



Merlangius merlangus Image © Scandinavian Fishing Year Book

Whiting (*Merlangius merlangus*) is widespread in waters around the British Isles and, historically, has been a popular fish with UK consumers. Its commercial importance has dwindled in the last three decades, due to declining stocks and reductions in catch associated with larger meshed nets used to conserve other valuable species, such as cod and haddock. The total weight landed into UK ports in 2011 was around 10,000 tonnes (t), with a first-sale value of £11.5 million (1). However, only 807 t were consumed in the UK during 2011 (2).

Whiting belongs to the cod family and is found in the North East Atlantic from the southeastern Barents Sea and Iceland to Portugal, as well as in the Black Sea, Aegean Sea and Adriatic Sea (3). The combined international landings from whiting stocks in the North East Atlantic to UK markets declined from over 120,000 t per year in the early 1980s, to less than 30,000 t by 2005. A large percentage of the catch is discarded due to low market value and a preponderance of undersized fish.

Although the whiting stock in the western English Channel and Celtic Sea appears to be in good condition, there has been a general low level of

juveniles recruiting to the fished populations elsewhere, which has led to declines in abundance over the last decade. Some stocks (Kattegat, West of Scotland and Irish Sea) are considered to be well outside safe biological limits. As a consequence, ICES continues to advise on restricted catches and to recommend that effective technical conservation measures are implemented to protect juveniles in an attempt to reverse this trend (4).

The purpose of this guide is to outline the status of whiting stocks and describe some of the measures that are being taken to protect them.

BUYERS' TOP TIPS

Know your species

The species marketed as 'whiting' in the UK is the European whiting, *Merlangius merlangus* (5). 'Blue whiting' (*Micromesistius poutassou*) and 'pout whiting' (or whiting-pout or bib – *Trisopterus luscus*) are quite different species that occur in European waters.

Know your source of supply and stock status

To understand sustainability issues concerned with your supply, you need to know the assessment and management areas from which the fish have been caught. The table on page 4 gives an overview of the status of whiting stocks in the North East Atlantic.

Seafish Responsible Sourcing Service

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Status of whiting stocks March 2013

Biology

Whiting occurs mainly in waters down to 100m depth, but may extend out to 200m (6). The juveniles tend to have a more coastal distribution than adults. Whiting around the UK are mature at two years of age and around 27cm in length and spawn mainly between February and June (7). The average landed length is usually around 30-40cm, but whiting can grow to 70cm and a weight of 3kg (3). Whiting are opportunistic predators feeding on a wide variety of shrimps, squids and small fish such as sandeels, sprats, Norway pout, young herring and haddock. In turn, they are preyed upon by species such as cod, saithe, monkfish and seals, and larger whiting (8).

Assessment

Whiting populations in the North East Atlantic are allocated to 'management areas' comprising one or more ICES divisions. However, the areas within which stocks are scientifically assessed sometimes extend over more than one management area, or cover only part of a management area. In addition, tagging studies indicate that whiting may move between adjacent management areas, and there may be limited mixing within management areas (4). This adds to the difficulty in estimating the abundance of whiting stocks, or to follow the dynamics of the different populations around the UK coast.

ICES has found it difficult to estimate year-on-year trends in whiting population size from fishery and research trawl survey data, particularly when these are collected over large areas such as the entire North Sea. This may be due to the different population trends within a particular management area, and also to inaccurate or missing data on the often substantial quantities of whiting discarded by trawl fleets in particular.

Though information on the status of many whiting stocks from ICES is based on trends in indicators

of abundance from survey trawl catches, ICES has been able to carry out new analytical assessments for two stocks, off the west coast of Scotland and in the western English Channel and Celtic Sea. Apart from in the latter area, where the stock appears to be in good condition, relatively low numbers of juveniles recruiting to the fished population have led to declining abundance over the last decade, and some stocks (Kattegat, West of Scotland and Irish Sea) are considered well outside safe biological limits.

Maximum Sustainable Yield (MSY) and the Precautionary Approach (PA)

Current ICES advice on fish stocks is given on the basis of MSY and the precautionary approach (9). MSY means fishing at a level that takes the maximum catch (yield) that can safely be removed from a fish stock, on a continuous basis, whilst maintaining its long-term productive capacity. This is achieved by keeping the Spawning Stock Biomass (SSB) above the biomass action point **MSY_{Btrigger}**. The precautionary approach aims to limit fishing mortality (F) and catches to levels that avoid depleting the stock's reproductive capacity, keeping its SSB above its biomass reference level (defined as **B_{pa}**).

These concepts are illustrated in the schematic (Fig. 1), which shows how catches from an unfished stock would increase in line with exploitation (or fishing mortality, F), up to a point where the total mortality on the stock causes so many fish to be caught at a relatively small size (and discarded or landed) that the potential production of the stock due to growth of individual fish is not realised ('growth overfishing'). The peak of this curve represents MSY and indicates where **F_{MSY}** lies.

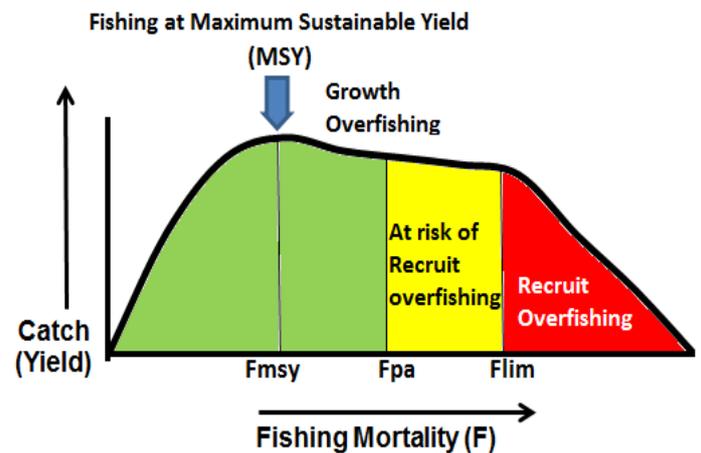
However, providing sufficient fish survive to become adults and spawn, they may still have the reproductive capacity to replace themselves.

Stock collapse can occur when fishing mortality reaches a level (F_{lim}) such that removals from a stock are so high, and its spawning capacity is so diminished, that fewer and fewer juveniles are produced. So, not only is the size of the stock being reduced by too high a level of exploitation, but there are fewer juvenile fish to replace those that are caught, and stock levels are likely to fall even lower ('recruit overfishing'). The yellow area between the green (inside safe limits) and red (outside safe limits) zones in the schematic and stock trajectories (Figs 2 and 3, p 5) represents levels of F or SSB that management should seek to avoid to ensure that the stock has a high probability of remaining sustainable.

Scientific advice given under the twin MSY/precautionary approach strategy will aim to either achieve catches consistent with fishing levels that would result in F_{MSY} , or reduce fishing mortality to return the stock to within safe biological limits ($>B_{pa}$). For many North Sea fish stocks, including whiting, parties exploiting the stock have management plans, and ICES also provides advice on catches compatible with such plans. Where there is insufficient information to

evaluate the status of the stock, as in the case of many whiting stocks, ICES advice is given on its approach for data-limited stocks (usually taking the precautionary approach by advising that catches should decrease by 20% in relation to the average landings of the last three years).

Figure 1 Schematic of ICES' MSY and PA reference points in relation to fishing mortality and Yield



Management Stock (coded to mapFigure 2)	Agreed TAC 2013(t) 10)	Advisory TAC 2013(t)	Scientific advice and management (November 2012 ICES advice) (4)
NORTH EAST ATLANTIC WHITING (<i>Merlangius merlangus</i>) www.ices.dk			
Inside Safe Biological Limits			
ICES Divs VIIe-k Western English Channel. Bristol Channel and Celtic Sea	17,500 (+7,000 in VIIId)	17,500	An analytical assessment was available in 2012, which estimated SSB to have increased recently to well above $MSY_{Btrigger}$, due to the recruitment of the above average 2007 and 2008 year classes following poor recruitment since 2001. Fishing mortality has declined considerably since 2007, and is now below F_{MSY} . ICES' advice is based on the MSY approach, and notes that technical measures should be introduced to reduce discard rates.
Outside safe biological limits			
ICES Div. VIa West of Scotland	292 (includes Vb)	Lowest possible level	An analytical assessment was available in 2012, which estimated SSB to have increased slightly since an historic low in 2005, though it remains well below B_{lim} . Recruitment has been low since 2000. Fishing mortality has declined continuously since around 2000 and is now very low. No MSY reference points are defined. ICES advice is given on the basis of the precautionary approach, and measures are required to reduce discards in the <i>Nephrops trawl</i> fleet.
Reference points not defined			
ICES Div. IIIa Skagerrak & Kattegat	721	<500	The available landing data provide insufficient information on stock status, and reference points have not been set. Landings in 2010 were at an all-time low and ICES' advice is based on its approach for data-limited stocks.
ICES Sub-area IV and Div. VIId North Sea and Eastern English Channel	18,932	19,600 (+7,000 for VIIId)	The perception of the stock abundance was revised upwards in 2012, though the trends in stock dynamics are unchanged. Recruitment was estimated to be low between 2003 and 2007, and has remained below average since 2008, and SSB has recently been around the long-term average. Fishing mortality has been relatively low and stable since 2003. No precautionary or MSY reference points are defined. The EU and Norway have developed a management plan for whiting (4) with a fishing mortality target which ICES considers is no longer applicable and needs re-evaluation. ICES' advice is given on the basis of precautionary considerations.
ICES Div. VIb Rockall		11	The stock status in VIb is unknown, and landings are negligible. ICES advice is based on its approach for data-limited stocks.
ICES Div. VIIa Irish Sea	84	Lowest possible level	The state of the stock is uncertain, though all available information indicates that the present stock size is extremely low and likely to be outside safe biological limits, whilst fishing mortality is likely to be above possible MSY targets (none defined). ICES advice, based on precautionary considerations, is that catches should be reduced to the lowest possible levels and further technical measures implemented to reduce discards.
Sub-area VIII Biscay	3,175		The available information is insufficient to evaluate stock status, and ICES advice is based on its approach to data-limited stocks. However, ICES is not able to quantify the resulting catch due to uncertainty in the landings data.

Figure 2: Fishing mortality trajectory for whiting in ICES Division VIa; west of Scotland. ICES 2012 assessment. The stock has been harvested sustainably since 2002

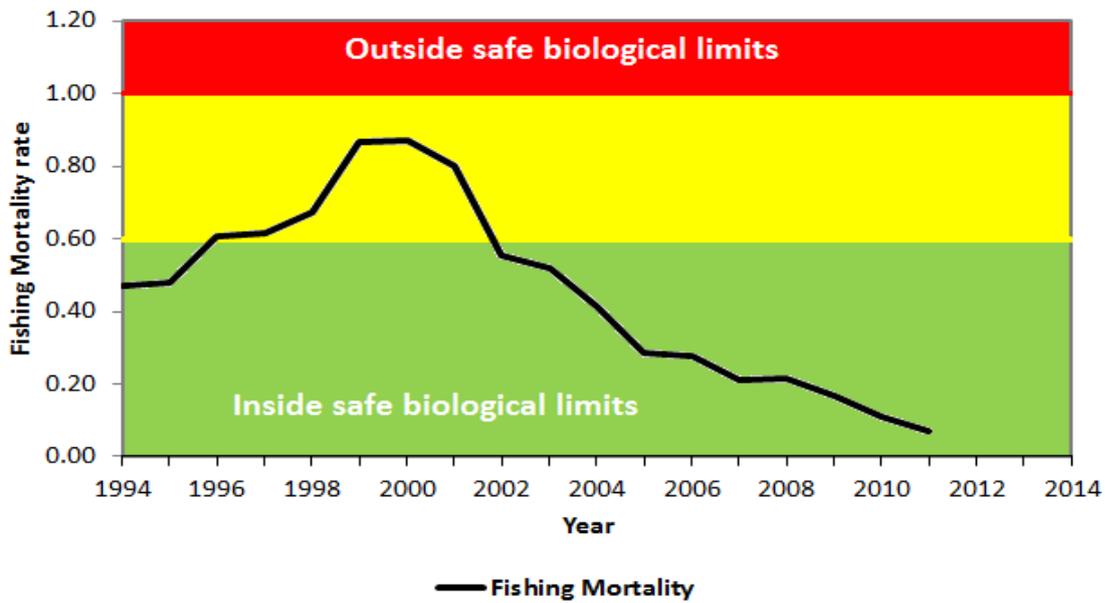
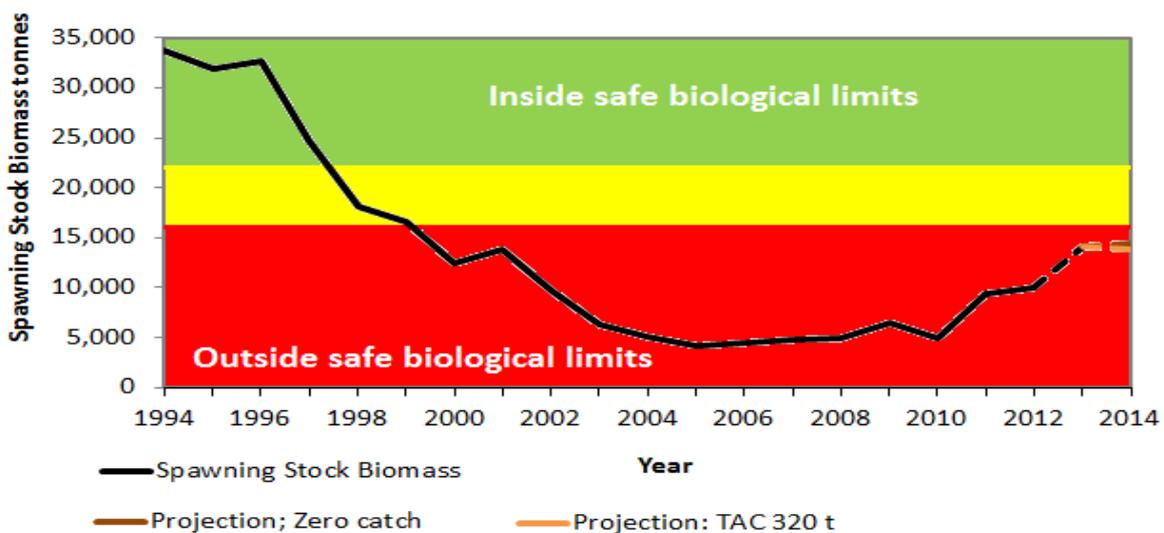
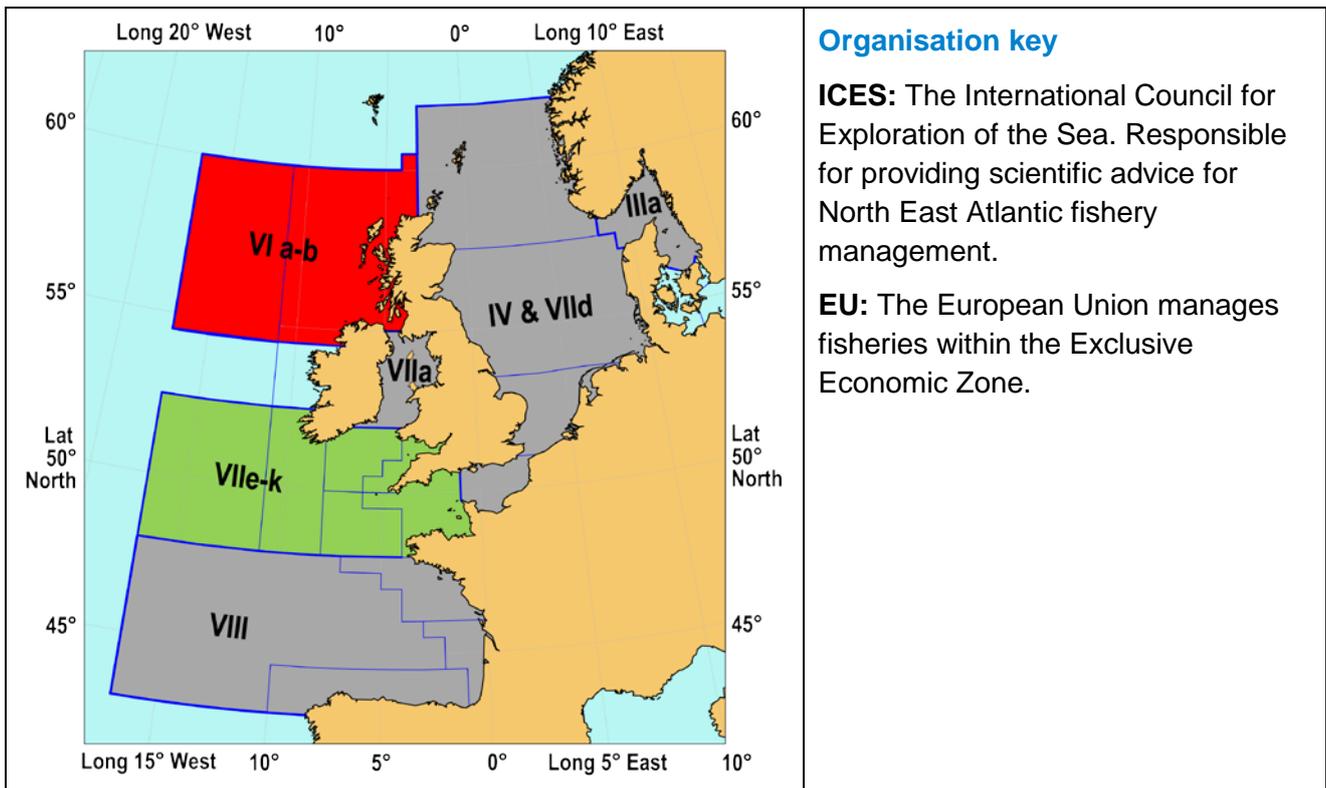


Figure 3 Spawning Stock Biomass trajectory for whiting in ICES Division VIa. ICES 2012 assessment.



B_{pa} is set at 22,000 t and the safe biological limit (B_{lim}) is at 16,000 t; the stock has been below this limit since 2000. The dark brown dotted line shows the effect of a TAC of zero as advised and the light brown dotted line shows the effect of a TAC of 320 t which is close to the agreed TAC of 292 t for 2013. Both scenarios leave the stock outside safe biological limits in 2014.

Figure 4: Management stocks of whiting by ICES division (colour coded to Table 1)



Research

Research on whiting populations has focused mainly on biological aspects such as growth and maturity (7), the role of whiting as predator and prey and stock structure (8). Although commercial fishery interests have shifted research away from whiting, the ‘Metagadoid’ project at the Fisheries Research Service Marine Laboratory in Aberdeen (now Marine Scotland Science) aims to establish the genetic structure of whiting and haddock spawning populations within the North Sea and waters to the west of Scotland. The results will help scientists to understand the degree of independence of the various populations and how this affects stock assessment models.

Management and conservation measures

The main supply of whiting to UK markets is from fisheries in the North Sea (UK fleets), English Channel (UK, French and some Belgian vessels) and western shelf waters of Sub-areas VI and VII (UK, Irish and French fleets). Historically, whiting have been taken mainly with otter trawls and seines, but its low market value and reduced abundance mean that whiting are now mainly a bycatch in mixed demersal fisheries, and in the *Nephrops* trawl fisheries. In western waters (Sub-area VII) and the southern North Sea (IVc), demersal trawlers and *Nephrops* trawlers may use mesh sizes down to 80 mm and 70 mm respectively. Such trawls retain a high proportion of small whiting and discard rates are high, so TACs based on landings do not control overall catches in many areas. As a consequence, information on many stocks is so poor that reliable assessments cannot be made, and TACs are based on ICES advice for data-limited stocks.

This situation has led to recommendations to find measures to improve selectivity of fishing gears, and much research has been conducted to develop trawls that reduce the bycatch of whiting below the minimum landing size of 27cm. Whiting are known to swim upwards to escape from trawls and are, therefore, well suited to conservation measures such as the square-mesh panel and coverless trawl shown in Figure 4. Other methods, such as separator trawls, also exploit this tendency to gather the whiting (and haddock) into an upper codend, where it can be selected away from other species. However, implementation of cod recovery plans and the switch to 120 mm mesh sizes and effort reductions in the whitefish fisheries in the northern North Sea in 2002, and later to the west of Scotland, may have contributed to reduced landings, discards and mortality in stocks of whiting.

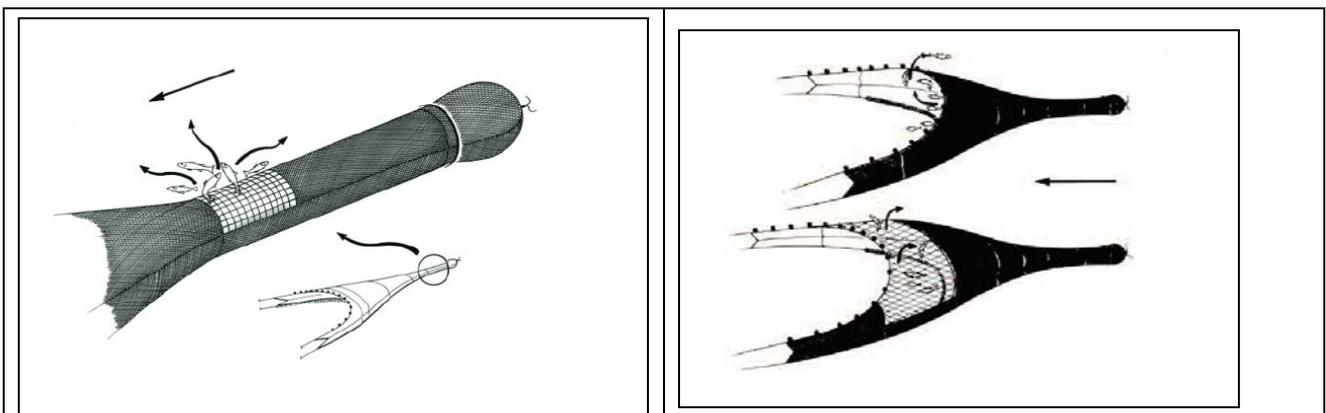


Figure 4. left: square-mesh panel through fish escape by swimming upwards - mandatory measure (11) for release of haddock and whiting in *Nephrops* trawls; right: coverless trawl (12) designed to avoid capture of haddock and whiting through the fish swimming over the top of the trawl - non-statutory measure. Arrows show direction of tow.

Product characteristics and seasonal cycles

Whiting are slender bodied fish with conspicuous white sides, a silvery belly and sandy to blue-green coloured backs. Whiting are a low value species and are usually presented either whole (round) or gutted, depending on size, and on ice. This often neglected fish is a good buy when fresh, but it can be easily overcooked. Whiting generally spawn between January and July, but mostly in March and April.

	J	F	M	A	M	J	J	A	S	O	N	D
North East Atlantic												
Mediterranean												
Black Sea												
			Spawning					Peak spawning				

Supply chain standards

Responsible practice in the chilled and frozen supply chain depends on correct catching, gutting, washing, chilling or freezing, processing and handling practices throughout the chain. There are standards which cover these aspects from capture to retailer:

- **Seafish Responsible Fishing Scheme.** Sets best practice standards for fishing vessels, based on British Standards Institution specifications (BSi: PAS 72:2006) (13);
- **British Retail Consortium (BRC) Global Standard & Safe & Local Supplier Approval (SALSA) certification.** Designed to raise standards in the seafood processing and wholesaling sectors.

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For further guides see: <http://tinyurl.com/seafishrsg>

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