



## North Sea sole

Sole is the most valuable flatfish landed in the Netherlands - 43% of the value of all auctioned fish comes from sole sales. In the North Sea, Dutch fishermen have 74% of the European catch quota for this fish. The larger part of sole products is exported. In order to ensure that we will be able to enjoy sole in future, measures are being taken to safeguard its future - at European level, at national level, and by the fishermen themselves.

Sole (*Solea solea*) is a flatfish. Sole lives on the seabed where it predominantly eats worms and lesser sand-eel. In the North Sea, adult sole occurs in the central and southern part. Sole is an elongated, oval fish with a round head. The right side, the upper side, is brown with spots and dots, and the underside is white. The maximum length of sole is 70cm. The smallest grading is a small sole, known as the 'slip sole', because it slips through the net. This grading is very popular among fish lovers.

## Social debate

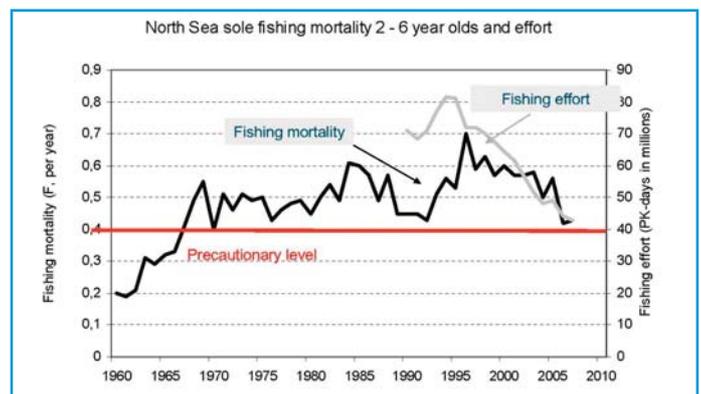
Nature organisations such as the WWF and the North Sea Foundation have put North Sea sole in the red column of their fish-purchase guide, the VISwijzer. The message is that it is 'better not to eat now', because the catch imposes too great a burden on nature and the environment. Their first objection is overfishing, which may endanger the existence of the

fish species. They also criticise the most important fishery method, the beam-trawl fishery, as this is said to 'plough over' the North Sea and cause major damage to life on the seabed. They also point to the fact that sole fishery has a substantial by-catch of young plaice, which is discarded with minimal chances of survival.

## The facts in brief

- The fishing effort for North Sea sole has decreased strongly in the last years. Sole is now part of the multi-annual plan and the stock is in balance with the catch capacity now<sup>1</sup>. See figure 1.
- The sole stock is characterised by major fluctuations in the strength of the incoming year classes (new growth).
- Since the 1950s, the stock experienced two major peaks. In other years it fluctuated between the precautionary level. The stock is above the precautionary level, therefore is out of the danger zone and complies with the criteria of the flatfish plan<sup>2</sup>. Fishing is managed every year based on the annual advices of international fishery biologists.
- Besides the fishing effort and the strong fluctuations in the growth, the size of the stock is also influenced by other factors, such as changes in the food supply and climatological conditions. However, the fishing effort is the only factor we can simply influence.
- Fishery for plaice and sole is the first seabed fishery in the North Sea that is managed in accordance with the Maximum Sustainable Yield (MSY) principle. The first phase is focused on reaching safe biological limits<sup>2</sup>. See figure 2.
- Sole is still caught with beam-trawl fishery with tickler chains. As the sole buries itself deep into the seabed, ticklers are needed to startle the sole. There are limited options of fishing for sole with static nets that are fixed to poles or buoys. During the summer, sole fishery with static nets is carried out in the coastal areas of the North Sea.
- Fishery by Dutch beam trawlers is limited to a third of the total North Sea area - 80% of the fishery is concentrated in 30% of this fished area<sup>3</sup>.
- The minimum size for sole is 24cm. All sole that is smaller than this size may not be landed and must be thrown overboard. The undesired bycatch of undersized sole is very limited in beam-trawl fishery.
- As sole is very flexible and easily slips through the mesh, it must be caught with a relatively small minimum mesh size of 80mm. The 80mm mesh width for sole does not match the 100mm mesh width for plaice.

Figure 1: Historical development of fishery effort for North Sea sole



F<sub>pa</sub> = precautionary level fishery effort = 0,4  
 F<sub>lim</sub> = lower limit stock size = undefined  
 F 2008 = 0,47

# Fish facts: North Sea sole (version September 2008)



## Bycatch and discards

Apart from the species a fishery actually wants to catch, fishermen also catch other species. This bycatch can be split into a desired and an undesired bycatch.

A desired bycatch consists of commercially interesting fish species that may be landed.

The undesired bycatch is the catch the fisherman puts overboard again. These so-called discards consist of commercial species for which the fisherman has no quota or that are smaller than the compulsory minimum size. Other discards are species that are not interesting from a commercial point of view, or other organisms, such as seabed animals.

- The plaice discards in beam-trawl fishery are probably lower than assumed until now. The Dutch institute IMARES samples just 10 fishing journeys per year, which is less than 0.25% of the efforts of the beam-trawl fleet. Weekly sampling on approximately 25 fishing boats demonstrated that approximately 30% in volume of all plaice that is caught must be put overboard, whereas international fishery researchers calculate 50%

in volume<sup>4</sup>.

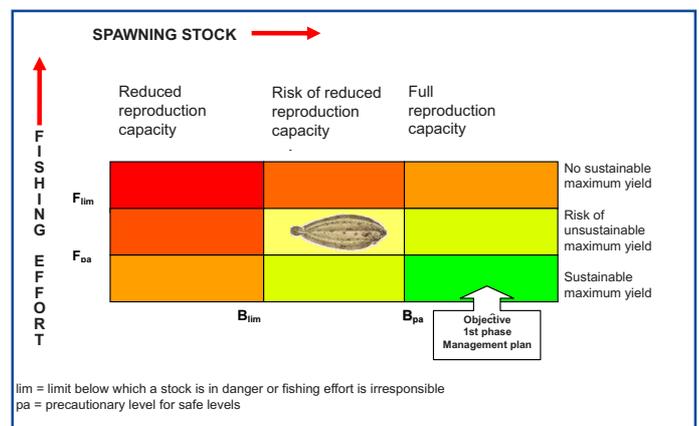
- Sole with the sustainability quality mark from the Marine Stewardship Council (MSC) has been available since 2007. This is sole that is caught on a small scale with static nets off the coast of Hastings in the UK<sup>5</sup>. It is a very small stock that is different from the North Sea sole.

## European management measures

For most fish species, measures are taken in a European context in order to safeguard the existence of the stock, and this applies to North Sea sole too. Quotas for the amount that may be caught, restricting the fishery capacity that may be used, minimum sizes and mesh widths form part of the standard package of European management measures. There is also a specific measure that has been taken for North Sea sole:

- Since 1 January 2008 a multi-annual plan has been in force for North Sea plaice and sole. It is based on the Maximum Sustainable Yield principle<sup>2</sup>. This plan consists of two phases. In the first phase, the fishing effort is reduced by 10% each year in order to bring the stock to and maintain it within safe biological limits (Figure 2). The maximum catch amount and the fishery effort are aligned to this. In the second phase, the objectives for the Maximum Sustainable Yield are developed.

Figure 2: Actual status North Sea sole in relation to objective 1st phase multi-annual management plan



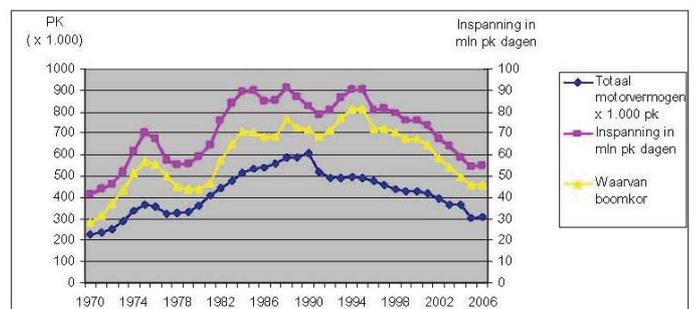


## Management measures Dutch fishery fleet

In addition to European management, the Dutch flatfish fleet has taken the initiative to introduce a number of its own measures to manage the sole stock.

- Over the past years, the catch capacity of the cutter fleet has fallen with over 40%. In 2008 23 ships were decommissioned, which reduced the number of large traditional North Sea beam trawlers to 81 (Figure 3).
- Heavy engines mean an increased catch capacity, and therefore there are European and national maximum levels for the engine capacity. The Dutch fleet is the only fleet in the European Union that has checked and controlled seals on the permitted engine capacity in all cutters.
- The Dutch fishermen are aware of the plaice discards in sole fishery and are taking a number of measures to prevent discards as much as possible. Increasing the European minimum mesh width from 80mm to 90mm for the beam-trawl nets did not produce the anticipated reduction in plaice discards, but led to large losses in the catch of sole<sup>6</sup>. Together with fishery researchers tests are being carried out with escape panels in the beam-trawl gear, and the initial results are most promising;
- The fishery works actively on alternative fishing methods, where reducing the undesired bycatch, reduced seabed disturbance, and fuel savings are the key issues. Examples include the pulse trawl, which is adapted beam-trawl gear where the tickler chains that are used to flush the fish have been replaced with electrical pulses. Besides that fishermen are working on innovative adaptations of the beam trawl-gear. The Sum-wing and hydriog are promising. These are fully floating beam-trawl gear. These initiatives, together with i.o. the pulse trawl gear will probably lead to less resistance and less soil disturbance
- As the Netherlands has a very large share in the EU TAC for sole (74%), these measures make an additional contribution to sustainable management.

Figure 3: Historic development capacity and effort Dutch demersal fleet



Agricultural Economics Institute, C. Taal, Nov. 2007.





## Sole processing

The flatfish industry consists predominantly of companies that specialise in processing and selling flatfish from the North Sea. Most companies purchase fresh raw materials from the Dutch auctions. Then processing takes place, including filleting, coating in bread crumbs, and freezing.

Europe is the most important export market, but sole is also a strong product in the domestic market, particularly in the restaurant and catering sector.

### Landings and import of sole in 2007

	tonnes landed weight
Landing Dutch auctions	12.000
- Dutch vessels	10.000
- Re-flagged ships	2.000
Import	1.500
<b>Total available</b>	<b>13.500</b>

Sources: Calculated by LEI from figures from NL auctions, Eurostat

### Dutch fish processing and wholesale in 2007

	tonnes landed weight
Total processed/traded	13.500
Destination sales	
- Domestic market	1.500
- Export	12.000

Sources: Calculated by LEI from figures from NL auctions, Eurostat, GfK

### Sole exports in 2006

	Export share (%)
Italy	40,7
Spain	23,3
France	14,0
Belgium	7,2
USA	4,8
Germany	4,8
England	1,6
Switzerland	1,6
Ireland	0,4
Sweden	0,2
Denmark	0,2
Slovenia	0,1
Greece	0,1
Portugal	0,0
Norway	0,0
Other countries	1,1
<b>Totaal</b>	<b>100</b>

Source: Eurostat - Comext

## WOULD YOU LIKE TO KNOW MORE?

If you would like to know more about North Sea sole and/or the measures taken by the Dutch fishery sector, please visit [www.pvis.nl](http://www.pvis.nl) where you will find more information.

## References

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