

## 6. Fisheries and aquaculture

### 6.1 Storyline for indicators

Fishing and aquaculture are two of the most important uses of the living resources in the seas and inland waters. As well as providing a healthy and enjoyable source of food they create much-needed jobs in coastal areas and promote the social and economic well being of Europe's fishing regions. Fisheries include the catch of fish and also the catch of mussels, shrimps and other shellfish, squids and, in some cases, whales. However, fishing has an impact on the ecosystem because the target species are overfished and not only the target species are being caught. The unwanted bycatch of fisheries includes other fish, marine mammals, seabirds, turtles, corals etc. The bycatch is usually dumped into the sea. Gear-related damage is also inflicted on benthic habitats and communities. There are too many fishing vessels causing fishing overcapacity in European waters, which has led to overfishing of fish stocks, too much discard, and uneconomic, unsustainable exploitation of the fish resources.

Aquaculture of fish and shellfish is providing an additional food source and an additional income for coastal human communities. Environmental impacts associated with aquaculture are deterioration of quality of effluent water leading to eutrophication, local smothering of the sea bed, transfer of disease agents, and impacts on biodiversity by the introduction of exotic species

The main policy objectives are:

- The objective of the current Common Fisheries Policy (CFP), is *“to provide for rational and responsible exploitation of living aquatic resources and of aquaculture, while recognising the interest of the fisheries in its long term development and its economic and social conditions and the interest of the consumers taking into account the biological constraints with due respect to the marine ecosystem”*.
- Communication on a European Marine Strategy with the aim to protect the Marine Ecosystem: One of the actions foreseen in the 6<sup>th</sup> Environment Action Programme is the development of a Thematic Strategy for the Protection and Conservation of the Marine Environment (Marine Strategy). Therefore, the overarching objectives are (i) *sustainable and healthy European seas and their ecosystems* and (ii) *sustainable exploitation of renewable marine resources of these seas*.<sup>1</sup>
- Green Paper on Common Fisheries Policy (Ecosystem approach). – Sustainable Development Strategy: *The Common Fisheries Policy should promote the sustainable management of fish stocks in the EU and internationally, while securing the long-term viability of the EU fishing industry and protecting marine ecosystems*.<sup>2</sup> - Sustainable Development Strategy: *Improve fisheries management to reverse the decline in stocks and ensure sustainable fisheries and healthy marine ecosystems, both in the EU and globally*.<sup>3</sup>

### 6.2 Indicators used

The DPSIR framework for assessing fisheries and aquaculture is shown below. The rectangles in green are those indicators used in this report.

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<sup>1</sup> Marine Strategy (COM(2002) 539 final)

<sup>2</sup> Sustainable Development Strategy p. 6

<sup>3</sup> Sustainable Development Strategy p. 17

**Figure 6.1 DPSIR framework for assessing fisheries and aquaculture**

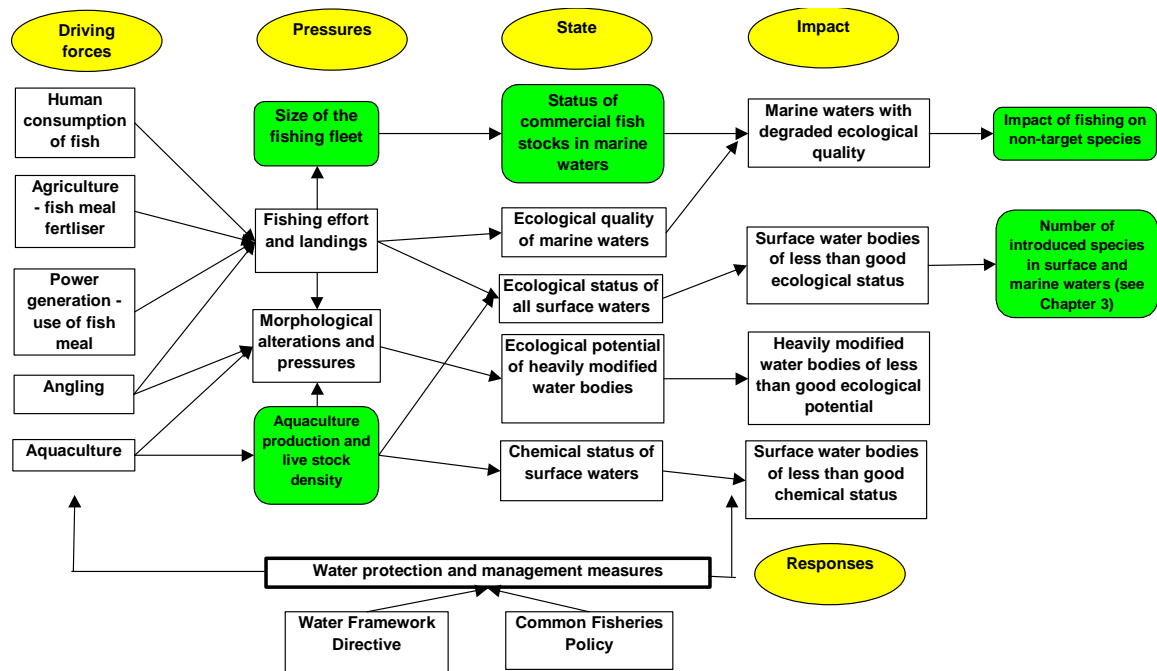


Table 6.1 summarises the assessments that are made in terms of the policy questions using relevant indicators. More detailed information and assessments then follow in the subsequent pages and indicator factsheets. An '✖' in the assessment column indicates that there is at this point no indicator developed or formulated to answer the specific policy question.

**Table 6.1 Overall assessment of progress in meeting policy objectives in terms of fisheries and aquaculture**

Policy question	Indicators	Assessment
<b>Question 1</b>	<b>Are we reversing the decline of fish stocks and ensuring sustainable fisheries and healthy marine ecosystems?</b>	
	Size of fishing fleet	⊖ Although the EU fishing fleet declined between 1989 and 2000 in terms of vessel numbers (-10 %), tonnage (-6 %) and power (-13 %), the decrease was not sufficient to lead to a corresponding improvement in the status of fish stocks. The much smaller fishing fleet of Norway and Iceland has also decreased in numbers (-27 %) but has dramatically increased in tonnage (31 %) and in power (6 %) during the same period. In the Accession countries, a strong decline in tonnage was observed in the first half of the 1990s..
	Fish consumption per capita	✖
	Aquaculture production in fresh and marine waters	⊖ Aquaculture production has increased dramatically in the EU and EFTA countries, since 1970, particularly in terms of fish (rather than shellfish) production. This represents a potential increase in pressure on water..
	Status of commercial fish stocks in marine waters	⊖ Most fish stocks of commercial importance in European waters appear to be outside safe biological limits.
	Environmental impact of fishing	⊖ Fishing is causing a change in the ecosystem composition of the North East Atlantic Ocean, and the Mediterranean and Black Seas suggesting that fish stocks are being exploited at unsustainable rates. ⊖ Fishing has a significant impact on cetacean, turtle and bird populations but no comparable datasets are available to properly assess the extent of the problem.
Percentage of fisheries reflecting environmental integration	✖	

✖ Indicator to be developed

## Policy question 1: *Are we reversing the decline of fish stocks and ensuring sustainable fisheries and healthy marine ecosystems?*

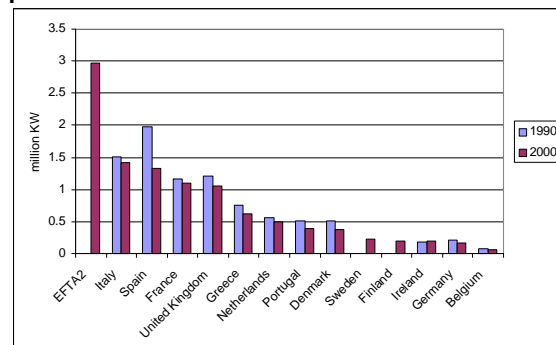
### Size of fishing fleet

Tonnage and power are the principal determinants of a fishing fleet's capacity and therefore of the pressure exerted on fish stocks.

Subsidies for the construction, modernisation and running costs of the EU fleet provided through the Structural Funds and the Financial Instrument for Fisheries (EC Council Regulation 2792/1999) have aggravated the pressure on the fish stocks. Of the monies allocated in the 1994-99 programme for the purposes of fleet-oriented aid, 60 % went into adjustment of the fleet, and 40 % to its modernisation. The decline in fleet capacity, overall, with main reductions in Spain, was not sufficient and has not led to an improved status for fish stocks. The Green Paper on the reform of the Common Fisheries Policy (European Commission web page) suggests reductions of fishing mortality of about 40% or more. Advances in technology mean that new vessels exert a greater fishing pressure than older vessels of equivalent tonnage and power. In a number of countries modernisation and decommissioning of the fleet has led to a decrease in total power, but still a slight net increase in tonnage.

The EU Multi Annual Guidance Programmes (MAGPs) are currently focused on reducing fishing efforts through scrapping of vessels and keeping them in port. In the 4<sup>th</sup> MAGP cuts of 30 % in the fishing effort for stocks on the verge of collapse and 20 % for those that were overfished were agreed. However these programmes have so far failed in delivering permanent, structural reductions in fishing effort since they are complex to administer and have not always been adequately enforced.

**Figure 6.4 Fishing fleet per country: total engine power**

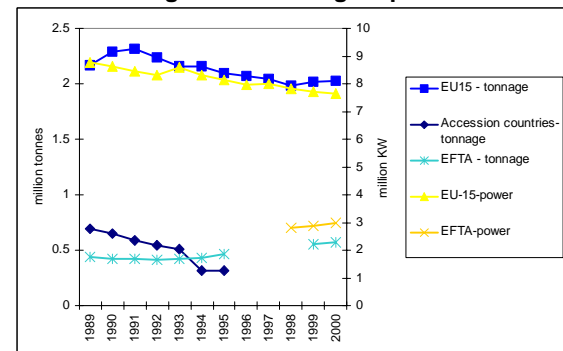


Notes:  
EFTA countries: Norway and Iceland.  
No data for Norway, Iceland, Finland and Sweden in 1990.  
Sources: EUROSTAT 2001; FAO 1998; European Commission 1999; EEA.

### Key message

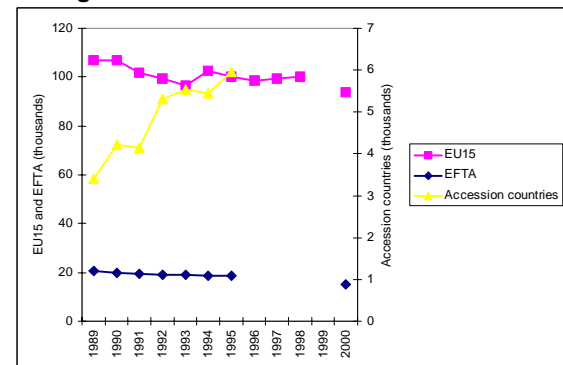
⊕ Although the EU fishing fleet declined between 1989 and 2000 in terms of vessel numbers (-10 %), tonnage (-6 %) and power (-13 %), the decrease was not sufficient to lead to a corresponding improvement in the status of fish stocks. The much smaller fishing fleet of Norway and Iceland has also decreased in numbers (-27 %) but has dramatically increased in tonnage (31 %) and in power (6 %) during the same period. In the Accession countries, a strong decline in tonnage was observed in the first half of the 1990s.

**Figure 6.2 Size of European fishing fleet in terms of total tonnage and total engine power**



Notes:  
EFTA countries: Norway and Iceland  
Accession countries: Bulgaria, Poland, Romania, Slovenia, Cyprus and Malta.  
Sources: EUROSTAT 2001; FAO 1998; European Commission 1999; EEA.

**Figure 6.3 Numbers of vessels in European fishing fleet**



Notes:  
EFTA countries: Norway and Iceland  
Accession countries: Bulgaria, Poland, Romania, Slovenia, Cyprus and Malta  
Sources: EUROSTAT 2001; FAO 1998; European Commission 1999; EEA.

## Policy question 1: *Are we reversing the decline of fish stocks and ensuring sustainable fisheries and healthy marine ecosystems?*

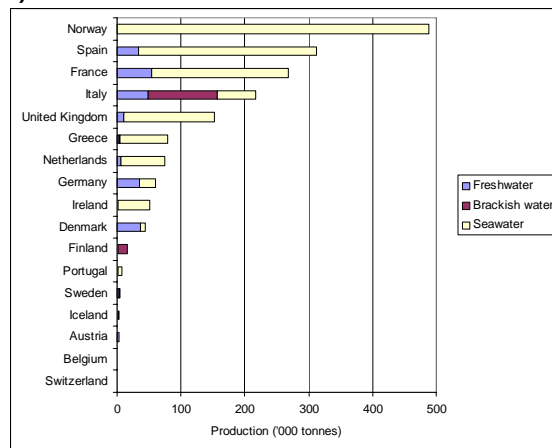
### Aquaculture production in fresh and marine waters

Aquaculture has benefited from financial support from the European Community since 1971. Limited at first to inland fish farming, Community support was extended to other areas in the late 1970s.

Between 1970 and 2000 there has been a four-fold increase in aquaculture production within the EU and EFTA countries, mainly because of subsidies, tighter fishing quotas and an increase in fish consumption. Norway accounts for a quarter of total European production, largely due to success in the mariculture of the Atlantic Salmon. In 1999 the share of mariculture in the total fisheries production in Europe amounted to 14 %.

Overall, aquaculture production in the Accession countries has remained fairly stable. The proportion of freshwater fisheries production was greater in 2000 for the Accession countries in comparison with the corresponding proportion for the EU and EFTA countries. This suggests that freshwater fisheries production is relatively more important in the former than in the latter. Turkey and Poland are also the greatest producers in terms of freshwater fisheries.

**Figure 6.6 Proportion of aquaculture production in different water types in 2000**  
a) EU and EFTA countries



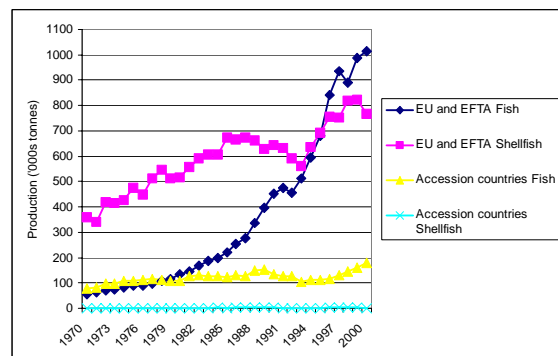
Notes: Aquaculture production includes finfish and shellfish production. Source: Eurostat, New Cronos database

Aquaculture can give rise to significant environmental impacts including discharges: of organic matter, phosphorus, nitrogen,

### Key message:

☺ Aquaculture production has increased dramatically in the EU and EFTA countries, since 1970, particularly in terms of fish (rather than shellfish) production. This represents a potential increase in pressure on water.

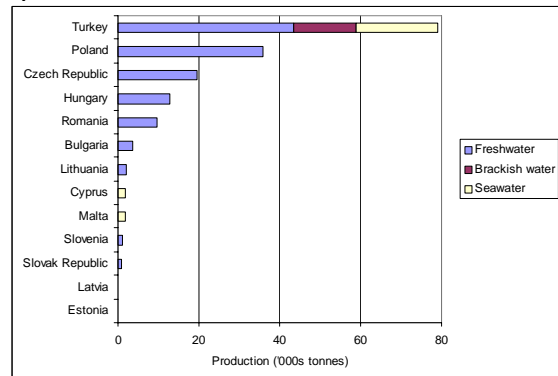
**Figure 6.5 Trends in aquaculture production in EU and EFTA countries and Accession countries for 1970-2000**



Notes: Fish production includes production in freshwaters, brackish and sea waters. Accession countries include data from former Yugoslavia before 1991 and Czechoslovakia before 1992.

Source: Eurostat, New Cronos database

### b) Accession countries



disinfectants, antifoulants, flesh colorants and medicines (including vaccines); quality of bathing water and the loss of recreational space; the depletion of oxygen in bottom waters; accidental introduction of non-indigenous species; genetic dilution due to escaped farmed fish breeding with wild populations, exchange of diseases and parasites between wild and farmed fish; potentially a large input of wild fish as fishmeal for a relatively low output of farmed fish.

**Policy question 1: Are we reversing the decline of fish stocks and ensuring sustainable fisheries and healthy marine ecosystems?**

**Status of commercial fish stocks in marine waters**

Fisheries are only sustainable if all fish stocks are within safe biological limits. Stocks are characterised as being outside safe biological limits (or overfished) when the fishing pressure (mortality) exerted on them, exceeds sustainability i.e. when mortality exceeds recruitment and growth.

The ratio of the number of overfished stocks (used here to denote stocks outside safe biological limits) to the number of commercial stocks (for which assessment of their status has been carried out) per fishing area is presented in Figure 6.7. Most fish stocks of commercial importance in European waters appear to be outside safe biological limits.. Knowledge of the biology of deep-sea species is insufficient, but it is suggested that stocks can sustain low rates of exploitation. In the Mediterranean demersal stocks are outside

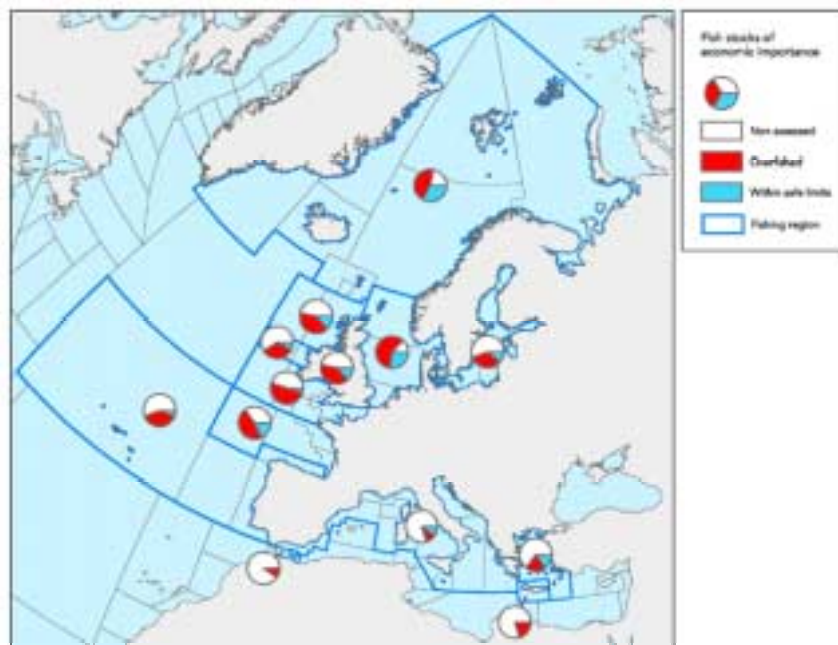
Key message:

⊖ Most fish stocks of commercial importance in European waters appear to be outside safe biological limits.

safe biological limits. Small pelagic stocks in the same area exhibit large scale fluctuations but do not seem to be fully exploited anywhere, except for the case of anchovy in Balearic, Adriatic and Aegean Seas. Particular concern has been raised about the overexploitation of Bluefin tuna and swordfish. The migratory nature of these species hinders data collection and consequently sustainable management. Bluefin tuna catches exceed the sustainable rate by 25 % and despite the recommendations from the International Commission for the Conservation of Atlantic Tuna (for both the Atlantic and Mediterranean), no measures (despite reductions in Total Allowable Catch) have been enforced or respected as yet.

**Figure 6.7 Commercial fish stocks outside safe biological limits in North East Atlantic, Baltic Sea and) in Mediterranean Sea in 2002**

Red: Stocks outside safe biological limits,  
Blue: stocks within safe biological limits,  
White: Stocks not assessed



Data sources: ICES, FAO, GFCM, SAC Report 2002, compiled by ETC Water

## Policy question 1: Are we reversing the decline of fish stocks and ensuring sustainable fisheries and healthy marine ecosystems?

### Environmental impact of fishing

Fishing gear is designed to maximise yields of target species and minimise cost of effort but they also trap non target species and damage the marine environment and habitats. Non-target organisms affected include benthos, birds, marine mammals, marine reptiles (turtles), plants and non-target fish. The effects on non-target species can either be direct (e.g. accidental entrapment) or indirect (e.g. through the alteration of energy transfers through trophic levels<sup>4</sup> thus reducing abundance and/or modifying relative size composition).

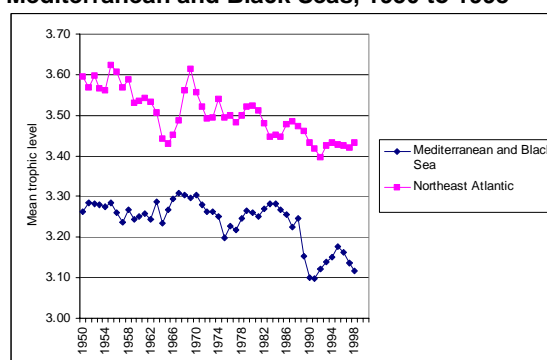
Capture fisheries tend to target the more valuable larger fish that are at higher trophic levels such as species that eat other fish. However, as overfishing reduces the populations of these fish, the landings of fish lower down the food web such as those species that eat zooplankton make up a larger proportion of the overall catch. This means a change in the ecosystem composition from fish eating species to plankton eating species. This is generally indicative of a negative impact on the whole ecosystem caused by fishing and has been called 'fishing down marine food webs'. For example, Figure 6.8 shows that the mean trophic levels in both the 'North East Atlantic' and 'Mediterranean and Black Sea' fishing areas have declined since 1950. It seems that fundamental changes in the structure of these marine ecosystems has occurred and it is likely that this is due to fishing. Fishing at lower trophic levels may suggest exploitation at unsustainable rates. It is also reported from the Baltic Sea that commercial fisheries are responsible for altered food web dynamics (HELCOM 2002).

There is particular concern about the impact of fishing on marine mammals, turtles and birds. Cetaceans (whales, dolphins and porpoises) are accidentally caught in drift nets and are in competition with fishermen for small pelagic resources. Drift nets and pelagic long lines are the major threats to birds and marine turtles. Even though there are no comparable datasets to properly assess the extent of the problem across Europe, there has been some efforts

#### Key messages:

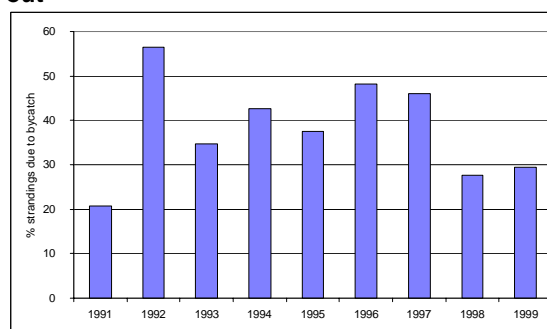
- ⊗ Fishing is causing a change in the ecosystem composition of the North East Atlantic Ocean, and the Mediterranean and Black Seas suggesting that fish stocks are being exploited at unsustainable rates.
- ⊗ Fishing has a significant impact on cetacean, turtle and bird populations but no comparable datasets are available to properly assess the extent of the problem.

**Figure 6.8 Mean trophic level<sup>4</sup> of fisheries landings for the North East Atlantic, Mediterranean and Black Seas, 1950 to 1998**



Source: Adapted from Pauly *et al* (1998) using FISHBASE (Pauly and Christensen, 1997)

**Figure 6.9 Cetacean strandings in England and Wales from bycatch as a percentage of strandings on which post mortems were carried out**



Source: DEFRA

nationally or regionally to monitor the bycatch of mammals, birds and turtles. For example, Figure 6.9 shows that between about 20 and 55 % of all cetacean strandings (on which post mortems were undertaken) in England and Wales can be attributed to bycatch.

<sup>4</sup> The level in the food web at which a group of organisms occurs. One way to detect ecosystem changes is to study the ratio of landings of predatory fish (piscivores) to landings of fish that feed on plankton (planktivores). As predatory fish are removed from the population, the proportion of plankton feeders in catches may grow.

### 6.3 References

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