



Annual Review of the feed grade fish stocks used to produce fishmeal and fish oil for the UK market

August 2009

This review focuses on recent independent documentary assessments of these stocks. These are predominantly published by the United Nation's Food and Agriculture Organisation (FAO) and the International Council for the Exploration of the Sea (ICES). The review provides factual information on the status and management of fish stocks used to produce fishmeal for the UK market.

This publication is updated annually. This 2009 edition is based on information available up to June 2009.

Compiled by Seafish with thanks to the International Fishmeal and Fish Oil Organisation (IFFO) for their advice.

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FISHMEAL PRODUCTION

What is fishmeal?

Fishmeal is the brown flour obtained after cooking, pressing, drying and milling whole fish and food fish trimmings. Use of whole fish is almost exclusively from small, bony species of pelagic fish (generally living in the surface waters or middle depths of the sea). UN FAO says that 90% of the fish used to make fishmeal and oil is “presently unmarketable in large quantities as human food”.

A valuable outlet for food fish trimmings

Fishmeal production also provides a major outlet to recycle trimmings from the food fish processing sector, which might otherwise be dumped at extra cost to the environment and the consumer. In 2008, 38% of fishmeal consumed in the UK was produced from trimmings (trade estimates). In 2006 trade estimates were that 33% of fishmeal produced in the EU was manufactured from trimmings/offal from food fish processing. Spain, France, Germany, Ireland and the UK produce fishmeal primarily from trimmings. Worldwide, the proportion is lower, at 24%.

Produced from short-lived, fast growing species

In general, the types of fish used to produce fishmeal are capable of very rapid reproduction and stock recovery. Stocks of Peruvian anchoveta, for example, are usually severely depleted by a warm current of water in the eastern Pacific Ocean (El Niño) every seven to ten years. However, natural stock replenishment usually takes just 12-18 months, supported by careful fisheries management and surveillance schemes.

Virtually all fishmeal supplies to the UK are sourced from Europe (UK, Denmark, Norway, Iceland and Ireland) and South America (Peru, Chile).

Europe (six species)

Six key species are used to produce fishmeal and fish oil in Europe. These can be divided into three groups:

- a) Not suitable for human consumption or inedible feed grade fish (sandeel and Norway pout).
- b) Potential use for human consumption but mainly used for fishmeal because of limited outlets for human consumption (blue whiting, sprat, capelin).
- c) Primary use is human consumption but any surplus within the Total Allowable Catch (TAC) may be used for fishmeal (herring).

South America (three species)

In Peru, anchovy is by far the most important species for fishmeal production. The Chilean fishmeal industry uses jack mackerel, anchovy and sardine.

STATUS OF FEED GRADE FISH STOCKS USED TO PRODUCE FISHMEAL(FM) AND FISH OIL FOR THE UK MARKET

	% of FM used in UK 2007	Whether used for human consumption/fishmeal	Commentary on status of fish stocks at June 2009	Source status Info
EUROPE				
Capelin <i>Mallotus villosus</i>	Less than 1%	Roe used for human consumption. Frozen capelin for specific limited markets. Mainly used for fishmeal.	Icelandic: Mainly unknown. No fishery recommended for 2008/9. Barents Sea: No commercial fishing in the last four years. Stock has recovered. Now classified at full reproductive capacity with quota of 390,000 t.	ICES Oct 08 & June 09 See page 17
Blue Whiting <i>Micromesistius Poutassou</i>	21%	Mainly used for fishmeal. Limited use for human consumption - there are processing difficulties.	Still considered to have full reproductive capacity but being harvested at increased risk. TAC has been lowered year on year.	ICES Oct 08 Page 19
Sandeel <i>Ammodytidae</i>	Less than 3%	Not used for human consumption.	The stock has full reproductive capacity but there are concerns stocks levels could fall below precautionary levels. Exploratory fishing in spring 2009 resulted in an increased TAC.	ICES June 09 Page 13
Sprat <i>Sprattus Sprattus</i>	3%	Potential uses for human consumption but mainly used for fishmeal.	State unknown. No evidence recent catches have caused problems. The stock is lightly exploited. No advice on TAC.	ICES June 09 Page 15
Herring <i>Clupea harengus</i>	3%	Primarily used for human consumption, but non-food grade fish and trimmings may be used for fishmeal.	Main North East Atlantic stock: assessed as full reproductive capacity & harvested sustainably. North Sea autumn spawning stock at risk. Icelandic spring spawning stable.	ICES Oct 08 & June 09 Page 21
Norway pout	Less than 1%	Not used for human consumption	Recovered to full reproductive capacity. Fishery re-opened in 2008. SSB has shown an increasing trend since 2005. Preliminary TAC is set which is updated mid year.	ICES June 09 Page 23
Trimmings	38%	Trimmings generally comprise small pelagic species (i.e. mackerel, capelin and herring) & trimmings from the white fish processing sector (e.g. cod).		
SOUTH AMERICA				
Anchovy <i>Engraulis ringens</i>	28%	Very small amount used for human consumption. Majority used for fishmeal.	Fully fished, according to most recent FAO commentary in 2008. Managed by quotas and closed season programme.	FAO/IMARPE P 27
Jack mackerel <i>Trachurus murphyi</i>	1%	50% of Chilean jack mackerel used for human consumption and 50% for fishmeal.	As above	FAO/IFOP P 30
Sardine <i>Stangomera bentincki</i>	Less than 1%	Used for human consumption and fishmeal	As above.	FAO/IFOP P 32

OVERVIEW OF MANAGEMENT AND CONTROL MEASURES

1. Fish stock management and control measures include:

Official Government controls

All fisheries involved in the supply of fishmeal to the UK are subject to government controls to conserve stocks and prevent over-fishing.

Independent scientific monitoring and assessment

Controls on these fisheries are based on regular monitoring and assessment of the status of individual stocks, conducted by independent and government scientific organisations. Where more information is needed to make an adequate assessment about the structure of a fish stock in the North East Atlantic and North Sea ICES will advise time is needed to gather more information.

Annual catch limits

All stocks used to supply fishmeal to the UK are subject to total annual catch limits, set by Governments on a yearly basis. Total catch limits for the North East Atlantic and North Sea are agreed by the EU Council, Norway or Iceland (with advice from ICES). In South America the Institutes of Fisheries Research in Chile and Peru advise national governments on catch limits.

Certification

- **IFFO Global Responsibility Supply Standard**

The International Fishmeal and Fish Oil Organisation (IFFO) is developing a new Global Responsibility Supply Standard (GRSS). The standard will enable fishmeal and fish oil producers to show that they are offering traceable, high quality marine products which are manufactured safely, using fish from responsibly managed fisheries. Compliance will be third-party audited. Raw material sourcing must take place in a country which complies with the FAO Code of Responsible Fishing.

- **GAA and GlobalGap join forces on aquaculture certification**

Seafood certification groups the Global Aquaculture Alliance (GAA) and GlobalGap have signed an agreement to work co-operatively to develop and harmonise certification schemes for the aquaculture sector worldwide.

- **Aquaculture Stewardship Council (ASC)**

WWF and the Dutch Sustainable Trade Initiative are funding the ASC aquaculture certification programme, which is intended to compliment the Marine Stewardship Council (MSC) certification programme for wild-caught seafood. The ASC will serve as the holding organisation for certifications of farmed seafood that come through standards being developed by the Aquaculture Dialogue round tables.

Overview of all controls observed by principal suppliers:

Species	TACs	Area catch limit	Closed area	Seasonal bans	By-catch limits	Type of gear Note 1	Any effect on seabed	Min mesh size	Min fish landing size	Vessel reg	Satellite tracking	ITQ system Note 2
North East Atlantic and North Sea												
Capelin	✓	✓	✓	✓		P	No	✓	✓	✓	✓	✓
Blue whiting	✓	✓				MT	No	✓		✓	✓	
Sandeel	✓	✓	✓	✓		T	Negligible	✓		✓	✓	
Sprat	✓	✓	✓	✓	✓	P	No	✓		✓	✓	
Herring	✓	✓	✓	✓	✓	P+T	No	✓	✓	✓	✓	✓
Norway pout	✓	✓	✓			P	No	✓		✓	✓	
South America												
Anchovy	✓	✓	✓	✓		P	No	✓	✓	✓	✓	
J Mackerel	✓	✓	✓	✓		P+MT	No	✓	✓	✓	✓	See P 31
Sardine	✓	✓	✓	✓		P	No	✓	✓	✓	✓	

1. P is Purse Seiner, T is Trawler and MT is Mid Water Trawler. 2. Individual Transferable Quota.

2. Independent stock assessment

There are four key organisations involved in assessing/reporting on the status of feed fish stocks. These are:

- A. The UN Food and Agriculture Organisation (FAO)
- B. The International Council for the Exploration of the Seas (ICES)
- C. IMARPE in Peru
- D. IFOP in Chile

A. UN Food and Agriculture Organisation (FAO).

The FAO's blueprint for sustainable responsible fisheries is defined by the 1995 Code of Conduct for Responsible Fisheries. The Code recognises that the long-term sustainable use of fisheries resources is the overriding objective of conservation

The FAO Code of Conduct is further defined in a number of documents:

- ◆ **UN Fish Stocks Agreement, 1995.** Relates to the conservation and management of straddling fish stocks and highly migratory fish stocks.

See:

http://www.un.org/Depts/los/convention_agreements/texts/fish_stocks_agreement/CONF164_37.htm

- ◆ **European Code of Sustainable and Responsible Fishing Practices, 2003.** Directed at fishing operators and builds on the framework established by the FAO Code of Conduct. **See:**
<http://govdocs.aquaculture.org/cgi/reprint/2004/1017/10170060.pdf>

- ◆ **FAO Strategy for Improving Information on Status and Trends of Capture Fisheries, 2003.** A voluntary instrument designed to provide a framework, strategy and plan for the improvement of knowledge and understanding of fishery status and trends. **See:** www.fao.org/fishery/topic/3456/en
- ◆ **FAO Guidelines for the ecolabelling of fish and fisheries products from marine capture fisheries, 2005.** Outline general principles that should govern ecolabelling schemes. Ecolabelling provides the assurance that fishery products have been sourced from a stock that can reasonably be expected to maintain good status for the foreseeable future. This is currently followed by the Marine Stewardship Council (MSC). **See:** www.fao.org/docrep/008/a0116t/a0116t00.htm

FAO 'State of World Fisheries and Aquaculture' 2008

The mission of the Fisheries Department of the FAO is to facilitate and secure the long-term sustainable development of the world's fisheries and aquaculture.

Its global view of capture and aquaculture fisheries entitled 'State of World Fisheries and Aquaculture' is published every two years. Its purpose is to provide policy-makers, civil society and those who derive their livelihood from the sector with a comprehensive, objective and global view of capture fisheries and aquaculture, including associated policy issues. The most recent issue is that for 2008 which was published in March 2009.

FAO summary for ALL fish species for consumption and feed 2008

- ◆ In 2007 about 20% of the stocks monitored were underexploited (2%) or moderately exploited (18%) and could perhaps produce more.
- ◆ In 2007 slightly more than half the stocks (52%) were fully exploited and, therefore producing catches at or close to their maximum sustainable limits, with no room for further expansion. The other 28% were either overexploited (19%), depleted (8%) or recovering from depletion (1%) and, thus, yielding less than their maximum potential owing to excess fishing pressure in the past, with no possibilities in the short to medium term of further expansion and with an increased risk of further declines and need for rebuilding.
- ◆ Overall, 80% of the 523 selected world fish stocks for which assessment information is available are reported as fully exploited or overexploited (or depleted and recovering from depletion).

It should be noted that the status of fully exploited is not undesirable provided it is the result of an effective and precautionary management approach. Nevertheless, the combined percentage reinforces earlier observations that the maximum wild capture fisheries potential from the world's oceans has probably been reached. Therefore, a more cautious and closely controlled approach to development and management of world fisheries is required.

B. International Council for the Exploration of the Seas (ICES)

ICES coordinates and promotes marine research in the North Atlantic, including adjacent seas such as the Baltic Sea and North Sea. Scientists working through ICES gather information about the marine ecosystem. As well as filling gaps in existing knowledge, this information is also developed into unbiased, non-political advice. The advice is then used by the 20 member countries, which fund and support ICES, to help them manage the North Atlantic Ocean and adjacent seas.

Generally ICES publishes new advice on individual fish stocks twice a year, in June and October.

ICES terminology

The nature of this ICES advice has changed in recent years with the move to provide advice on the basis of an ecosystem approach, with a more general picture of stock status in response to concerns about marine management. This has led to a more integrated presentation of its advice and a change in the language of its fisheries advice. ICES has adopted a precautionary approach to fisheries management, under which reference points are set to provide markers for management decisions on each stock. These are based on assessments of the risk of a spawning stock biomass (SSB) falling below levels required for the stock to produce sufficient recruits (young fish) to support a fishery and maintain a spawning population for sustainable, commercial harvesting. The approach is compatible with the FAO Code of Conduct for Responsible Fisheries. Using these reference points, the stock may be classified as:

- ◆ 'Harvested sustainably and at full reproductive capacity', meaning the stock is inside safe biological limits; or
- ◆ 'At risk of reduced reproductive capacity and/or being harvested unsustainably', meaning the SSB is below the precautionary reference level and/or the exploitation level is above the precautionary level; or
- ◆ 'Suffering from reduced reproductive capacity and/or being harvested unsustainably'; meaning the stock is outside safe biological limits.

ICES ecosystem approach

ICES advice came from the two Committees – the Advisory Committee on Fishery Management (ACFM) and Advisory Committee on Ecosystems (ACE) which have been integrated. The new report format delivers advice on the basis of an ecosystem approach by integrating information on the ecosystem and the fisheries. All stocks belonging to a given area are placed in the area, together with an overview of the ecosystem, and the state of the stocks and fisheries.

C. Institute of Fisheries Research (IMARPE) in Peru

The role of IMARPE is to study the environment and marine biodiversity, evaluate the fish resource and provide information to enable decisions to be made about the fishing, aquaculture and protection of the marine environment.

IMARPE provides the Ministry of Fisheries with an honest scientific and technical basis to enable the rational use of marine resources with the view of developing the socio-economic base of Peru.

D. Fisheries Development Institute (IFOP) in Chile

The Fisheries Development Institute or IFOP is a non-profit technological institute controlled by the Agency for Economic Development (CORFO), which in turn is controlled by the Ministry of Economy. It is the main Chilean institution carrying out scientific and technological fishery research concerning the exploitation of fisheries resources and fish stock assessment in jurisdictional waters. IFOP advises Government before annual quotas are set.

3. Annual EU programme to implement TACs in the NE Atlantic & North Sea

In May 2006 the EU Commission published a Communication detailing a new calendar for Community fisheries management for 2007 and beyond.

April	Commission publishes its 'policy statement' concerning setting fishing opportunities for the following year. This includes a discussion of harvest rules for TAC and effort levels and other technical issues such as effort management.
Early June	ICES & STECF provide scientific advice in June and October.
June-July	The Commission consults the Regional Advisory Council (RAC) on the application of Community fisheries policy to the 'June advice' stocks. Negotiations take place with third countries concerning jointly managed pelagic stocks.
Early Sept	The Commission issues its proposal for a Regulation on fishing opportunities for the 'June advice' stocks.
October	The Commission adopts a regulation on TACs for the 'June advice' stocks. ICES and STECF provide scientific advice for the remaining stocks. Discussions on fisheries policy options and latest scientific advice for the 'October advice' stock continue with stakeholders.
November	Negotiations with Norway and other coastal States concerning 'October advice' stocks. The Commission takes account of discussions with RACs in preparing its second fishing proposal, to be issued in late November.
December	The Commission adopts a regulation on fishing opportunities for the 'October advice' stocks.
January	Regulations come into force for next calendar year.

4. Ecolabelling schemes

In addition a number of international organisations are offering independent third party-certified ecolabelling schemes for fisheries. These include the Marine Stewardship Council (MSC) and Friends of the Sea. A few feed fisheries are exploring this approach. In addition the Responsible Fishing Scheme was introduced in 2006. This is an independent, audited assessment of the application of good practice by a vessel skipper and crew in their fishing operations.

NORTH SEA & NORTH EAST ATLANTIC FEED GRADE FISH STOCKS

IMPORTANT RECENT EU DEVELOPMENTS

- ◆ **EU Consultation on 2010 TACs. May 2009.** The consultation states that slow progress has been made in stock recovery since the 2002 reform of the Common Fisheries Policy, as a result 88% of EU stocks are now overfished (against a global average of 25%), and 30% are considered "outside safe biological limits". On the other hand several long-term plans have been implemented successfully, generating signs of stock recovery. In addition the Commission reiterates its intention to phase out discards. In 2009, significant steps are being taken to address the problem of discards: highgrading has been banned in the North Sea and Skagerrak, fishing effort has been further reduced in the context of multi-annual plans and there are ongoing pilot studies on how to further reduce discards.
- ◆ **EU 2009 TACs.** The Commission is proposing greater flexibility in changing TACs from year to year, to enable more effective recovery measures for overexploited stocks. A number of feed fisheries, are or have been, subject to an in season review or fishery closure to help manage stocks and help stocks recover. Sandeel stocks are subject to an in season review. No fishing of Icelandic capelin is recommended for 2009. With no commercial fishing of Barent Seas capelin the last four years the stock has now recovered and ICES recommends a quota of 390,000 t in 2009. The targeted fishery for Norway pout was closed in 2005, the first half of 2006 and all of 2007. The stock has also been protected with small mesh trawler bans, closed and seasonal areas, and mesh limitations. The fishery re-opened on 1 January 2008 with an EU TAC of 43,300 t. For 2009 ICES advises landings should be restricted to 157,000 t.
- ◆ **In April 2009 the European Commission adopted a Green Paper on the future of the Common Fisheries Policy.** (This follows the policy document on March 2007 to reduce unwanted by-catch and eliminate discards in European fisheries). The Paper sets out the EU commitment to dramatically reduce discards. Achieving this objective requires changes in Community legislation as well as changes in fishermen's behaviour. In 2009, significant steps are being taken to address the problem of discards: a highgrading ban has been put in place in the North Sea and Skagerrak, effort has been further reduced in the context of multiannual plans and there are on-going pilot studies on how to reduce discards further. For 2010, more significant steps should be taken, such as:
 - Reducing fishing effort as agreed in the context of multiannual plans; this is a fundamental step to reduce discards, as it reduces discarding of *all species* (including non-commercial).

- A general highgrading ban, i.e. the prohibition to discard any marine organism that is caught in a fishing operation and brought on board a fishing vessel that can be legally landed.
 - Pilot studies - research studies on specific issues that relate to a discard ban should be encouraged.
 - Fishing permits – Member States are urged to give fishing permits only to vessels with an allocation of fishing opportunities in the form of quotas for the species that are likely to be caught in the fishery in question.
- ◆ **A new impetus for the Strategy for the Sustainable Development of European Aquaculture was launched in April 2009.** The Commission communication sets out to examine the root causes of the stagnation in EU aquaculture production and looks at ways to improve the sector's competitiveness, sustainability and governance. Ensuring high quality and sustainable feedstuff for fish is one of the key priorities. Within its policy for a very high level of consumer protection, the Commission will contribute to facilitating EU aquaculture through improving the EU feed law through:
- Increasing the availability of necessary additives for fish feed, notably on the basis of guidelines on 'smooth' authorisation procedures of feed additives adopted in May 2008;
 - Securing the adoption of its proposal for the revised 'Animal by-product Regulation' to ensure that aquatic animals can be given feed originating from aquatic animals while preventing the feeding of a fish species with feed originating from the same fish species.
- ◆ **Long-term management plan for blue whiting.** Agreement was reached in December 2005 on a long-term management plan consistent with a precautionary approach, The plan includes arrangements for sharing out the quota among the main fishing nations. The establishment of an annual quota for blue whiting now ensures that **all stocks used to produce fishmeal supplies for the UK are subject to annual catch limits.** The annual quotas since then have been 2.0Mt for 2006, then 1.7Mt for 2007 and 1.26Mt for 2008 (and the Coastal States reduced this last further to a quota of 1.15Mt for 2008). However three years with very low recruitment, combined with a fishing mortality above precautionary levels in the last 12 years, has resulted in a continuing decline in SSB and ICES has advised catches should not be above 384,000 t in 2009. In July 2008 a new draft management plan was proposed by the Coastal States. ICES has criticised the management plan as not in accordance with the precautionary approach in a period of low recruitment. Press reports in August 2009 reveal further concerns about a collapse in blue whiting stocks.

Overview of annual quotas for the North East Atlantic and North Sea

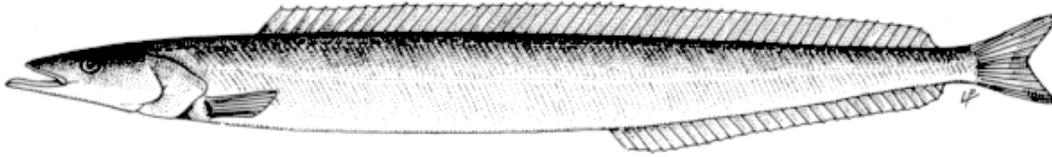
<i>Tonnes</i>	2003	2004	2005	2006	2007	2008	2009	Quotas are set by
North Sea sandeel	863,000	836,200	655,960	300,000	170,000	ISR	177,500*	EU
Sprat	286,250	284,250	296,250	203,940	195,128	195,000	176,081*	EU
Capelin								
Barents Sea	NA	NA	NIL	NIL	NIL	NIL	390,000	Russia/ Norway
Icelandic	690,000	737,000	803,000	210,000	180,000	150,000	NIL	Iceland
Blue whiting								
EU				438,557	364,500	350,906	165,628	EU/Faroes/ Iceland/ Norway
Faroes				522,500	444,125	300,572	141,870	
Norway				514,900	437,665	296,200	139,806	
Iceland	No quota	No quota	No quota	353,000	300,050	202,836	95,739	
Total				2.0M	1.7M	1.26M	543,043	
Herring								
NE Atlantic**	710,000	825,000	890,000	967,000	1,280,000	1,518,000	1,643,000	NEAFC
North Sea	284,000	326,000	379,850	322,874	341,000	201,227	171,000	EU
By-catch: North Sea	51,693	43,200	50,000	42,500	31,875	18,806	15,985	EU
By-catch S&K	21,000	21,000	24,150	20,528	15,396	11,470	8,373	EU
Four Baltic stocks S&K		135,078	163,650	163,342	170,260/ 133,000	320,294	288,346	EU
Icelandic		110,000	110,000	110,000	117,000	130,000	37,722	ISR
							130,000	Iceland
Norway pout								
North Sea + S&K	198,000	198,000	NIL	95,000	NIL	50,000	53,476*	EU

* Subject to in-year management assessment.

** Also known as Norwegian Spring Spawning or Atlanto Scandian

ISR = in season review. NA = Not available. S&K = Skagerrak and Kattegat.

1. SANDEEL



Scientific Name

Ammodytes tobianus

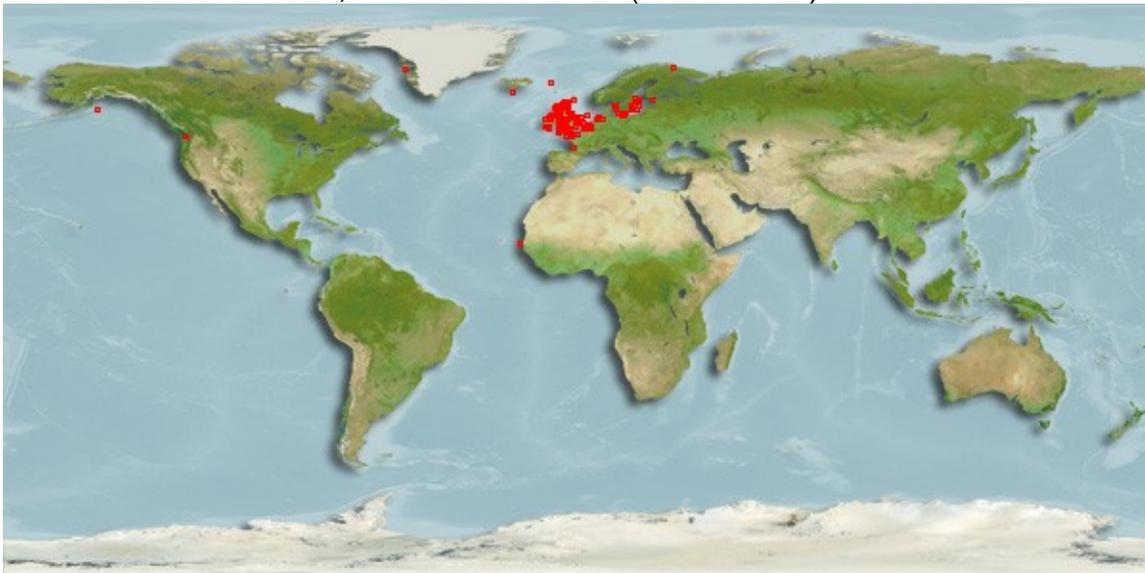
Description Sandeels are small eel-like fish which swim in large shoals and live in sandy substrates. They are an abundant and crucial component of food webs in the North Atlantic and are an important prey species for many marine predators such as seabirds and fish. In the North Sea fishing mortality is lower than natural mortality.

Fishery Demersal. An inedible feed-grade fish used mostly for fishmeal and fish oil. No demand for human consumption. Sandeel are caught by industrial fishery fleets. Seasonal fishery - mostly spring/summer.

Resilience High. Sandeels are comparatively short-lived. Life span of less than 10 years. Minimum population doubling time is less than 15 months. Maximum size is 20cm.

% use in UK It is estimated that sandeels accounted for less than 3% of the fishmeal used in the UK in 2007.

Distribution North Sea, North East Atlantic (Sub-area IV) and Shetland.



Map: www.fishbase.org

Current status of the sandeel stock

- ◆ The sandeel fishery built up from modest catch levels in the 1950s to around 800,000 tonnes per annum in the 1980s and 1990s but then collapsed quite abruptly to 350,000 tonnes in 2003 and 2004, then to 172,000 in 2005. Since the collapse there has been a series of ICES recommendations: restricted fishing seasons, local measures to protect bird stocks, opening and closing fisheries to protect and rebuild the stocks.
- ◆ In **October 2008** the most recent estimate of spawning stock biomass classifies the stock as having full reproductive capacity, but forecast to decline below precautionary levels at the start of 2009. ICES recommends that fishing grounds that are known to be commercially depleted should be closed to fishing until there is evidence from monitoring programmes that local populations have recovered. On other fishing grounds, a fishery should only be allowed in 2009 if analysis of monitoring indicates that the stock can be rebuilt to precautionary levels by 2010.
- ◆ In October 2008 ICES was not able to offer advice on the Division IIa (Skagerrak – Kattegat), Division VI (West Of Scotland) and Shetland Area fisheries for which it said inadequate information was available on spawning stock or fishing mortality.

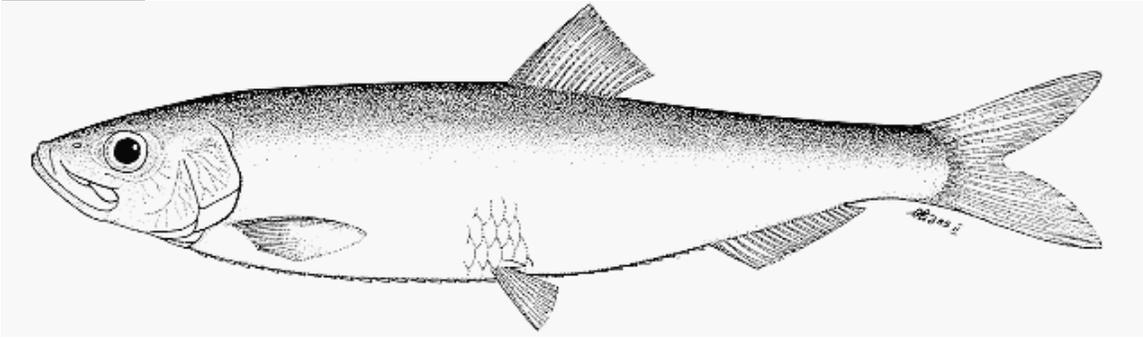
Sandeel management and control measures

- ◆ EU Regulation 23/2009 setting quotas for 2009 sets the North Sea sandeel TAC at 177,500 tonnes, with an additional 20,000 tonnes for Norway and 2,500 tonnes for the Faroe Islands to be taken in EU waters of the North Sea.
- ◆ Following monitoring and exploratory fishing of sandeel in the spring of 2009, in June 2009 ICES advised that the total TAC (for EC and Norway combined) for sandeel in the North Sea should be 400,000 tonnes, however this is based on the assumption that there is a single stock of sandeel in the North Sea. Current knowledge for defining sub stocks in the area is too limited to recommend specific management measures for 2009 which take into account the full stock structure of sandeel in the region.
- ◆ There are precautionary initiatives to help manage sandeel stocks. In the North Sea a sandeel fishery is prohibited (April to August) in a 20,000 km² band of the North Sea off the Firth of Forth and Grampian Coast to safeguard seabird colonies. In Shetland a yearly quota of 1,000 tonnes has been agreed for the sandeel fishery off the coast of Shetland. Fishing would normally continue uninterrupted from April onwards. It was agreed to stop fishing in June and July to protect food supplies for the breeding seabird population.

TAC history 2003 - 2009

North East Atlantic and North Sea – quotas							
<i>Tonnes</i>	2003	2004	2005	2006	2007	2008	2009
Sandeel	863,000	836,200	655,960	300,000	170,000	In season review	400,000

2. SPRAT



Scientific Name

Sprattus sprattus

Description Sprat favour mostly inshore shoals moving to the surface at night. Filter feeders that predate on a variety of planktonic organisms. Spawning usually occurs in coastal waters in spring and summer, with planktonic eggs and larvae.

Fishery Pelagic. Potential use for human consumption (juvenile are marketed as whitebait) but mainly used for fishmeal because of limited outlets for human consumption. Sprat are caught by trawl, pair trawl and seine net.

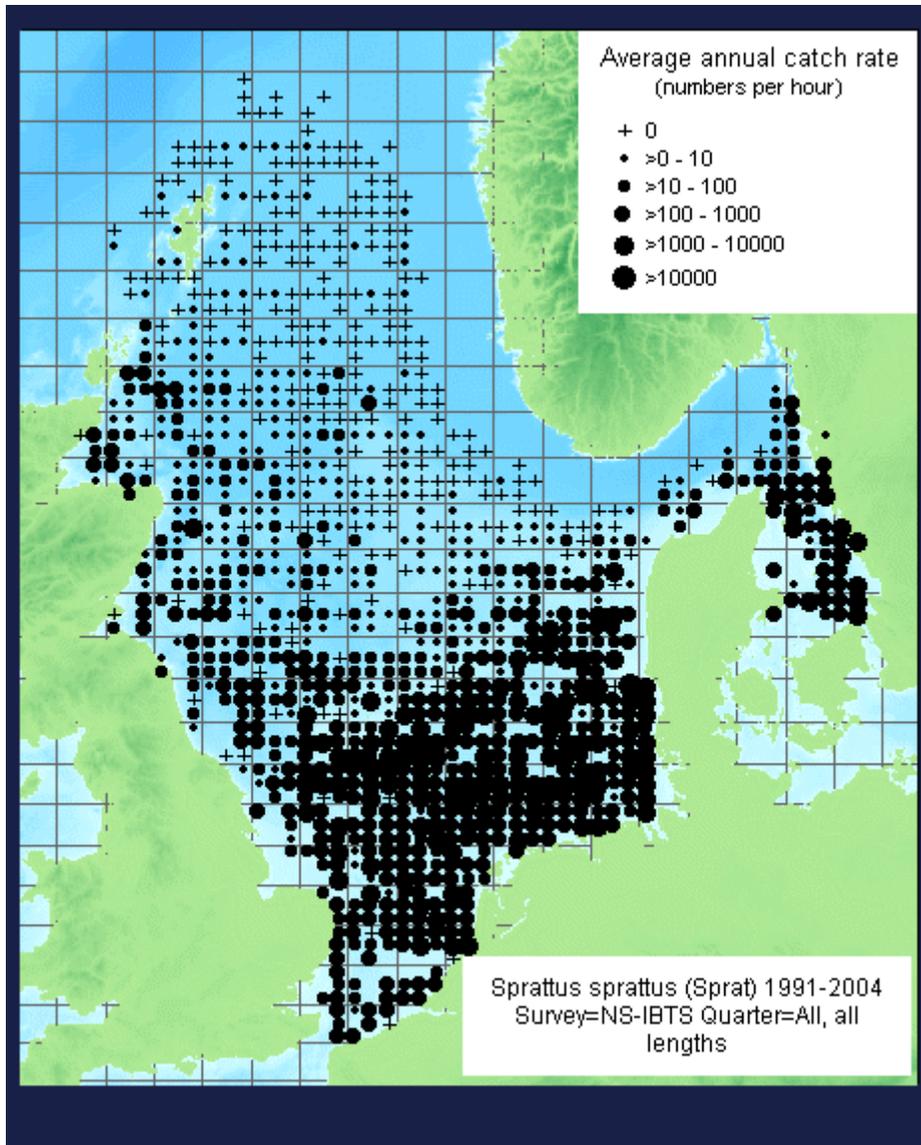
Resilience High. Life span maximum 6 years. Minimum population doubling time is less than 15 months. Maximum size is 16cm.

% use in UK It is estimated that sprat accounted for 3% of the fishmeal used in the UK in 2007.

Distribution North East Atlantic, North Sea, Baltic south to Morocco, also Mediterranean, Adriatic and Black Seas.

Current status of the sprat stock

- ◆ In June 2009 the state of the North Sea and Norwegian Sea stock was unknown. Survey trends indicate the stock size has increased from the 1980's and varied around average levels since 1998 with no trend. There is no evidence that recent catches have created problems for this stock. Previous advice has been based around a relationship between survey and catches, resulting in specific numerical advice. Because recent catches have been low due to other factors than stock abundance, the historical relationship between stock size and catch is now considered inappropriate to provide annual quantitative advice. There is no basis for specific numerical advice for the TAC in 2009. A benchmark assessment is scheduled for September 2009. The state of the stock in Skagerrak and Kattegat (IIIa) is unknown.



Map: ICES

Sprat management and control measures

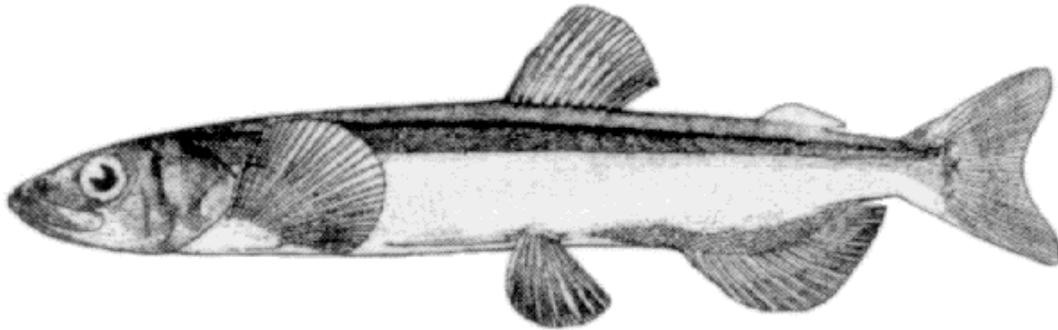
TACs – Sprat fishing quotas for 2009

The preliminary TAC for 2009 for EC waters of Zone IV the North Sea and Zone II, the Norwegian Sea is 170,000 tonnes for 2008 (150,777 EU, 10,000 Norway and 9,160 Faeroe Islands). There is also a TAC of 52,000 tonnes for 2009 for Skagerrak and Kattegat (IIIa).

TAC history 2003 - 2009

Norwegian Sea and North Sea – quotas							
Tonnes	2003	2004	2005	2006	2007	2008	2009
Sprat	286,250	284,250	296,250	203,940	195,128	195,000	170,000

3. CAPELIN



Scientific

Name *Mallotus villosus*

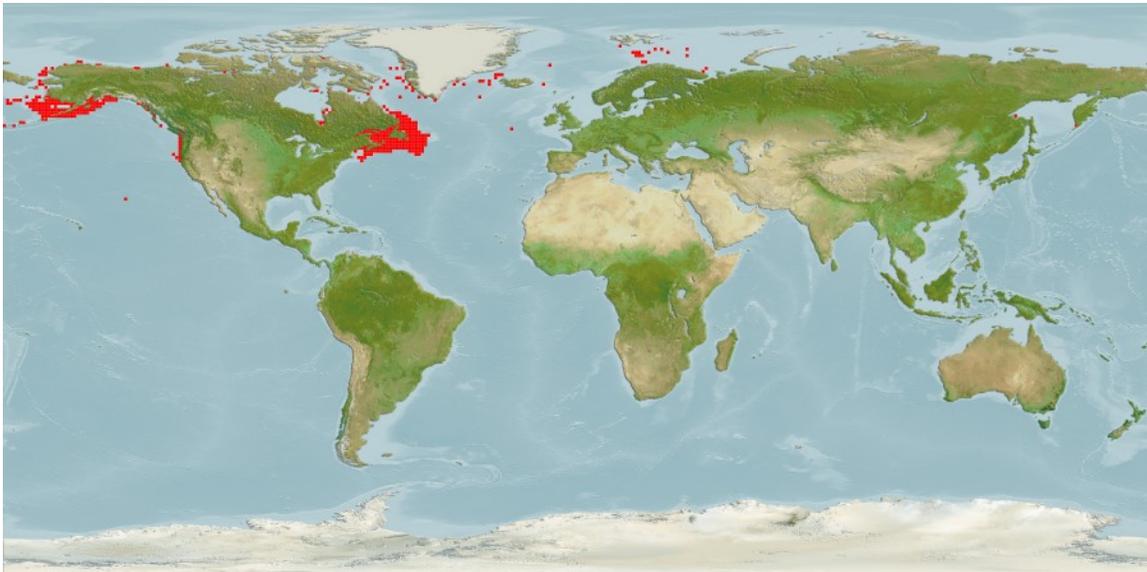
Description Capelin is a small pelagic shoaling fish which feed on animal plankton and small fishes. They are an important prey species for cod, saithe and other fish species. Spawning late winter.

Fishery Pelagic. Potential use for human consumption but mainly used for fishmeal because of limited outlets for human consumption. Capelin are caught by purse seine. Seasonal – mainly January to April, and late summer. Two capelin stocks – Barents Sea and Icelandic.

Resilience Medium. Life span maximum 6 years. Minimum population doubling time 1.4 to 4.4 years. Maximum size is 25.2cm.

% use in UK It is estimated that capelin accounted for less than 1% of the fishmeal used in the UK in 2007.

Distribution Northern hemisphere - North Atlantic, Barents/Norwegian Seas.



Map: www.fishbase.org

Current status of the capelin stock used to supply fishmeal to the UK

- ◆ In June 2009 the status of Icelandic capelin is largely unknown. The 2007 year class is estimated to be the second lowest in the time series and not sufficient to start a fishery in 2009/10. The advice is for no planned fishery until new information on stock sizes becomes available after the planned survey in November 2009. The stock is managed in season to maintain a spawning biomass of 400,000 t. Icelandic capelin is managed by Iceland in co-operation with Norway and Greenland.
- ◆ The status of Barents Sea capelin has improved. In October 2008 the stock was classified as having full reproductive capacity. The spawning stock in 2009 will consist of fish from the 2005 and 2006 year classes, but the 2006 year class will dominate. The survey estimate indicated the 2008 year class is very strong. Barents Sea capelin is managed by Norway and Russia. ICES recommend a nil quota for 2008 but following the agreed management plan would imply catches of 390,000 t in 2009.
- ◆ Capelin has a key role in the food chain between animal plankton and other fish. Most fish, but especially groundfish, feed on capelin at some stage in their life and it is estimated that capelin may be 40% of the total food of cod. The estimated annual consumption of capelin by cod has varied between 0.2 and 3.0 million tonnes over the period 1984-2003. Young herring consume capelin larvae, and this predation pressure is thought to be one of the causes for the poor year classes since 2002.

Capelin management and control measures

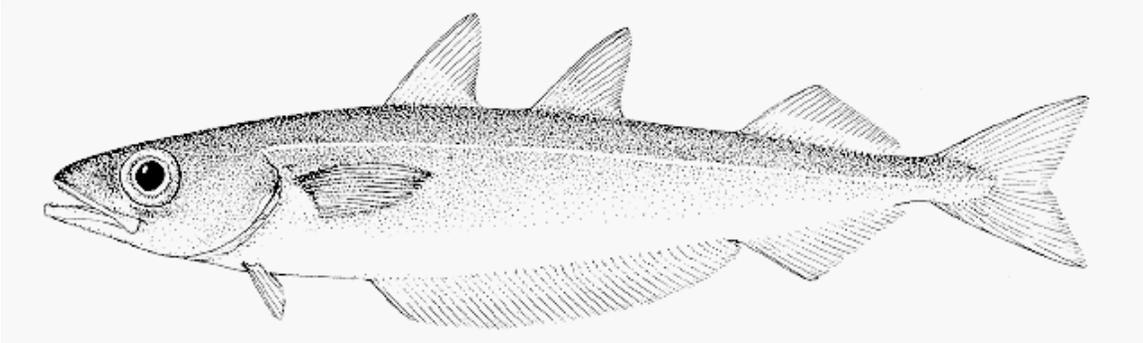
TACs – Capelin fishing quotas for 2009

- ◆ Icelandic – Initially harvest control rules indicated a catch for 2008 of 207,000 tonnes, but after about 40,000 tonnes was fished in 2008, Iceland imposed a ban on fishing in February amid concerns about stocks. But by March further stocks had been located and a 150,000 tonne quota for 2008 announced. No initial quota is advised for 2009. The catch is used partly for human consumption partly for fishmeal and fish oil production.
- ◆ Barents Sea – With no commercial fishing in the last four years the stock has recovered and is now classified as at full reproductive capacity. A quota of 390,000 t has been advised for 2009.

TAC history 2003 - 2009

Capelin quotas							
<i>Tonnes</i>	2003	2004	2005	2006	2007	2008	2009
Icelandic	690,000	737,000	803,000	210,000	180,000	150,000	NIL
Barents Sea	Info not avail	Info not avail	NIL	NIL	NIL	NIL	390,000

4. BLUE WHITING



Scientific Name

Micromesistius poutassou

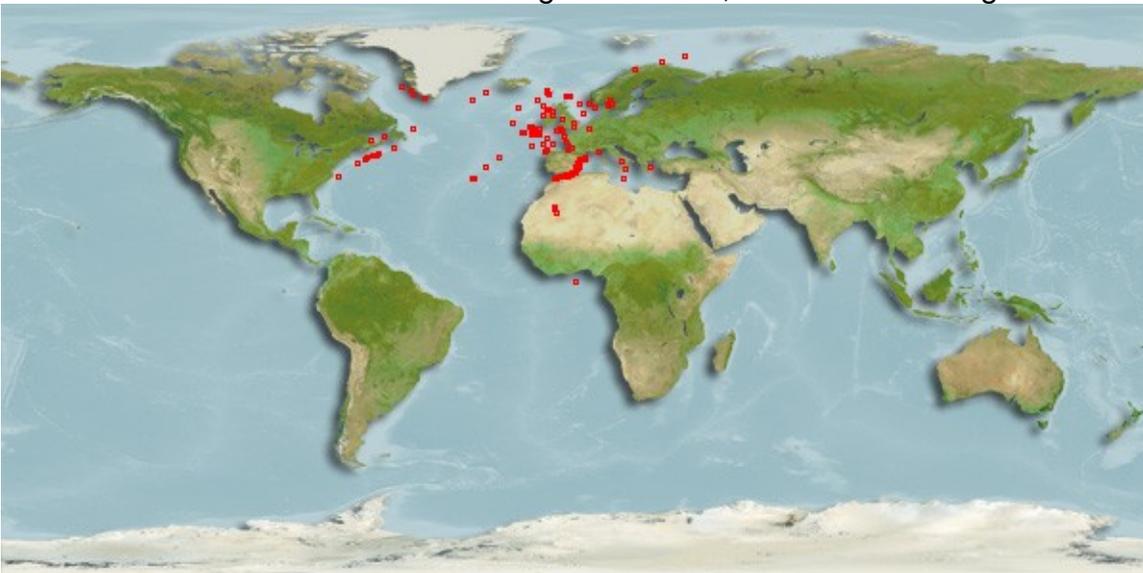
Description Blue whiting are found in open seas, most often near the surface or in mid water, but can be found down to depths of 1000m. Feeds primarily on krill and small crustaceans. Spawns in the spring.

Fishery Pelagic. Potential use for human consumption but mainly used for fishmeal because of limited outlets for human consumption. Blue whiting are caught by pelagic trawler. Seasonal – starts in March, mainly May to July.

Resilience Medium. Life span maximum 20 years. Minimum population doubling time 1.4 to 4.4 years. Maximum size is 50cm.

% use in UK It is estimated that blue whiting accounted for 21% of the fishmeal used in the UK in 2007.

Distribution Very large fishery. Distribution extends from Straits of Gibraltar to the Barents Sea including NE Atlantic, North and Norwegian Seas.



Map: www.fishbase.org

Current status of the blue whiting stock

- ◆ In October 2008 the blue whiting stock is still considered to have full reproductive capacity but being harvested at increased risk. The spawning stock biomass (SSB) increased to an historic high in 2003 but has decreased since then and is expected to be just above precautionary levels in 2009. Three years with very low recruitment, combined with a fishing mortality above precautionary levels in the last 12 years, has resulted in a continuing decline in SSB. ICES has advised catches should not be above 384,000 t in 2009. Press reports in August 2009 reveal further concerns about a collapse in blue whiting stocks.
- ◆ ICES has criticised the management plan as not in accordance with the precautionary approach in a period of low recruitment. In July 2008 a new draft management plan was proposed by the Coastal States. ICES has evaluated the draft management plan and considers it precautionary if fishing mortality in the first year is immediately reduced to the fishing mortality that is implied by the Harvest Control Rule.
- ◆ Blue whiting is fished by the EU, Denmark (on behalf of the Faeroe Islands and Greenland), Iceland, the Russian Federation and Norway, which together form the North East Atlantic Fisheries Commission (NEAFC). Total landings in 2004 were 2.4 million tonnes (2.3 million tonnes in 2003 and 2 million tonnes in 2002).
- ◆ In December 2005 these coastal states agreed on a sharing arrangement for the blue whiting stock. The management targets are to maintain Spawning Stock Biomass at levels above 1.5 Mt and the fishing mortality rates at levels of no more than 0.32 (Fpa) for appropriate age groups as defined by ICES. The Parties agreed to reduce the TAC by at least 100,000 tonnes annually until the fishing mortality (amount of fish taken from the stock by fishing) reaches 0.32 (Fpa).
- ◆ In addition on 13 December 2005 the EU Commission announced agreement had been reached between Norway and the EU on blue whiting fisheries in the North East Atlantic. The Commission, on behalf of the EU, and Norway agreed that 61% of each party's TAC, to be set under a future coastal agreement, can be caught in the waters of the other party.

Blue whiting management and control measures

TACs – Blue whiting fishing quotas for 2009

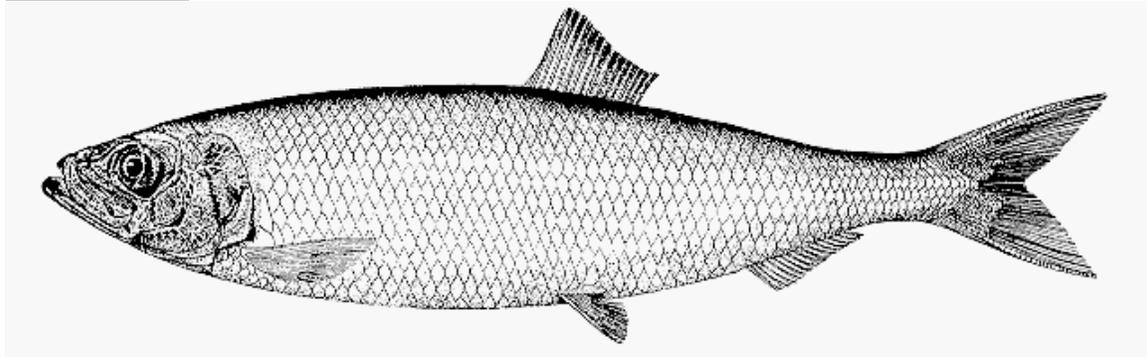
The quota for blue whiting in the North East Atlantic has been declining since it was introduced in 2006. From 2.0M in 2006, 1.7M in 2007, 1.15M in 2008 and a substantial reduction in 2009 to 543,043 t.

TAC history 2003– 2008

<i>Tonnes</i>	2003	2004	2005	2006	2007	2008	2009
Total	No quota	No quota	No quota	2.0M	1.7M	1.26M*	543,043

*The fishing countries then decided to reduce this to 1.15Mt.

5. HERRING



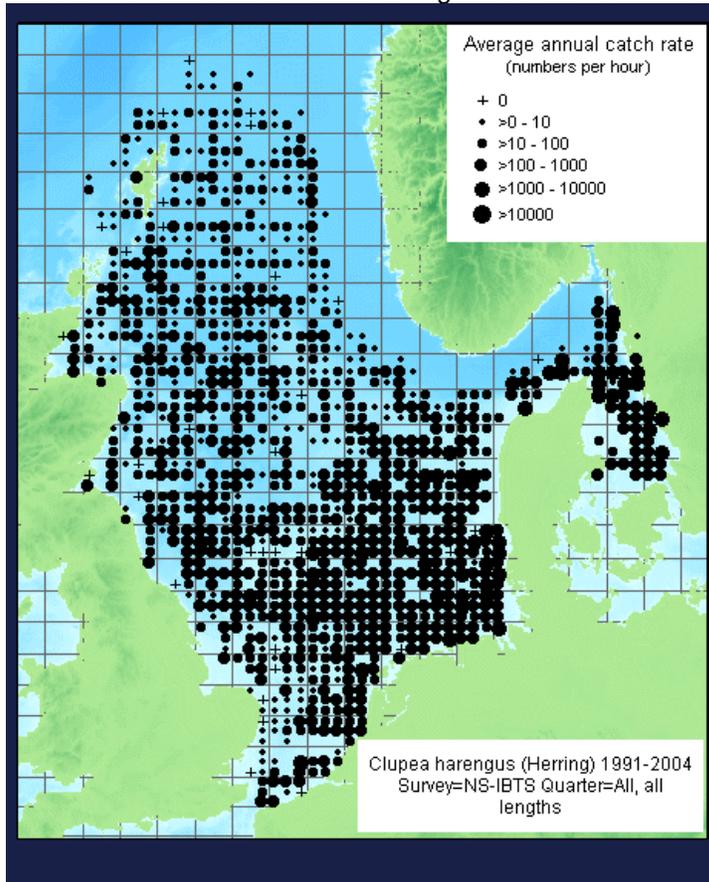
Scientific Nm *Clupea harengus*

Description Herring school in coastal waters and have complex feeding and spawning migrations. Spends the day in deeper waters rising to the surface at night. Feeds on small planktonic copepods in the first year, then mainly on copepods. Has major impact as prey and predator to most other fish stocks and prey for sea mammals.

Fishery Abundant pelagic species. In the EU primary use is human consumption but any surplus within the TAC may be used for fishmeal. Baltic herring may be used as feed grade. In Norway and Iceland may be directed as feed or food grade. Can be caught as a by-catch in the feed grade sprat fishery and small mesh fisheries. Highly commercial – caught by purse seiner and trawl fisheries.

Resilience Medium. Minimum population doubling time is 1.4 – 4.4 years. Maximum age is 11 years. Maximum size is 45cm.

% use in UK It is estimated herring accounted for 3% of UK fishmeal in 2007.



Map: ICES

Current status of the herring stocks

Herring is spread across a number of fishing divisions including the North Sea, Skaggrak, Kattegat, NE Atlantic, Baltic and Norwegian/Icelandic waters.

- ◆ In October 2008 ICES advised that the biggest stock, North East Atlantic, or **Norwegian spring spawning herring** has full reproductive capacity and was being harvested sustainably. The fishery is shared between the EU, Faeroe Islands, Iceland, Norway and the Russian Federation. The productivity of the stock presently is high. In the last 10 years, four large year classes have been produced (1998, 1999, 2002 and 2004). This stock has shown a large dependency on the irregular occurrence of very strong year classes. In recent years, the stock has tended to produce strong year classes more frequently. The management plan implies maximum catches of 1,643,000 t in 2009.
- ◆ In June 2009 ICES herring in the **North Sea** has produced six poor year classes in a row. Indications suggest the 2008 year class is slightly higher. The size of the 2007 year class has been revised upwards, but it is still considered poor. The survival of the larvae has been poor. In 2008 ICES advised a management plan. This was agreed in November 2008. Based on the management plan ICES advises a TAC of 174,700 t for 2010. The Pelagic Freezer Association North Sea fleet fishery has MSC certification.
- ◆ In June 2009 the status of the **Icelandic summer spawning herring stock** has improved. The stock has full reproductive capacity but is at increased risk of being harvested unsustainably. A high *Ichthyophonus* infection was observed in the stock in the winter 2008/2009 causing additional mortality. For 2008/09 the TAC was set at 130,000 tonnes (up from 117,000 t in 2007/08). New information on *Ichthyophonus* will be available in July 2009. ICES has advised no TAC for 2009/10 should be set until this is available.

Herring management and control measures

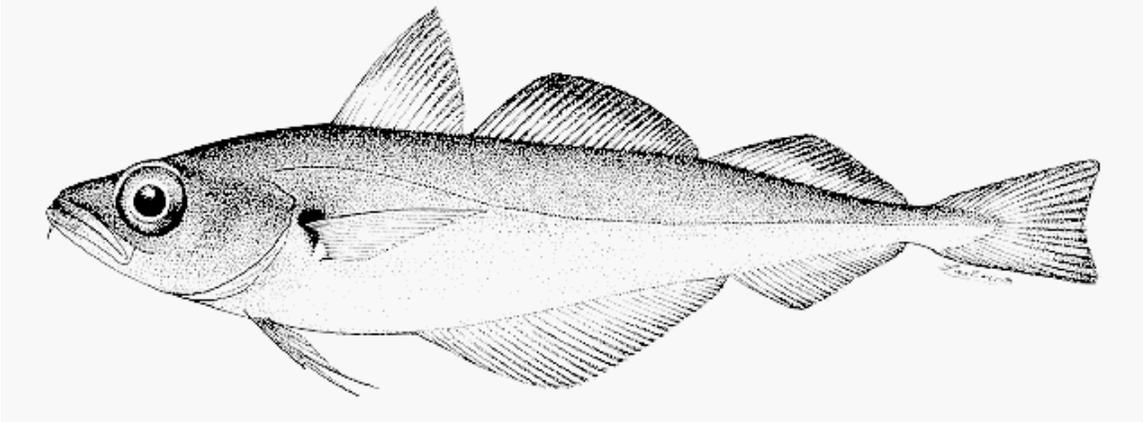
TACs – Herring fishing quotas for 2009

Atlanto-Scandian herring (NE Atlantic or Norwegian spring spawning). A TAC of 1,643,000 was agreed for 2009, slightly up on 2008. The North Sea autumn spawning TAC was reduced again to 171,000 and no TAC has yet been set for the 2009/10 Icelandic spring spawning fishery. (Four Baltic herring fisheries have a total quota of just under 300,000 tonnes for 2009. The proportion used in reduction to fishmeal and fish oil is not known.)

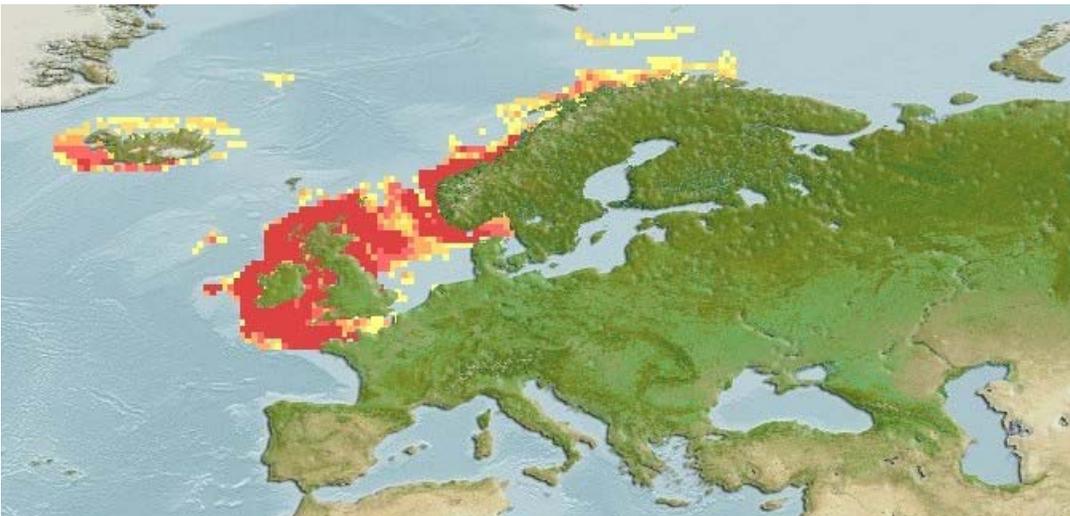
TAC history 2003 to 2009

Tonnes	2003	2004	2005	2006	2007	2008	2009
NE Atlantic	710,000	825,000	890,000	732,000	1,280,000	1,518,009	1,643,000
North Sea	284,000	326,000	379,850	322,874	341,000	201,227	171,00
Icelandic		110,000	110,000	110,000	117,000	130,000	ISR
By-catch: North Sea	51,693	43,200	50,000	42,500	31,875	18,806	15,985
By-catch S&K	21,000	21,000	24,150	20,528	15,396	11,470	8,373

6. NORWAY POUT



Scientific name	<i>Trisopterus esmarkii</i>
Description	A small short-lived gadoid which rarely gets older than five years
Resilience:	Medium, minimum population doubling time 1.4 - 4.4 years (K=0.36; tm=2.3; tmax=5; Fec=27,000)
Fishery	The main area is The North Sea and Skaggerak-Kattegat where landings were 200,000 tonnes per annum up to 1995, then declined through to 2007. The species is also taken as by-catch in the Blue Whiting Fishery. Mainly fished by Danish and Norwegian vessels using small mesh trawls. A second fishery is operated by Danish vessels in the West of Scotland.
% use in UK	It is estimated Norway pout accounted for less than 1% of UK fishmeal in 2007.
Distribution	Northeast Atlantic: southwest Barents Sea, sometimes at Bear Island, south to the English Channel, around Iceland, and at the Faeroe Islands. Spawning takes place in the North Sea between Shetland and Norway.



Map: www.fishbase.org

Current status of the North Sea/Skagerrak-Kattegat Norway pout stock

- ◆ The North Sea fishery developed in the 1960s, peaked at 740,000 tonnes in 1974, in the 1980s and early 1990s fluctuated around 200,000, and then fell sharply. The targeted fishery for Norway pout was closed in 2005, the first half of 2006 and all of 2007, and fishing mortality and effort have accordingly reached historical minima in these periods. The stock has also been protected with small mesh trawler bans, closed and seasonal areas, and mesh limitations. The fishery re-opened on 1 January 2008 with an EU TAC of 43,300 t.
- ◆ In June 2009 based on the most recent estimate of SSB (Q1 2009) ICES classifies the stock as having full reproductive capacity. SSB has shown an increasing trend since 2005. Due to the short-lived nature of this species a preliminary TAC is set every year, which is updated on the basis of advice in the first half of the year. In order to maintain the spawning stock biomass above precautionary levels in 2010 ICES advises landings should be restricted to 157,000 t in 2009.

Norway pout management and control measures

- ◆ The Norway pout fishery is regulated through a single species TAC and by technical measures such as minimum mesh size in the trawls, fishing area closures and bycatch regulations.

Norway pout quotas							
<i>Tonnes</i>	2003	2004	2005	2006	2007	2008	2009
	173,000	173,000	NIL	NIL	NIL	50,000 + IYM	53,476 + IYM

IYM = in year management

OVERVIEW OF CONTROLS - SOUTH AMERICAN FEED GRADE FISH STOCKS

The status of fish stocks used by the South American fishmeal industry are detailed in the latest published version of the biennial FAO *State of World Fisheries and Aquaculture 2008* (published March 2009), the Review of the State of World Marine Fishery Resources (2005) and in national Government statistics.

Three species in the Southeast Pacific account for around 80% of total catches in the region:

- Anchovy (two stocks)
- Jack mackerel
- South American pilchard (sardine)

Control of Southeastern Pacific fisheries

The governments of Peru and Chile have adopted a precautionary approach to fisheries management to safeguard the viability and prevent depletion of stocks, by means of national quotas for individual species and a closed season programme. They have taken steps to ensure commercial fishing in Peru and Chile is strictly monitored and controlled. These controls are based on independent scientific advice.

Peru

- Government control of fisheries in Peru is managed by the Vice-Ministry of Fisheries, a part of the Ministry of Production.
- The government-funded marine research institute in Peru, IMARPE, advises government and conducts acoustic surveys to assess fish populations two to three times every year along the entire Peruvian coastline.
- Peruvian fishing companies, representing over 70% of the vessels have organised themselves into the Sociedad Nacional de Pesquería (SNP) and developed an Ethical Code of Conduct that has responsible fishing as a central theme, including strict compliance with regulations.

Chile

- Government control of fisheries in Chile is managed by the Under Secretary of Fisheries, with the approval of the National Fisheries Council in Chile.
- The Chilean Fishery Research and Development Institute, IFOP, conducts research cruises and acoustic assessments of fish stocks.

Overall

- Peru and Chile have started scientific collaboration towards joint stock assessments of sardine and anchovy for Southern Peru and Northern Chile (bordering the Humboldt Current LME) to foster national and regional efforts to manage and sustain fish stocks.
- SGS (international surveillance company) is appointed to monitor and record all fishing landings in Peru and Chile for management purposes.

El Niño and La Niña

The whole of the Southeast Pacific is well known for experiencing large changes in the abundance and species composition of the main fish resources. The area is under the influence of two phases of the El Niño Southern Oscillation (El Niño and La Niña), generally on a ten-year cycle. These are the main source of interannual variability, having noticeable regional and extra-regional impacts on climate, and on the state of fishery resources and related fishery productivity, particularly when the warm phase of El Niño occurs. As a consequence large catch fluctuations are common in the area. The severe El Niño event (warm water currents) in 1997-98, led to a sharp decline in catches of two leading species (anchoveta and Chilean jack mackerel) during the late 1990s.

The USA National Oceanic and Atmospheric Administration (NOAA) climate prediction centre monitors this phenomenon. As at August 2009 there is an El Niño present across the equatorial Pacific Ocean. While there is disagreement on the eventual strength of this, nearly all of the dynamic models predict a moderate-to-strong El Niño in the Northern Hemisphere during winter 2009 - 2010.

The situation in 2008

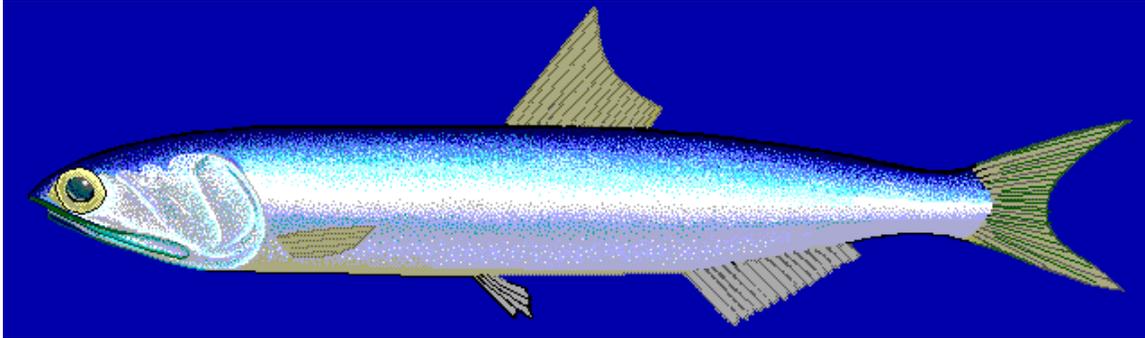
There have been a number of new developments in Peru. Independent surveillance of landings has been introduced, Maximum Catch Limits per Vessel (MCLV) are also new. There is improved protection of artisanal fishing and the environment, with parachute payments and pensions for those who retire from fishing. The Government has tackled corruption and abuses of the rules to protect fishery and crews with higher fines and the revoking of illegal licences. An ecosystem based approach to stock management has been initiated.

Lower fishmeal production in 2006, 2007 and 2008 compared with 2005 reflects a responsible and precautionary approach to catch limits on the part of the relevant governments, especially in Peru and Chile.

Fishmeal production in Peru and Chile

Fishmeal production tonnes								
<i>Tonnes</i>	2001	2002	2003	2004	2005	2006	2007	2008
Peru	1.8M	1.9M	1.2M	1.9M	2.0M	1.4M	1.4M	1.4M
Chile	699,000	839,000	664,000	933,000	789,000	758,000	713,000	

1. PERUVIAN ANCHOVY (anchoveta – Peru and Chile)



Scientific name

Engraulis ringens Jenyns, 1842

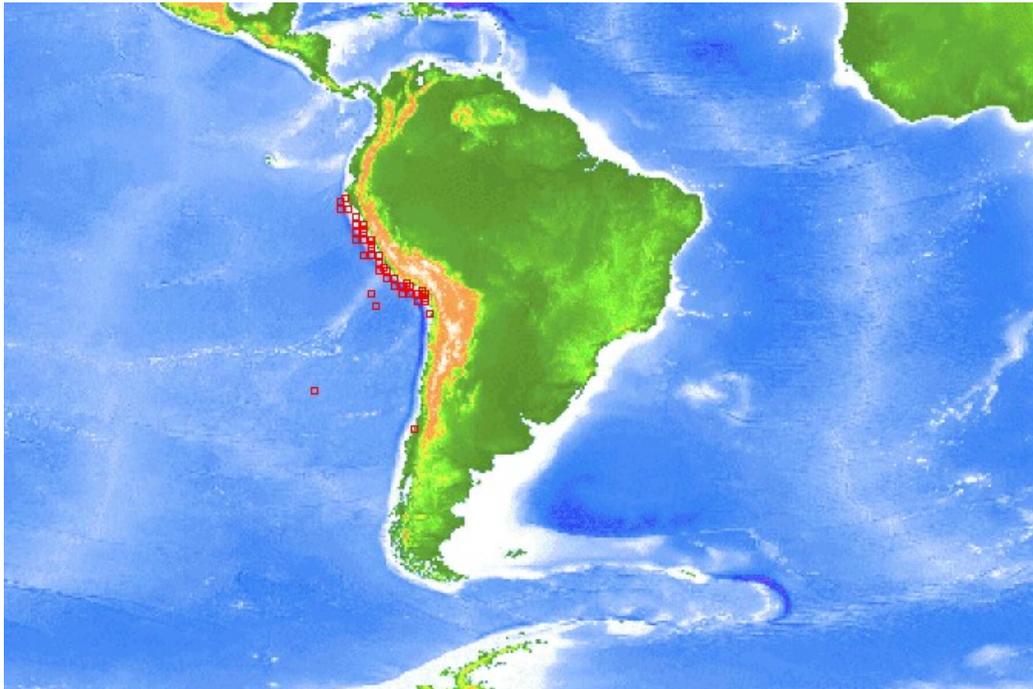
Description Anchovy form huge schools chiefly in surface waters ranging from 3 to 80 metres. Mostly restricted to cool, nutrient-rich upwelling zones. A filter-feeder entirely dependent on the rich plankton of the Humboldt current. Spawn in batches all year round, with two peaks.

Fishery Pelagic species. Very small amount is now used for human consumption. Majority used for fishmeal. Highly commercial – caught by purse seiner.

Resilience High. Minimum population doubling time is less than 15 months. Short-lived species. Maximum age 3 years. Maximum size 18.5cm.

% use in UK It is estimated that anchovy accounted for 28% of the fishmeal used in the UK in 2007.

Distribution South-eastern Pacific Ocean, mainly within 80 km of the coasts of Peru and Chile.



Map: www.fishbase.org

Current status of the anchovy stocks

In the Southeast Pacific, the FAO report for 2008 stated that anchoveta has fully recovered after the severe El Nino event in 1997- 98 and is considered fully exploited in most of the area.

Peruvian anchoveta annual catches for fishmeal production – Mt									
Tonnes	2000	2001	2002	2003	2004	2005	2006	2007	2008
Anchoveta	9.7	7.2	8	5.3	8.6	9.4	6.0	6.1	6.0

Source: IFFO and Ministerio de la Producción del Perú.

Anchovy management and control measures by Peruvian Government

- IMARPE advises on fisheries control based on ecosystem effects. The approach is a multi-step procedure, which includes identification of ecosystems, relevant ecosystem components and linking human activities to impacts on the ecosystems.
- IMARPE undertakes hydro-acoustic evaluation of pelagic resources along the entire Peruvian coastline to assess environmental status of fish stocks.
- Fishing stops during Feb and March to protect growth of anchovy and sardine juveniles. Fishing closure from August to October to protect spawning stock
- All fishing boats operating outside the 5 mile limit fitted with a satellite tracking system to allow government to monitor position of all boats at any given time.
- The Peruvian government imposes closed fishing seasons, closed entry of new fishing boats, and vessel licences to fish within the 200 mile limit.
- Limits on the minimum size of fish that can be landed with local short-term fishing closures if the level of small fish exceeds the number allowed.
- The Swiss-based international surveillance company SGS records all fishing landings on the coast of Peru for government management purposes. Only authorised vessels with the correct licence are permitted to unload fish in the 115 unloading points. This system is effective 24 hours per day.
- Fishmeal plants all have to have a working licence from the Ministry of Production and health certification from the Ministry of Health. Plants are also formalising HACCP systems and working towards implementing quality control systems such as FEMAS.
- A Fishing Behaviour Code has been established which covers the owners of plants and vessels, technicians of plants, skippers and crew members.
- **Maximum Catch Limits per Vessel (MCLV)** - were introduced in April 2009, There is a fixed percentage of the global quota assigned to each vessel: for steel fleets depending on the catch history and the hold capacity of each vessel - 60% or 40%; and for wooden vessels - based on their best annual catch - 100%. Before the introduction of MCLV there was an 'Olympic race' at the start of each fishing season when too many boats rush out and caught the entire quota in less than 50 days with consequent congestion at ports and fishmeal plants. The main objectives of the MCLV and other decrees introduced at the same time are to achieve more efficient use of the present oversized fleet and to better distribute fishing effort throughout the fisheries seasons, so reducing stress on the stock. Further objectives are to improve

protection of artisanal fishing, safety of crew, impact on the environment and quality of fishmeal. The new regulations are also designed to promote investment, competitiveness and increased supply for human consumption. They include parachute payments and pensions for those who retire from fishing.

- **Voluntary codes** – Peruvian fishery companies representing over 70% of the trawlers have organised themselves into the Sociedad Nacional de Pesquería (SNP) and developed an Ethical Code of Conduct that has responsible fishing as a central theme, including strict compliance with regulations. A Fishing Behaviour Code has been established which covers the owners of plant and vessels, technicians of plants, skippers and crew members.
- **Anchovy for human consumption is a state policy** – there is a commitment against child malnutrition. By law, a minimum of 8% of all food purchases by the Peruvian state destined for social programs have to be anchovy and/or squid. In addition there is new investment in human consumption applications, including canning of anchovies.

EXAMPLE OF FISHERY CLOSURES TO PROTECT THE STOCK

Statutory seasons/closures – fishing stops during January, February and March to protect the growth of anchovy juveniles. A fishing closure from July/August to October protects the spawning stock.

2007 Peruvian Open Seasons – Quota of 3 million tonnes is taken in three steps.

Fishing was authorised in three different sessions with different quotas attached to each session:

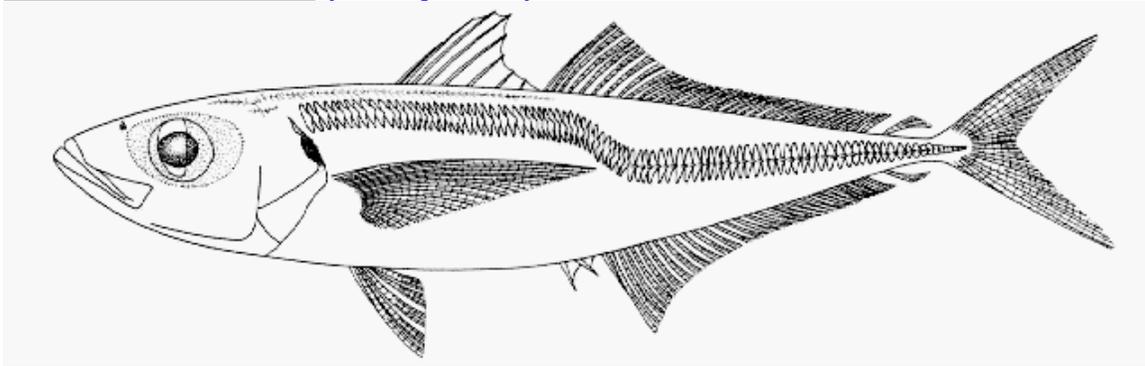
- 1) April 10 at 00:00 hours until April 14: 500,000 tonnes
- 2) May 2 at 00:00 hours until May 11: 1 million tonnes
- 3) June 1 at 00:00 hours onwards [no final date specifically mentioned]: 1.5 million tonnes.

This open season is subject to existing conditions:

- All vessels must have a valid fishing permit and use nets of minimum 13 mm,
- Minimum fish size: 12 cm with 10% tolerance in the number of animals
- If the presence of juveniles exceeds 10% in the daily landings of a port, fishing will be stopped in this port for a minimum of three days.
- Fishing within five miles of the coast line is prohibited, the vessels travelling through this zone are prohibited to stop and must keep a minimum speed of 2 knots
- Each vessel is authorised only one sailing per day
- All vessels must have on board an operating satellite positioning system.

For more about anchovy see: www.iffonet.net/intranet/content/archivos/67.pdf

2. JACK MACKEREL (mostly Chile)



Scientific Name

Trachurus murphyi

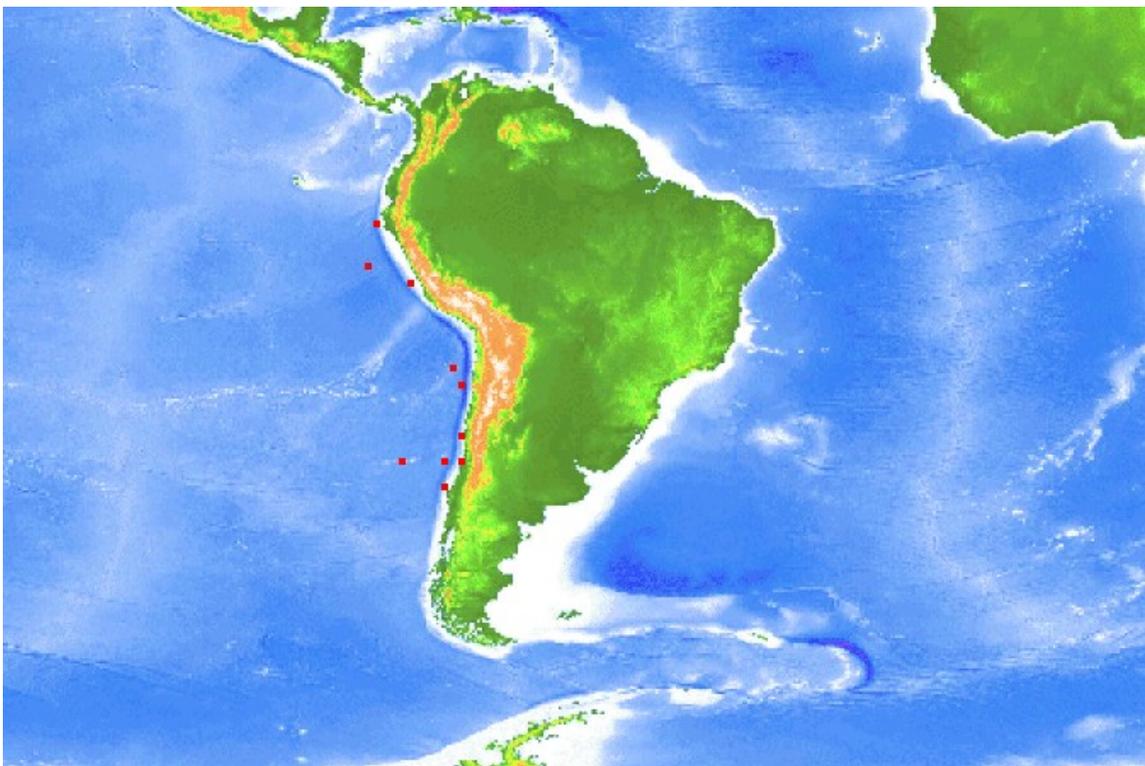
Description Jack mackerel form schools and are found in shore and open oceanic waters at a depth of 10 – 300 metres. Feed mainly on fish larvae and small crustaceans.

Fishery Pelagic species. Used for human consumption (canned) and used for fishmeal. Highly commercial – caught by purse seiner.

Resilience Low. Minimum population doubling time is 4.5 – 14 years. The maximum age is 16 years. Maximum size is 70cm.

% use in UK It is estimated that jack mackerel accounted for 1% of the fishmeal used in the UK in 2007.

Distribution South-eastern Pacific Ocean, off Peru and Chile.



Map: www.fishbase.org

Current status of the jack mackerel stocks

In the Southeast Pacific, the FAO report for 2008 stated that the Chilean jack mackerel remains in a decadal cycle of natural low abundance, producing a fraction of the record catches observed between the mid-1980s and mid-1990s.

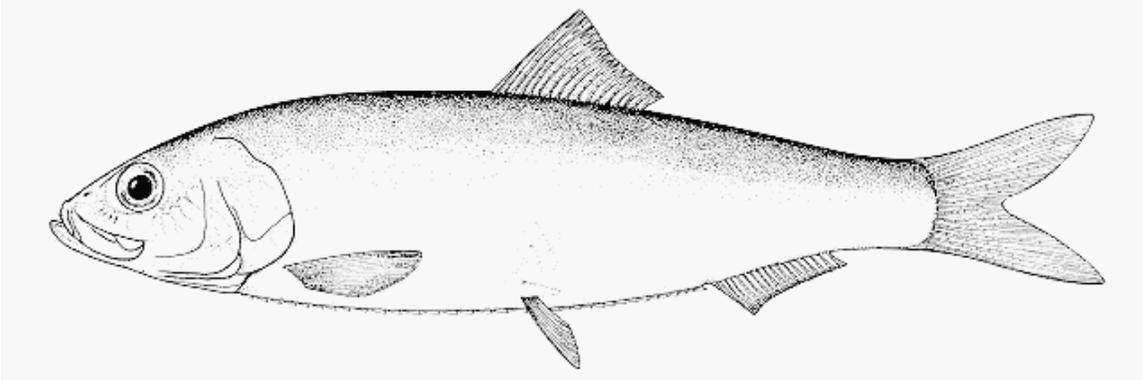
Annual catches in Chile for fishmeal production Mt								
<i>Tonnes</i>	2000	2001	2002	2003	2004	2005	2006	2007
Anchoveta		0.85	1.5	0.75	1.7	1.5	0.9	1.4
J mackerel		1.65	1.44	1.38	1.36	0.9	0.7	0.7
Tot Pelagic	3.7	3.2	3.7	2.9	3.9	3.5	3.4	3.1

Jack mackerel management and control measures by Chilean Government

To preserve stocks the Under Secretary of Fisheries with the approval of the National Fisheries Council in Chile has introduced a number of monitored control measures based on acoustic assessments of fish stocks and research cruises. Sernapesca (The National Fisheries Service) is the Governmental body that watches over the whole system.

- Jack mackerel in Chile has been controlled by the government's national annual quotas since 1999/2000 by species, and with individual quotas by company/ship-owner (ITQ or Maximum Capture Limits (LMCA)). A stringent unloading certification system is carried out by independent companies under the control of Sernapesca.
- A compulsory satellite positioning system is in place for the industrial fleet. All fishing boats are fitted with a Satellite Tracking System to ensure boats operate outside prohibited areas (such as designated areas of recovery) or the zone reserved for small artisan fisheries (first 5 miles offshore).
- Regular monitoring surveys to establish the state of the fishery resources. The results are used to set control measures required to protect the stocks.
- Legislation introduced to establish a maximum annual total catch limit for each species declared fully exploited and to provide quotas for each licensed fishing company according to its annual catch.
- For jack mackerel several fishing bans can be imposed during the year to protect small-sized fish including reproduction, spawning and recruitment fishing bans, and protected fishing zones.
- Minimum landing sizes (MLS) are also applied. As an example the MLS for jack mackerel, *Trachurus murphyi*, in the EU (the Northeast Bay of Biscay, the Cadiz Gulf, and Canary Islands) is 15 cm and for the Mediterranean Sea it is 12 cm. While the minimum size for Chilean jack mackerel is 26 cm.

3. SARDINE (mostly central Chile)

**Scientific****Name**

Clupea (Strangomera) bentincki, Norman 1936 (*Sardinia araucana*)

Description

A coastal species that form large schools in central and southern Chile. Feeds mostly on zooplankton.

Fishery

Pelagic species. Primarily used for fishmeal and partly for human consumption. Highly commercial.

Resilience

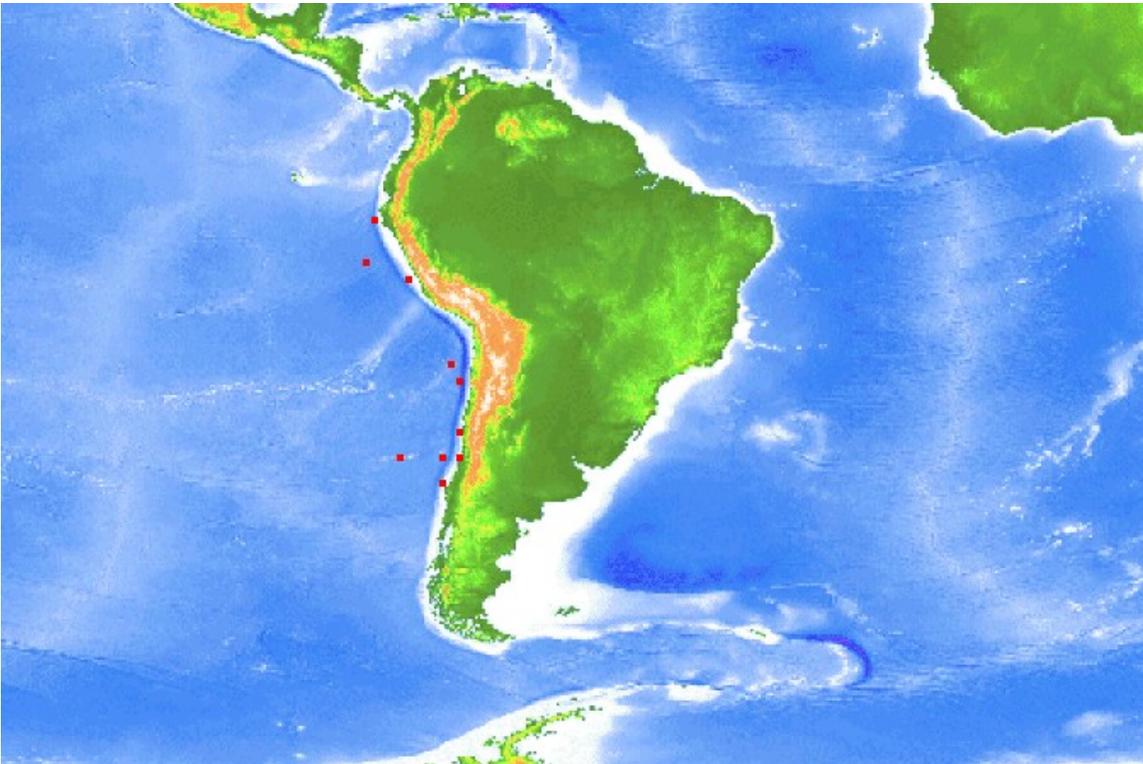
Medium. Minimum population doubling time is 1.4 – 2.4 years. Maximum age is 4 years. Maximum size is 14cm.

% use in UK

It is estimated that sardine accounted for less than 1% of the fishmeal used in the UK in 2007.

Distribution

Southeast Pacific, Chile.



Current status of the sardine stocks

- In the Southeast Pacific, the FAO report for 2008 stated that the South American pilchard remains in a decadal cycle of natural low abundance, producing a fraction of the record catches observed between the mid-1980s and mid-1990s.

Annual catches in Chile for fishmeal production								
<i>Tonnes</i>	2000	2001	2002	2003	2004	2005	2006	2007
Sardine	723,000	325,000	310,00	274,000	329,000	277,000	374,000	229,000

Sardine management and control measures by Chilean Government

- Since 2002 sardines have been subject to a national quota.
- Closed seasons for sardine and anchovy are set on an annual basis to protect the spawning stocks appropriate to the spawning cycle usually between August and September of each year in the northern part of the country. Closed seasons are also imposed during December to mid January to protect the recruitment process of anchovy.
- In the central-southern part of the country closed seasons are set for sardine and anchovy to protect the spawning period (usually July and August) and also from mid-December to mid-February.

FISHMEAL FACTS AND FIGURES

Fishmeal production

UK fishmeal summary 2006 (tonnes)		Fishmeal imports into the UK 2007 (tonnes)		World fishmeal production 2007 (tonnes)	
UK consumption	189,000	Peru	21,200	Peru	1,407,000
Imports from EU	63,000	Peru via Germany	13,500	Chile	770,000
Imports from non-EU	76,000	Denmark	13,100	Thailand	428,000
UK production	44,000	Iceland	3,800	USA	251,000
		Chile	5,100	China	204,000
		Norway	10,900	Japan	200,000
		Eire	13,200	Norway	172,000
		Faeroe Islands	3,400	Denmark	166,000
		Morocco	1,900	Iceland	152,000
		Spain	300	S Africa	88,000
				Mexico	73,000

**Includes fishmeal imported into another EU country and re-exported to the UK*

Fishmeal in the UK

- ◆ UK fishmeal consumption in 2007 was about 135,000 tonnes – significantly down on 2006's 189,000 tonnes. Of the 2007 consumption 90,800 tonnes were imported and 44,000 tonnes produced in the UK, the latter mainly from food fish trimmings.
- ◆ 38% of the fishmeal consumed in the UK is manufactured from trimmings (supplier figures - 2008).
- ◆ The main suppliers to the UK in 2007 were Peru, Germany, Denmark, Iceland, Chile, Norway and Eire (in order).
- ◆ There is no recent estimate of usage by sector in the UK – fish, pigs, poultry etc, but see estimate for the world below.

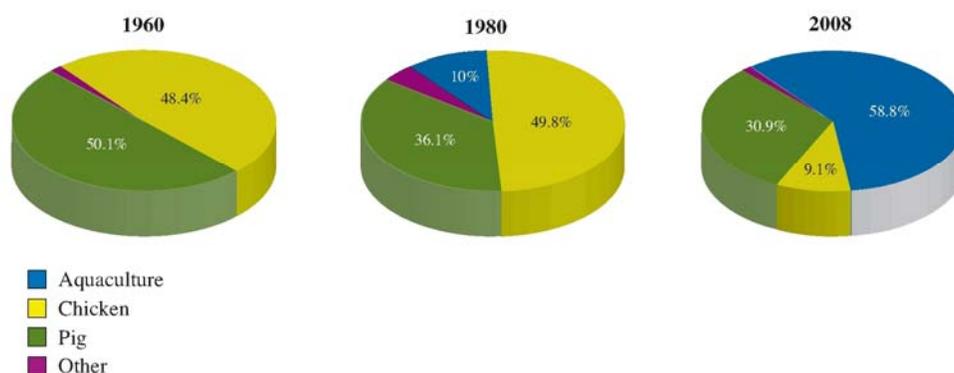
Fishmeal in the EU

- ◆ EU fishmeal production is about 450,000 tonnes per year.
- ◆ In the EU about 33% of fishmeal is produced from trimmings from the food fish processing sector (2006 trade estimate).
- ◆ There is no known recent estimate of use by sector – fish, pigs, poultry etc, but see below for global figure.

Fishmeal world-wide

◆ Usage by sector 2008 (source IFFO)

Changing uses of fishmeal



- ◆ World annual fishmeal production is about 5 to 6 million tonnes.
- ◆ In order of output the main fishmeal producing countries in 2007 were Peru, Chile, Thailand, China, USA, Japan, Denmark, Norway and Iceland.

Fishmeal production by top 16 countries 1997 to 2007

(ranked according to 2007 figures)

'000 tonnes	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Peru	1741	815	1904	2309	1844	1941	1251	1983	2,019	1,378	1,407
Chile	1195	642	957	842	699	839	664	933	794	759	770
Thailand	386	410	398	387	381	387	397	403	410	461	428
USA	394	294	355	335	342	337	318	353	268	232	251
China	534	693	707	806	723	460	420	400	305	297	204
Japan	363	379	409	387	227	225	230	295	230	219	200
Norway	253	301	241	264	216	241	212	215	154	169	172
Denmark	341	324	311	318	299	311	246	259	213	209	166
Iceland	279	220	234	272	286	304	279	204	188	144	152
S Africa	55	94	84	109	111	93	113	114	108	73	88
Mexico	63	45	48	65	61	65	65	55	55	80	73
Russian Fed	177	163	155	126	98	95	68	70	60	65	66
Morocco	70	55	59	53	55	61	64	63	66	28	60
Pakistan							46	47	48	51	56
F Islands			25	24	44	37	42	68	57	62	54
Vietnam							32	33	36	47	52
UK (20)	51	52	53	50	47	48	52	51	53	44	44

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2008. Figures rounded up or down. Only new 2007 figures added – no revisions have been made to previous years' figures.

DOCUMENTARY EXTRACTS

For ease of reference, relevant extracts, mainly from UN FAO and ICES, have been reproduced verbatim from the cited documents in support of the FIN summary.

Lists of key extracts

- A. UN FAO State of World Fisheries and Aquaculture, March 2009** - relevant extract detailing FAO's independent assessment of the status of fish stocks off the Pacific Coast of Latin America.
- B. EU implementing legislation** setting TACs and Quotas for 2009 in the North Sea and surrounding area.
- C. Reports of the ICES Advisory Committee on Fishery Management**, October 2008, and June 2008 and 2009. Extracts from ICES latest assessment of North Sea industrial stocks and by-catch levels.

Other sources of information from:

UN FAO Code of Conduct for Responsible Fisheries

<http://www.fao.org/DOCREP/005/v9878e/v9878e00.htm>

UN FAO Review of the State of World Marine Fishery Resources. 2005

<http://www.fao.org/docrep/009/y5852e/y5852e00.htm>

FULL List of FAO fisheries publications

<http://www.fao.org/fishery/publications/en>

Access to FULL ICES advice by species and region

<http://www.ices.dk/products/icesadvice.asp>

The State of World Aquaculture 2006. UN Food and Agriculture Organisation. 4 September 2006 <http://www.fao.org>

Use of fishery resources as feed inputs for aquaculture development – trends and policy implications. FAO Fisheries Circular No 1018. 2006.

Report of the ICES Advisory Committee on Fishery Management and Advisory Committee on Ecosystems, North Sea. May 2005.

Extract from paper by Professor Robert Furness, October 2001 – interactions between sandeel-dependent seabirds and seals in the North Sea.

DOCUMENTARY EXTRACTS

Extract A

Review of The State of World Fisheries and Aquaculture 2008 – published March 2009. Relevant extracts from the United Nations Food and Agriculture Organisation (FAO) independent assessment of the status of fish stocks. (Premier advocacy document published every 2 years).

Aquaculture and the demand for fishmeal:

- The contribution of aquaculture to global supplies of fish, crustaceans, molluscs and other aquatic animals has continued to grow, increasing from 3.9 per cent of total production by weight in 1970 to 36% in 2006.
- In the past few years, major increases in the quantity of fish consumed have originated from aquaculture. The average contribution of aquaculture to per capita fish available for human consumption rose from 14% in 1986, to 30% in 1996 and to 47% (43%) in 2006, and it can be expected to reach 50% in the next few years. China is mainly responsible for this increase.
- About 5-6 million tones of low value/trash fish are used as direct feed in aquaculture worldwide, either provided without processing or as part of farm-made feeds.....For decades, the need to provide fish as feed for other fish has been seen as an almost insurmountable obstacle given that the amount of fish that can be produced annually from the world is finite. Thus, much research has been focused on finding replacements for fishmeal and fish oil in fish feeds. Partial replacements have been achieved. However, no dramatic breakthroughs have been reported, and the share of fishmeal and fish oil used in aquaculture is increasing (recently at the expense of poultry).
- The aquaculture sector consumed about 3.06 mt (or 56%) of world fishmeal production and 0.78 mt (or 87%) of total fish oil production in 2006. Thus, the total amount of fishmeal and fish oil used in aquafeeds is estimated to have grown more than threefold between 1992 and 2006, from 0.96 mt to 3.06 mt and from 0.23 mt to 0.78 mt respectively.
- The world's supply of fish available for human consumption is determined by capture fisheries production (marine and freshwater) and aquaculture production, less the share of this total withdrawn from human consumption and used for other purposes. Given the strong livelihood that fish landings will remain stagnant in capture fisheries, aquaculture remains the only apparent means to expand world supplies.
- Given the available commercially-adapted fish and shrimp feed technology, the demand for fishmeal from aquaculture is set to increase in the near future. In the longer term, demand will depend on the success of scientific research in reducing the use of fishmeal in fish and shrimp feeds. The global market will also be conditioned by future demand from the livestock sector and other users.

Status of marine fisheries:

- In 2007 about 20% of the stocks monitored were underexploited (2%) or moderately exploited (18%) and could perhaps produce more.
- In 2007 slightly more than half the stocks (52%) were fully exploited and, therefore producing catches at or close to their maximum sustainable limits, with no room for further expansion. The other 28% were either overexploited (19%), depleted (8%) or recovering from depletion (1%) and, thus, yielding less than their maximum potential owing to excess fishing pressure in the past, with no possibilities in the short to medium term of further expansion and with an increased risk of further declines and need for rebuilding.
- Overall, 80% of the 523 selected world fish stocks for which assessment information is available are reported as fully exploited or overexploited (or depleted and recovering from depletion). **It should be noted that the status of fully exploited is not undesirable provided it is the result of an effective and precautionary management approach.** Nevertheless, the combined percentage reinforces earlier observations that the maximum wild capture fisheries potential from the world's oceans has probably been reached. Therefore, a more cautious and closely controlled approach to development and management of world fisheries is required.
- The percentage of stocks fully exploited, overexploited or depleted varies greatly by area. The major fishing areas with the highest proportion (71-80%) of fully exploited stocks are the Northeast Atlantic, Western Indian Ocean and Northwest Pacific. The proportion of overexploited, depleted and recovering stocks varies between 20 and 52% in all areas except in the Northwest Pacific, Western Central Pacific and Eastern Central Pacific, where it is 10% or less.
- In the North East Atlantic, catches of blue whiting have stabilized at about 2 mt per year since 2003, and the stock is considered fully exploited. Fishing mortality has been reduced in cod, sole and plaice. Cod remains depleted in the North Sea and in the Faeroes, but other stocks are healthier and considered fully exploited. Several stocks of haddock have shown spectacular increases in biomass since 2000, fisheries have grown and most stocks are now considered fully exploited. Saithe stocks have also increased since 2000. Some sandeel and capelin stocks have become depleted, while fishing for shrimp seems to have ceased in some areas.
- Most of the stocks of the top ten species, which account in total for about 30% of the world marine capture fisheries production in terms of quantity are fully exploited or overexploited and therefore cannot be expected to produce major increase in catches. This is the case for: anchoveta with two main stocks in the Southeast Pacific that are fully exploited and overexploited...blue whiting which is fully exploited in the Northeast Atlantic... Atlantic herring, with several stocks that are fully exploited, some that are depleted and some that are underexploited because of market conditions...Chilean jack mackerel which is fully exploited and overexploited in the Southeast Pacific. (Yellowfin tuna, Alaska pollock and Japanese anchovy also mentioned.)

- In the Southeast Pacific, total catches have oscillated around 12 mt in the last five years. There has been no major change in the status of stocks since 2004. The stock of anchoveta has recovered from after the severe El Niño event in 1997- 98 and is considered fully exploited in most of the area. Two other important pelagic stocks, the Chilean jack mackerel and in particular the South American pilchard, remain in a decadal cycle of natural low abundance, producing a fraction of the record catches observed between the mid 1980s and mid 1990s.

Fishmeal:

- In recent decades, fishmeal production has been remarkably stable at about 6 mt (product weight), fluctuating between 5 million and 7 million tonnes depending on catch levels of anchovy off South America. Total fishmeal production of the main fishmeal exporters for 2007 reached 2.7 mt, slightly below that of 2006. A significant reduction in anchovy catches off Peru in 2006 led to sharply higher fishmeal prices in that year, but prices were rather stable in the course of 2007. In early 2008, fishmeal prices moved upwards again, and are likely to remain high, also in view of high vegetable meal prices. Of note is the large share of fishmeal now consumed by the aquaculture industry, estimated at 60%, with a strong demand particularly in China. At the same time, the poultry industry has dramatically reduced its fishmeal use.
- Aquaculture's share of fishmeal and fish oil has been growing. In 2006, this sector absorbed 56 and 87% respectively, of world fish supplies. Fish and shrimp feed producers, who have seen their production costs rise, are trying to escape from dependence on fishmeal. Some success has been achieved – salmon diets now contain 30% fishmeal instead of the 50% of some years ago. However, given the available commercially-adapted fish and shrimp feed technology, the demand for fishmeal from aquaculture is set to increase in the near future. In the longer term, demand will depend on the success of scientific research in reducing the use of fishmeal in fish and shrimp feeds. The global market will also be conditioned by future demand from the livestock sector and other users.
- The supply of raw material for fishmeal has always fluctuated. Variations in oceanic conditions off the coast of Peru and farther out to sea mean that each season's landings of anchoveta for the fishmeal industry can differ in volume by more than 30% from that of the previous season. For example, in the El Niño year of 1998, anchoveta production was 1.2 mt (5.3mt in 1997). It went down from 8.6mt in 2002 to 5.3mt in 2003. While seasonal variations may not be as drastic in other fisheries supplying raw material to fishmeal plants, global production volumes of fishmeal have fluctuated between 5 and 7 mt irrespective of variations in demand for the final product.

<http://www.fao.org/docrep/011/i0250e/i0250e00.htm>

Extract B**Implementing legislation**

- 16/01/09 Council Regulation (EC) No 43/2009 of 16 January 2009** fixing for 2009 the fishing opportunities and associated conditions for certain fish stocks and groups of fish stocks in Community waters and, for Community waters, in waters where catch limitations are required.
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:022:0001:0205:EN:PDF>
- 18/12/08 Council Regulation (EC) No 1300/2008 of 18 December 2008** establishing a multi-annual plan for the stock of herring distributed to west of Scotland and the fisheries exploiting that stock.
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:344:0006:0009:EN:PDF>
- 28/11/08 Council Regulation (EC) No 1322/2008 of 28 Nov 2008** fixing for the fishing opportunities and associated conditions for certain fish stocks and groups of fish stocks applicable in the Baltic Sea for 2009.
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:345:0001:0009:EN:PDF>
- 13/11/08 NEAFC Management plan agreed for Atlanto-Scandian herring in the North East Atlantic in 2009** www.neafc.org
- 11/11/08 NEAFC Management plan agreed for blue whiting in the North East Atlantic in 2009** www.neafc.org
- 17/10/08 Agreement on Norwegian-Russian capelin quota for 2009** www.regjeringen.no/en/dep/fkd/Press-Centre/Press-releases/2008
- Oct 2008 Icelandic Ministry of Fisheries and Agriculture Regulation 638/2008** allocating Total Allowable Catches for the fishing year September 1 2008 to August 31 2009.
<http://www.fisheries.is/management/total-allowable-catch/>

Extract C**ICES STOCK BY STOCK ASSESSMENT**

Reports of the ICES Advisory Committee on Fishery Management, October 2008 and June 2009: extracts from ICES latest assessment of North Sea industrial stocks and by-catch levels looking forward to prospects for 2009.

ICES now generally publishes advice on fish stocks twice a year in June and October. Generally in June new advice is published on sprat, Norway pout and herring. In October new advice is published on sandeel and the other industrial species.

ICES: BLUE WHITING

9.4.4 Blue whiting combined stock (Sub-areas I-IX, XII and XIV)

State of the stock October 2008

Based on the most recent estimates of fishing mortality and SSB, ICES classifies the stock as having full reproductive capacity, but being harvested at increased risk. SSB increased to a historical high in 2003, but has decreased since then and is expected to be just above B_{pa} in 2009. The estimated fishing mortality is well above F_{pa} . Recruitment of the 2005 and 2006 year classes are estimated to be in the very low end of the historical time-series. Surveys indicate that the 2007 year class could also be low.

The management agreement Is to maintain the SSB of the blue whiting stock at levels above 1.5 million tonnes (B_{lim}) and the fishing mortality rates at levels of no more than 0.32 (F_{pa}). To achieve this, TAC are reduced by at least 100 000 t a year until the fishing mortality is reduced to 0.32 (F_{pa}). The plan states that if the spawning stock falls below 2.25 million t unspecified actions to obtain a safe and rapid recovery to this level should be taken. ICES has evaluated this management plan in 2006 and found it not to be in accordance with the precautionary approach in a period of low recruitment.

Management considerations

Three years with very low recruitment, combined with a fishing mortality above F_{pa} in the last 12 years, have resulted in a continuing decline in SSB. SSB is predicted to be just above B_{pa} at the beginning of 2009. Due to low recruitment, SSB is expected to decline further. In order to keep SSB above B_{pa} in 2010 catches should be less than 384,000 t in 2009. WORSE

ICES: CAPELIN

2.4.11 Capelin in the Iceland East Greenland Jan Mayen area (Subareas V and XIV and Division IIa west of 5°W)

State of the stock June 2009

In the absence of defined reference points, the state of the stock cannot be evaluated. It is estimated that 328,000 tonnes were left for spawning in spring 2009 which is below the management target. The 2007 year class is estimated to be the second lowest in the time series and not sufficient to start a fishery in 2009.

Advice on Management June 2009

The 2007 class is estimated to be very low and not sufficient to start a fishery in 2009/10. There should be no fishery until new information on stock sizes becomes available after the planned survey in November 2009. The TAC should be set so that at least 400,000 tonnes is left to spawn in March 2010. This year no initial TAC is advised.

3.4.8 Barents Sea capelin (Subareas I and II, excluding Division IIa west of 5°W)

State of stock October 2008

Based on the most recent estimates of SSB and recruitment ICES classifies the stock as having full reproductive capacity. The maturing component in autumn 2008 was estimated to be 2.47 mill. tonnes. The spawning stock in 2009 will consist of fish from the 2005 and 2006 year classes, but the 2006 year class will dominate. The survey estimate indicated that the 2008 year class is very strong.

Advice on management October 2008

Following the agreed management plan would imply of 390,000 tonnes in spring 2009.

ICES: HERRING

9.4.5 Norwegian spring-spawning herring (AKA NE Atlantic)

State of stock October 2008

Based on the most recent estimates of SSB and fishing mortality, ICES classifies the stock as having full reproductive capacity and being harvested sustainably. The estimate of the spawning-stock biomass, although uncertain, is well above Bpa in 2008 and near the highest in the recent time-series. Fishing mortality is well below Fpa. The productivity of the stock presently is high. In the last 10 years, four large year classes have been produced (1998, 1999, 2002 and 2004). The 2004 year class has not been fully recruited yet; consequently, catches and SSB are expected to increase in the near future. This stock has shown a large dependency on the irregular occurrence of very strong year classes. In recent years, the stock has tended to produce strong year classes more frequently.

Advice on management 2008

The management plan implies maximum catches of 1,643,000 t in 2009, which is expected to leave a spawning stock of 11.5 million tonnes in 2010.

6.4.16 Herring in Subarea IV and Divisions IIIa and VIId (North Sea autumn spawners)

State of stock in June 2009

Six poor year classes have been produced in a row. Indications suggest the 2008 year class is slightly higher. The size of the 2007 year class has been revised upwards, but it is still considered poor. The survival of the larvae has been poor. In 2008 ICES advised a management plan. This was agreed in November 2008. Based on the management plan ICES advises a TAC of 174,700 t for 2010.

2.4.12 Icelandic summer-spawning herring (Division Va)

The status of the stock has improved. In June 2009 ICES classifies the stock as having full reproductive capacity but that it is at increased risk of being harvested unsustainably. A high *Ichthyophonus* infection was observed in the stock in the winter 2008/2009 causing an additional mortality. For 2008/09 the TAC was set

at 130,000 tonnes (up from 117,000 t in 2007/08). New information on *Ichthyophonus* will be available in July 2009 and ICES has advised no TAC for 2009/10 should be set until this is available.

ICES: NORWAY POUT

6.4.22 Norway pout in ICES Subarea IV (North Sea) and Division IIIa (Skagerrak Kattegat)

State of stock June 2009

Based on the most recent estimate of SSB (Q1 2009) ICES classifies the stock as having full reproductive capacity. SSB has shown an increasing trend since 2005. Due to the short-lived nature of this species a preliminary TAC is set every year, which is updated on the basis of advice in the first half of the year. The targeted fishery for Norway pout was closed in 2005, the first half of 2006 and in 2007. The Norway pout fishery is regulated through a single species TAC and by technical measures such as minimum mesh size in the trawls, fishing area closures and bycatch regulations.

Advice on management 2009

In order to maintain the spawning stock biomass above precautionary levels in 2010 landings should be restricted to 157,000 t in 2009.

ICES: SANDEEL

6.4.24 Sandeel in the North Sea (Sub-area IV)

Advice on management June 2009:

Using real-time monitoring data from weeks 14 to 18 in 2009 the stock size estimate of age 1 sandeel in 2009 is 130 billion individuals and the mean weight is 6.11 g.....Therefore the total 2009 TAC (for EC and Norway combined) should be around 400,000 t as specified in the agreement.

State of the stock October 2008

According to the most recent estimate of SSB, ICES classifies the stock as having full reproductive capacity, but the stock is forecast to decline below Bpa at the start of 2009. Fishing mortality has been decreasing since 2001 and is now close to its lowest historical level, but the present absolute level is uncertain. In the absence of an F reference point, the state of the stock cannot be evaluated with regard to sustainable harvest.

Advice on management October 2008:

ICES recommends that fishing grounds that are known to be commercially depleted should be closed to fishing until there is evidence from monitoring programmes that local populations have recovered. On other fishing grounds, a fishery should only be allowed in 2009 if analysis of monitoring indicates that the stock can be rebuilt to Bpa by 2010.

6.4.23 Sandeel in Skagerrak Kattegat (Division IIIA)**State of the stock October 2008**

The available information is inadequate to evaluate spawning stock or fishing mortality relative to risk, so the state of the stock is unknown. The only recent data available are official landing statistics which have been variable and provide only a limited basis for scientific advice.

5.4.32 Sandeel in Division VIa (West of Scotland)**State of stock 2008**

The available information is inadequate to evaluate spawning stock or fishing mortality relative to risk, so the state of the stock is unknown. The only recent data available are official landing statistics which have been variable and provide only a limited basis for scientific advice. The stock was last assessed in 1996.

6.4.25 Sandeel (Shetland area)**State of the stock October 2008**

The available information is inadequate to evaluate stock trends. The state of the stock is therefore unknown and there is no basis for an advice.

ICES: SPRAT**6.4.20 Sprat in the North Sea (Subarea IV)****State of the stock June 2009**

The state of the stock is uncertain. Survey trends indicate the stock size has increased from the 1980's and varied around average levels since 1998 with no trend. There is no evidence that recent catches have created problems for this stock.

Advice on management June 2009.

Previous advice has been based around a relationship between survey and catches, resulting in specific numerical advice. Because recent catches have been low due to other factors than stock abundance, the historical relationship between stock size and catch is now considered inappropriate to provide annual quantitative advice. There is no basis for specific numerical advice for the TAC in 2009. A benchmark assessment is scheduled for September 2009. A TAC of 170,000 tonnes has been agreed for 2009.

6.4.19 Sprat in Division IIIa (Skagerrak & Kattegat)**State of the stock June 2009**

The new data available for this stock ie landings and survey indices give no reason to change the advice from 2008.

Advice on management June 2009

The advice on this stock for the fishery in 2010 is therefore the same as the advice given in 2008 for the 2009 fishery. Sprat in Division IIIa is mainly fished together with juvenile herring and the exploitation of sprat is limited by the restrictions imposed on fisheries for juvenile herring. There will be no update of advice for 2010.

8.4.8 Sprat in Subdivisions 22 - 32 (Baltic)**State of the stock June 2009**

In the absence of applicable biomass reference points, the state of the stock cannot be evaluated with regards to these. SSB in 2008 is estimated to be around 10% above the long term average. Based on the most recent estimates of fishing mortality (in 2008), ICES classifies the stock at risk of being harvested unsustainably. Of the recent year classes, the 2006 year class is estimated to be above average, and the 2008 year class is predicted to be strong.

Advice on management June 2008

Fishing mortality in 2009 should be below $F_{pa} = 0.40$ corresponding to landings of less than 306,000 t.

GLOSSARY

ORGANISATIONS

ACFM – Advisory Committee on Fishery Management, an ICES committee with representatives from each country which decides on official ICES advice.

CEFAS - The UK Government's Centre for Environment, Fisheries and Aquaculture Science, based in Lowestoft, provides scientific research and advice in fisheries management and environmental protection.

EU Fishmeal – Union of Fishmeal and Fish Oil Manufacturers in the European Community

FAO - United Nations' Food and Agriculture Organisation, based in Rome, monitors fishery resources worldwide and provides independent scientific assessments of the status of individual stocks.

GAFTA - Grain and Feed Trade Association. The international Association promoting trade in grain, animal feedingstuffs, pulses and rice world-wide.

ICES - International Council for the Exploration of the Sea, an independent scientific organisation advising North Sea and North East Atlantic Governments on the status and management of commercial fish stocks. The information collected by ICES is developed into unbiased, non-political advice about the marine ecosystem.

IFFO - International Fishmeal and Fish Oil Organisation

IFOP – Institute of Fisheries Research (Chile)

IMARPE – Institute of Fisheries Research (Peru)

MCS - Marine Conservation Society. A registered charity

MSC - Marine Stewardship Council. An independent body set up to establish basic principles for sustainable fishing and provide standards for individual fisheries.

NEAFC – North East Atlantic Fisheries Commission.

RAC – Regional Advisory Council

STECF - The Scientific, Technical and Economic Committee for Fisheries (STECF) of the EU which advises on marine biology, marine ecology, fisheries science, fishing gear technology and fisheries economics.

TERMS OF REFERENCE

Adult fish	Fish that have reached sexual maturity
Age group	A group of fish of the same age in years
Benthic	Bottom-living fish
B_{lim}	Limit biomass
B_{pa}	Precautionary biomass
By-catch	Species in the catch that are not the main target of the fishery.
Cpue	catch per unit effort
Catch	The total quantity of the fish taken by the fishery
Demersal	Fish living on or close to the seabed
Discards	Organisms that are returned to the sea after capture
F_{lim}	Limit fishing mortality rate
F_{pa}	Precautionary fishing mortality rate
Gadoid	Bony round fish with a body form like cod and hake
IBTS	International Bottom Trawl Survey
ISR	In Season Review (usually before setting TAC)
Industrial Fishing	A fishery that catches fish in bulk for reduction to fishmeal and fish oil – usually targeted at small, short-lived species
In year	ICES prefers to advise on the quota for a particular year until the year begins and checks can be made on the up-to-date status of the stocks.
Juvenile fish	(Immature) fish that have not reached sexual maturity
Landings	Fish that are brought ashore
Larva	Stage of life between hatching from the egg and metamorphosis
Mortality rate	A measure of the rates at which fish in a given stock die during a given time period. Natural mortality defines deaths due to natural causes – fishing mortality deaths caused by fishing
Pelagic	Fish living mostly in mid-water or near the surface and grouped in shoals
Precautionary approach	Implemented in ICES advice on fisheries management in 1998, includes a framework of biological reference points, related to upper exploitation boundaries. Management decisions for sustainable fisheries should restrict the risk that spawning biomass falls below a minimum limit, or that fishing mortality rate becomes too high. A minimum level of spawning stock biomass, or limit biomass (B_{lim} is defined). Below B_{lim} there is a higher risk that the stock reaches a level where it suffers from severely reduced productivity. A limit to fishing mortality has also been defined. Management should prevent the spawning stock decreasing below B_{lim} and avoid fishing mortality above F_{lim} . Management advice is generally aimed at avoiding the risk that the spawning stock falls below the B_{pa} (precautionary biomass) and fishing mortality increases above F_{pa}
Stock	A part of a fish population. Total stock refers to both juveniles and adults, whether in numbers or by weight. Spawning stock biomass refers to the numbers (weights) of individuals which are old enough to reproduce
TAC	Total Allowable Catch - the annual or seasonal quota limit applied to commercial landings of individual fish stocks.

USEFUL WEB SITES FOR INFORMATION ON FEED FISH STOCKS

www.ices.dk	ICES - International Council for the Exploration of the Sea
www.fao.org/fishery	FAO - United Nations' Food and Agriculture Organisation, based in Rome.
www.fishbase.org	A global information system on fishes. Set up initially in collaboration with FAO with support from the EC. Since 2001 supported by consortium of seven research institutions.
www.fishsource.org	FishSource provides information on the status of fish stocks/environmental performance of fisheries.
www.greenfacts.org/fisheries/index.htm	Greenfacts has reproduced the 2008 UN FAO publication 'The State of World Fisheries and Aquaculture' in fact sheet format.
www.fisheries.is	Information Centre of the Icelandic Ministry of Fisheries
www.hafro.is	Marine Research Institute, Iceland.
www.neafc.org	North East Atlantic Fisheries Commission
http://ec.europa.eu/fisheries	EU official information site.
www.fin.org.uk	FIN – Fishmeal Information Network
www.iffo.net	IFFO - International Fishmeal and Oil Organisation



Seafish, the authority on seafood, was founded in 1981 by an act of parliament and supports the seafood industry for a sustainable, profitable future. Our services range from research and development, economic consulting, market research and training through to account management and legislative advice for the seafood industry.

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