 h 00 to 06 h 00.
- In the aquaculture sector, further areas have been allocated for aquaculture development. In addition, several pilot projects are in place.
- To increase quality of fish products, a new regulation, "Market Standards in Fishery and Consumer Information", has been drafted and is expected to become effective during 2008.

Harvesting and aquaculture production

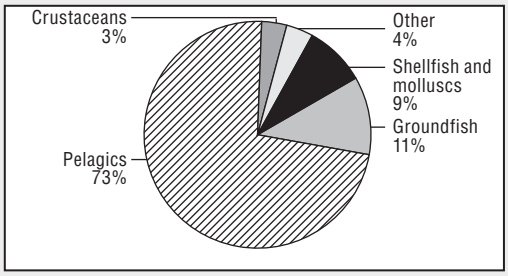


Source: FAO.

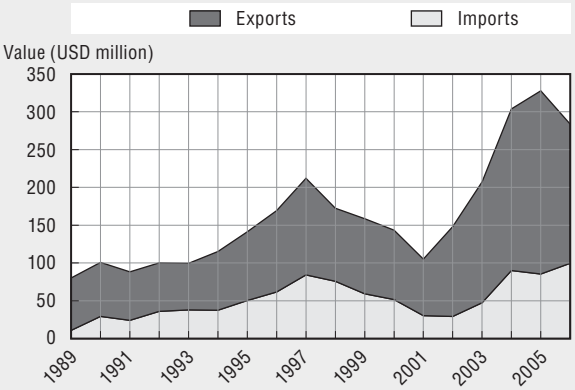
Key characteristics of the sector

- Capture fishery production in Turkey decreased from 550 484 tonnes in 2004 to 426 494 tonnes in 2005, although it rebounded in 2006 to almost 2004 levels. Aquaculture production has increased considerably since 2002 and reached its highest level in 2006 at 129 073 tonnes.
- Pelagic fishery was the main contributor to capture fisheries production, with horse mackerel (TRY 121 million) and sardine (TRY 63million) being the most important species. Other main species were white/silver hake, mussel, shrimp and tuna. In the aquaculture sector, sea bass (TRY 288 million), freshwater rainbow trout (TRY 238 million) and sea bream (TRY 221 million) were the major species farmed.
- Trade in fish products has significantly increased since 2001 when trade was at its lowest level in recent years. The expansion of exports was more noticeable than imports, generating a considerable trade surplus. The trade surplus showed a sharp increasing trend until 2006 when it decreased to USD 85 million from the previous year's USD 157 million.
- Turkey reported that its GFTs were USD 136 million in 2006, all of which were categorized as general services. Almost half of the GFTs were devoted to construct and maintain fishing ports and to operate the Coast Guard for monitoring, control and surveillance purposes. The remaining half of the GFTs were spent for programs not specified.
- With respect to the number of fishers, this figure has doubled over the last 10 years. The number of fish farmers has also increased during the same period. These figures imply that the fisheries sector in Turkey is still expanding.

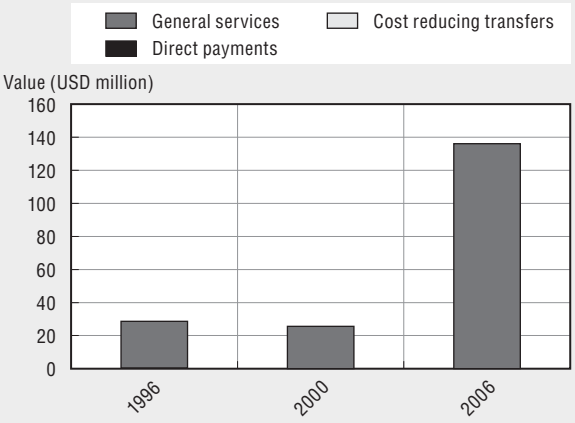
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	54 000	110 230
Number of fish farmers	4 021	6 143
Total number of vessels	17 475	18 790
Total tonnage of the fleet	n.a.	189 777

n.a.: Not available.

Legal and institutional framework

Law-1380 is the main legislative instrument governing fisheries, aquaculture and fisheries-related activities. The law empowers the Ministry of Agriculture and Rural Affairs (MARA) to develop and implement policies on fishing; aquaculture; the conservation of fisheries resources; quality, safety and hygiene of fishery products; and fisheries research.

The MARA is the main state organisation responsible for fisheries (including aquaculture) administration, regulation, protection, promotion and technical assistance. There are four General Directorates and 81 Provincial Directorates under the Ministry.

During Turkey's accession process to the EU, Turkish fisheries policies have been subject to comprehensive review and, as a result, new policy measures have been introduced to create a framework for sustainable fisheries. Draft amendments have been made to the existing Fisheries Law-1380 in order to impose provisions on, *inter alia*, the Vessel Monitoring System (VMS), data collection, designation of landing ports, marketing of fishery products and market standards, and establishment of producer organisations. The amendment is expected to be effective by the end of 2008 if the Turkish Parliament approves it.

Strategic policy and management documents, including Fisheries Management Plans and Fisheries and Aquaculture Sector Studies were prepared in 2007 under a project which was supported by the PHARE program of the EU.

Capture fisheries

Total volume of fishery production increased from 661 991 tonnes in 2006 to 772 323 tonnes in 2007, a 16% increase. The increase came from mostly marine capture fisheries that increased by 20% from 463 074 tonnes in 2006 to 589 129 tonnes in 2007. The main factor contributing to growth in marine capture was the increased anchovy catches. Anchovy accounted for 66 and 75% of total marine capture in 2006 and 2007, respectively. Atlantic bonito, pilchard, horse mackerel, sprat, whiting, grey mullet and hake were the other main commercial fish species. Despite the increase in volume of marine capture fisheries, their value decreased by 22% from TRY 1 386 million (USD 1.0 million) to TRY 1 078 million (USD 0.75 million). Aquaculture production also increased from 128 943 tonnes in 2006 to 138 773 tonnes in 2007. There has been a slight decrease in inland fishing from 44 082 tonnes in 2006 to 43 321 tonnes in 2007.

In 2007, overall employment in the harvesting sector (marine and inland fisheries) was 136 782, a 24% increase compared with 110 230 in 2006. While 127 810 were employed in the marine fishing sector, 8 972 were employed in inland fisheries. However, these figures include amateur fishers according to a regulation imposed by the Under-secretariat for Maritime Affairs requiring all amateur marine fishers to be registered as professional fishers. Therefore, the real employment in commercial marine fisheries was estimated at 50 000 in 2007.

In Turkey, the status of fish stocks is not assessed on a regular basis. Instead, fish stocks have been estimated based on fisheries statistics surveys. To improve stock assessment capacity, a project titled "Introduction of Stock Assessment to the Fisheries Management System of Turkey" will be implemented under the EU's IPA Program. The project aims to establish and improve necessary capacity for ecosystem-based fisheries in Turkey. This project is expected to be launched in 2008. In addition, preparatory works to establish a mechanism for monitoring biological parameters of catches at landing ports are continuing.

Management

Technical measures are the primary tools to conserve fishery resources and limit fishing efforts. Fishing activities are regulated by two distinct Notifications: Notification 1/1 Regulating Commercial Fishing and Notification 1/2 Regulating Amateur Fishing. The Notification 1/1 includes provisions on minimum mesh size, fishing gear, fishing region, time, species, minimum legal size/weight of catch and maximum percentages of by-catch. All fishing activities are prohibited within a radius of 500 meters of river estuaries. Trawling is completely prohibited in the Sea of Marmara to protect demersal species. There are also other areas where fishing activities are not allowed.

The anchovy fishing season is generally closed earlier than the legal fishing season and restrictions are in place for the number of permitted fishing hours per day by purse seiners: fishing is only permitted between 16:00 and 06:00 the following day. The aim of this regulation is twofold: to facilitate more effective controls at sea over anchovy fishing and to restore declining fish feeding on the anchovy.

A Total Allowable Catch (TAC) system is applied to limited species: bluefin tuna, which is regulated by the rules of ICCAT, and striped venus clam, whose quotas were 35 000 tonnes in 2008. However, MARA plans to extend the TAC system to other commercial fish species, including anchovy, sprat and mackerel in 2009.

All fishing vessels involved in commercial fishing are legally required to have a license. Under the existing management regime, fishing licenses are granted to a registered vessel, not individuals. Fishing licenses are valid for two years. If they are not renewed, fishing is prohibited at the end of the two year period. However, vessels may apply for a new license at any time during the following 3 years after the expiry of their 2-year license. If the vessel does not apply for a license during these 3 years, the license is permanently suspended. Fishing licenses are not required for recreational fishing. Active fisherman must have a fisherman's license valid for 5 years. Although foreigners may own Turkish fishing vessels, they are prevented from fishing. There is no restriction on the fishing region/area where a licensed vessel operates. However, most vessels generally operate at a local or sub-regional level.

State aid allocated to fishing industry in the 1970s and 1980s led to the expansion of fishing capacity and increased pressure on fish stocks. In 1991, a limitation was imposed on the issue of fishing licences to reduce fishing capacity. There has been a decline in the number of vessels since 2002, when the size of fleet was frozen. Modification or modernization of current fishing vessels are allowed with a 20% increase in length but engine power or tonnage must remain constant.

In 2007, there were 18 343 vessels registered with a total tonnage of 187 101 GT. The majority of the fishing fleet is comprised of small vessels: 94% of fishing vessels were less than 18 metres in length in 2007. Of the total vessels, 16% had an engine capacity greater than 100 HP and 2% had a crew of 10 or more. Nearly half of the total fishing fleet is based in the Black Sea. The majority of large vessels operate in the Sea of Marmara and the Black Sea.

At the national planning and policy level, fisheries policy is generally formulated under the national development plan prepared by the State Planning Organization. The national plan provides broad guidelines on how the fisheries sector may contribute to national objectives and strategy. Priority areas identified by the 9th Development Plan (2007-2013) in relation to fisheries include restructuring of the fisheries sector, sustainable

exploitation of marine fish stocks, institutional re-organisation and capacity building, strengthening technical infrastructure, improving competitive advantage and profitability.

A framework to establish Fishery Producer Organisations has been developed. Over the last few years, Fishermen's Associations have been undergoing restructuring. Currently, there are 482 Fishing Co-operatives, 14 Regional Unions and 1 Central Union of Fishery Co-operatives. In 2007, about 22% of fishermen were members of Fishing Co-operatives.

In 2007, MARA launched a satellite-based VMS for vessels registered for bluefin tuna fishing. MARA plans to gradually extend the system to other fishing vessels. Compliance controls are routinely undertaken in marine and inland waters, landing ports, wholesale and retail fish markets, processing facilities and cold storages. To collect data at landing ports, 30 landing port offices have been constructed for the first time. Data collected at these ports are transmitted to the central Fisheries Information System.

The updating of the vessel registry system is to be completed in 2008. The system will be integrated into the Fisheries Information System, including data on landings, logbooks, vessel monitoring system, sale notes, observer and control forms, first buyer notification and storage notification.

Recreational fisheries

No new regulation has been introduced on recreational fisheries between 2006 and 2008. In Turkey, no license is required for recreational (amateur) fishing activities. An identification document is granted to amateur fishermen, upon request. The volume of recreational fishing is estimated to be too low compared to commercial fishing.

Aquaculture

In the aquaculture sector, further areas have been allocated as potential Aquaculture Development Sites and several pilot projects are in place. The issue of permits for new tuna farms has been stopped and a limit on production and export has been in place since 2004. In lakes, further areas were opened to cage culture under a protocol signed between the MARA and the Ministry of Energy and Natural Resources.

In 2007, there were 1 616 farms (1 277 inland and 339 marine farms) where 6 500 people were employed. About two-thirds of these farms were rainbow trout farms. The remainder was mainly sea bass and sea bream farms. These farms are mostly family-operated small and medium sized units. Total aquaculture production in 2007 was 138 773 tonnes, which contributed 18% to total fishery production. The value of aquaculture products was about TRY 840 million (approximately USD 587 million) in the same year. The proportion of marine aquaculture was 57% while inland aquaculture comprised 43% in terms of volume. Main farmed species were rainbow trout (42%), sea bream (30%) and sea bass (29%).

Fisheries and the environment

There are a number of fisheries regulations to develop environment-friendly fisheries and aquaculture in Turkey. For example, fish farms with an annual production capacity of over 30 tonnes are subject to an "Environmental Impact Assessment".

Governmental financial transfers

Total government financial transfers were around TRY 191 million (USD 134 million) in 2006, an increase of 9.1% compared to 2005. The majority of government financial transfers were devoted to Marine Capture Fisheries (around TRY 132 million or

USD 92 million). Under this category, General Services covered a Tax Relief Scheme for Diesel Oil, construction of fishing ports, monitoring, surveillance, control of fisheries activities and research. There are no direct payments to the fishing industry under any category. Subsidies for aquaculture started in 2003 and increased to TRY 57 million (USD 40 million) in 2006.

Post-harvesting policies and practices

There are 174 licensed large or medium-sized fish processing enterprises nationwide. Among them, 109 are approved for export to the EU while 30 are allowed to export to third countries other than the EU. 35 are licensed for the domestic market only. At the end of 2007, the total number of people permanently employed in the processing sector reached 6 673, of which 3 391 were female (50%). Besides this, about 3 000 people were employed as part-time or seasonal workers. Approximately 64% of these part-time workers were female.

The operation, inspection and control of fishery processing and handling facilities in Turkey are carried out in conformity with the framework of EU regulations. A special focus has been given to comply with EC Directive 91/493, which deals with health conditions.

Markets and trade

Fish consumption in Turkey is dependent mainly on marine capture, particularly anchovy. Per capita fish consumption over the last few years has been around 7 kg. Whole fresh fish rather than frozen fish are preferred by Turkish people. Freshwater fish is mainly sold on local markets and generally consumed in areas close to production sites.

The domestic market for aquaculture products has grown over the past years. Main species sold in the domestic market are sea bass and sea bream. Although about 70% of sea bass and sea bream production is exported, this ratio decreased to 40% in 2007, partly because consumption in the domestic market increased and large companies invested in domestic market-oriented products.

Imports of fishery products increased from 47 676 tonnes in 2005 to 58 000 tonnes in 2007 in terms of volume. In value terms, imports have increased from USD 69 million to USD 97 million over the same period. The main imported species were mackerel, sardine, herring, anchovy, skipjack, stripe-bellied bonito species, pilchard and salmon. Norway, the Netherlands and Spain remained key suppliers of fishery products to Turkey.

Exports have also increased in both volume and value terms. Exports in 2005 were 37 655 tonnes, worth USD 206 million, and those in 2007 were 47 000 tonnes, worth USD 273 million. Therefore, the trade surplus in fishery products increased from USD 137 million in 2005 to USD 176 million in 2007. Sea bass, sea bream, anchovy, bluefin tuna, silverside and smoked trout are the most important species. EU countries, including Italy, Greece, Spain and France, are the main destinations of Turkey's fish products. Japan is also an important market for Turkey's farmed tuna.

Outlook

A regulation has been drafted to increase quality standards of fishery products. The draft regulation titled, "Market Standards in Fishery and Consumer Information" is expected to become effective during 2008. In addition, standardized boxes will be used to store and transport fishery products in a safer and more reliable manner. Furthermore, a communiqué on hygiene requirements for fishing vessels and landing sites has been drafted.

PART III

Chapter 27

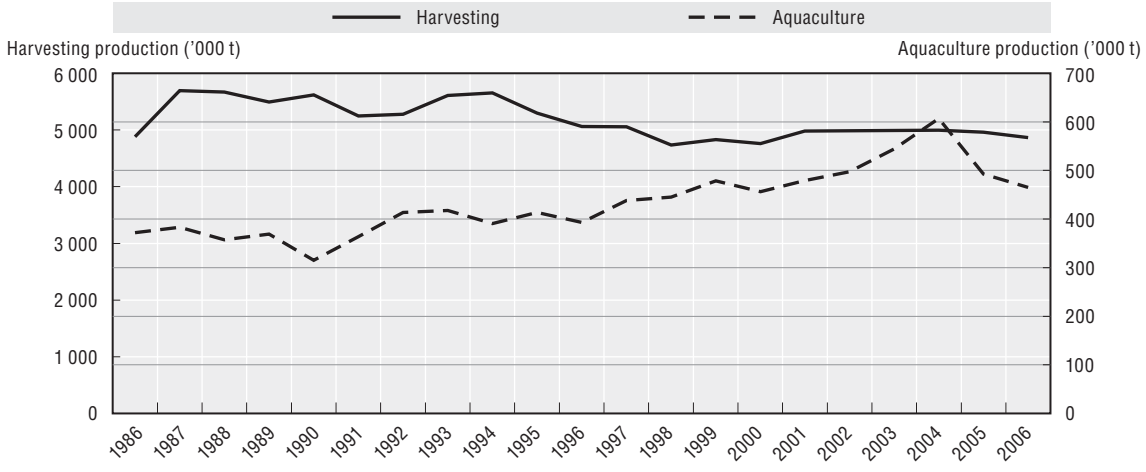
United States

United States

Summary of recent developments

- The reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act in 2007 provides an updated legal framework for addressing a wide variety of marine stewardship issues. The reauthorized law mandates a date-certain end to overfishing, promotes market-based management, strengthens the role of science, improves data on recreational fisheries, and includes new measures to combat illegal, unreported and unregulated (IUU) fishing and to reduce bycatch in global fisheries.
- Overfishing and overfished stocks declined in the 2007 review of the status of individual stocks and stock complexes. 17% of stocks and stock complexes with known overfishing determinations were subject to overfishing and 24% of stocks and stock complexes with known stock conditions continued to be overfished.
- Since 2000, ex-vessel gross revenues from commercial landings has increased to USD 419 million, which represents a 10% increase in nominal terms but, after adjusting for inflation, represents a 5% decrease in landings value.
- A national marine aquaculture summit, the introduction of the National Offshore Aquaculture Act, a new 10-Year Plan for Marine Aquaculture, and an alternate feeds initiative were among the highlights for NOAA in 2007.

Harvesting and aquaculture production

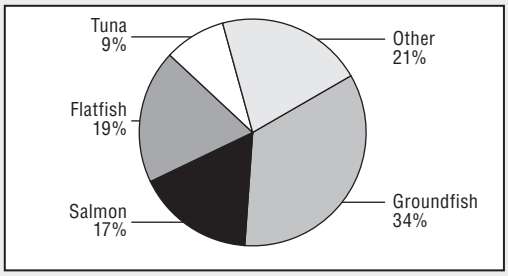


Source: FAO.

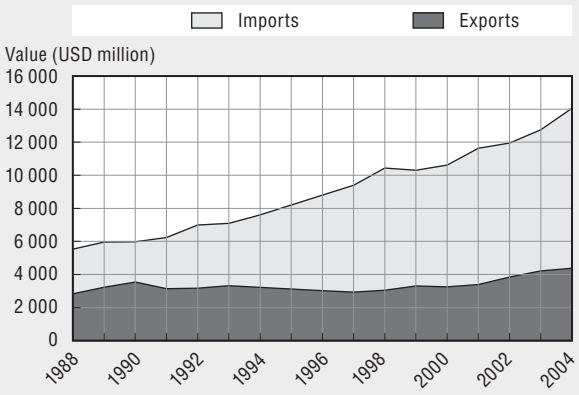
Key characteristics of the sector

- Commercial landings totalled 4.2 million tonnes valued at USD 4.1 billion in 2007, representing a 3% decrease in volume and a 2% increase in value compared with 2006.
- Alaskan pollock, menhaden, Pacific salmon, cod, and hake are the five most important species in terms of volume, while crab, shrimp, lobster and scallops remained highest in terms of gross value.
- The value of imports has increased by around 40% since 2000 while exports have shown only marginal growth.
- Government financial transfers increased significantly in 2006 and 2007, due largely to increases in assistance for disaster relief for Hurricanes Katrina and Rita as well as for West Coast Salmon.

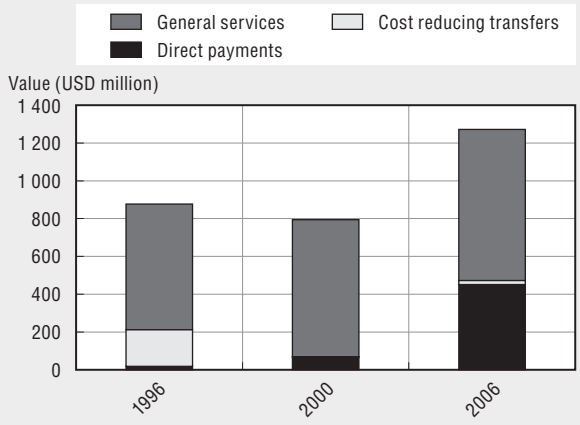
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Legal and institutional framework

The primary legal authority for fisheries management in the US Exclusive Economic Zone (EEZ) is the Magnuson-Stevens Fishery Conservation and Management Act. This statute establishes eight Regional Fishery Management Councils (Councils), which are responsible for recommending fishery conservation and management measures via fishery management plans (FMPs) to the Secretary of the US Department of Commerce for approval.[1]

The Magnuson-Stevens Act was extensively amended in October 1996 with the passage of the Sustainable Fisheries Act (SFA). Some of the key provisions of the SFA required that actions be taken to: prevent and end overfishing; rebuild overfished stocks to levels consistent with maximum sustainable yield (MSY); reduce bycatch and minimize mortality of unavoidable bycatch; designate and conserve essential fish habitat, and to the extent practicable, minimize adverse effects on such habitat caused by fishing; account for impacts of management measures on fishing communities and minimize negative impacts; and establish a fishing capacity reduction program. In December 2006, Congress again reauthorized the Magnuson-Stevens Act, placing heavy emphasis on ending overfishing, strengthening the role of science, establishing the rules for market-based management, creating a national registry of recreational fishing data, and providing new tools to combat IUU fishing and the bycatch of protected marine mammals in global fisheries under legislative authority of the High Seas Driftnet Fishing Moratorium Protection Act (Moratorium Protection Act).

Under the Moratorium Protection Act, as amended by the reauthorized Magnuson-Stevens Act, the Secretary of the US Department of Commerce is required to produce a biennial report to the US Congress that lists countries the United States has identified as having vessels engaged in IUU fishing and/or bycatch of protected living marine resources (PLMRs). The first biennial report is due in January 2009. The Moratorium Protection Act requires the development of regulatory procedures to certify whether nations identified in the biennial report have taken appropriate corrective action to address IUU fishing; adopted regulatory programs for PLMRs comparable with US programs, taking into account different conditions; and established management plans for PLMRs. The absence of steps by identified nations to address problems of IUU fishing and bycatch of PLMRs may lead to prohibitions on the importation of certain fisheries products from such nations into the United States and other measures.

The Moratorium Protection Act also calls on the United States to promote improved monitoring, control, and surveillance for international fisheries; improve the effectiveness of Regional Fishery Management Organizations (RFMOs) through the adoption of IUU vessel lists, stronger port state controls, and market-related measures; and build capacity in other countries to ensure sustainable fisheries and regulatory enforcement.

NMFS has published a proposed rule that would establish procedures for the identification of nations whose vessels are engaged in IUU fishing and/or bycatch of PLMRs, as well as procedures to certify whether sufficient action is being taken by identified nations to address these activities. The first biennial report to Congress is also being prepared. In preparation for the first identifications to be included in this report, NMFS solicited information from the public regarding nations whose vessels are engaged in IUU fishing and bycatch of PLMRs. Upon verifying this information, a list of identified nations will be developed.

Capture fisheries

Commercial landings (edible and industrial) by US fishermen at ports in the 50 states totalled 4.2 million tonnes with a gross ex-vessel value of USD 4.1 billion in 2007 – a 3% decrease in volume and a 2% increase in value, respectively, compared with 2006 (Table III.27.1). Alaskan pollock, menhaden, Pacific salmon, cod, and hake are the five most important species in terms of landings, while crab, shrimp, lobster, and scallops remained highest in terms of value. Since 2000, revenue from commercial landings has increased USD 419 million, which represents a 10% increase in nominal terms but, after adjusting for inflation, represents a 5% decrease in landings value.

Table III.27.1. **US commercial fishing landings (2000-2007)**

	tonnes (thousands)	Pounds (millions)	Revenue (USD millions)
2000	4 147	9 142	3 674
2001	4 315	9 511	3 244
2002	4 277	9 430	3 194
2003	4 315	9 514	3 377
2004	4 392	9 683	3 756
2005	4 403	9 707	3 942
2006	4 301	9 483	4 024
2007	4 188	9 232	4 089

In 2007, commercial landings by US fishermen at ports outside the 50 states along with Internal Water Processing (IWP) agreements provided an additional 158.4 million pounds (71 838 tonnes) valued at USD 62.5 million. These numbers represent an increase of 3.0%, or 4.6 million pounds (2 076 tonnes) in quantity and USD 1.3 million (2%) in value compared with 2006. Most of these landings consisted of tuna and swordfish landed in American Samoa and other off-shore ports.

At-sea processed fishery products (Pacific groundfish that are processed at-sea aboard US vessels), on a round (live) weight basis, exceeded 1.3 million tonnes in 2007 and comprised about 34% of total domestic landings. Comprehensive information on landing port or percentage of catch transferred to transport ships for delivery to foreign ports is unavailable, although Dutch Harbor, Alaska, is the primary port for groundfish harvested in the Bering Sea.

Based on US Coast Guard and NMFS federal permit databases, it is estimated that there are 25 000 to 27 000 commercial fishing vessels licensed to operate in the US EEZ, and that this number has not changed significantly in recent years. NMFS is currently developing a national permit database that will enable the agency to readily quantify the total number of federally permitted craft.

In 2006, there were 63 199 workers employed in 3 228 wholesale and processing plants. Processors employed 40 823 workers at 892 plants while wholesalers employed 22 376 workers at 2 336 plants. US economists have recently completed a national employment survey of the commercial harvest and for-hire fleets, but the data analysis is not yet complete.

In 2007, the commercial marine fishing industry contributed USD 34.2 billion (in value added) to the US Gross National Product. However, the evidence suggests that overall economic performance of the fleet has been at a non-optimum level for many years

(although performance varies substantially between fisheries). In a Congressionally mandated report (April 2008), NMFS acknowledged that high levels of excess harvesting capacity were found in one-third to one-half of the assessed federally managed fisheries and fleet sectors, likely contributing to poor economic profitability.[2]

Management

The US Coast Guard, under the Department of Homeland Security, is charged with the maritime authority and infrastructure to project federal law enforcement presence in the US EEZ. The Coast Guard continues to measure the rate of compliance with federal regulations. The 2006 observed domestic compliance rate was 96.6% and the 2007 rate was 96.3%, both slightly below the program goal of 97%. The NMFS Office for Law Enforcement (OLE) is the primary investigative arm of the Federal government regarding the enforcement of federal fisheries laws and regulations. OLE continues to investigate both criminal and civil violations. Ongoing investigative work has revealed the existence of complex schemes to harvest, process, sell, import, and export fish and seafood products illegally. There has also been a significant increase in the identification of ongoing international violations as revealed by investigations that have identified numerous multinational/international schemes to smuggle both wild-caught and aquaculture seafood products into the United States.

The United States continues to promote the use of technology to enhance investigations and compliance. NMFS has increased the number of fisheries covered by VMS to almost 6 000 US-flag vessels in various fisheries in every region of the United States. By mid-2007 the US had disbursed USD 2.9 million to fishermen through an arrangement with the Pacific States Marine Fisheries Commission to reimburse them for the purchase of VMS units (1 239 vessels). The United States is also engaged in global efforts to apply VMS to various international arenas. NOAA remains committed to fulfilling its international enforcement obligations under various treaties and agreements and continues to host the International Network for Monitoring, Control and Surveillance.

The MSMFCA, as amended by the Sustainable Fisheries Act of 1996, requires that the Secretary of Commerce report annually to Congress and the Regional Fishery Management Councils on the status of US fisheries.[3] Status determinations are generally made during a formal review of a scientific stock assessment using the best available scientific information. The Councils are required to develop programs to end overfishing and rebuild overfished stocks and to prevent overfishing from occurring for the stocks approaching an overfished condition, generally in a time period not to exceed 10 years. In this context, "overfished" refers to the state of the stock, while "overfishing" refers to the fishing pressure on the stock.

NMFS continues to increase the number of assessed stocks (here "stocks" includes both stocks and stock complexes). In 2007, NMFS reviewed status determinations for 528 individual stocks and stock complexes, and made new "overfishing" and "overfished" determinations for 179 stocks and stock complexes. This latest review shows that 17% of stocks/stock complexes with known overfishing determinations continue to be subject to overfishing, while 24% with known overfished determinations are still overfished. Both of these rates represent modest reductions from the previous report, and, as a result, NMFS can report that the national fisheries management program is moving in the right direction.

NMFS introduced the fish stock sustainability index (FSSI) in 2005. The FSSI is a performance measure for the sustainability of 230 US fish stocks selected for their importance to commercial and recreational fisheries. The FSSI will increase as overfishing is ended and stocks rebuild to the level that provides MSY. The FSSI is calculated by assigning a score for each fish stock based on the following five criteria:

Table III.27.2. **Five criteria of fish stock sustainability index (2005)**

Criteria	Points awarded
"Overfished" status is known	0.5
Overfishing is not occurring	1.0
Biomass is above "overfished" level	1.0
Biomass is at or above level that produces MSY	1.0

The maximum score each stock may receive is 4. The value of the FSSI is the sum of all 230 individual stock scores. The maximum total FSSI score is 920, achieved if all 230 stocks were to each receive a score of 4. The most recent FSSI score – for the second quarter of 2008 – is 532. This total score has been increasing steadily since the FSSI rating system was adopted.[4]

The United States employs a wide range of management instruments, including total allowable catch (TAC) levels, gear and vessel restrictions, seasonal and area closures, restrictions on size/weight, and individual fishery quotas to manage its stocks. The majority of US fisheries are managed under limited entry or regulated open access programs using a variety of these tools to manage catch, but a growing number of federally managed fisheries employ some form of exclusive harvest quotas, including individual fishing quotas, fishing co-operatives, and community quotas. For more information on fisheries management tools, see the government financial transaction section of this report.

US federal fisheries management has demonstrated on a selective and case-by-case basis a willingness to devolve management authority to local (state) government and to user groups. An example of devolution from federal to state authorities is West Coast Dungeness crab, which has been turned over to the states of California, Oregon, and Washington under section 306 of the reauthorized Magnuson-Stevens Act. In addition, the growing interest in fishing co-operatives and sector allocations can be viewed as examples of devolution, since, in both cases, the user group would exercise certain authorities that otherwise would be provided for in a federally approved fishery management plan. Fishing co-operatives exist in several Alaska and Pacific Northwest fisheries, and sector allocation programs have been implemented in the Northeast Multispecies fishery management plan.

To ensure that federal fisheries management prevents and ends overfishing, the latest comprehensive reauthorization of the Magnuson-Stevens Act, signed into law on 12 January 2007, introduced two new mandates: annual catch limits (ACL) and accountability measures (AM). ACLs must be set at a level that overfishing does not occur in the fishery, and must be in place by 2010 in fisheries subject to overfishing and by 2011 in all other federally managed fisheries. ACLs will be enforced by AMs, which may be in-season actions or "payback" measures taken in the following year. NMFS has conferred extensively with the Councils on the specifics of ACLs and AMs, and recently published a final regulation that will provide detailed guidance on their implementation. NMFS expects a final rule on ACLs and AMs to go into effect in early 2009.

Foreign investments in the US fish harvesting sector are regulated by flagging, ownership, and cabotage requirements that were amended in the American Fisheries Act of 1998. Essentially, fishing vessels participating in US fisheries must be documented under US Coast Guard regulations, built in the United States, and subject to a 75% US ownership requirement. Foreign ownership of quota shares in three current ITQ fisheries is prohibited under the FMPs. Foreign investments in other sectors *(e.g.,* processing, trading, marketing, and aquaculture) are not currently subject to analogous restrictions.

No major changes have occurred during the review period with respect to foreign access arrangements to US fishery resources or US access to fisheries outside the US EEZ. Only one Governing International Fishery Agreement (GIFA) is in force (Russia). Historically, small quantities of Atlantic herring and Atlantic mackerel were available for joint venture operations in US waters (*i.e.,* operations in which US-flag vessels harvest fish specified as available for joint ventures and sell their catches over-the-side for processing by authorized foreign vessels). However, no species were available for joint ventures processing in 2006 or 2007. No US fishers have operated outside US waters under this specific type of bilateral fisheries access arrangement for a decade.

US access to foreign fisheries primarily occurs via the provisions of the 1987 Multilateral Treaty on Fisheries between the governments of Certain Pacific Island States and the government of the United States of America (also known as the South Pacific Tuna Treaty). Under the terms of the Treaty, US-flag tuna purse seine vessels have access to fisheries in the waters of the 16 Pacific Island nations that make up the Forum Fisheries Agency (FFA). The US tuna industry currently pays USD 3 million in annual access fees for up to 40 licenses, with an additional five licenses for joint ventures. Under an economic assistance agreement associated with the South Pacific Tuna Treaty, the US government annually provides USD 18 million in economic support to the Pacific Island Parties. In recent years, the number of US vessels licensed under the Treaty has fluctuated, reaching a low of 11 vessels operating in the central and western Pacific in 2006. Since 2007, however, this trend has been reversed through a concerted effort by the US industry to revitalize the US fleet. As a result, 29 vessels are licensed to fish during the current 2008-2009 licensing period. We expect the US industry will be using all the available licenses within the next 2 years.

NMFS and its partner agencies within the Federal government work with a variety of domestic and international partners to promote ecosystem-based fisheries management, control fishing capacity, combat IUU fishing, strengthen regional fisheries management organisations, secure equitable access for US fishers to shared living marine resources, reduce bycatch, increase assistance to developing states, and ensure food security. To achieve these goals the United States participates in regional fisheries management organisations, multilateral and bilateral environmental agreements/fora, and free trade negotiations. In addition, the US conducts workshops on living marine resource conservation, management, and enforcement issues and builds partnerships to improve marine conservation.

Over the reporting period, the United States joined multilateral negotiation of a regional fisheries management organisation in the South Pacific on non-highly migratory species. Negotiations were concluded on the "Antigua Convention" to revise and update the 1949 Convention establishing the Inter-American Tropical Tuna Commission (IATTC). The Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean entered into force, with the United States ratifying as a Party to that Convention.

In 2006, the US chaired and participated in the UN Fish Stock Review Conference, where delegates reaffirmed the principles of UNFSA and promoted ecosystem and precautionary approaches in the management of the highly migratory fish stocks and straddling stocks.

Recreational fisheries

Recreational fishing in the US EEZ is defined by the Sustainable Fisheries Act (SFA) of 1996 as "fishing for sport or pleasure". Federal regulations do not provide for the sale of recreationally caught fish. However, each state sets regulations for its waters and, in a few cases, state regulations allow for the sale or barter of recreationally caught fish. With the exception of highly migratory species, recreational fishing regulations are, in most cases, set by each state. For species under federal regulation, state and federal governments work together to develop appropriate regulations. The reauthorized Magnuson-Stevens Act requires NOAA to establish a "national saltwater angler registry" to account for all fishing occurring in federal waters or anywhere for anadromous species. The new registry is set to go into effect 1 January 2009. With the information from this registry, NMFS will be in a far better position to take into account the impacts of management measures on recreational fisheries. Many states require a saltwater fishing license, and these states would likely be exempted from the federal registration requirement. Daily recreational catch limits vary by state and species – from zero for some depleted species to unlimited amounts for other more abundant species. Size limits and gear restrictions are also applied in some fisheries.

In 2007, nearly 13 million people made more than 86 million marine recreational fishing trips to the Atlantic, Gulf, and Pacific coasts. The estimated total marine recreational catch was 468 million fish. These figures represent a 1% increase in the number of fishing trips and a 1% decline in the total catch over 2007.[5] Nearly 58% of the marine recreational catch was released live.[6] The economic importance of marine recreational fishing to the US economy was last estimated in 2000. Economic importance in 2000 was estimated at over USD 30.5 billion in sales and USD 12.0 billion in income. In addition, marine recreational fishing supported over 350 000 jobs.[7]

The US government has a trust responsibility to federally recognized entities, including tribes, nations, villages, pueblos, etc. These entities are tribal governments, exercising a measure of governmental authority over their membership and territory. Special arrangements and provisions relating to fishing rights arise from various treaties, statutes, and court rulings. As an example, federally recognized tribes on the Pacific Coast generally are treated as co-managers of fisheries resources. The Magnuson-Stevens Act grants them a seat on the Pacific Fishery Management Council, which develops conservation and management measures for federal fisheries off the coasts of California, Oregon, and Washington. As another example, in Alaska, the Western Alaska Community Development Quota (CDQ) Program provides a unique harvesting privilege to 65 rural communities (of which indigenous people comprise 79% of the population) on the Bering Sea coast of Alaska. The CDQ Program currently allocates a portion of the annual quota of several species, with an estimated value of about USD 55 million per year, to six non-profit corporations that represent the eligible western Alaska communities. Native people in Hawaii and the Western Pacific region are not federally recognized governmental entities. However, the Magnuson-Stevens Act authorizes a Western Pacific Community Development Program and Western Pacific Community Demonstration Project Program to

provide access to fisheries for these groups and to promote traditional indigenous fishing practices. In addition, both the Endangered Species Act and Marine Mammal Protection Act expressly provide for Native Alaskan subsistence activities.

Aquaculture

A national marine aquaculture summit, the introduction of the National Offshore Aquaculture Act, a new 10-Year Plan for Marine Aquaculture, and an alternate feeds initiative were among the highlights for NOAA in 2007.

The National Offshore Aquaculture Act of 2007 was transmitted to Congress in March 2007 and subsequently introduced in the House and the Senate. If enacted, the bill would give NOAA the authority to permit and regulate aquaculture in federal waters – from state waters to 200 miles off US coasts. The bill would also establish a research program for all types of marine aquaculture.

Estimated production numbers and values are not yet available for 2007. New figures available for 2006 show a 16 000 metric ton decrease in production and a USD 129 000 increase in value from 2005 (Table III.27.3). According to the US Department of Agriculture National Agricultural Statistics Service, there were 4 309 farms in 2005. This is an increase of 281 farms since the first national census of aquaculture, which reported 4 028 farms during the 1998 crop year.

Table III.27.3. **Estimated US aquaculture production (1997-2006)**

	Volume (000 tonnes)	Value (USD 000)
1997	348	910
1998	358	939
1999	382	987
2000	373	973
2001	371	935
2002	393	882
2003	420	961
2004	408	1 065
2005	376	1 115
2006	360	1 244

NMFS. Fisheries of the United States.

Fisheries and the environment

Protection or management of living marine resources is derived primarily from three federal statutes: the reauthorized Magnuson-Stevens Fishery Conservation and Management Act, the Endangered Species Act (ESA), and the Marine Mammal Protection Act (MMPA). It is the policy of the US Department of Commerce to apply the requirements of the National Environmental Policy Act (NEPA) to any conservation or management actions NMFS conducts under these three statutes. NEPA provides a mechanism under which the requirements of these three conservation statutes, and others as appropriate, are integrated into the federal decision-making process. All four statutes contain substantial opportunity for public review and comment before the agencies complete final actions, except in cases where short-term emergency protections are required. To improve the quality and timeliness of NEPA assessments of commercial fisheries plans, section 304 of the reauthorized Magnuson-Stevens Act calls for revising and updating NMFS procedures for compliance with NEPA.

Government financial transfers

Government financial transfers (GFTs) totalled USD 2 238 million in 2007, an increase of 8% from 2006 (Table III.27.4). General services accounted for around 37% of total GFTs, while direct payments (including market price support) accounted for 25%, while no cost reducing transfers were made.

The United States does not have an official fisheries sector social assistance program. However, the United States continues to address impacts on fishing communities in various ways. One example is National Standard 8 under the Magnuson-Stevens Act, which states that "conservation and management measures shall take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities." Under this standard, NMFS is defining fishing communities and profiling these communities to enable improved social impact analyses for all federally managed fisheries.

Disaster assistance, under provisions in the Interjurisdictional Fisheries Act (IFA) and the MSFMCA, provides another example of social assistance. The IFA provides that the Department of Commerce can provide disaster assistance to states determined by the Secretary of Commerce to have been affected by a commercial fishery failure or serious disruption affecting future production due to a fishery resource disaster. Such disasters may arise from either natural or undetermined causes. Funds as appropriated may beUSed for any purpose the Secretary determines appropriate to restore an affected fishery or to prevent future failures. In addition, the IFA enables the Secretary to provide assistance to persons engaged in commercial fisheries, for measures to alleviate harm incurred as a direct result of a fishery resource disaster.

In addition, some individual states have social assistance programs. For example, in Alaska, the Fishermen's Fund program provides for the treatment and care of Alaska licensed commercial fishermen who have been injured while fishing onshore or offshore in Alaska. Benefits from the Fund are financed from revenue received from each resident and non-resident commercial fisherman's license and permit fee.

The United States does not have a statutory structural adjustment program *per se*, but has implemented specific programs that address some of the same objectives as structural adjustment (reduction of fishing capacity). Measures to address capacity fall in three broad categories: limited entry and other permit programs; exclusive quota programs, including limited access privilege programs (LAPPs, a new term included in the reauthorized Magnuson-Stevens Act), individual fishing quotas (IFQs), community development quotas (CDQs), and co-operatives; and buybacks.

NMFS has the authority, under the Magnuson-Stevens Act, to conduct a fishing capacity reduction program. Funding for such programs is authorized under the Act, which allows NMFS to obtain funding via public, private, industry, and/or non-profit sources. Assistance may not be provided for a fishing capacity reduction program unless adequate conservation and management measures are in place for that fishery. Pending and future permit and vessel buybacks are likely to be strictly industry-funded.

From 1994 to 2007, the United States implemented 10 permit and vessel buybacks with total costs of more than USD 313 million, the largest of which occurred in the Bering Sea and Aleutian Islands (BSAI) non-pollock groundfish fishery, Pacific groundfish fishery,

Table III.27.4. **US government financial transfers marine fisheries for 2005-2007 (USD million)**

	2005	2006	2007
Revenue enhancing transfers (from consumers): Market price support (1)	68.9		
Transfer effects of US tariffs on fishery imports[1]	68.9	66.7	68.2
Revenue enhancing transfers (from government budgets): Direct payments (2)	23.7		
Promote and develop fisheries fund[2]	12.0	6.5	6.7
USDA Surplus Commodity Removal[3]	11.7	2.2	0
Payments for the permanent withdrawal of fishing vessels[4]	0	0	0
Fisheries Disaster Relief[5]	0	188.0	170.4
Total direct payment revenue enhancing transfers (3) = (1) + (2)	92.6		
Cost reducing transfers (4)	2.3		0
NMFS Finance Program[6]	0	0	0
Capital Construction Fund[1]	2.5	2.2	2.2
NMFS Fishermen's Contingency Fund	0.2	0.2	0.2
Economic development assistance to FFA members		18	18
Total revenue enhancing and cost reducing transfers (5) = (3) + (4)	94.9		
General services transfers[8] (6)	1 137.40		
Fisheries research and Mgt services[9]	297.9	281.2	300.2
Protected resources research and Mgt services	175.5	145.0	141.0
Habitat conservation	53.2	46.6	43.5
Sustainable Habitat Mgt	33.3	21.8	19.8
Fisheries Habitat Restoration	19.9	24.8	23.7
Enforcement and surveillance	858.4	1 026	1 039
Dept. of Homeland Security/Domestic Coast Guard Fisheries Law Enforcement[10]	814.8	953.4	961.5
NMFS Enforcement and observers	26.8	56.9	60.1
NMFS Co-operative Enforcement Programs	16.8	15.8	17.5
Sea Grant College Program[11] (fisheries projects)	6.7	5.5	3.8
Sea Grant College Program (aquaculture projects)	4.3	2.1	1.0
Saltonstall-Kennedy Development Grants[12]	12.2	0.2	201
Fisheries Infrastructure[13]	n.a.	n.a.	n.a.
Expenditures of State Fisheries Agencies[14]	n.a.	n.a.	n.a.
Aquaculture[15]		5.2	6.8
– National Marine Fisheries Service (NMFS + OAR)	9.2	5.2	6.8

*. NLA refers to subcategories that no longer exist in the new budget structure.

**. NA refers to numbers that were not available or could not be obtained for reasons detailed below.

1. These figures represent total US tariff revenues for imports of edible fish and shellfish products. Since most fishery imports are duty-free, the majority of these amounts are accounted for by imports of a handful of processed products such as canned tuna, sardines and oysters, smoked salmon, and frozen crabmeat.

2. The USDA market access program as relates to marine capture fisheries provides funding to the Alaska Seafood Marketing Institute with some small amounts going to the Quality Samples Program budget (average: USD 37 k per annum). The funding cycles reflected in the 2006 and 2007 numbers are however for 18-month periods and are not on a calendar year basis. The figures for each year are therefore inflated by approximately 33%.

3. During the review period, USDA purchased 97 600 cases (2.1 million lbs) of pink salmon at a cost of USD 2.2 million in May 2006. No surplus removal purchases were made for fish products during FY 07.

4. This category covers, *inter alia*, assistance to address impacts of US management mandates and capacity reduction schemes. The Bering Sea/Aleutian Islands Crab Buy Back took place in 2005 and the Bering Sea/Aleutian Island Non-Pollock Ground Fish in 2007, with no government transfer. The entire amount, of these loans, are being repaid from future landings fees, including loan interest at a market rate There was no activity in May 2007. Other agencies have contributed to the Gulf Coast Disaster Relief.

5. Fisheries Disaster Relief includes USD 188 M appropriated for Hurricanes Katrina and Rita plus USD 170.4 M appropriated for West Coast Salmon.

6. The Fisheries Finance Program (FFP) provides direct loans to industry for various purposes (some repair and maintenance of fishing vessels; aquaculture; buybacks; and purchase of IFQ shares in the halibut and sablefish fisheries). It is important to note, that due to the relatively high interest rates charged on these loans and the relatively low default rate, FFP is a self-financing program. In other words, the program historically has not resulted in a net outflow of government funds.

Table III.27.4. **US Government financial transfers marine fisheries for 2005–2007 (USD million)** *(cont.)*

	2005	2006	2007
Total GFTs (7) = (5) + (6)	1 232.3	2 256.8	2 238.4
Total ex-vessel fisheries revenues **(8)**	3 932.1		
Transfers/total revenues (%) **(9) = (7)/(8) x 100**	31.3%		
Revenue Enhancing and Cost reducing transfers/total revenues (%) **(11) = (5)/(8) x 100**	2.4%		
General services transfers/total revenues (%) **(6)/(8) x 100**	28.9		

1. The figures given for the CCF tax deferral program represent an estimate of the economic impact on the industry of deferring these taxes. Annual deferred taxes are for the most part recaptured at a later date through lower depreciation allowances. The effective transfer to industry in the form of lower taxes has been calculated at about USD 2.2 million based on a 6.25% estimate.

8. A new budget structure for the National Oceanic and Atmospheric Administration became effective in FY2002 and again in 2005.

New footnote 8a for economic development assistance line: Under an economic assistance agreement associated with the South Pacific Tuna Treaty, the US government annually provides USD 18 million in economic support funds to the Pacific Island Parties.

9. This number includes funds provided via the Mitchell Act (16USC 755-757; 52 Stat. 345) which authorizes the Secretary of Commerce to carry on activities for the conservation of fishery resources in the Columbia River Basin. The Mitchell Act specifically directs establishment of salmon hatcheries, the conduct of engineering and biological surveys and experiments, and the installation of fish protective devices. The major objective of this program has traditionally been to mitigate the negative effects of lost salmon habitat caused primarily by the building of dams for hydroelectric power, and also by other factors, such as agricultural runoffs, logging, and urban development. Over the years, Mitchell Act hatchery production has changed to meet two other objectives. First, some hatchery production has shifted to areas above the Bonneville Dam in order to provide harvestable salmon under the Columbia River Treaty Indian Trust. Second, a portion of the hatchery production is being shifted to fulfil a conservation role in preserving endangered salmon stocks (captive breed) and supplementing their recovery. With the application of the Endangered Species Act throughout the Columbia River Basin, substantial changes have been, and will continue to be, required of the Mitchell Act Program. The program was funded at USD 16.9 million and USD 16.8 million for 2006 and 2007, respectively.

10. US Coast Guard fisheries law enforcement has domestic and foreign components, with the bulk of spending allocated to domestic enforcement. 2007 spending reflect enacted budget numbers; actual expenditures have not yet been reconciled or published.

11. The entire Sea Grant program covers a range of activities unrelated to fisheries. The transfer amount given in this table is the share of the Sea Grant program that supports fisheries and aquaculture science programs. It should be noted that many of these programs support basic science that is not applied to a specific fisheries and that all project reports are available to the public.

12. The entire S-K grants program is listed under "general services" because practically all of these grants are awarded to support basic scientific and management missions.

13. Fisheries infrastructure, including the construction, maintenance and modernisation of fishing ports and landings facilities, is funded by many Federal and local agencies, such as the Army Corps of Engineers and various Port Authority and other local public works agencies. These transfers to fisheries infrastructure were not calculated and are therefore not included in this submission.

14. States with fairly large fisheries agencies include: Maine, Massachusetts, New York, New Jersey, Virginia, Florida, Texas, California, Oregon, Washington, Alaska, and Hawaii. These agencies generally deal with both freshwater and marine fisheries, and are funded from both State and Federal sources. It is assumed that the large bulk of their programs fall in the "general services" category of transfers. No estimate of these State transfers is available.

15. Spending on aquaculture activities is spread across many state and Federal Agencies. The numbers here only represent the NMFS Office of Aquaculture programs. This number is thus an underestimate as it does not include congressional earmarks for aquaculture, aquaculture spending by other NMFS programs, or aquaculture spending by other US agencies (such as the USDA).

and the BSAI crab fishery. With the exception of the BSAI crab fishery, all vessel/permit buybacks to date have involved some public funding. Aggregate public costs have amounted to almost USD 70 million, or approximately 25% of total buyback costs.

Use of exclusive quota programs and co-operatives to rationalize fisheries is also increasing. Under LAPPs and IFQ regimes, major reductions in capacity have occurred in the BSAI crab, surf clam/ocean quahog, South Atlantic wreckfish, and Alaska halibut/sablefish fisheries. LAPPs and IFQ programs have recently been approved for the Gulf of Mexico red snapper fishery, and a pilot program was implemented for the Central Gulf of

Table III.27.5. **Fishing Capacity Reduction Programs (Buybacks)**
(USD million)

Program	Buyback			Industry
	Year	Amount	Appropriation	Loan
Authorised industry funded buybacks (completed)				
Northeast multispecies	1995	1.89	1.89	
Washington salmon	1995	3.88	3.88	
Northeast multispecies	1996	22.50	22.50	
Washington salmon	1996	5.08	5.08	
Texas shrimp	1997	1.40	1.40	
BSAI pollock	1998	90.00	15.00	75.00
Northeast multispecies	2002	10.00	10.00	
Pacific coast groundfish	2003	45.70	10.00	35.70
BSAI crab	2004	97.40		97.40
BSAI non-pollock groundfish	2007	35.00		35.00
Total		**312.85**	**69.75**	**243.10**
Authorised industry funded buybacks (not completed)				
BSAI non-pollock groundfish		40		
Northeast multispecies		45		
New England lobster		50		
SE Alaska purse seine salmon		25		
GOM reef fish		35		
Total		**155**		

Alaska rockfish fishery. In addition, harvest co-operatives were established in two federally managed fisheries starting in the mid- and late-1990s – Pacific Coast whiting and Bering Sea pollock – resulting in rationalized harvesting operations and reduction in overcapacity or transfer of some overcapacity to other fisheries. A new co-operative was recently implemented in the BSAI Groundfish (non-pollock) fishery.

In general, during the 2006–2007 reporting period, the trend toward increased use of exclusive access continued, as federal fisheries management continued to steadily move away from the traditional regulated open access and other limited access approaches. In 2006, the Administration including in its Ocean Action Plan an emphasis on increasing the use of market-based approaches to fisheries management. The number of these types of programs has doubled since 2002 (from 6 to 12 fisheries), and with increased funding to support their development, this trend is expected to continue. These exclusive access arrangements have assumed many forms, including LAPPs, IFQs, fishing co-operatives, community quotas, and sector allocations. These developments were most evident in the rationalization plans in Alaska and in the Gulf of Mexico red snapper fishery, but are also seriously being considered in the fisheries for Pacific groundfish, mid-Atlantic tilefish, and Gulf of Mexico grouper.

It should also be noted that NMFS issued a Congressionally mandated report on excess harvesting capacity in federally managed fisheries in April 2008, providing the first-ever national review of capacity estimates in nearly all major commercial fisheries.

Post-harvesting policies and practices

Seafood inspection in the United States is handled by an extensive framework of federal and state agencies. The Food and Drug Administration, under the Department of Health and Human Services, has the primary authority and responsibility under the Food,

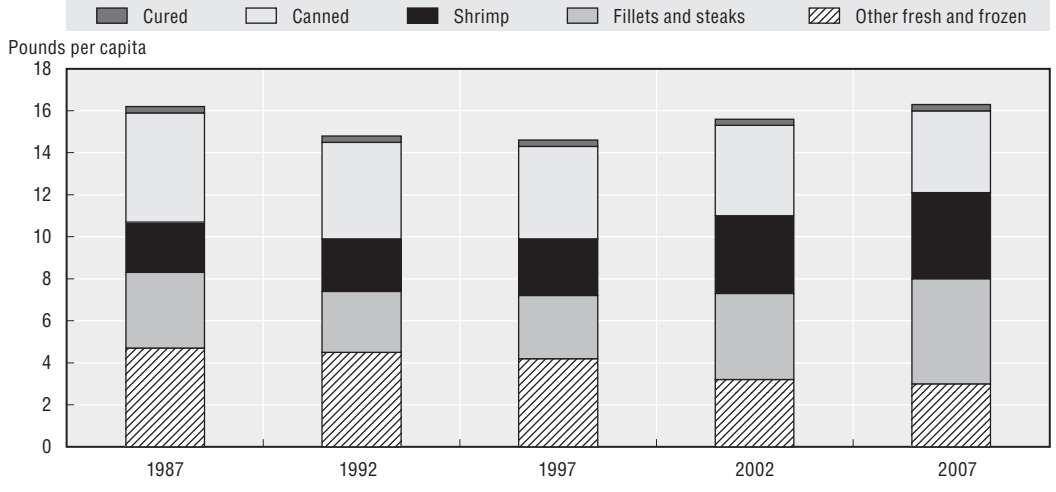
Drug and Cosmetic Act for the safety, wholesomeness, and proper labelling of the seafood supply in the United States. The US Department of Commerce, through NMFS, operates a fee-for-service Federal Seafood Inspection Program (described in the Agricultural Marketing Act as amended), which provides inspection and certification services to requesting parties also with regard to food safety, wholesomeness, and proper labelling with additional effort on food quality concerns. Both agencies provide export certification of seafood from the United States. Imports of seafood are primarily under the jurisdiction of the Food and Drug Administration.

NMFS has launched FishWatch (*www.nmfs.noaa.gov/fishwatch/about_us.htm*) to help consumers identify the status of fishery stocks and understand the management and science requirements involved with building and maintaining sustainable fisheries. FishWatch provides consumers with relevant, factual data to assist in decisions about sustainable seafood. These data are taken from a variety of NOAA sources, including stock assessments, fisheries surveys, fisheries management plans and amendments, environmental analyses, and co-operative research. These sources were selected to ensure that the information on FishWatch is the most timely and accurate information available on US fisheries.

Markets and trade

US per capita consumption of edible fishery products was 16.3 pounds (7.4 kg) of edible meat per person in 2007, slightly below the 2004 record per capita consumption of 16.6 pounds (7.6 kg). The majority of seafood consumed in the United States is in either fresh or frozen forms, followed by canned products consisting mostly of tuna (Figure). The importance of fillets and steaks and shrimp has increased significantly in the last decade. US consumers spent an estimated USD 68.4 billion for fishery products in 2007. The 2007 total includes USD 45.8 billion in expenditures at food service establishments (restaurants, carry-outs, caterers, etc.); USD 22.1 billion in retail sales for home consumption; and USD 474.2 million for industrial fish products.

Figure III.27.1. **US per capita consumption of seafood (1987-2007)**



Source: NMFS.

US imports of edible fishery products in 2007 were valued at a record USD 13.7 billion, USD 0.3 billion higher than in 2006. However, the quantity of edible imports was declined by 53.8 million pounds from 2006 to total 5.3 billion pounds. The volume of shrimp imports declined by 5% from 2006 to 2007, although shrimp still accounted for 28% of the total value of imports. Salmon remains the second largest import category, valued at USD 1.6 billion in 2007.

US exports of edible fishery products in 2007 were 2.9 billion pounds valued at USD 4.3 billion, a decrease of 97.9 million pounds and an increase of USD 30.9 million when compared with 2006. The major fresh and frozen commodities were salmon (327.4 million pounds valued at USD 467.1 million), surimi (310.6 million pounds valued at USD 289.9 million), and lobsters (60.7 million pounds valued at USD 390.9 million). Canned items were 176.9 million pounds valued at USD 268.9 million.[8]

The US trade policy for fish and fisheries products is driven by a number of underlying precepts. The United States recognizes that, without sustainable fisheries, there can be no long-term, commercially viable trade in seafood. Therefore, the concepts of conservation and sustainability are at the core of US trade policy. Additionally, the United States takes the position that tariffs and quantitative restrictions on trade are, for the most part, ineffective substitutes for good management. As a country with relatively low tariffs on fish and fish products, the United States supports liberalizing global trade in these products. To accomplish these outcomes, the United States has actively promoted market access and fisheries subsidies reform negotiations at the World Trade Organization. The United States engages its trade partners bilaterally, regionally, and multilaterally. Since 1985, the United States has completed 15 Free Trade Agreements covering 20 countries, of which 10 have entered into force.

After years of negotiations between the United States and the European Union, in 2006 the European Union published a new set of decisions recognizing the US seafood inspection system as equivalent to the European system. This recognition will facilitate seafood trade between the United States and the European Union by removing technical barriers, such as 100% controls at border inspection posts and restricted circulation of US seafood products currently limited to the country of first port of entry. US exporters still need to be approved and registered by the Food and Drug Administration before exporting seafood to the European Union. Since April 2006, US exporters are required to use a new public health certificate to export US fishery and aquaculture products to the European Union. Both the FDA and NOAA are competent authorities capable of issuing the certificates. In 2007, the European Union adopted its second Hygiene Package aiming at harmonizing existing EU food and feed safety legislation, thus creating new certificates again. It led the United States to negotiate a special status with the European Union regarding the certification of fishery and aquaculture products. As a result, US exporters are still using public health certificates coming from the 2006 legislation and not from the 2007 hygiene package. A revision of the US fishery inspection system is planned by the EU Food and Veterinary Office for the first semester of 2008.

Outlook

Despite the cessation of active negotiations under the Doha Development Agenda, the United States will continue to work toward liberalizing trade in the fisheries sector. To this end, the United States will pursue bilateral and regional free trade agreements as

appropriate and, should the Doha Round of multilateral negotiations be revived, continue working toward a successful conclusion of the Doha Development Agenda or its successor at the World Trade Organization.

The National Offshore Aquaculture Act of 2007 was transmitted to Congress in March 2007 and subsequently introduced in the House and the Senate. If enacted, the bill would give NOAA the authority to permit and regulate aquaculture in federal waters, from state waters to 200 miles off US coasts. The bill would also establish a research program for all marine aquaculture.

Notes

1. The one exception is highly migratory species along the Atlantic coast of the United States, which are managed directly by the National Marine Fisheries Service.
2. Report to Congress on Excess Harvesting Capacity in US Fisheries, 28 April 2008.
3. Status of US Fisheries Stocks Reports from 1997 to 2007 are available online at *www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm*.
4. The FSSI stock status updates are posted quarterly at *www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm#07*.
5. Additional years, species specific, and region specific data are available online at *www.st.nmfs.noaa.gov/st1/recreational/queries/index.html*.
6. The remainder of the data in this paragraph is being updated and should be available by end-September 2008
7. NMFS is currently conducting a study on marine fishing expenditures, expected to be completed in the next reporting period (2006-2007).
8. Quantities and values of imports and exports of specific products are available online at: *www.st.nmfs.gov/st1/publications.html*.

PART III

Chapter 28

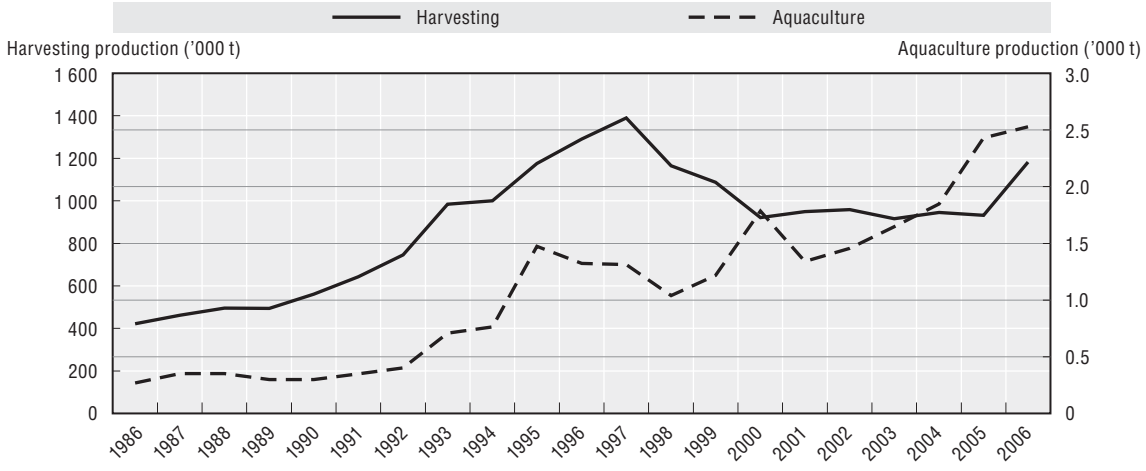
Argentina

Argentina

Summary of recent developments

- The fishery policy in Argentina intends to reconcile, through an adequate fisheries management scheme, the biological sustainability of stocks with the economic activity related to their exploitation. Main objectives of the fishery policy are the sustainability and profitability of the fishing activity. There are regulations for the annual assignment of fishing rights for some species as a preparatory step to the establishment of a ITQs system foreseen by the Federal Fisheries Law.
- The national fisheries administration has been recently reorganized. Within the Ministry of Economy and Production – Secretariat of Agriculture, Livestock, Fisheries and Food, the National Department of Fisheries Planning was created simultaneously with the Fisheries Economy Department and the Inland Fisheries Department.
- In the years 2006-2007 the Argentinean fisheries companies' profitability has seriously suffered the consequences of increases in production costs, particularly labor costs, fuel and cargo services, as well as stronger international competition in some key fisheries (squid, shrimp).

Harvesting and aquaculture production

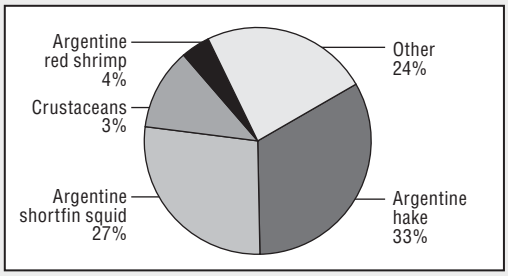


Source: FAO.

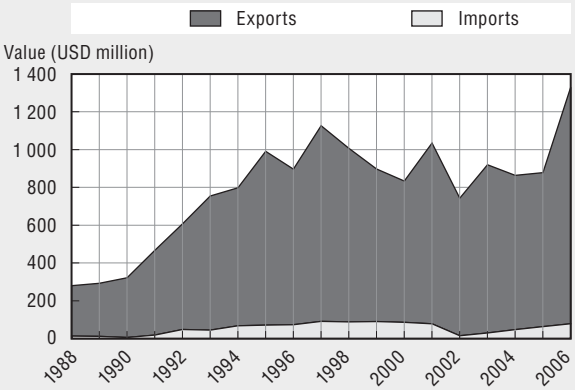
Key characteristics of the sector

- Capture production peaked in 1997 with almost 1.4 million tonnes but declined by 30% since then. Only in 2006 there was a sign of recovery.
- In 2006, fish accounted for about 67% of the total Argentinean capture production. Hake alone made up almost 50% of this share. The small share of crustaceans (4%) is dominated by Argentine Red Shrimp. Argentine Shortfin Squid is the main contributor to the shellfish and molluscs category which represented approximately 28% of the total catch.
- Imports of fishery products to Argentina are almost irrelevant but more than 90% of the total fishery production is exported, in particular to the EU markets.
- The total number of boats and tonnage decreased between 2003 and 2006. However, the average tonnage per boat and the average number of fishers per boat increased from 267 to 313 and from 18 to 27 respectively suggesting a trend towards a fleet with bigger vessels.

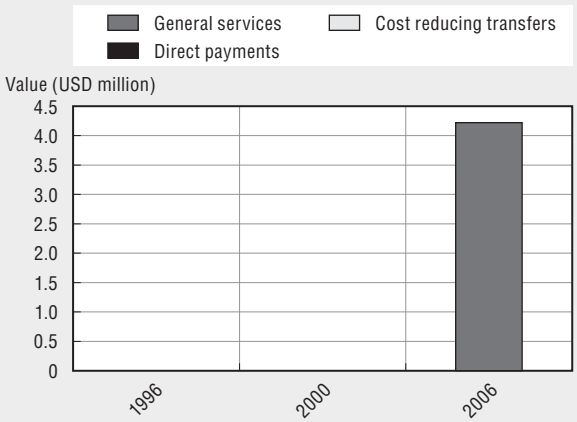
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	2003	2006
Number of fishers	15 234	16 917
Number of fish farmers	n.a.	n.a.
Total number of vessels	816	624
Total tonnage of the fleet	218 326	195 349

n.a.: Not available.

Legal and institutional framework

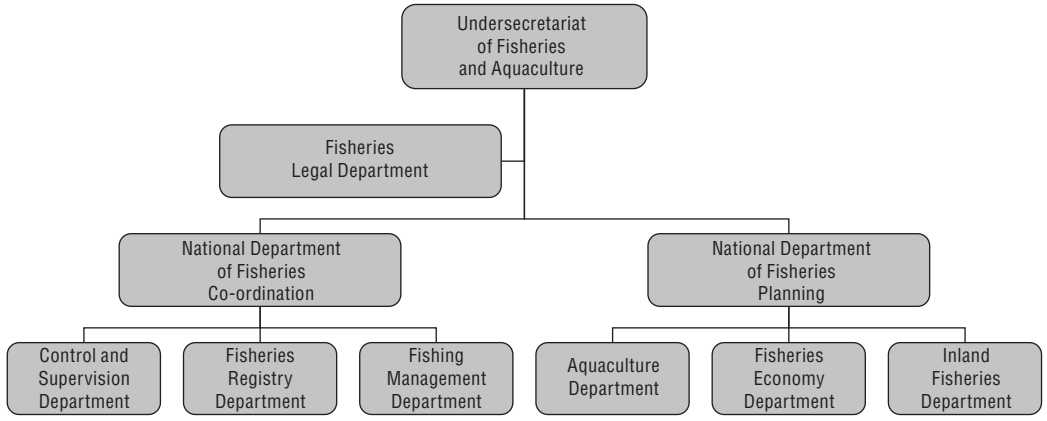
The National Constitution amended in 1994 establishes that the authorities should promote the rational use of natural resources and the preservation of biodiversity (Art. 41). The fishing activity is ruled by Law 24 922 (Fisheries Federal System) – from now on, "the Law"– passed in 1998.

The Law establishes that the living aquatic resources of inland waters and of the Argentine territorial sea adjacent to its coasts up to twelve nautical miles are under the jurisdiction of the provinces with maritime coasts with regard to exploration, exploitation, conservation and management.

There is one central federal fisheries authority, the Federal Fisheries Council, which is a body with national and maritime coastal province representatives, and a number of fisheries management bodies in the coastal provinces. The Council is responsible for the planning of national fisheries development, establishing national fisheries and research policies, setting total allowable catch (TAC) and individual transferable quotas, approving fishing permits and establishing fishing exploitation fees.

The executing agency of the Law is the Secretariat of Agriculture, Livestock, Fisheries and Food (SAGPyA) of the Ministry of Economy and Production. The Secretariat acts through the Under-Secretariat of Fisheries.

Figure III.28.1. **Organizational chart of the Ministry of Economy and Production – Secretariat of Agriculture, Livestock, Fisheries and Food**



Each coastal province has its own fishing management sovereignty, in accordance with the Fisheries Federal System. The provinces also develop fishing research activities.

SAGPyA is supported by two institutions: the National Institute for Fisheries Development and Research (INIDEP) and the National Agrifood Health and Quality Service (SENASA). The main responsibility of INIDEP is to define and execute fisheries research programs within the framework of the research policy established by the Federal Fisheries Council. It is also in charge of providing advice to the Federal Fisheries Council. The SENASA is the sanitary organism responsible for the control and certification of animal and plant products and sub-products. For importing and exporting living material, companies and individuals must be registered and should comply with SENASA and Customs requirements.

The Under-Secretariat of Fisheries and Aquaculture – Aquaculture Division – is the national executing agency with regard to aquaculture production. The 987/97 regulation of SAGPyA (recently modified in 2004) controls the fish farming sector production as well as the import and export of living aquatic resources, including ornamental species, for international and domestic trade. Aquaculture projects at national level can be accepted only subject to the prior inspection through provincial authorities.

The exploitation of living marine resources in maritime areas under Argentine jurisdiction can only be carried out by persons domiciled in the country, or juridical persons of private law constituted and working according to the national rules. The vessels to be used in the fishing activity must be registered in the national registry and must fly the national flag. Flag reservation for commercial fishing objectives cannot be changed while inside the inland waters and the territorial sea.

According to the Law, national companies may rent bare hull foreign vessels to catch surplus quotas of unexploited or underexploited species if they receive authorization by the Federal Fisheries Council. The State may allow vessels flying foreign flags to operate in Argentinean waters according to international treaties passed by a National Congress law. In Argentina there are no restrictions for foreign capital investment in fisheries or aquaculture.

Catch levels are controlled through TACs. The Federal Fisheries Council is working on an ITQ system foreseen by the Law. Since January 2008, the Council allocates catch authorizations for Patagonian toothfish (*Dissostichus eleginoides*) and Southern blue whiting (*Micromesistius australis*) to vessels with a catch history of more than 1% of the total catch over the past five years. Hake quotas are assigned annually per vessel in three months installments. A fishing permit only allows the vessels enter the waters; in order to fish, it is necessary to have an ITQ or a catch authorization for each species.

Capture fisheries

In 2006 there has been an increase of 24% in total landings compared to 2005. More than 90% of the total production is exported. Argentinean hake landings with a volume of 353 109 tonnes in 2006 remained stable compared to 2005. In 2007, catches decreased by 15%, mainly due to the 11.6% TAC reduction established by the authority to allow stock recovery.

The Argentinean squid fisheries consist of two management units, one south and one north of latitude 44 °S. Each of them includes two populations which are spawning in different seasons. The Argentinean fishery has been largely dependent on the southern management unit, specifically on the autumn-spawners, known as the South Patagonian Stock. This stock was so abundant that it allowed the recovery of the catches. However, many jiggers stopped fishing before the closing of the season because of falling prices. High catches outside the Exclusive Economic Zone, together with the accumulated supply in the European market, had a negative impact on international prices. As a consequence, squid average export prices fell by 39% during 2005-07. In the meantime, exploitation costs increased by 39%, primarily due to increases in salaries and fuel prices.

After a sharp decline in 2005, shrimp landings recovered to over 40 000 tonnes per year. In 2007, international prices of Argentinean shrimps fell by 95.3% in relation to 2005 prices.

Scientific advice provided by INIDEP for Argentinean hake stocks south of 41 °S showed a biomass increase of 2% between 2005 and 2006. Spawning biomass recovered to 1999 levels of more than 300 000 tonnes. INIDEP stated that in 2005 good recruitments observed

since 2000 have stopped. A period of low recruitments started. This is reflected in the juvenile evaluations of January 2006 and 2007. It is likely to see future drops of the reproductive biomass.

For longtail hake, total biomass as well as spawning biomass show positive trends in the period 1995-2001 compared to other annual classes, mainly those of 1993 and 1995. Since 2001, a slight decrease started, reducing biomass to 1.38 million tonnes at the beginning of 2006. The spawning biomass reached around 676 000 tonnes. The 2006 TAC of 200 000 tonnes was lowered to 189 000 tonnes in 2007.

Patagonian toothfish slightly recovered compared to the low catch level of 2005. The stock is lower than at the beginning of the 1990s and the spawning biomass is close to the limit established for fisheries characterized by longevity, slow growth and low fecundity. There are still precautionary measures in place (maximum by-catch quotas, minimum depth for capture, minimum sizes, et.).

Figure III.28.2. **Composition of the capture fishery fleet in 2006**

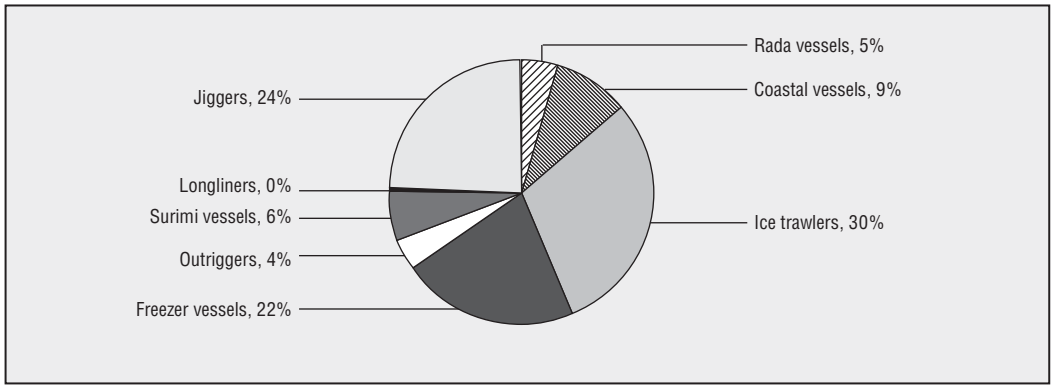
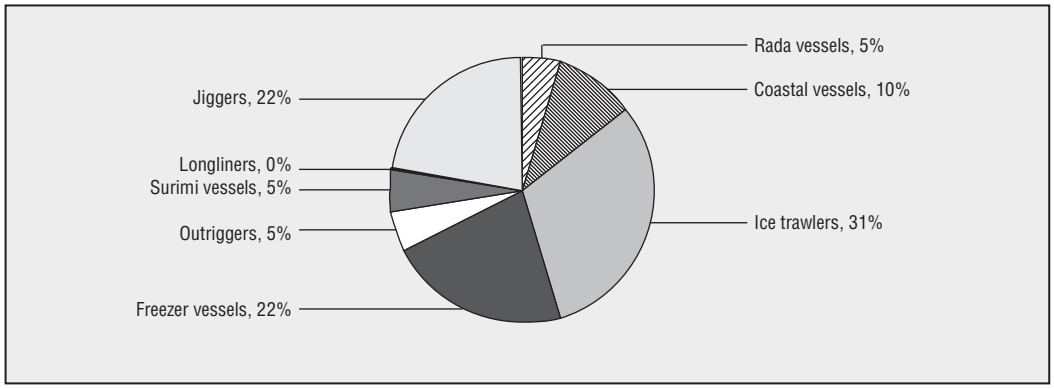


Figure III.28.3. **Composition of capture fishery fleet in 2007**



The so-called "variado costero" fishery targeting more than 40 species can be found in the Argentine jurisdiction as well as in the joint Argentinean-Uruguayan administration zone. This fishery targets species with low biomass and biological characteristics which make them highly vulnerable. Three kinds of fleets targeting different species operate in the fishery (inshore vessels, coastal vessels, high seas vessels). Since a precautionary criterion is applied, the INIDEP recommended limiting the fishing effort on the Buenos

Aires coast area from the coast line up to the 50 meter isobaths. Vessels of more than 25 meter length are not allowed to catch on this area. For chondrychtlians included in this fishery the Federal Fisheries Council has established measures to improve the scientific knowledge about their behavior in order to take proper management measures.

Management

Argentina uses a wide range of output and input controls and related technical measures:

- Patagonian toothfish, Southern blue whiting fisheries: transferable catch authorizations per vessel as percentage of the TACs are granted for five years. In the case of vessels transfers, the replacing vessel cannot exceeds the catch capacity of the replaced vessel. Patagonian toothfish fishing with longlines is subject to Federal Fisheries Council Resolution 7/08;
- Argentinean hake: catch authorizations per vessel, partially transferable, are granted for a three months periods of each calendar year; and
- other measures: occasional compulsory stops of vessels for specific fisheries, permanent or provisional closed areas for different vessel types, maximum by-catch for many species, devices to exclude juveniles, fish gear restrictions, minimum net and mesh size, trawl speed control, time restrictions, bathymetric restrictions, early closure of fishing seasons.

Argentina, as a member of CCMLAR, complies with all the regulations stated by the Convention, including the use of CDS for trading Patagonian toothfish. SSPyA participates actively in the Technical Mixed Commission of the Maritime Front – Treaty of the Rio de la Plata and its Maritime Front between Argentina and Uruguay. TACs for the Treaty Area, closed area limits, season closures, etc., were established. Every three months, the performance of the Argentine fishing fleet in the area of the Treaty is documented on the SAGPyA website.

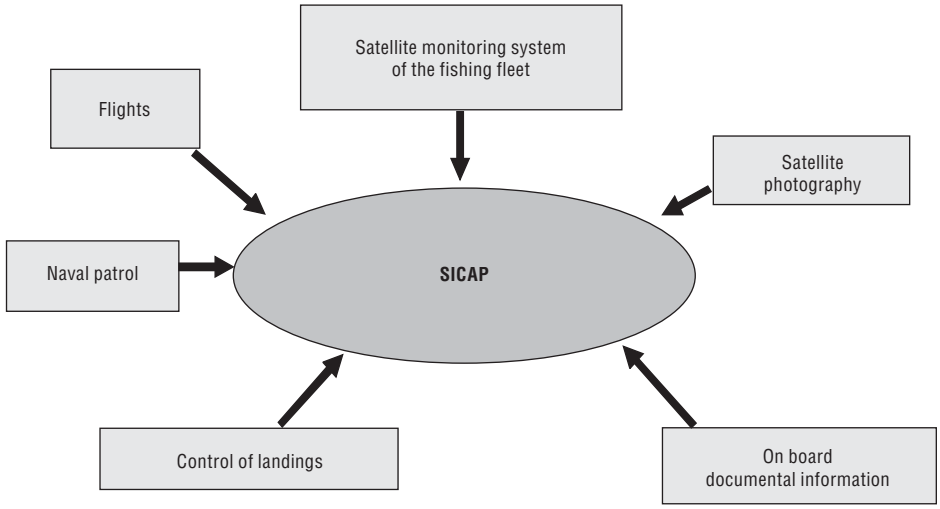
The private sector co-operates with the Federal Fisheries Council, the Under-Secretariat of Fisheries and Aquaculture and the INIDEP in the following commissions:

- Commission for the Patagonian Scallop Fisheries;
- Advisor Commission for the Patagonian Toothfish Fisheries, Under-commission of Landings Control;
- Advisor Commission for the Argentine Red Shrimps Fisheries on the National Jurisdiction Area;
- Advisor Commission for the Argentinean Hake, Under-commission of Landings Control;
- Commission for the Argentinean Shortfin Squid Fisheries;
- Commission for the Inter-jurisdictional Area of restricted fishing effort; and
- Commission for the experimental anchovy (*Engraulis anchoita)* fishing plan.

With regard to inshore fisheries, export allocations for shads were established within the framework of the Inshore Fisheries Commission.

The Under-Secretariat of Fisheries and Aquaculture has developed the Overall Surveillance System of the Fishing Activity (SICAP). It is a system of satellite positioning for the national fishing fleet. In addition, the National Commission of Space Activities provides satellite information about foreign vessels operating outside the EEZ. The Argentinean Patrol Force, Navy and Air Force with coastguards, corvettes, airplanes and helicopters co-operate to control illegal fishing.

Figure III.28.4. **Overall Surveillance System of the Fishing Activity**



There are always one or two vessels of each force patrolling the zone with different strategies. Whenever necessary, there is air support according to the requirements of the commanders operating in the area. There is more patrolling during the squid season from mid December to the end of March, which attracts more foreign fishing vessels. As a result of these controls, seven foreign vessels were arrested in 2005, three in 2006 and one in 2007.

The Under-Secretariat has offices in Buenos Aires, Bahía Blanca, Mar del Plata, San Antonio Este, Puerto Madryn, Caleta Paula, Comodoro Rivadavia, Puerto Deseado and Ushuaia. Inspectors control nets, landings, sizes and transshipments in ports. On-board inspectors control if vessels with fishing permits operate in authorized zones, check discards and fishing gears.

Argentina is party to a number of multilateral agreements and organisations: UNCLOS, CCAMLR, CITES, Convention on Biological Diversity, Agreement on the Conservation of Albatrosses and Petrels, FAO and of the Rio de la Plata Treaty and its Maritime Front. The National Plan of Action (NPOA) for seabirds is being developed and the NPOA-sharks is to be completed.

Recreational fishing

Recreational fishing is regulated by the provinces, some of which have agreements with the National Parks Administration (Secretariat of Tourism) or among each other. Regulations provide requirements for fishing permits, taxes, seasons, gear, bait, volumes and release (in the case of salmonids).

Aquaculture

The State supports and promotes the responsible development and diversification of the aquaculture sector. Aquaculture production in 2007 was composed for 62% of rainbow trout, for 22% of pacú and for 16% of other aquatic organisms farmed (oysters, lobsters, frogs, mussels, other fish, yacaré). These percentages do not include ornamental fish.

The Aquaculture Unit has an annual training program for producers, technicians and professionals. In 2006 and 2007, the National Center of Fish Farming Development

(CENADAC) developed food technologies for three species (randiá, amur, Australian lobster). The first step of the Sanitary Plan for salmonids was finished with no presence of diseases and presented to the World Organization for Animal Healths (OIE). The second campaign started in 2008.

In marine aquaculture, the zone classification for bivalve mollusks was finished for two provinces. In 2008 the first export shipment to Honk Kong of oysters farmed in Buenos Aires Province took place. The first Aquaculture Expo was held and proposed an International Congress of Aquaculture and an International Seminar of Aquaculture, both for professionals, technicians and producers respectively.

Markets and trade

In 2007 the total fish product export value was USD 1 103 million for a volume of 540 000 tonnes. Although fillets and other processed fish meat export volumes decreased in 2007 by 18% compared to 2006, the export value of these products increased by 1%. Argentinean hake, longtail hake and surimi account for 65%, 9% and 5% respectively. Crustacean exports increased by 14% reaching 45 191 tonnes in 2007, but their value fell by 22%, from USD 373 million in 2006 to USD 290 million in 2007. Mollusk exports decreased in value and volume by 16% and 34% respectively. Prepared products (prepared and preserved fish) increased in volume and in value, 18% and 14% respectively.

Table III.28.1. **Fishery exports in 2006 and 2007**

	2006		2007		Variation	
	Tonnes	USD millions	Tonnes	USD millions	Tonnes (%)	USD (%)
Fresh or chilled fish exc. fillets	13 035	13 429	9 727	14 541	–25	8
Frozen fish exc. fillets	156 619	165 134	137 179	187 043	–12	13
Fillets and other fish meats	176 427	381 640	144 814	384 955	–18	1
Fish dried, salted or in brine, smoked/flour/meals and pellets. Fit for human consumption.	13 460	23 549	11 709	23 092	–13	–2
Crustaceans	39 488	373 583	45 191	290 333	14	–22
Mollusks	187 023	251 352	157 531	166 081	–16	–34
Products not expressed in other chapters. Unfit for human consumption	124	263	131	344	6	31
Fats and oils of fish or marine mammals	489	710	959	923	96	30
Extracts and juices of fish and seafood	77	230	80	267	4	16
Prepared or preserved fish	2 591	8 833	2 795	10 050	8	14
Prepared or preserved seafood	314	2 819	250	1 952	–20	–31
Flours, meals and pellets of fish. Unfit for human consumption.	37 821	27 173	30 000	24 375	–21	–10
TOTAL	**627 468**	**1 248 715**	**540 366**	**1 103 956**	**–14**	**–12**

Main export destinations in 2007 were the EU (54%), APEC countries (16%), MERCOSUR (12%) and NAFTA (8%). Within the EU, Spain is still the main destination. In 2006, Spain received 48% of the total exports accounting for 166 thousand tonnes worth USD 457 million.

Compared to 2006, the value of fish imports, mainly prepared and preserved products, increased in 2007 by 48% to USD 95 million.

Ninety seven per cent of Argentinean fisheries imports come from only seven countries. The main supplier is Chile accounting for 40% of total imports.

Table III.28.2. **Main export destinations**

	USD million		Tonnes
		2006	
Spain	457 835	Spain	166 762
Italy	124 958	China	73 901
Brazil	90 809	Brazil	49 147
France	84 333	Italy	36 848
United States	76 437	United States	30 394
Japan	71 428	Japan	29 922
China	55 280	France	16 490
Subtotal	961 080	Subtotal	403 464
% of total 2006 exports	77%	% of total 2006 exports	64%
		2007	
Spain	350 39	Spain	133 705
Italy	118 083	China	64 826
Brazil	116 788	Brazil	48 898
United Status	76 949	Italy	35 970
France	55 265	United States	24 425
China	47 413	Japan	23 822
Japan	42 093	France	14 998
Subtotal	806 730	Subtotal	346 644
% of total 2007 exports	73%	% of total 2007 exports	64%

Table III.28.3. **Fishery imports**

	2006		2007		Variation	
	Tonnes	USD million	Tonnes	USD million	Tonnes (%)	USD (%)
Chilled or fresh fish, exc. Fillets	1 936	9 297	2 378	11 861	23	28
Frozen fish, exc. fillets	2 303	3 440	2 318	3 476	1	1
Fillets and other fish meats	483	1 596	679	2 370	41	48
Fish dried, salted or in brine, smoked/flours/meals and pellets Fit for human consumption	92	787	150	1 173	63	49
Crustaceans	490	2 054	295	1 520	–40	–26
Mollusks	768	1 431	1 584	3 147	106	120
Products not expressed in other chapters Unfit for human consumption	439	265	342	286	–22	8
Fats and oils of fish or marine mammals	106	274	72	84	–32	–69
Extracts and juices of fish and seafood	2	42	9	118	350	181
Prepared or preserved fish	22 379	40 962	31 632	66 109	41	61
Prepared or preserved seafood	883	2 339	1 265	3 825	43	64
Flours, meals and pellets of fish Unfit for human consumption	1 993	1 701	1 446	1 422	–27	–16
TOTAL	**31 874**	**64 188**	**42 170**	**95 391**	**32**	**49**

Table III.28.4. **Importing countries**

	USD million		Tonnes
		2006	
Chile	24 665	Chile	12 692
Brazil	12 817	Brazil	5 503
Ecuador	10 230	Ecuador	3 925
Thailand	7 447	Thailand	4 521
Singapore	5 167	Singapore	3 182
Spain	1 191	Peru	657
Peru	592	Spain	619
Subtotal	62 109	Sub total	31 099
% of total 2006 imports	97%	% of total 2006 imports	97%
		2007	
Chile	28 794	Chile	12 521
Ecuador	21 728	Thailand	8 286
Brazil	17 821	Ecuador	8 270
Thailand	14 194	Brazil	6 432
Singapore	3 905	Singapore	2 321
Spain	2 843	Spain	1 290
Peru	1 349	Peru	1 229
Subtotal	90 634	Sub total	40 349
% of total 2007 imports	95%	% of total 2007 imports	96%

Outlook

Fisheries authorities intend to promptly apply the ITQs system in the main fisheries. The strengthening of the ties between the central authority and the provinces within the framework of a federal government is essential for the implementation of efficient and appropriate management measures.

Other key targets are the expansion of research and private sector assistance on modern techniques for sustainable fisheries, aquaculture development and consolidation and the promotion of the production of value added products Training on handling, industrial process (processes and products), transport and trade will be fostered to support the latter one.

To tackle the issue of increasing production costs, studies on the implementation of methods for saving fuel on the fishing vessels will be carried out.

PART III

Chapter 29

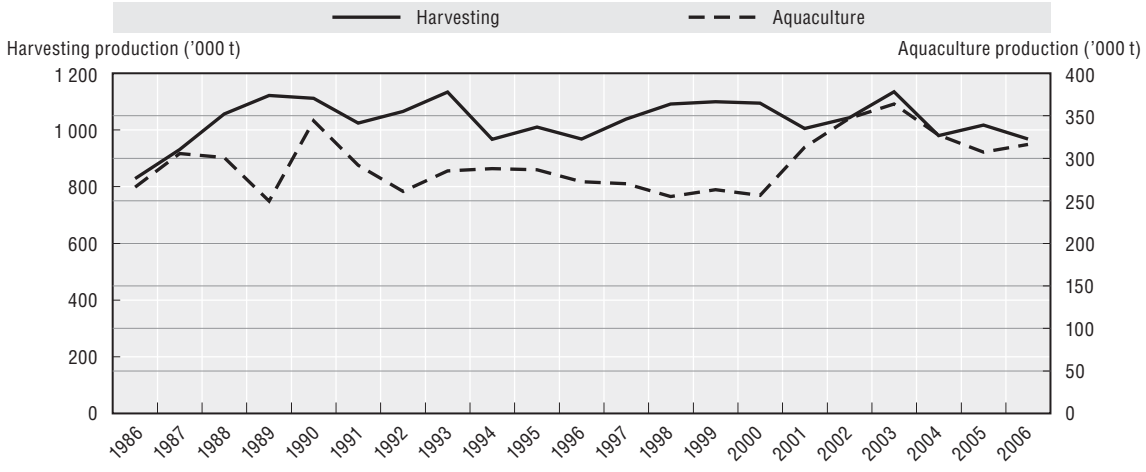
Chinese Taipei

Chinese Taipei

Summary of recent developments

- A compulsory fleet size reduction program has been in place in Chinese Taipei since 2005. In 2007, Chinese Taipei completed a three-year reduction program of large-scale tuna longliners larger than 100 GRTs, reducing the total number from 614 to 421.
- To control the building and exporting of foreign-flagged fishing vessels, regulations on Permission for the Export of Fishing Vessels were revised in May 2007. The regulations require bilateral consultations between competent government authorities to ensure effective management.
- Another policy initiative to enforce responsible fishing is to equip all large scale long line vessels with the Vessel Monitoring System. In addition, legislation to implement integrated coastal management is in the process of public hearings.
- Aquaculture policy focuses on rational use of land and water resources and upgrading of the quality of products.
- Capture fishery production increased from 980 362 tonnes in 2004 to 1 017 471 tonnes in 2005, but it decreased to 967 658 tonnes in 2006. Aquaculture production was relatively stable at 300-330 000 tonnes over the same period. Total fish production in Chinese Taipei has been around 1.3 million tonnes in recent years.

Harvesting and aquaculture production

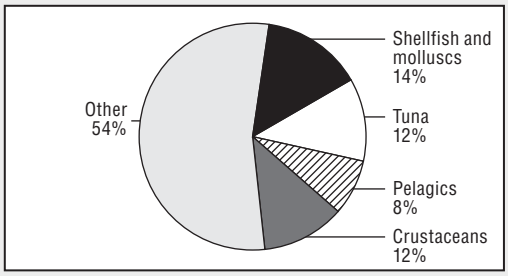


Source: FAO.

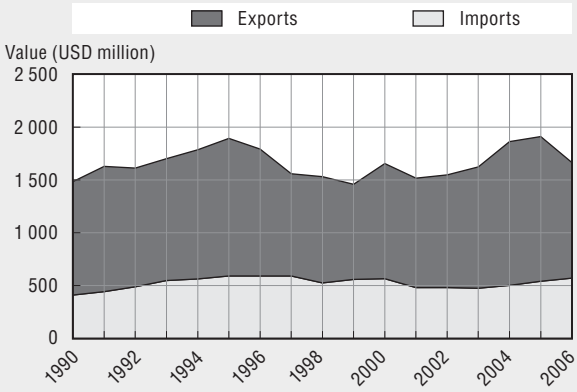
Key characteristics of the sector

- The most important species in capture fisheries in 2006 in terms of value included squid (TWD 3.5 billion), tuna (TWD 3.1 billion), mackerel (TWD 2.4 billion) and shrimp (TWD 2.2 billion).
- Fishery product exports peaked at USD 1.4 billion in 2004 but decreased to USD 1.1 billion in 2006 while imports remained at slightly above USD 500 million. As a result, the trade surplus decreased from USD 857 million in 2004 to USD 522 million in 2006. However, over the last two decades, Chinese Taipei has shown a constant trade surplus.
- Government Financial Transfers in 2006 were USD 87.2 million, which was more than double the 2003 figure. In 2006, approximately 81% of total GFTs were to reduce fishing efforts through fishing vessel reduction/buy-back programs and compensation for closing fishing seasons early.
- The total number of fishers in 2006 was 245 113, which was slightly down from 246 484 in 2004 but above many other countries. In the meantime, fish farmers have increased from 99 544 in 2004 to 108 982 in 2006.

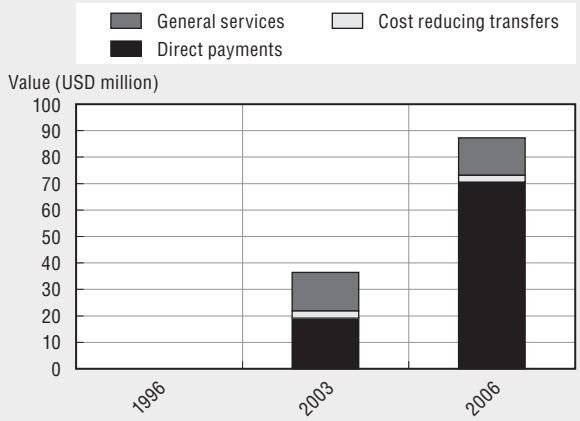
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	n.a.	245 113
Number of fish farmers	n.a.	108 982
Total number of vessels	n.a.	26 216
Total tonnage of the fleet	n.a.	766 385

n.a.: Not available.

Legal and institutional framework

The Fisheries Act, established in 1929, constitutes the legal basis of Chinese Taipei's fishery management framework. A number of new regulations have recently been enacted or are currently underway in order to incorporate international management trends, in particular, combating IUU fishing.

The Council of Agriculture of the Executive Yuan is the central fisheries policy-making body in Chinese Taipei and its Fisheries Agency is the highest fisheries administrative agency implementing policy decided by the Council. The Agency is comprised of several Divisions and Offices as well as regional offices, a Research and Development Centre and a Fishery Radio Station, all of which have their own responsibilities to implement fisheries policies and provide services to the industry.

Capture fisheries

In recent years, annual capture fisheries production has exceeded 1 million tonnes, with a value of more than TWD 60 billion. Major species caught are tuna, mackerel and squid. In order to promote sustainable development of coastal and offshore fisheries resources, fisheries management is focused on conservation of resources and ecological restoration. With such targets in mind, measures such as vessel buybacks, fishing closures, the establishment of closed areas, conservation areas and protected habitats are in use to protect fishery resources. In addition, stock enhancement programs such as the releasing of fish seeds are being implemented to improve the productivity of fishing grounds.

In recent years, deep sea fishery production has surpassed 800 000 tonnes, accounting for over 58% of overall fisheries production. Major fishing methods in the deep sea fishery include tuna long-lining, tuna purse seining, trawling, squid jigging and torch-light saury fishing. The tuna purse seine fishery is concentrated in the Central and Western Pacific Ocean. Squid jigging mainly takes place in the South-Western Atlantic Ocean, the Northern Pacific Ocean and the Eastern Pacific Ocean, depending on the fishing season. Some squid jiggers travel to the Northern Pacific Ocean to carry out torch-light saury fishing on a part-time basis after the squid fishing season is over. Trawlers currently operate mainly in the waters off Indonesia under joint venture partnerships. Most tuna long-liners and purse seiners use foreign ports as supply bases, for repairs and for transhipments. Some 72 foreign ports have been approved as base ports for Chinese Taipei's deep sea fishing activities.

Major coastal and off-shore fisheries include trawling, long-lining, torch-light fishing, mackerel purse seine fishing and set-net fishing. Annual production is approximately 250 000 tonnes with a value of TWD 18.7 billion.

To cope with recent developments in fisheries resource management, Chinese Taipei is implementing a series of policies to address issues such as responsible fishing, overcapacity in fisheries, prevention of IUU fishing and integrated coastal management:

- A compulsory fleet size reduction program has been in place since 2005. In 2005 and 2006, 59 and 101 large-scale tuna longline vessels were scrapped or sunk respectively. In 2007, Chinese Taipei continued to reduce 23 large-scale tuna longline vessels. After the completion of this three-year reduction program, the total number of large-scale tuna longliners larger than 100 GRTs in Chinese Taipei was reduced from 614 to 421, thereby surpassing the objective of a 20% reduction in the world's total large-scale tuna longliners as proposed by the FAO International Plan of Action (IPOA) on Capacity.

- In line with international fisheries management, regulations on Permission for the Export of Fishing Vessels were established to control the building and exporting of foreign-flagged fishing vessels in Chinese Taipei. On 17 May 2007, the Regulations were further revised, requiring bilateral consultations between competent government authorities to ensure effective management by the importing country before the industry builds and exports fishing vessels.
- Another policy initiative to enforce responsible fishing is to equip all large scale long line vessels with VMS. Monitoring and control by the Fishery Agency will be strengthened to prevent any possible illegal activities. Also, legislation to implement integrated coastal management is in the process of public hearings. Once the new law is established, coastal fisheries will be regulated by the law and new concepts such as Marine Protection Areas (MPA) will be introduced for the first time to fisheries management, to ensure environmental protection.
- Finally, to restore coastal fishery resources, it is planned that the fishing of juvenile herring, flying fish, larval fish, Japanese anchovy and Buccaneer anchovy will be prohibited.

In terms of international co-operation, Chinese Taipei participates in a number of international and regional fishery management organisations in various capacities, ranging from full membership to observer. These organisations include WCPFC, ISC, CCSBT, IATTC and ICCAT. In addition, Chinese Taipei is also a member economy and takes active part in the Fishery Working Group of the Asia Pacific Economic co-operation (APEC).

Aquaculture

Aquaculture in Chinese Taipei can be classified into fresh water farming, brackish water farming and mariculture. Available farming acreage is approximately 55 000 hectares with an annual production of 250-325 000 tonnes and a value of TWD 33 billion. Through core development of specialized aquaculture areas and refined aquaculture, the acreage of fish ponds will be reduced and water supply infrastructure will be constructed. Marine cage farming will be developed in order to allow the building of sea parks so that aquaculture production areas will incorporate multi-faceted developments involving recreational and hands-on experience of fish farming.

Current aquaculture policy focuses on promoting environmentally-friendly aquaculture. The government will be focusing on rational use of land and water resources and upgrading of the quality of products. Furthermore, the government will continue to assist aquaculture fish farms to meet certification criteria and introduce organic aquaculture.

Recreational fisheries

Assistance has been provided to fishermen engaging in the recreational fishery, including sea angling and dolphin watching, to diversify coastal and offshore fisheries.

Fisheries and the environment

To achieve sustainable aquaculture and the rational utilization of land and water resources, the Fisheries Agency has been actively promoting the use of recycled water in aquaculture by providing fish farmers with subsidies to install facilities and by training in water recycling techniques.

In addition, the establishment of Marine Ecological Restoration Areas has been planned. As a part of restoration efforts, various types of artificial reefs have been installed and different species of fish, shellfish, crustaceans, algae and coral have been stocked. Through better management and planning of artificial fishing grounds, recreational scenic points will be developed for sea bottom touring, sea angling and scuba diving. It is envisaged that an excellent operating environment for coastal and offshore fisheries can be built and the development of traditional fisheries will be diversified towards multi-purpose use such as recreation and tourism.

In addition, vessel buyback programs were implemented to downsize the fishing fleet and restore fisheries resources. The government has encouraged fishermen by providing incentives to adopt management measures such as fishing closures to reduce fishing effort.

Assistance has also been provided to the Chinese Taipei Fishermen's Association for the joint establishment of teams for fishing affairs and the domestic economy, in conjunction with the 39 district fishermen's associations under its supervision. Professors and experts from fisheries related colleges, universities and research institutes have been invited to provide training and instruction to fishers, with the hope that through the organisation of local and specialized teams, the Association will receive the latest knowledge regarding fishing technology, distribution channels for fish products and government policy directions.

Governmental financial transfers

GFTs in Chinese Taipei increased significantly from TWD 1 415 million in 2005 to TWD 2 846 million in 2006 and decreased sharply to TWD 1 783 million in 2007 (except for the Fisheries Agency's administration budget). When divided into sub-sectors, it is clear that the majority of government financial transfers are devoted to marine capture fisheries, accounting for between 62% and 77% of the total (Tables III.29.1 and III.29.2). Aquaculture, as well as marketing and processing, receive relatively small amounts that never exceed 5% of the total. With a few exceptions, such as the Fishery Radio Station and the Deep Sea Fishery Development Centre, the largest type of government financial transfer is direct payments, which outweigh the sum of cost reducing transfers, general services and cost recover charges by a very large margin.

When it comes to specific programs, the Fishing Vessel Reduction Program and the Fishing Vessel Buyback Programs together account for 60-70% of the GFTs for marine capture fisheries. Chinese Taipei emphasizes that the purpose of such payments is to achieve sustainable fisheries by reducing fishing effort and restoring fish stocks.

Table III.29.1. **Government financial transfers, including fisheries agency budget in %**

	2005	2006	2007
Fishery administration annual administration budget	33.05	20.49	29.36
Marine capture fisheries	62.42	77.29	67.69
Aquaculture	2.85	1.32	1.51
Marketing and processing	1.68	0.90	1.45

Source: Fisheries Agency, *Annual Budget Report*, 2005-2007.

Table III.29.2. **Marine capture fishery government transfer payment breakdown in %**

	2005	2006	2007
Direct payments	73.87	80.83	63.29
Fishing Vessels Reduction Program	59.22	65.88	26.41
Fishing Vessels Buy-back Program	4.11	8.81	30.00
Reward for Closing Fishery Season	10.53	6.14	6.88
Cost reducing transfers	6.33	3.04	4.57
Fishing Vessels Marine Insurance Reward	6.33	3.04	4.57
General services (budget)	19.80	16.13	32.14
Scientific Research	5.91	3.12	4.64
International Co-operation	0.24	0.12	0.13
General Administration	5.15	8.81	20.86
Deep Sea Fishery Development Center	3.40	1.69	2.61
Fishery Broadcasting Station	5.10	2.38	3.89

Source: Fisheries Agency, Annual Budget Report, 2005-2007.

Post-harvesting policies and practices

Excellent quality and ample supply of raw materials are the basic requirements of Chinese Taipei's fish processing industry. Coupled with demand from foreign markets, a variety of processed sea products have been developed. For processed seafood, the processing technique and quality of frozen roasted eel for export are most prominent. Processing of traditional frozen food products such as fish ravioli, shrimp ravioli, fish steaks, squid balls, etc. has been developed. As a result of years of development, production of cured and canned food is already fully automated. In addition, there has been significant demand for seafood snacks that include shredded dried squid, tuna candy, kelp candy, etc. The development of items such as eel calcium, eel oil essence, clam essence and collagen from fish skins has pushed the seafood industry to a new level by using fish offal to produce by-products, thus enabling the industry to enter into an era of high refinement.

With respect to fish distribution, the function of fish markets and direct sales centres will be strengthened. A system of computer auctions of fish and fish products will be promoted in order to establish a fair, transparent, efficient and service-oriented marketing and distribution system.

Markets and trade

Chinese Taipei is one of the major fish and fish product exporters in the global trading system, with deep sea fishery and aquaculture being the major sources. Major export markets, as indicated in Table III.29.3, are Japan, Thailand and the US These three markets account for over 60% of Chinese Taipei's total fishery products export by value.

To meet the trade challenge of Chinese Taipei's accession to the World Trade Organization and to improve the competitiveness of Chinese Taipei's fishing industry, enhancement of overseas markets through the promotion of Chinese Taipei's fishery products will be the key for the fishing industry. Premium quality fish products with export potential have been selected and with a focus on such markets as the USA, Japan, Korea and the EU, assistance has been provided to fishers and fisheries associations to participate in international food and seafood exhibitions and overseas marketing

Table III.29.3. **Major export markets, 2007**

	Quantity (tonnes)	Quantity in %	Value (thousand TWD)	Value in %
Total	673 957	100.00	40 812 043	100.00
Japan	91 433	13.57	16 739 651	41.02
Thailand	184 362	27.36	5 450 152	13.35
United States	58 155	8.63	4 740 209	11.61
Korea	31 136	4.62	1 624 949	3.98
Mainland	54 138	8.03	1 254 204	3.07

Source: Fisheries Statistical Yearbook Chinese Taipei, Kinmen and Matsu Area, 2007.

campaigns. Extensive fisheries trade information will be collected to maximize export opportunities. Those organisations with marketing capability will be institutionally strengthened or integrated and an international label for sea products will be established.

In terms of the domestic market, there were 50 regional fish wholesale markets in 2007, including 14 consumption area fish markets and 36 production area fish markets. In 2007, wholesale fish market transactions amounted to 513 064 tonnes with a total value of TWD 31.4 billion, a decrease of 52 262 tonnes and TWD 272 million respectively, from 2006.

Outlook

Recognizing the importance of the fishing industry in sustaining the environment and the economy, a series of policies are in place to achieve the goal of sustainable fisheries in Chinese Taipei. Sustainability in fisheries can be further secured from three different aspects: ecology, food safety and work safety.

- **Ecological sustainability** is the overall theme of the new set of policies. Their implementation is categorized into sub-sectors of the fishing sector in terms of fishing activities. Appropriate programs will be conducted by deep sea, offshore and coastal fisheries as well as aquaculture. For *deep sea fisheries*, the focus is on the management of adequate fishing capacity and responsible fisheries. As mentioned above, policy actions include strengthening monitoring and control of large-scale longline vessels through satellite-based vessel monitoring systems (VMS), reduction of fleet size and inspection programs on international management measures in foreign ports. With regard to *offshore and coastal fisheries*, the main focus is to restore the marine ecosystem. Examples include implementation of the TAC system on selected stocks and prohibition of harvesting of restricted species. It is envisaged that the promulgation of the Coast Management Act in the future will further contribute to the safeguard of the marine ecosystem. For *aquaculture*, developing new technologies that will enable sustainable fish farming while protecting the environment will be pursued. Such programs as pond water recycling and organic aquaculture certification are already in full operation and additional policy tools are to be introduced.
- **Food safety** is another important issue because the fishing industry should be able to provide safe and high quality protein to consumers. In the production phase, the concept of organic aquaculture is promoted and education on prudent application of medication is continuing. For the processing phase, traceability of fishery products is the program that is currently advocated. Along with the introduction of HACCP, it is expected that the food safety aspect of fishery products can be safeguarded.

- Finally, on the issue of **safety at work**, the current workforce shortage in the fishing industry has driven increased foreign labour force employment. Also, the safety of local fishermen is at stake in view of the complexity of their recruiting system. In addition, the existence of unsolved overlapping exclusive economic zones with neighbouring countries has made fishing in offshore waters a high risk to fishermen. Therefore, it is necessary to review existing practice to ensure safe, legal and legitimate working conditions for fishers.

PART III

Chapter 30

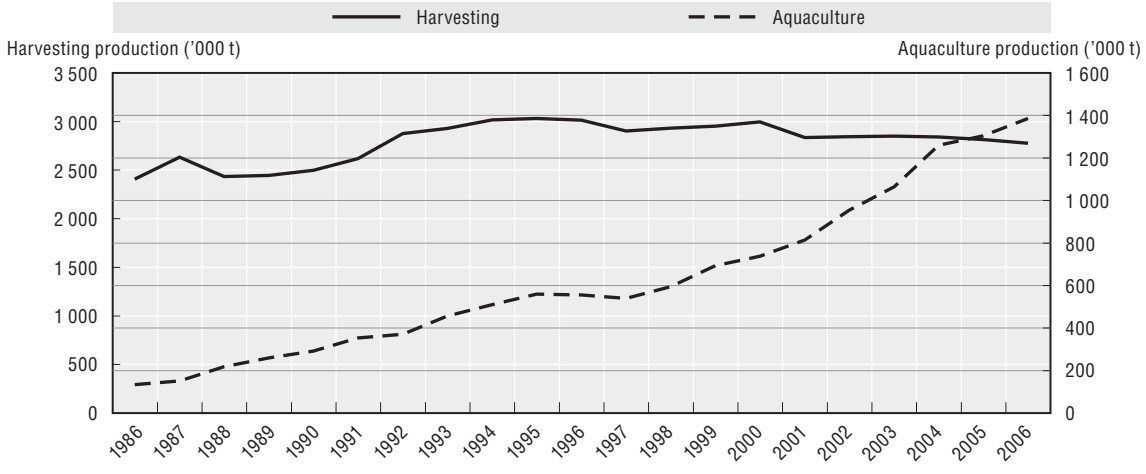
Thailand

Thailand

Summary of recent developments

- As a result of constitutional changes in Thailand in 2007, more emphasis has been put on the participation of local authorities and stakeholders in establishing and implementing fisheries policies.
- While efforts to recover exploited capture fishery resources are continuing, policies have recently been developed to increase the quality and safety of aquaculture. One example is to apply the Code of Conduct for Responsible Aquaculture and Good Aquaculture Practices to inland aquaculture as well as marine aquaculture. Another policy that has been adopted with respect to food safety is the Q-mark certificate system. The mark is awarded to safe and high quality agricultural and fishery products.
- Capture fisheries production has been stable over the last decade at around 2.7-3.0 million tonnes although production for the last five years shows a slight decreasing trend. On the contrary, aquaculture production has significantly increased over the last 10 years from 0.56 million tonnes in 1996 to 1.39 million tonnes in 2006. Total fishery production (including capture fisheries and aquaculture) has continuously increased and exceeded 4 million tonnes since 2004.

Harvesting and aquaculture production

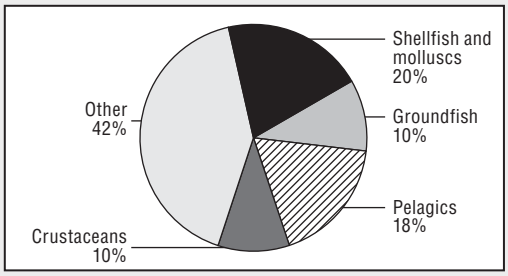


Source: FAO.

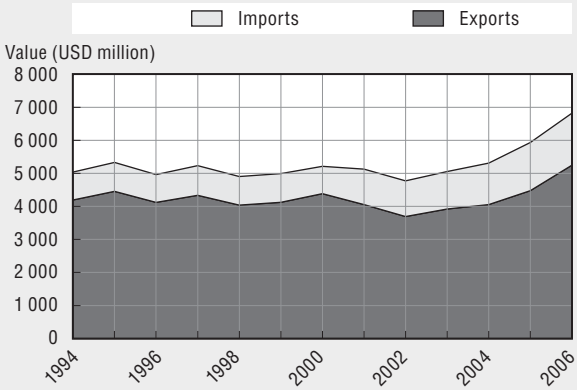
Key characteristics of the sector

- The most important species landed in 2006 in terms of value were squid, cuttlefish, mackerel and shrimp.
- Thailand's exports of fish and fishery products have continuously increased since 2002 and reached a peak of USD 5.2 billion in 2006. Imports have also slightly increased since 2000. However, the trade surplus in the fisheries sector is still significant at more than USD 4 billion.
- Government financial transfers in Thailand in 2006 were USD 10.3 million, mostly devoted to fisheries management and research in the General Services category.
- Total number of fishing vessels and their tonnage dropped from 13 627 and 441 171 tonnes respectively in 2005 to 12 552 and 407 913 tonnes respectively in 2006. The majority of the vessels ranged from 12 m to 24 m in length.

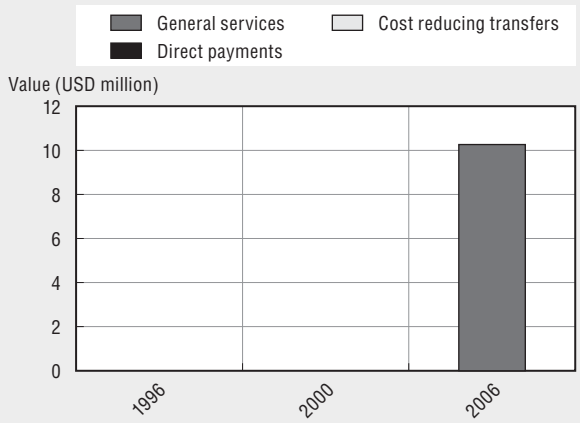
Key species landed by value in 2006



Trade evolution



Evolution of government financial transfers



Production profile

	1996	2006
Number of fishers	n.a.	80 538[1]
Number of fish farmers	n.a.	62 598[1]
Total number of vessels	n.a.	12 552
Total tonnage of the fleet	n.a.	407 913

n.a.: Not available.
1. 2000 data.

Legal and institutional framework

Key legislations regulating Thai fisheries include: The Fisheries Act[1] (1947), revised in 1953 and 1985; the Act Governing the Right to Fish in Thai Waters (1939); the Act Organizing the Activities of the Fish Market (1953); the Wildlife Reservation and Protection Act (1992); and the Enhancement and Conservation of National Environmental Quality Act (1992).

The Department of Fisheries (DOF) has played an active role in promoting fisheries and aquaculture development in Thailand. The DOF has established a vision for 2004-2008, titled, "Towards security and sustainability of fisheries stakeholders and prosperity of fisheries commodities and trade". Under this vision, DOF defines its mission as the following:

- to study, develop and transfer fisheries technology to fishermen, fish farmers and entrepreneurs to secure their occupation;
- to manage fisheries resources and environment for sustainable development and protection of biodiversity;
- to promote and develop fish and fisheries product to meet international standards, as to strengthen the competitiveness in the world markets; and
- to rehabilitate fisheries resources and raise public awareness to involve public participation in fisheries resources management in order to increase fish production.

The DOF, reengineered in 2002, is comprised of central and regional administrations. The central administration includes the Administrative Offices, 6 Divisions (Fish Inspection and Quality Control Division, Fisheries Foreign Affairs Division, Fishery Technological Development Division, Personnel Division, Finance Division, Planning Division), 1 Centre (Fishery Information Technology Centre), 1 Institute (Aquatic Animal Genetics Research and Development Institute), and 5 Bureaus (Fisheries Administration and Management Bureau, Fishery Technology Development and Transfer Bureau, Coastal Aquaculture Research and Development Bureau, Marine Fisheries Research and Development Bureau, Inland Fisheries Research and Development Bureau).

For regional administration, there are 75 provincial offices. Each office is responsible for research, analysis and evaluation of fisheries technology to support the fishing industry; issue of certificates in accordance with fishing laws and regulations; surveillance of aquatic animals breeding; and provision of knowledge and services to fishers and employees.

The aim of DOF is to: increase quantity and quality of fishery production from both capture fisheries and aquaculture to meet domestic demands and international requirements; manage fisheries resources in a sustainable manner by fishers, local communities and organisations and the government; accelerate research in supporting aquaculture to increase the quality of production and to reduce production costs; have fishers and local organisations participate in fisheries management and development in line with the overall decentralisation trend in Thailand; increase knowledge and skill of fishers to maintain their self-reliance and manage their organisations; control and regulate fishing operation in compliance with agreements with other coastal States or joint-venture partners; and maintain the status of Thailand as one of the important fish producing and exporting countries.

Capture fisheries

Capture fisheries production in Thailand has been stable in recent years (Table 1). In 2005, marine capture fisheries production was 2.62 million tonnes, valued at USD 1 581 million. The Gulf of Thailand contributed approximately 64% to total marine

catch, while the Andaman Sea coast accounted for the remainder. Inland capture fisheries production was 198 800 tonnes, valued at USD 196 million. Inland fisheries have been part of Thai culture and provide an important source of animal protein to Thai people.

It has been reported that most capture fishery resources in Thailand are fully-exploited or over-exploited. Demersal fish resources in coastal waters have been severely depleted. Catch rates surveyed by research vessels have decreased and the number of benthic species has decreased significantly from 394 in 1976 to 88 in 1995. Factors contributing to this over-fishing include: increasing human population; increasing pressure from Thai trawlers who lost access to foreign fishing grounds after neighbouring countries declared EEZs; development of processing techniques for low-price demersal fish for human consumption; excessive fishing capacities, especially a large number of fishing vessels;[2] and increasing number of fishmeal manufacturing plants that utilize by-catch fish.

With regard to pelagic fisheries, it is known that Indo-Pacific mackerel stocks in the Gulf of Thailand as well as anchovy have been fully exploited. While sardines have been over-exploited, other pelagic fish stocks including Spanish mackerel, carangids and hardtail scads have not yet been fully exploited. The exploitation of Indo-Pacific mackerel is remarkable as the fish was once the most popular species for Thai consumers and the catch accounted for about 47% of pelagic fisheries production. In addition, Penaeid prawn and small sized shrimps have been over exploited. Most cephalopods in Thai waters have also been fully exploited.

Table III.30.1. **Production and value of capture fishery production (1994-2005)**

	Marine capture		Inland capture	
	Production (million tonnes)	Value (million USD)	Production (million tonnes)	Value (million USD)
1994	2 804	908.4	0.203	120.1
1995	2 827	1 129.6	0.192	115.0
1996	2 786	1 170.4	0.208	124.9
1997	2 680	1 178.4	0.205	128.9
1998	2 709	1 209.5	0.202	192.2
1999	2 725	1 211.1	0.206	180.5
2000	2 774	1 235.0	0.202	175.6
2001	2 632	1 343.0	0.203	176.2
2002	2 644	1 459.4	0.198	157.3
2003	2 651	1 604.2	0.198	176.7
2004	2 636	1 545.0	0.204	185.9
2005	2 616	1 580.6	0.199	196.3

1. Exchange rate in 2005 = 40.0 Baht/USD.

Management

The DOF has implemented various fisheries management measures, including: freezing the number of licenses of trawlers and push nets; prohibiting license transfers except for transfers to holders' children; closed areas and closed seasons; the prohibition of certain fishing methods; reserved zones within 3 kilometres from the shoreline; no-fishing zones for boats with engines; promotion of community-based fisheries management; programs to recover fishery resources and habitats such as artificial reef installation and releasing fish fries; setting limits on mesh sizes of trawler and purse seiners; and reducing fishing capacity, especially trawlers and push netters.

The DOF is in charge of monitoring, control and enforcement programs along the coasts of the Gulf of Thailand and Andaman Sea. Local authority involvement in enforcement activities has been strengthened. Moreover, fishers have established volunteer networks for monitoring, controlling and informing on illegal fisheries. In addition, education and campaigns to raise public awareness have been emphasized to support these enforcement activities.

Thailand has engaged in fisheries co-operative arrangements with several foreign countries, mainly its neighbouring countries. At present, its fishing vessels are operating in the waters of Indonesia, Cambodia, Malaysia, Bangladesh, Somalia, Madagascar, and Myanmar.

Moreover, under technical co-operation program – both bilateral and multilateral, Thailand has co-operated with various international organisations such as Food and Agriculture Organization (FAO), Southeast Asian Fisheries Development Center (SEAFDEC), Network of Aquaculture of Asia (NACA), Codex, European Commission, German Technical Co-operation (GTZ), Japanese International Co-operation Agency (JICA), Norwegian Development Agency (NORAD), USAID, etc. there are many technical bilateral arrangements on fisheries, including co-operation between Thai and France, Thai-Norway, Thai-US, Thai-Korea, Thai-China, Thai-South Africa, Thai-Canada, Thai-Vietnam, Thai-Malaysia, etc.

Aquaculture

Aquaculture in Thailand was estimated to account for about 33.5% (in volume) and 52.2% (in value) of total fisheries production in 2007 (Table 2). The development of freshwater aquaculture started in 1922 after the import of Chinese carp for culture around Bangkok while coastal aquaculture has only recently developed. The DOF has established aquaculture promotion programs since 1951. Recent freshwater aquaculture productions have ranged from 500 000 tonnes to 550 000 tonnes, valued at USD 500 million. Major species were Nile tilapia, hybrid walking catfish, silver barb, freshwater prawn, and snakeskin gourami. Coastal aquaculture production in recent years has been between 750 000 tonnes and 900 000 tonnes. The most important species were marine shrimp, Vanamei and Jumbo Tiger Prawn, producing as much as 400-500 000 tonnes, valued at USD 12 million.

With respect to production facilities, there are 414 323 inland farms with a total cultured area of 133 709 hectares. Over 90% of them consist of pond and paddy-field type culture systems. The remainders are dammed-up ditches, swampy areas and cage culture systems. In the marine aquaculture sector, marine shrimp farming has been practiced for more than 30 years and was expanded rapidly during the mid 1980s. Types of shrimp farming vary from traditional systems to more advanced semi-intensive and intensive systems. Sea bass and Grouper are popular brackish water fish cultivated in Thailand since 1973. They can be cultured in earthen ponds, cages and pens. At present, Grouper seeds of at least three species can be obtained from the wild and hatcheries. Grouper larval rearing techniques have been developed since 1993. Moreover, new candidate species are Cobia and Milkfish.

Since 2000, the DOF has put much more emphasis on quality of aquaculture production rather than on quantity. DOF, together with the Thai aquaculture industry has developed and implemented two standards known as the Code of Conduct for Responsible

Table III.30.2. **Production and value of aquaculture production (1994-2005)**

	Coastal aquaculture		Freshwater culture	
	Production (million tonnes)	Value (million USD)	Production (million tonnes)	Value (million USD)
1994	0.346	1 024.0	0.170	102.2
1995	0.358	1 026.0	0.196	132.2
1996	0.326	1 050.7	0.229	169.6
1997	0.300	1 260.0	0.200	148.9
1998	0.368	1 538.2	0.227	173.8
1999	0.441	1 766.6	0.253	198.8
2000	0.467	2 315.1	0.271	210.8
2001	0.534	1 714.3	0.280	232.0
2002	0.660	1 416.0	0.294	274.7
2003	0.703	1 187.9	0.361	329.6
2004	0.736	1 231.3	0.524	482.8
2005	0.765	1 244.7	0.539	504.1

1. Exchange rate in 2005 = 40.0 Baht/USD.

Aquaculture (CoC) and the Good Aquaculture Practice (GAP). The CoC addresses the key issues involved in sustainable aquaculture management and the GAP focuses on basic management for food safety, environmental impacts, social responsibility, animal health and welfare, and traceability. Certificates for these standards have been issued for marine shrimp production since 2000 and the number of certified shrimp farms is 28 000 farms out of a total 30 000 farms. These standards have also been applied to freshwater aquaculture since 2004.

Thailand established a nation-wide food safety program in 2004, which has been applied to the whole supply chain from farm (or processing plant) to table. For example, in the case of marine shrimp production, all farmers and hatchery operators have been trained to operate their facilities in accordance with the CoC or GAP standards. Once the farms and hatcheries are ready to be certified, farmers request DOF for auditing. Fish feeds and antibiotic residues are inspected at the facilities by the Coastal Aquaculture Research and Development Centre. Traceability is also required in the production, processing and distribution process. The traceability manual, "movement document" or MD has already been applied to the shrimp industry for 5 years and now the DOF is implementing two pilot programs for a computerized traceability system

With regard to inspection and quality control, all aquaculture farms are required to register with the DOF in order to ensure that fish and shrimp from certified farms do not contain toxic substances at levels harmful to human health and to prevent environmental pollution. Specific activities or programs include checking on farm sanitation; disease controls; record keeping on feeds, drugs, and chemicals used; water quality and sediment determination; inlet, outlet, and surrounding water quality determination; and inspection of drug residues in farmed species.

In addition, there are several operational activities to promote environmentally friendly aquaculture in Thailand. For water management for farm clusters, DOF has promoted Seawater Irrigation Systems for marine shrimp farm clusters in order to maintain water quality and control water discharge. For on-site water management, zero-water discharge or closed systems has been applied to marine shrimp farming to minimize the use of water and control water quality in the farming system. Moreover, mangrove re-plantation in marine shrimp farming has been promoted.

Fisheries and the environment

Various initiatives have been developed towards ensuring sustainable fisheries and aquaculture in Thailand. One of the characteristics of recent fisheries and aquaculture policies in Thailand is to put more emphasis on participation of local authorities and local communities in monitoring, controlling and enforcing policies in line with decentralised policies. Specific initiatives or programs include:

- *Marine Fisheries*: Sea turtle, marine mammal, sea grass and coral reef protection program; Program to maintain biodiversity; Pilot program to produce fish meal using plant protein instead of animal protein *i.e.* trash fish; Habitat and fishing ground improvement program to rehabilitate fisheries resource; Promotion of fisheries and environment sustainability and responsible fisheries program; Fishing capacity reduction program for trawl and push net; and Promotion of non-destructive fishing gear program; Monitoring program for seawater quality on heavy metal residues in fishing grounds;
- *Coastal Fisheries and Aquaculture*: Promotion of co-management program for fishing communities in coastal areas; Promotion of Seawater Irrigation Program for (cluster) marine shrimp farm; Management to maintain water quality for farming system and to control quality of water discharge to coastal environments; Promotion of zero water discharge (or closed system) for water management system of marine shrimp farming to minimize the use of water and control water quality in the farming and culturing system; and Promotion of mangrove re-plantation in coastal areas or in marine shrimp farming system.
- *Freshwater Fisheries*: Promotion to use fish ladder in dam/reservoirs to maintain fish biodiversity in the rivers and reservoirs; Control program on the use of destructive fishing gears or others means in freshwater fisheries; and Water discharge quality control program from inland aquaculture and freshwater environments.

Government financial transfers

Government Financial Transfers (GFTs) in Thailand were only to General Services for fisheries management operations and fisheries research. GFTs for this purpose was USD 10.3 million in 2006 (USD 8.9 million for fisheries management and USD 1.4 million for research) and increased to USD 13.5 million in 2007 (USD 12.0 million for fisheries management and USD 1.5 million for research).

Post-harvesting policies and practices

The DOF is the principal government agency interacting with the fishing industry and the competent authority for the control of fish and fishery product exports. The DOF operates several programs to ensure food safety by taking a farm-to-table approach, such as control of drugs and chemicals in aquaculture, bivalves/molluscs production and sanitation program, shrimp import control, fishery monitoring program and product surveillance program.

In response to food safety policy, framework guideline for agriculture and food inspection and certification, the Roadmap of Food Safety for Agricultural Products was established by the Ministry of Agriculture and Co-operatives (MOAC). In addition, the MOAC has recently launched a quality label called “Q-mark” for certified agricultural commodities including fishery products. The Q-mark logo represents high quality commodities and ensures safety for consumption although this national logo is awarded

on a voluntary basis. Since Q-mark is advertised internationally, it became a tool to assist the Thai fishing industry in succeeding in the world market and in achieving the national goal of being the "Kitchen of the World".

There is another program related to fish processing and fishery products. Under the program, fish processors who wish to register to the DOF must institute a quality control program based on General Principles of Food Hygiene and Good Manufacturing Practices (GMPs). Every approved processor must develop and implement an effective Hazard Analysis Critical Control Point (HACCP) Program for their individual products. DOF inspectors audit the implementation of HACCP activities on a yearly basis. Processors are subjected to DOF's full plant inspection on a regular basis. The inspection involves observation, taking measurements, interviews, recording reviews and sample collections.

There are several types of processing plants in Thailand. Among them, 218 plants produce frozen products and 55 plants are involved in canning while 78 plants process fish products in a traditional way. The DOF sets operating standards or inspection protocols and issues manuals to provide reasonable assurance that the associated legislation and the relevant requirements of other countries are met. Inspection of processing plants is based on the GMPs and all processors under DOF's approval are also required to implement the HACCP principles.

Markets and trade

Trend of domestic fish consumption in Thailand were relatively stable at 3.9-4.1 million tonnes or 36-42 kilograms per capita from 2003 to 2005.

Table III.30.3. **Domestic fish consumption (2003-2007)**

	Grand total (000 tonnes)	For raw material used (000 tonnes)	Imported (000 tonnes)	Exported (000 tonnes)	Domestic consumption (000 tonnes)	Population (million)	Consumption per capita (kg/person/year)
2003	3 914	697	1 164	2 091	2 290.00	63.08	36.30
2004	4 100	772	1 330	2 070	2 587.90	61.97	41.76
2005	4 119	755	1 561	2 ,261	2 663.55	62.42	42.67
2006[1]	4 138	754	1 559	2 433	2 510.49	62.83	39.96
2007[1]	4 139	763	1 473	2 275	2 572.99	62.96	40.87

1. Estimated.
Source: Department of Fisheries.

Outlook

Marine capture fisheries production will be maintained at an annual production level high enough to meet domestic demands and to export fishery products to foreign markets. However, fishing capacity, especially trawl and push net fishing will be reduced while the use of non-destructive gears will be promoted for commercial fisheries. Small-scale fisheries will concentrate on balancing quantity and quality of production. Fishery co-management or community-based fisheries management will be promoted to create self-sustaining livelihoods. Habitat rehabilitation and resource enhancement programs will continue while there will be increased emphasis on stakeholder involvement. Offshore fisheries will be operated under the terms and conditions agree between countries concerned. High sea fisheries in the Indian Ocean will be complied with management and conservation measures established by IOTC. Sea safety programs for fishers will also be

implemented. Fisheries laws and regulations will be revised to accommodate recent development at the national, regional and international level. Higher license fee will be charged to the highly efficient gears. Moreover, devices to exclude juvenile fish will be used to reduce by-catch of commercially valuable species.

Thailand adopted the Code of Conduct for Responsible Fisheries as one of the major tools for fisheries management. Moreover, Thailand has accepted the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU) and is establishing a national plan to implement an IPOA-IUU and to ensure responsible fishing.

Notes

1. The Act is in the process of being revised.
2. Based on efficiency comparison, it was estimated that 44.5% of registered fishing vessels in Thailand had an excessive capacity in 1996.

OECD PUBLISHING, 2, rue André-Pascal, 75775 PARIS CEDEX 16
PRINTED IN FRANCE
(53 2010 01 1P) ISBN 978-92-64-07974-8 – No. 57139 2010

Review of Fisheries in OECD Countries 2009

POLICIES AND SUMMARY STATISTICS

This publication describes major developments affecting fisheries in OECD countries in 2005, 2006 and some recent events of 2007, including changes in national and international policies, trade, and fisheries and aquaculture production. This edition contains a special chapter on Climate Change, Adaptation and the Fisheries Sector: A Review of the Key Issues.

Analytical work by the OECD on fisheries is carried out by the Committee for Fisheries and covers a wide range of issues related to management, resource conservation, trade and sustainable development.

COUNTRIES COVERED: Argentina, Chinese Taipei, Thailand (observers); Australia, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, Mexico, The Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Turkey, United Kingdom, United States.

2009

OECD*publishing*
www.oecd.org/publishing

ISBN 978-92-64-07974-8
53 2010 01 1 P