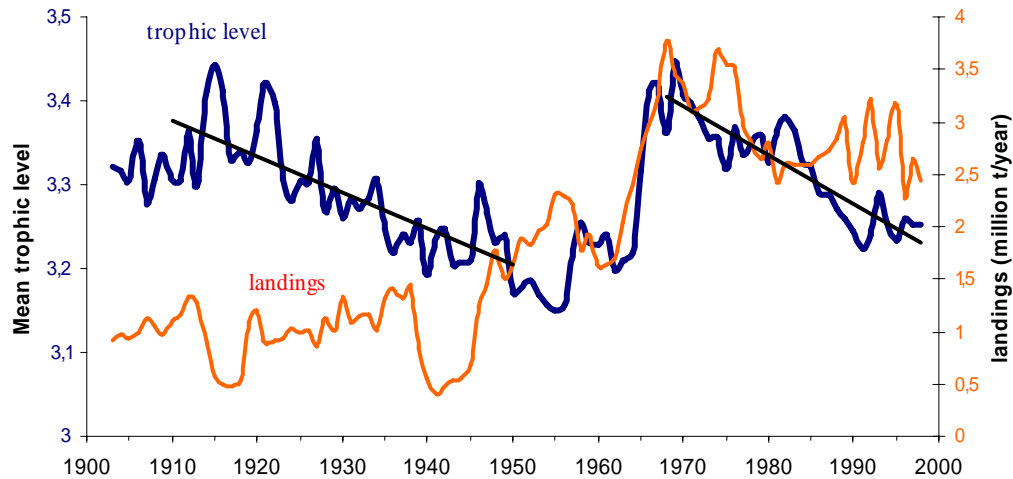
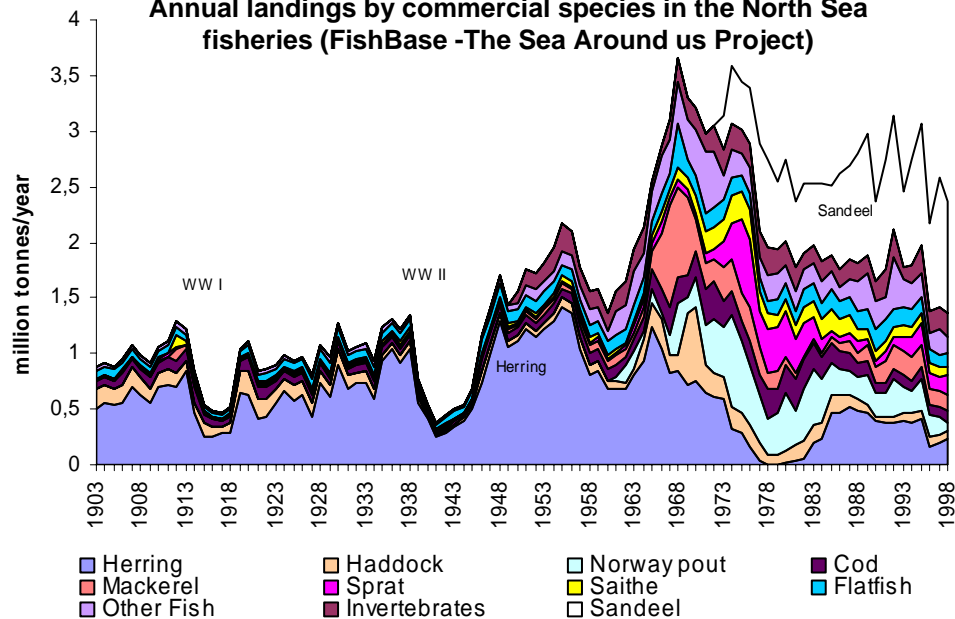


Indicator 21 Fish stocks and fish landings

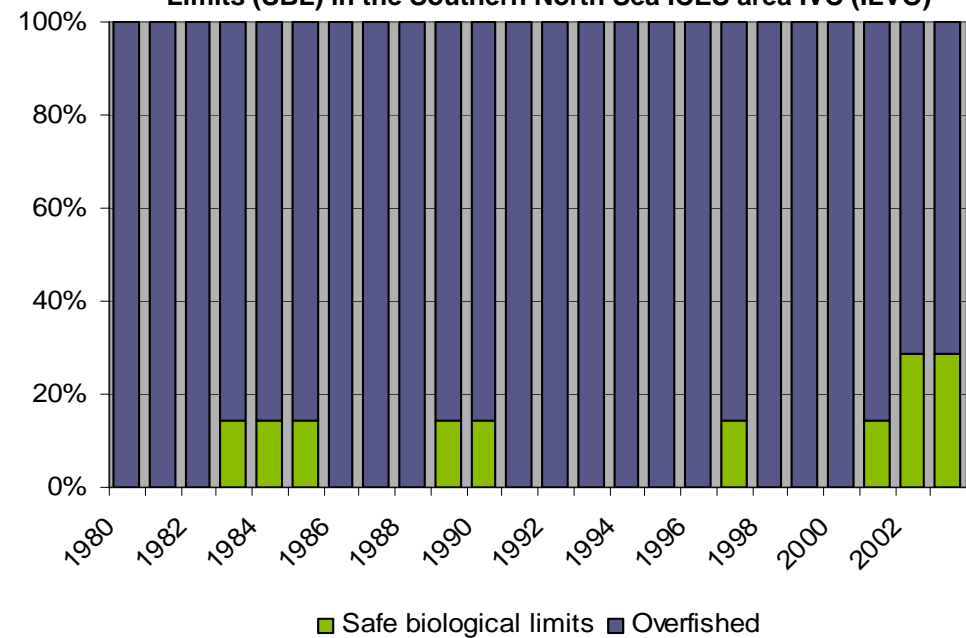
Mean trophic level of the North Sea fisheries 1903-1998
(FishBase - The Sea Around us project)



Annual landings by commercial species in the North Sea fisheries (FishBase -The Sea Around us Project)



Percentage of commercial fish stocks within Safe Biological Limits (SBL) in the Southern North Sea ICES area IVC (ILVO)



- *Trophic level trends in the North Sea Fisheries*
- *Percentage of commercial fish species within Safe Biological Limits (SBL)*
- *Total values of landed fish of commercially important species*
- *Estimations of discards in fisheries*

Key Message

- Trophic level in the North Sea fisheries has decreased steadily since 1970.
- Since 1980, the proportion of commercial fish stocks within SBL in the (Southern) North Sea has never exceeded 29% in any given year.
- Total landings in fishing ports in the Southern North Sea reach an approximate value of €15million.
- The estimated annual cost of discarding in North Sea fisheries (1999) varied from 70% of total annual landed value in the Dutch case to 42% in the UK whitefish case and 43% in the French *Nephrops* case.

Why monitor fish stocks and fish landings?

The trophic level is the position that an organism occupies in the feeding hierarchy of the food chain. The trophic level of fisheries is the average level at which fisheries obtain their catch within the food chain. When catch effort per unit for species of high commercial interest decreases below economic gain, fisheries tend to move further down in the food chain, and the average trophic level of fisheries decreases gradually. Abrupt changes in the trophic level are generally an indication of sudden changes in target species.

Fishing has a direct impact on the ecosystem by removing organisms from the marine environment. Ideally a fishing impact indicator should include all landings plus catches that are returned as discards. Landings statistics only under-

estimate the total catch and hence the impact on the environment. Estimation of discards in a particular fishery provides an indication of its environmental and economic efficiency.

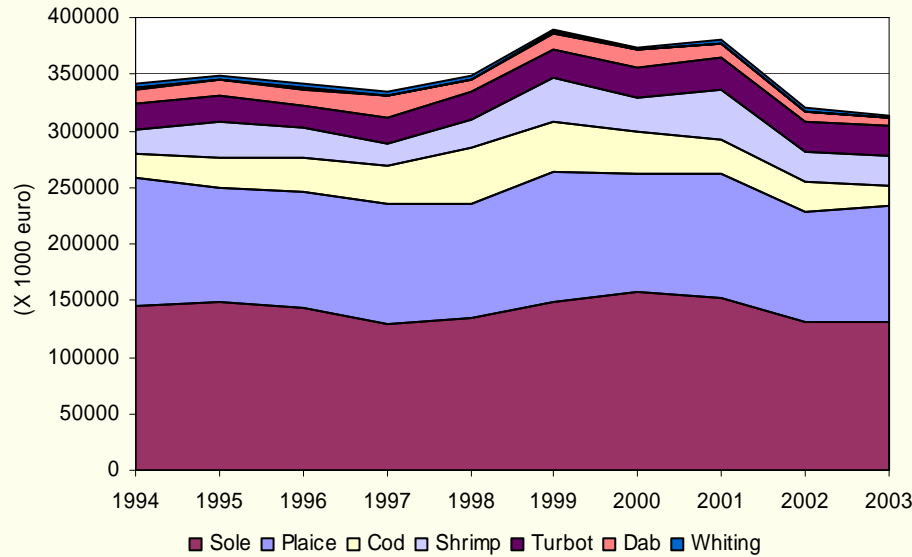
The impact of fishing must also be assessed against the state of the stock and its ability to recover. Stocks are 'overfished' or *outside safe biological limits* when the fishing pressure (mortality), exceeds recruitment and growth. The number of stocks within SBL is expressed as a proportion of the total number of commercial stocks for which status has been assessed.



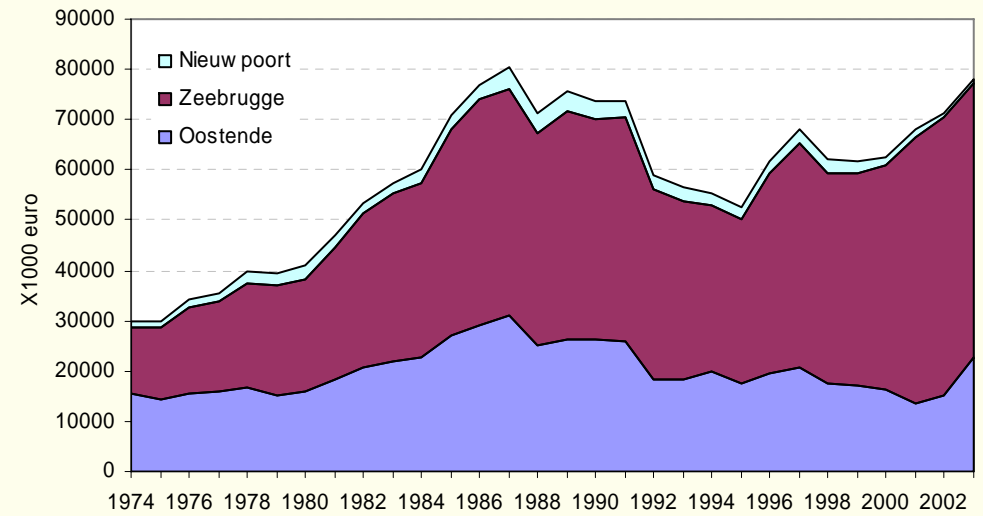
Where do the data come from?

Trophic level trends in the North Sea Fisheries are described and calculated by FishBase and The Sea Around Us Project (<http://www.seaaroundus.org>). For the northeast Atlantic detailed stock assessments are obtained through the International Council for the Exploration of the Sea (ICES). Data on the percentage of commercial fish species within SBL are supplied by ILVO (Sea Fisheries Department), based on ICES data. Values and landings of commercially important species by fishing port are obtained from the Dienst voor Zeevisserij-DVZ (Belgium), Office National Interprofessionnel des Produits de la Mer et de l'Aquaculture-OFIMER (F), Department for Environment Food and Rural Affairs (UK), and Centraal Bureau voor de Statistiek (CBS) and individual Fish markets in Zeeland (The Netherlands). Estimations of discards in the shrimp fisheries are the results of PhD research at Ghent University-Belgium (dr. H. Polet-ILVO).

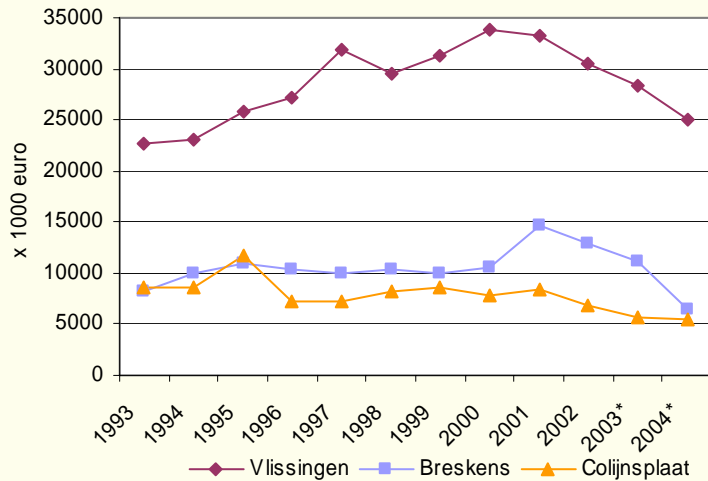
Economic importance (x €1000) of fish landings by species Zeeland (Productschap vis 1994-2003)



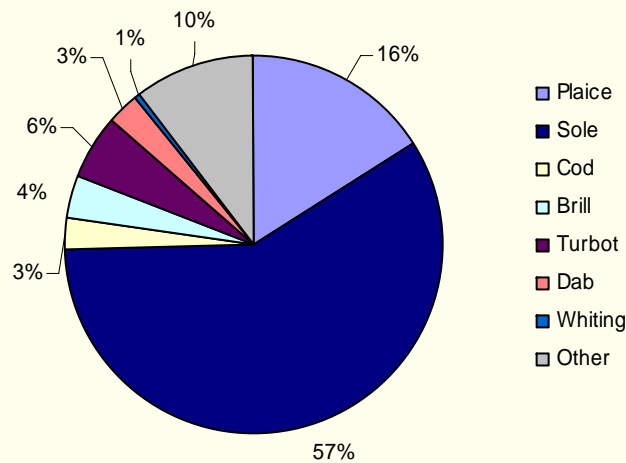
Value of annual landings (x €1000) - West-Vlaanderen (1974-2003)



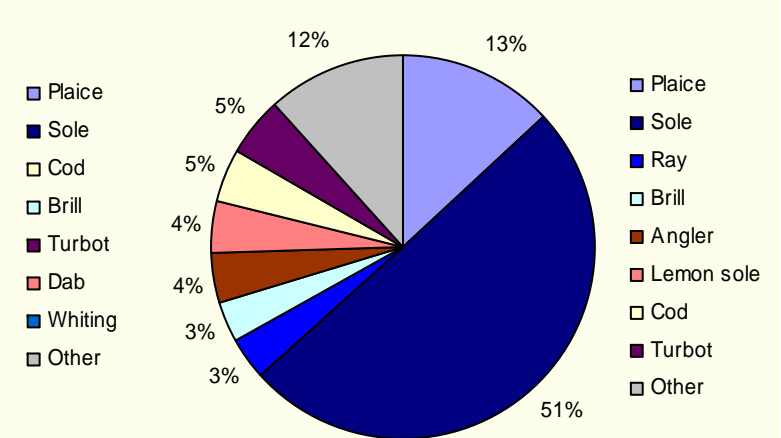
Value of annual landings (x €1000) in fishing ports of Zeeland (1993-2004)



Share of economic importance of fish landings by species-Vlissingen (2004)



Share of economic importance of fish landings by species-Belgian fishing ports (2003)



What does the indicator show?

Trophic level trends in the North Sea Fisheries

The average trophic level of fisheries in the North Sea have gradually decreased by 0.04 points per year since the first half of the 1900s, until the first collapse of the herring stocks. Fisheries then turned to a variety of predator fish species, which explains the sudden increase in the average trophic level in the 1970s. Since 1970 the average trophic level is in decline again (0.06 points per year), due to the strong exploitation of these fish stocks, and specifically because species that are on a lower scale in the food chain (e.g. shrimps, sandeel) are gaining importance in terms of landings.

Percentage of commercial fish species harvested inside Safe Biological Limits

Fisheries are inside Safe Biological limits when the spawning stock biomass (SSB) (the mature part of a stock) is above a biomass precautionary approach reference point (Bpa), or when the fishing mortality (F) (the proportion of a stock that is removed by fishing activities in a year) does not exceed a fishing mortality precautionary approach reference point (Fpa).

The indicator refers to seven commercial fish stocks: the pelagic herring and mackerel and the demersal cod, haddock, whiting, plaice and sole. The evolution of the percentage of commercial fish stocks within SBL ($F < F_{pa}$ and $B > B_{pa}$), reveals a discouraging situation. Since 1980, the number of commercial fish stocks within SBL in the (Southern) North Sea has been maximum 2 out of the 7 (28%). Herring and Haddock fisheries were within SBL between 2002 and 2003. Plaice has been overfished except in 1983-1985 and in 1990. A similar situation is observed in the wider north-east Atlantic: 62-91% of commercial stocks are outside SBL.

Total values of landed fish of commercially important species

Leigh-on-sea and the group of fishing ports of Hastings, Eastbourne and Seaford, are economically the most important fishing ports in the Kent and Essex area. Their landings are worth £2.3 and 2.4million respectively. The most important species in the local economy in terms of value of landings are cockles in Leigh-on-Sea (£2.2million in 2003) followed by sole (£0.7million) at Hastings, Eastbourne and Seaford. In 2003, sole landings are 'top one' income fisheries for most of the fishing areas: Hastings (Hastings, Eastbourne and Seaford), Rye, Hythe (Hythe, Dungeness, Camber), Ramsgate, Maldon (Maldon, Burnham-On-Crouch, Great Wakering, Canvey Island, Southend-On-Sea), Whitstable, West Mersea, Folkestone and Faversham.

Vlissingen is economically the most important fishing port and market in Zeeland. It has an

annual turnover of €25-30million. Sixty-five percent of the total income in 2003 was provided by sole. In Breskens 45% of the annual turnover comes from the sole fishery and 30% from shrimp. Sole, plaice cod and shrimp are the most important commercial catches in Zeeland.

The Belgian fishing ports show similar features: sole and plaice provided 64% of income in 2003. Zeebrugge is slightly more important than Oostende; annual turnover in Zeebrugge fluctuates between €15 and 40million. The maximal annual turnover of the three ports together reached €80million in peak year 1987 and €78million in 2003.

Nord-Pas-de-Calais is by far the most important centre for fish products in the Southern North Sea. Boulogne-sur-mer has a total turnover of €5million, which represents 90% of the total regional turnover (2003). Nearly 50% of the value of sales is derived from the landings of squid, sole and plaice.

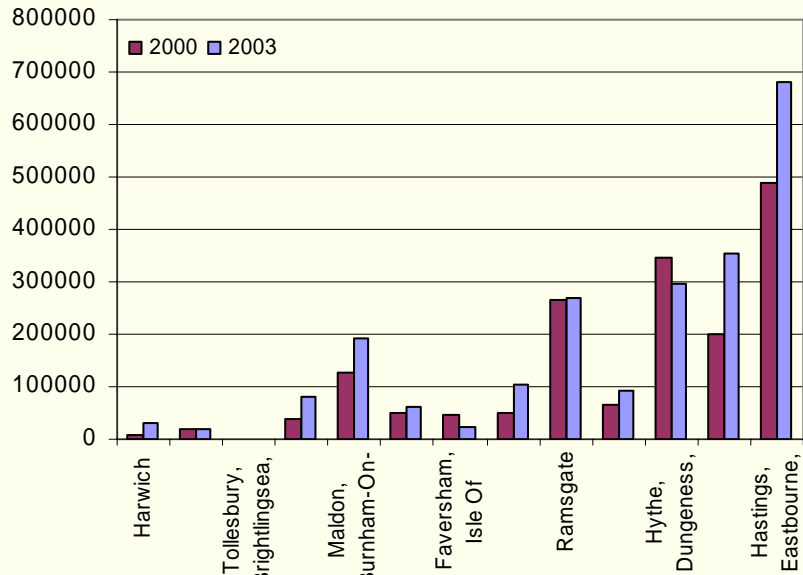
Estimations of discards in North Sea fisheries

The main discard problem in EU fisheries is that of undersized fish. Survey results indicate that over two thirds of the discarded catch in the UK whitefish trawl fishery consists of commercial species, of which undersized fish account for the vast majority (cod 98%, haddock 87% and whiting 97%). The estimated annual cost of discarding in three case studies in North Sea fisheries (1999) varied from approximately 70% of total annual landed value in the Dutch case to 42% in the UK whitefish case and 43% in the French *Nephrops* case.

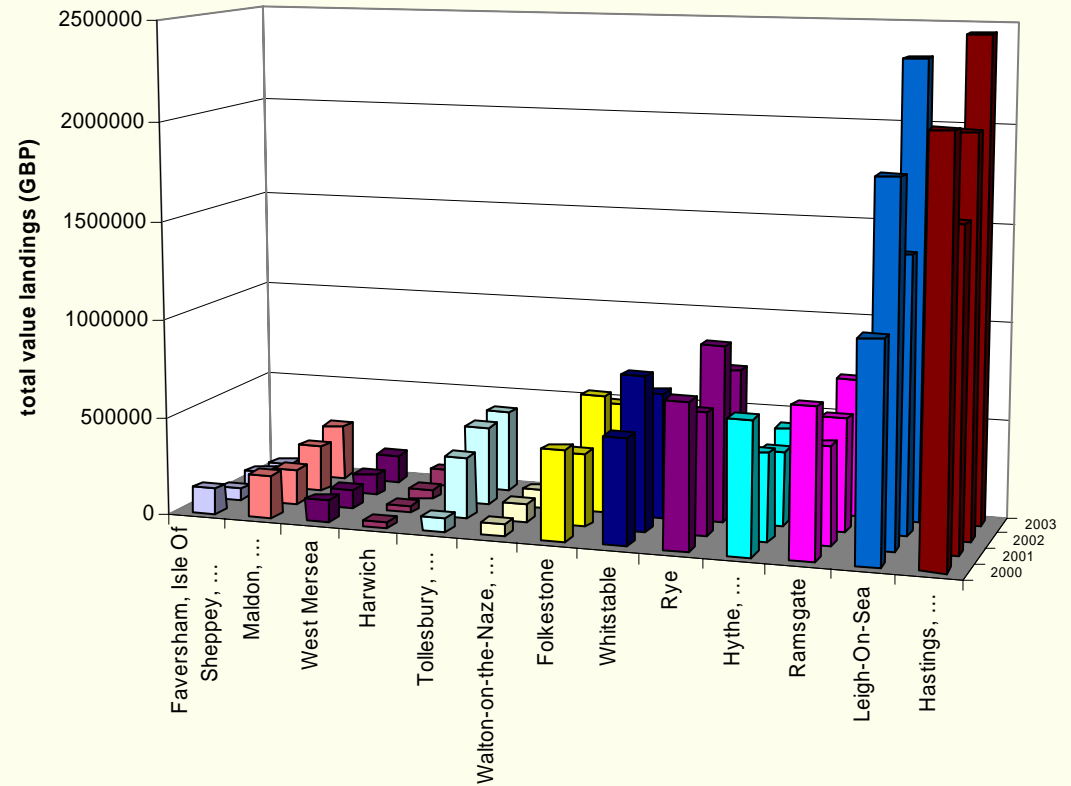
In the UK North Sea trawl fisheries for cod, haddock and whiting, an estimated £47million (€75million) worth of these species was discarded in 1999 (£11million cod, £31million haddock and £5million whiting).

Discard ratios in the North Sea shrimp fishery (*Crangon crangon*) were estimated at 59% (Alversson et al., 1994b).

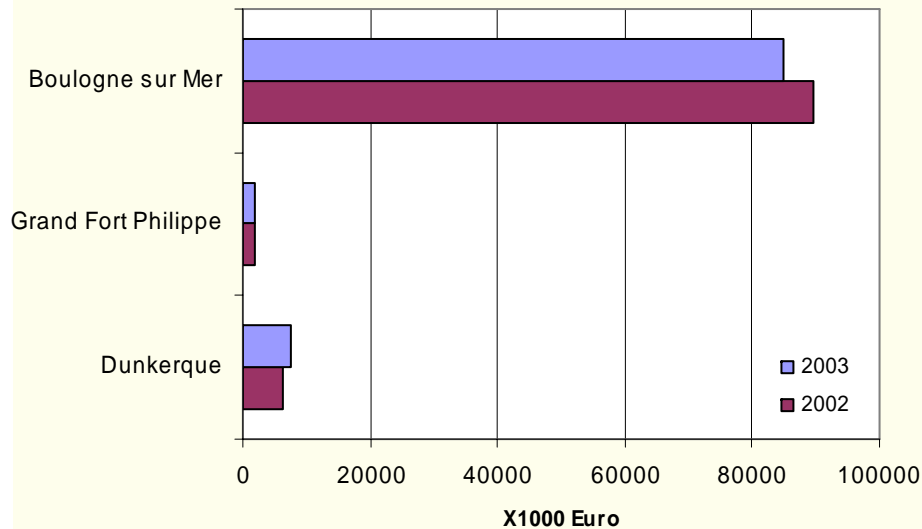
Value of sole landings (GBP) in ports of Kent and Essex



Annual turnover in fishing ports of Kent and Essex (2000-2004)

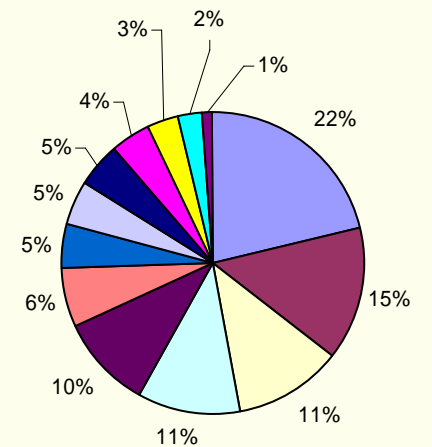


Annual turnover (x €1000) in fishing ports Nord-Pas de Calais 2002-2003



Fish landings by species, Boulogne-sur-mer 2003

- squid
- sole
- w hiting
- red barbel
- saithe
- grenadier
- cod
- bass
- blue ling
- mackerel
- plaice
- scallops
- lemon sole



A study concluded in 2003 in Belgian brown shrimp fisheries shows that a higher proportion of the catch is thrown overboard. These discards consist of undersized shrimps, commercial fish and a large variety of non-commercial fish and invertebrate species. On average, the catch consisted of 29% commercial shrimps and the estimated discard ratio was 71% (Polet, 2003).

What are the implications for planning and managing the coast?

Fishing is not only an important sector in the regional economy, it also has a major impact on marine ecosystems. The European Common Fisheries Policy (CFP) (1983) aims to implement management mechanisms for sustainable fisheries while offering stable economic and social conditions. However, the CFP has recognized the need to achieve sustainable fishing while safeguarding vulnerable marine wildlife and habitats as required by European legislation (such as the Habitats Directive).

Sustainable fishing requires balancing natural growth in fish stocks with the total number of fish that are removed yearly by fishing activity. This balance, known as the "maximum sustainable yield", aims to maximise earnings in fisheries while conserving fish stocks for the future. In the North Sea, MSY on fish stocks is obtained and regulated by setting 'Total Allowable Catches' (TACs). Through this mechanism, quotas are determined annually by the Fisheries Council and divided among the countries that fish those stocks. Compliance is ensured by monitoring landings from fishing vessels, and taking into account the discards. Vessels and countries that do not adhere to their agreed quota may suffer economic sanctions and a reduced quota the following year.

Two approaches are used to address unsustainable practices in fisheries: direct restrictions in fishing effort through e.g. the reduction in number of ships or fishing days, and indirect restrictions in terms of the output or catches. The second approach (e.g. catch quota such as the TAC) has shown to be less efficient, in particular in mixed fisheries with more than one target species. The beam-trawler fisheries on plaice and sole commercially valuable catch has to be discarded when TAC for one species has been completed while for the other species it has not.

Priorities in the CFP are the introduction of the precautionary approach in setting annual TACs, adjusting catch effort and the size of the fleet to the carrying capacity of the stocks, and introducing environmentally friendly fishing tools and methods.



How reliable is the indicator?

Stock assessments should also be extended to other commercially important stocks, in order to obtain a broader view on the status of fish stocks. In the future, data on recruitment, spawning stock biomass and fishing mortality should also be based on commercial catches and landings along with scientific surveys. Long time data series of landings in Western Europe provide a good indication of changes in landings patterns. Landings however do not include information relating to discards. The ICES recognizes that discard data is variable in its accuracy and availability and that by-catch data for many species (such as marine mammals) is often based on anecdotal and voluntarily collected evidence. New EU legislation regarding collection of discard information and concerted efforts by many groups to study and reduce by-catches should increase both the quantity and quality of information available in the future.

