



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

September 2010

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 2010 edition is based on information available up to July 2010.

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INDEX OF CONTENTS

Page 3	Fishmeal production
Page 4	STATUS OF FEED GRADE FISH STOCKS USED TO PRODUCE FISHMEAL AND FISH OIL FOR THE UK MARKET
Page 5-10	Overview of management and control measures
Page 11	North Sea & North East Atlantic feed grade fish stocks Overview of TACs (p 13)
	Individual species information
	Sandeel (p 14)
	Sprat (p 16)
	Capelin (p 18)
	Blue whiting (p 20)
	Herring (p 22)
	Norway pout (p 24)
Page 26	Gulf and South American feed grade fish stocks Overview (p 26)
	Individual species information
	Anchovy (p 27)
	Jack mackerel (p 31)
	Sardine (p 33)
	Menhaden (p 35) NEW
Page 37	Fishmeal facts and figures
Page 39	List of Documentary extracts (in date order)
Page 40	Documentary extracts (in date order)
<hr/>	
Page 49	Glossary – Organisations
Page 50	Glossary – Terms of reference
Page 51	Useful web sites

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 2008 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).

Southeast Pacific (three species) and the Gulf of Mexico

In Peru, anchovy is by far the most important species for fishmeal production. The Chilean fishmeal industry uses jack mackerel, anchovy and sardine. The menhaden fishery in the Gulf of Mexico is primarily a single-species reduction fishery for fishmeal and fish oil.

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 <u>June 2010</u>	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 2010/11. Barents Sea: Stock recovered. Commercial fishing re-started in 2009. Now classified at full reproductive capacity.	ICES Oct 09 & June 10 See page 17
Blue Whiting <i>Micromesistius Poutassou</i>	21%	Mainly used for fishmeal. Limited use for human consumption - there are processing difficulties.	Stock has full reproductive capacity and harvested sustainably due to TAC being lowered year on year.	ICES Oct 09 Page 19
Sandeel <i>Ammodytidae</i>	Less than 3%	Not used for human consumption.	Stock has reduced reproductive capacity but absolute levels not known. Exploratory fishing in spring 2010 resulted in TAC maintained at 2009 levels..	ICES Oct 09 & June 10 Pg 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 10 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 at full reproductive capacity & harvested sustainably. North Sea autumn spawning stock at risk. Icelandic spring spawning infection risk.	ICES June 10 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.	ICES June 10 Page 23
Trimmings	38%	Generally comprise small pelagic species (i.e. mackerel, capelin and herring) & trimmings from the white fish processing sector (e.g. cod).		
SOUTH AMERICA/GULF				
Anchovy <i>Engraulis ringens</i>	28%	Very small amount used for human consumption. Majority used for fishmeal.	Uncertainty surrounding the status of the stock and fishing mortality levels are not disclosed, however compliance is high.	FAO/IMARPE Page 27
Jack mackerel <i>Trachurus murphyi</i>	1%	50% of Chilean jack mackerel used for human consumption and 50% for fishmeal.	Currently in a vulnerable state . Showing signs of overexploitation since 1997. It is considered near its limit reference point.	FAO/IFOP Page 31
Sardine <i>Stangomera bentincki</i>	Less than 1%	Used for human consumption and fishmeal	Remain in a decadal cycle of natural low abundance.	FAO/IFOP Page 33
Menhaden	n/a	Mostly used for fishmeal and fish oil	Strength of 2008 year class and its relative abundance as age-2 fish in 2010 remains uncertain. Indications 2009 year class may be above the long-term average.	NOAA Page 35

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.

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.

The Sustainable Fisheries Partnership (SFP) league. March 2010.

SFP published a sustainability league of the 22 principal fisheries used for the production of fishmeal and fish oil. Stocks have been assessed against existing fishery sustainability indicators. The table shows the stocks in order – highest scoring at the top. The table is intended to be a strong indicator of a well managed fishery as assessed by existing fishery sustainability measures.

- Criteria 1 Is management precautionary?
- Criteria 2 Do fishery managers follow scientific advice?
- Criteria 3 Do fishers comply?
- Criteria 4 Is the stock biomass healthy?
- Criteria 5 Will the stock biomass be healthy in the future?

Fishsource scores for global reduction fisheries

Fishery	Catch ('000 tonnes)	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5
Herring (Norwegian spring spawner)	1267	8.4	10	9.7	10	8
Herring (Canada, NAFO 4TVn – autumn spawner)	48	≥6	≥6	10	10	9.3
Sprat (Baltic Sea)	388	≥6	6.1	10	10	6.8
Herring (Icelandic summer spawning)	159	6	10	9.8	8.6	6.9
Horse mackerel (w stock, NE Atlantic)	123	≥6	9.5	10	9.7	n/a
Norway pout	6	≥6	10	10	9	n/a
Herring (US, Atlantic)	86	≥6	≥6	10	7.9	9.9
Japanese anchovy*	1648	≥6	10	10	≥6	7.1
Capelin (Barents Sea)	0	≥8	10	10	≥6	n/a
Sprat (N Sea)	84	≥6	10	10	≥6	n/a
Peruvian anchovy	5800	6	10	9.1	≥6	n/a
Menhaden (US, Atlantic)	201	≥6	n/a	n/a	10	8.4
Menhaden (US, Gulf of Mexico)	457	≥6	n/a	n/a	7.7	7.4
Sandeels (N Sea)	206	≥6	n/a	10	7	n/a
Chilean sardine	270	n/a	9.1	10	≥6	n/a
Iberian sardine	96	≥6	n/a	≥6	≥6	n/a
Blue Whiting (NE Atlantic)	1612	8.9	10	10	10	5.6
Herring (N Sea)	388	7.2	10	5.5	7	5.7
Horse mackerel (S stock, NE Atlantic)	23	<6	6.1	10	≥6	n/a
Chilean jack mackerel	1292	n/a	n/a	10	<6	n/a
Capelin (Icelandic)	202	10	10	0	<6	n/a
Herring (Canada NAFO 4TVn – spring spawner)	4	8.6	≥6	8.4	4.5	10

http://media.sustainablefish.org/SFP_Brief_FS_Reduc.pdf
http://media.sustainablefish.org/Feedfish_PR_Mar_2010.pdf

2. Independent stock assessment

There are a number of 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
- E. MRI in Icelandic waters
- F. NOAA in West Atlantic

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 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. 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.aquake.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' Report 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 (2010 version expected March 2011).

- ◆ 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 co-ordinates 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. **There has been a change to ICES terminology in 2010:**

The nature of this ICES advice has changed in recent years and there has been a significant change in 2010 (a guidance note was issued in May 2010 to this effect). ICES provides fisheries advice that is consistent with the broad international policy norms of maximum sustainable yield (MSY), the precautionary approach, and an ecosystem approach while at the same time responding to the specific needs of the management bodies requesting advice. ICES recognises that the fisheries for which it provides advice have not in general been managed with MSY as an objective. The nature of ICES fisheries advice is evolving. The evolution includes options for a transition process to attain full implementation of the MSY approach by 2015. This MSY approach for fisheries advice is designed to be consistent with the precautionary approach. The approach is compatible with the FAO Code of Conduct for Responsible Fisheries. However this transition will be gradual. Over the next few years, ICES will advise on management options that take account of this evolving situation

and will provide catch options according to management plans, the precautionary approach and the ICES MSY approach.

<http://www.ices.dk/committe/acom/comwork/report/2010/2010/Introduction%20for%20Advice.pdf>

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 (Instituto de Fomento Pesquero - 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.

E. Marine Research Institute (MRI) in Icelandic waters

The Marine Research Institute (MRI) is a government institute under the auspices of the Ministry of Fisheries. MRI conducts various marine research and provides the Ministry with scientific advice based on its research on marine resources and the environment. The MRI conducts research on the marine environment around Iceland and its living resources; provides advice to the government on catch levels and conservation measures and informs the government, the fishery sector and the public about the sea and its living resources.

F. National Oceanic and Atmospheric Association (NOAA) in West Atlantic

NOAA's National Marine Fisheries Service is the federal agency responsible for the management, conservation and protection of living marine resources within the United States' Exclusive Economic Zone (water three to 200 mile offshore). It assesses and predicts the status of fish stocks, ensures compliance with fisheries regulations and works to reduce wasteful fishing practices. With the help of the six regional offices and eight councils, NOAA's National Marine Fisheries Service is able to work with communities on fishery management issues.

3. Certification and ecolabelling schemes – developments in 2010.

The development of aquaculture standards is underway through separate organisations:

- ◆ **IFFO Global Standard for Responsible Supply** will enable fishmeal and fish oil producers to show that they are offering traceable, high quality marine products, 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. The initial Standard was finalised in September 2009 and the programme opened to applications from October 2009. In March 2010 IFFO announced that Tecnológica de Alimentos S.A. (TASA) of Peru, the world's largest fishmeal producer, is the first producer to achieve certification. It anticipates that up to one third of global fishmeal and fish oil production could be certified by the end of 2010.

- ◆ **Global Aquaculture Alliance (GAA)** Best Aquaculture Practices (BAP) program was launched in 1999 with the publication of a Code of Practice for Sustainable Shrimp Farming. When this code was transformed into an auditable standard, major players in the retail and food service sectors saw BAP as a valuable tool for assuring food safety, environmental and social responsibility and traceability in farmed seafood.
- ◆ **GLOBALGAP** is a private sector B2B initiative that sets voluntary standards for the certification of agricultural products around the world. GLOBALGAP aquaculture standards are currently operating in 11 countries with certification standards for shrimp, tilapia and pangasius. In March 2009 GLOBALGAP and the Global Aquaculture Alliance (GAA) signed an agreement to work co-operatively with the aim to provide producers with an opportunity to have a one-stop-shop audit on farm. In June 2009 GLOBALGAP agreed to partner WWF on its Aquaculture Dialogue Standards as a voluntary add-on to the GLOBALGAP standards.
- ◆ **Aquaculture Stewardship Council (ASC)** Aquaculture Dialogues are a series of multi-stakeholder roundtable discussion that cover twelve of the most important species globally including tilapia, salmon, freshwater trout, pangasius, shrimps, clams, oysters, mussels, scallops, abalone, seriola and cobia. The completed standards will be held by an independent organisation, the Aquaculture Stewardship Council (ASC), an independent nonprofit organisation, founded by WWF and the Dutch Sustainable Trade Initiative (IDH) to manage the global standards for responsible aquaculture developed by the Aquaculture Dialogues. The ASC is expected to be in full operation by mid 2011.
- ◆ In addition a number of international organisations offer 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 UK/EU DEVELOPMENTS

1. Defra report – Charting Progress 2. July 2010.

The amount of UK fish stocks being harvested sustainably is up to around 40 percent, according to a government report. According to Charting Progress, a report from the UK government Department of Environment, Food and Rural Affairs (Defra), out of 20 indicator fin-fish stocks in UK waters, the proportion of stocks at full reproductive capacity and being harvested sustainably has risen from around 10 percent in the early 1990s to 25 percent in 2007.

- Out of 20 indicator fin-fish stocks in UK waters, the proportion of stocks at full reproductive capacity and being harvested sustainably has risen from around 10% in the early 1990s to 25% in 2007, while the proportion of stocks with full reproductive capacity has changed little since 1990. The list includes North Sea herring and blue whiting).
- The proportion of these 20 indicator fin-fish stocks being harvested sustainably has risen from 10% to around 40% over the same time period.
- Data for 2008 have become available since the Feeder Report was prepared by the Productive Seas Evidence Group and begin to show improvements in spawning stock biomass associated with the progressive reduction in fishing mortality.
- Overall, the large majority of scientifically assessed stocks continue to be fished at rates well above the levels expected to provide the highest long-term yield. The EC is developing multi-annual management plans to recover depleted stocks, and to manage stocks sustainably. They seek to restrict fishing mortality rates to the maximum sustainable yield (MSY) by 2015.

<http://chartingprogress.defra.gov.uk/fisheries>

<http://www.cefas.co.uk/media/139292/website%20psa%20sustainability%20indicator%20v2.pdf>

2. EU Consultation on 2011 TACs. May 2010. The document sets out how the Commission intends to act on the scientific advice it receives on the state of fish stocks when proposing catch limits and quotas for next year. Maritime Affairs and Fisheries Commissioner Maria Damanaki wants to bring EU fishing limits back to sustainable levels in 2011. There are some positive signs:

- The number of stocks that are known not to be overfished has increased from 2 in 2005 to 11 in 2010;
- There were 20 stocks subject to an advice to stop fishing, by now these have decreased to 14;
- Stocks outside safe biological limits (but not subject to an advice to stop fishing) have diminished from 30 in 2003 to 22 in 2010;
- While total allowable catches (TACs) have still been set at much higher levels than those advised by scientists, this excess has decreased from around 47% to 34% in 2010.

- However, there are more stocks (42, up from an average of 35) where scientists have not provided advice because of concerns about the quality of data or other reasons.

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0241:FIN:EN:PDF>

3. In season review and fishery closures

The Commission has previously proposed 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 2011.
- A closure of the Barent Seas commercial capelin fishery has allowed the stock to recover. The fishery re-opened in 2009 and a quota of 360,000 t is recommended for 2010.
- 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 and the stock is now considered to be above maximum sustainable yield.
- A high *Ichthyophonus* infection was observed in the Icelandic summer spawning herring stock in the winter 2008/2009 and again in 2009/2010 causing additional natural mortality (estimated at 40%). No TAC has been set until new information on the *Ichthyophonus* infection and the stock size is made available from survey monitoring early autumn 2010.

4. MEPs demands measures to strengthen aquaculture. June 2010.

The plenary session of the European Parliament (EP) has called for the implementation of measures to strengthen European aquaculture and reinforce its role as an economic activity and an alternative to wild species capture. Future legislation should lay down standard certification criteria for products and basic parameters on environmental impact, use of water resources, feeding of farmed fish, molluscs and crustaceans, product traceability and labelling, fish health and welfare standards. The report also stresses that European aquaculture should give priority to fish species which do not need other fish as part of their feed or which require smaller amounts of fishmeal and oil and the Commission is asked to introduce an eco-labelling programme for fishery and aquaculture products.

<http://www.fis.com/fis/worldnews/worldnews.asp?monthyear=&day=18&id=36967&l=e&special=&ndb=1%20target=>

Overview of annual quotas for the North East Atlantic and North Sea 2004 - 2010

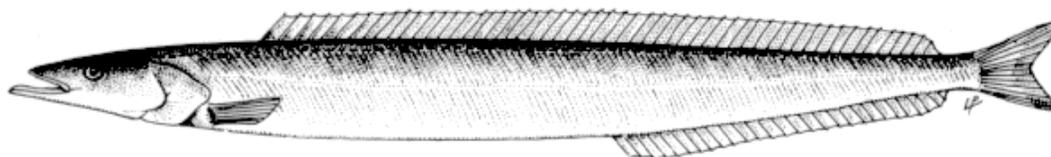
<i>Tonnes</i>	2004	2005	2006	2007	2008	2009	2010	Quotas are set by
North Sea sandeel	836,200	655,960	300,000	170,000	ISR	177,500*	200,000*	EU
Sprat	284,250	296,250	203,940	195,128	195,000	176,081*	170,000*	EU
Capelin								
Barents Sea	NA	NIL	NIL	NIL	NIL	390,000	360,000	Russia/ Norway
Icelandic	737,000	803,000	210,000	180,000	150,000	NIL	NIL*	Iceland
Blue whiting								
EU			438,557	364,500	350,906	165,628	151,592	EU/Faroes/ Iceland/ Norway
Faroes			522,500	444,125	300,572	141,870	129,847	
Norway			514,900	437,665	296,200	139,806	127,958	
Iceland	No quota	No quota	353,000	300,050	202,836	95,739	87,625	
Total	No quota	No quota	2.0M	1.7M	1.26M	543,043	540,000**	
Herring								
NE Atlantic	825,000	890,000	967,000	1,280,000	1,518,000	1,643,000	1,483,000	NEAFC
North Sea	326,000	379,850	322,874	341,000	201,227	171,000	164,300	EU/Norway
By-catch: North Sea	43,200	50,000	42,500	31,875	18,806	15,985	10,390	EU
By-catch S&K	21,000	24,150	20,528	15,396	11,470	8,373	5,442	EU
Four Baltic stocks	135,078	163,650	163,342	170,260/ 133,000	320,294	288,346	288,804	EU
S&K						37,722	20,924	
Icelandic	110,000	110,000	110,000	130,000	130,000	150,000	40,000*	Iceland
Norway pout								
North Sea + S&K	198,000	NIL	95,000	NIL	50,000	53,476*	75,888*	EU

* Subject to in-year management assessment

** Within a total catch limitation of 540,000 tonnes of blue whiting in the North East Atlantic, the NEAFC delegations agreed to recommend the limitation of their total catches in 2010 to 497,022 tonnes. The split listed totals 497,022 tonnes.

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

1. SANDEEL



Scientific Name *Ammodytes tobianus*

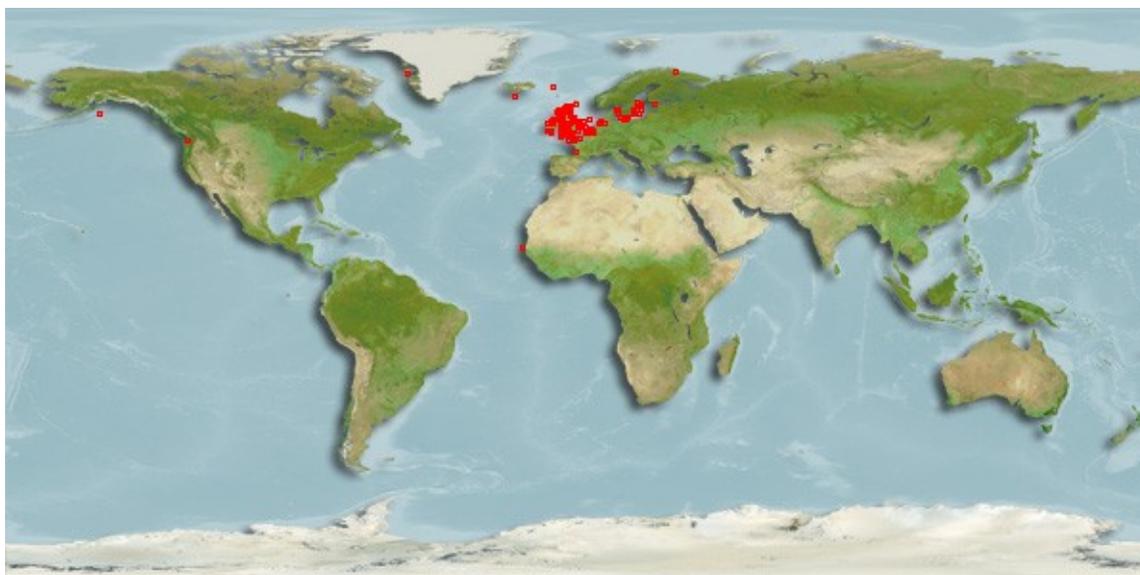
Description Sandeels are small eel-like fish which swim in large shoals and live in sandy substrates. They are an abundant and crucial component of food webs in the North Atlantic and are an important prey species for many marine predators such as seabirds and fish. In the North Sea fishing mortality 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 2009** the most recent estimate of spawning stock biomass classifies the stock as being at risk of reduced reproductive capacity. Fishing mortality decreased between 2001 and 2007 and increased in 2008 and 2009, but the present absolute level is uncertain. The state of the stock cannot be evaluated with regard to sustainable harvest. ICES recommends that fishing grounds known to be commercially depleted should be closed to fishing until there is evidence from monitoring programmes that local populations have recovered, while at non-depleted fishing grounds fishing should only be allowed in 2010 if analysis indicates stock can be rebuilt.
- ◆ In **October 2009** ICES was not able to offer advice on the Division IIa (Skagerrak – Kattegat), Division VI (West Of Scotland) and Shetland Area due to inadequate information. Exploratory work is taking place in order to be able to present an assessment for this stock.

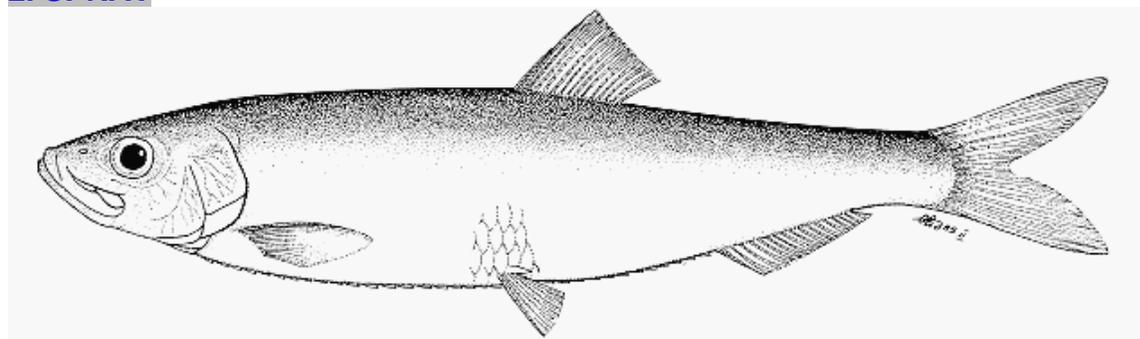
Sandeel management and control measures

- ◆ EU Regulation 23/2010 setting quotas for 2010 set the North Sea sandeel TAC at 200,000 tonnes, including 20,000 tonnes for Norway.
- ◆ Following monitoring and exploratory fishing of sandeel in the spring of 2010, in **June 2010** scientists have advised the Commission that the North Sea TAC can be raised to 400,000 tonnes with the EU claiming a 90% share. A further 16,920 tonnes of sandeel can be fished from the EU waters of the Skagerrak. During negotiations with Norway it was agreed that, in the event of a significant TAC increase, the Norway allocation would increase from 20,000 to 27,500 tonnes. In return, EU fishermen would be allowed to fish for other species in Norwegian waters. A further 2,500 tonnes from the EU share has been allocated to the Faroe Islands (only 350,000 t taken in 2009).
- ◆ 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 2004 - 2010

North East Atlantic and North Sea – quotas							
<i>Tonnes</i>	2004	2005	2006	2007	2008	2009	2010
Sandeel	836,200	655,960	300,000	170,000	ISR	400,000	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.

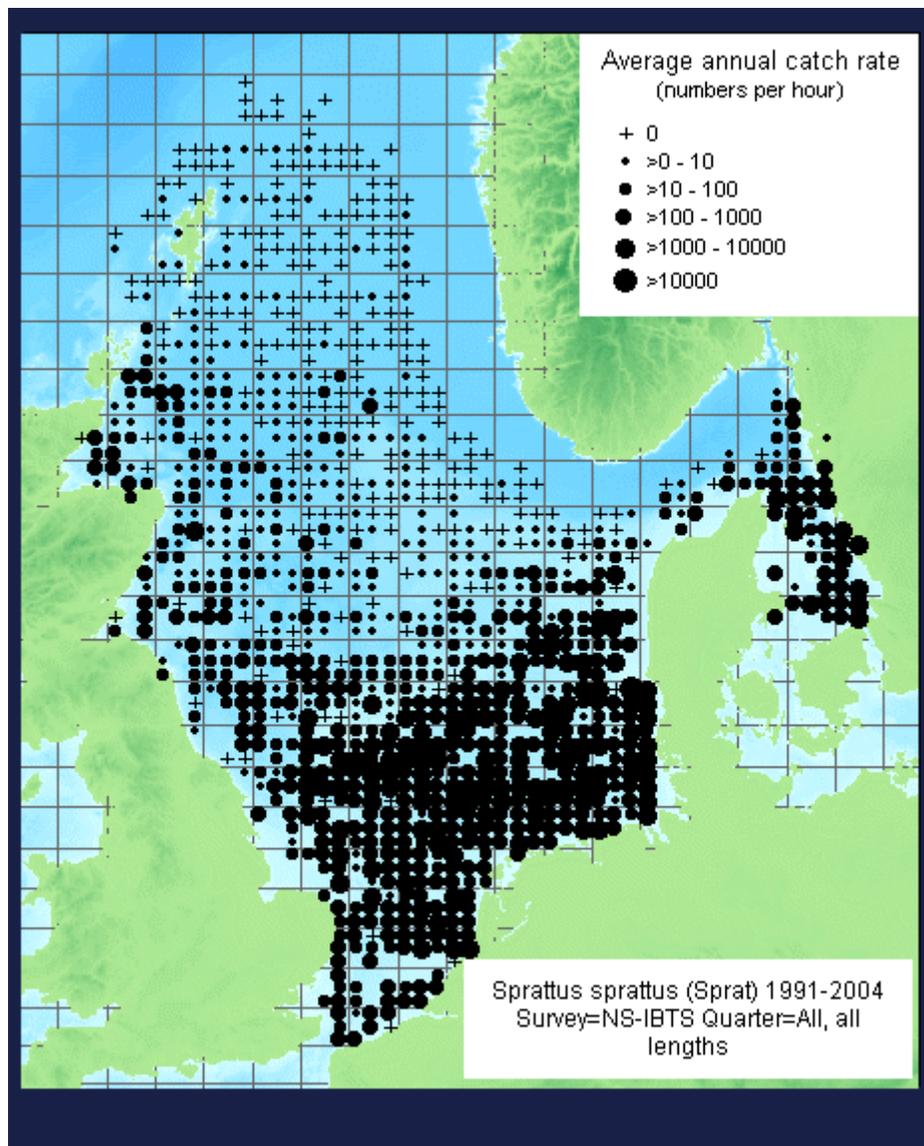
Resilience High. Life span maximum 6 years. Minimum population doubling time is less than 15 months. Maximum size is 16cm.

% 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 2010** the state of the North Sea and Norwegian Sea stocks was unknown. 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 2011. Advice will be revisited in 2011. For sprat in the Baltic Sea spawning stock biomass has declined from a historic high level in the late 1990s and was estimated around the long term average. Fishing mortality has increased. The 2008 year class is estimated to be strong, and the 2009 year class is predicted to be slightly below average.



Map: ICES

[Sprat management and control measures](#)

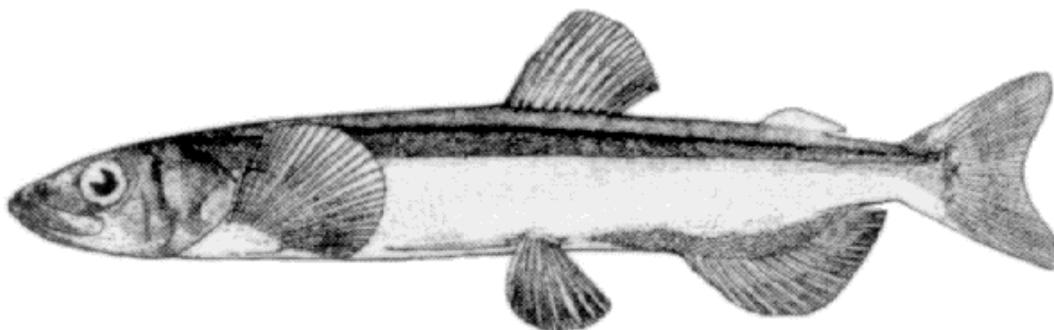
TACs – Sprat fishing quotas for 2010

The preliminary TAC for EC waters of IV the North Sea and Zone IIa, the Norwegian Sea, is 170,000 tonnes for 2010 (98,005 EU). There is also a TAC of 31,265 tonnes for 2010 for Skagerrak and Kattegat (IIIa).

TAC history 2004 - 2010

Norwegian Sea and North Sea – quotas							
Tonnes	2004	2005	2006	2007	2008	2009	2010
Sprat	284,250	296,250	203,940	195,128	195,000	176.081	170,000

3. CAPELIN



Scientific Name

Mallotus villosus

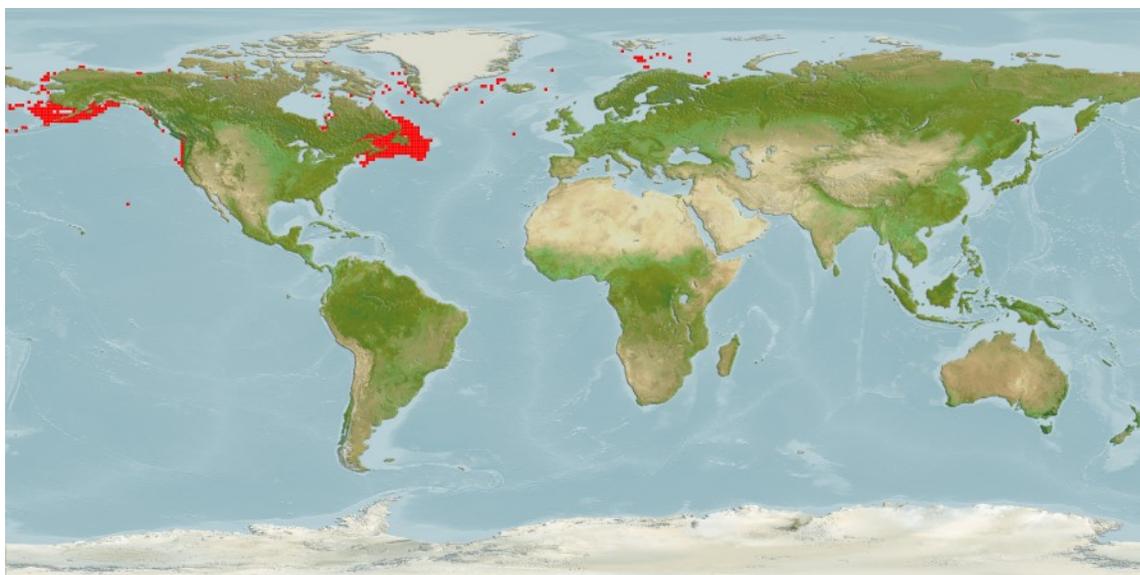
Description Capelin is a small pelagic shoaling fish which feed on animal plankton and small fishes. They are an important prey species for cod, saithe and other fish species. Spawning late winter.

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 2010** the status of Icelandic capelin is largely unknown. The fishable capelin stock has been at a low level during the last four seasons. The 2008 year class was estimated acoustically as the third lowest age-1 abundance estimate in the time series and not sufficient to start a fishery in 2010/11. The advice is for no planned fishery until new information on stock sizes becomes available after the planned survey in November 2010. 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 maintained. In **October 2009** the stock was classified as having full reproductive capacity. The maturing component in autumn 2009 was estimated to be 2.3 million tonnes. The spawning stock in 2010 will consist of fish from the 2006 and 2007 year classes, but the 2006 year class will dominate. The survey estimate at age 1 of the 2008 year class is below the long-term average, but there are indications the 2009 year class is strong. Barents Sea capelin is managed by Norway and Russia. ICES recommended a nil quota for 2008, and for 2009 to follow the agreed management plan and a catch of 390,000 t. This has been reduced slightly to a catch of 360,000 tonnes from January to April 2010.
- ◆ 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

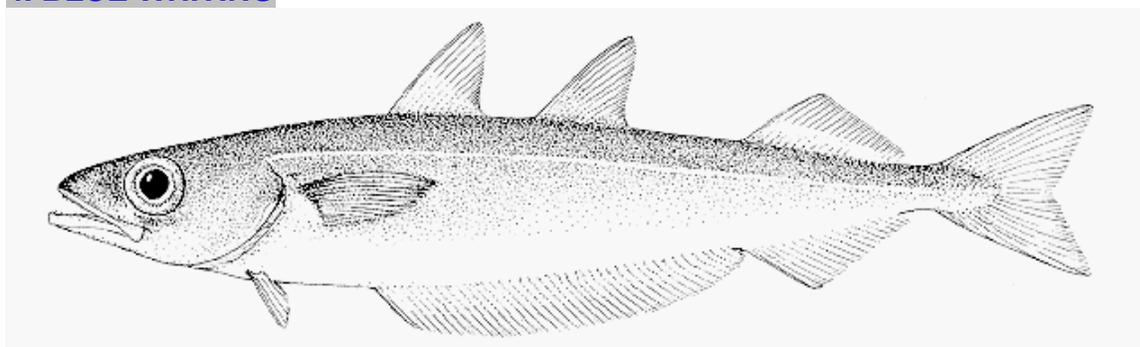
TACs – Capelin fishing quotas for **2010**

- ◆ Icelandic – No initial quota is advised for 2010. The results of the 2008 autumn surveys do not justify a starting quota – the fishery should not be opened unless further acoustic surveys confirm sufficient abundance to sustain a fishery with a target remaining spawning stock of 400,000 tonnes in spring 2011.
- ◆ 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 360,000 t has been advised for 2010.

TAC history 2004 - 2010

Capelin quotas							
<i>Tonnes</i>	2004	2005	2006	2007	2008	2009	2010
Icelandic	737,000	803,000	210,000	180,000	150,000	NIL	NIL
Barents Sea	Info not avail	NIL	NIL	NIL	NIL	390,000	360,000

4. BLUE WHITING



Scientific Name

Micromesistius poutassou

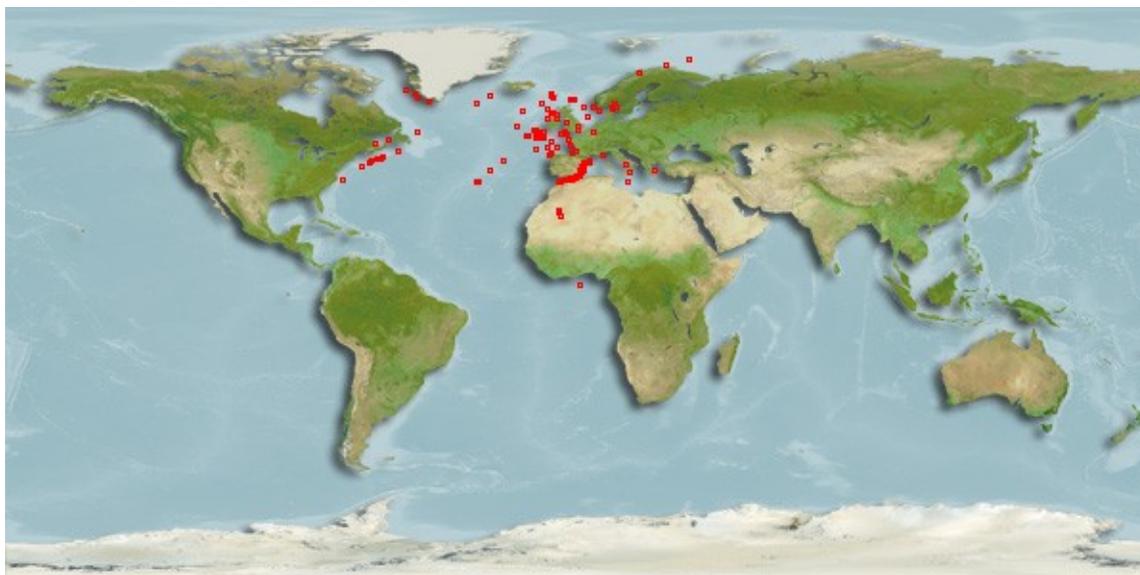
Description Blue whiting are found in open seas, most often near the surface or in mid water, but can be found down to depths of 1000m. Feeds primarily on krill and small crustaceans. Spawns in the spring.

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 2009** the blue whiting stock is considered to have full reproductive capacity and harvested sustainably. The spawning stock biomass (SSB) increased to an historic high in 2003 of 7 million tonnes but due to recent low recruitment, SSB has declined to 3.6 million tonnes at the beginning of 2009, and the decline is expected to continue in the short-term. All models show a deep decline in SSB, such that SSB is only half of what it was in the period 2003-2006. All the available information shows that the recruitment (age 1 fish) has been at a low level since 2006. A TAC of 540,000 tonnes is advised for 2010 in accordance with the management plan. Even such a low fishing mortality will lead to a decrease in SSB by 14% in one year, and the decline is expected to continue if recruitment remains at the recent low level.

Management agreement

- ◆ 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).
- ◆ In December 2005 these coastal states agreed on a sharing arrangement for the blue whiting stock. The management targets were 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.
- ◆ A new management plan was agreed in November 2008. As a priority, the long term plan ensures with high probability that the size of the stock is maintained above 1.5 million tonnes. The parties agreed to establish the TAC consistent with reductions in fishing mortality of 35% each year until fishing mortality was reached. This was to apply during 2009 and 2010. ICES has evaluated the management plan and considers it precautionary.

Blue whiting management and control measures

TACs – Blue whiting fishing quotas for 2010

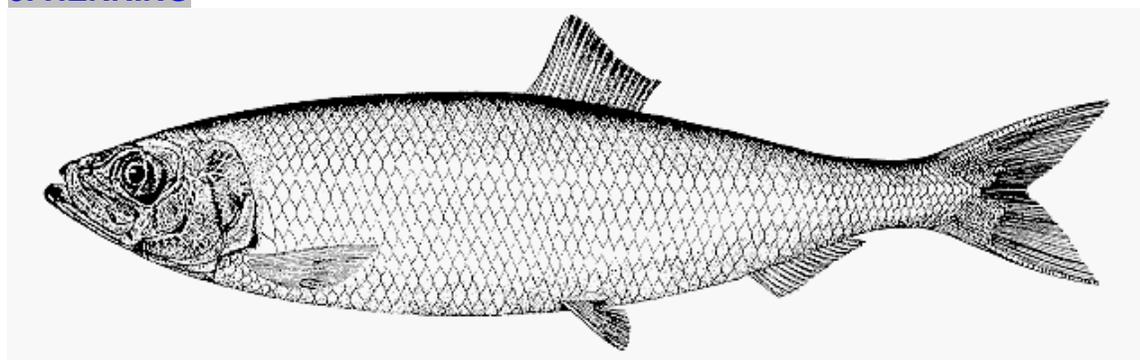
The quota for blue whiting in the North East Atlantic has been declining since it was introduced in 2006.

TAC history 2004 – 2010

<i>Tonnes</i>	2004	2005	2006	2007	2008	2009	2010
Total	No quota	No quota	2.0M	1.7M	1.26M*	543,043	540,000

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

5. HERRING



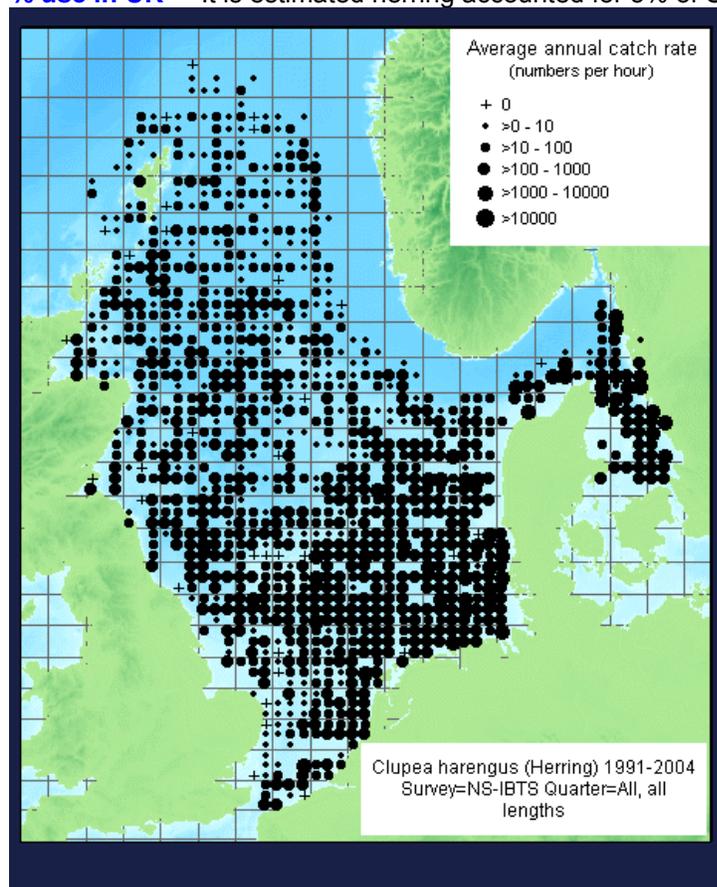
Scientific Nm *Clupea harengus*

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, Skaggeiak, Kattegat, NE Atlantic, Baltic and Norwegian/Icelandic waters.

- ◆ In **October 2009** 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, Faroe Islands, Iceland, Norway and the Russian Federation. Stock productivity is presently high (in 2009 at the highest level for 60 years). 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 the absence of strong year classes after 2004, stock is expected to decline in the near future even when fished according to the management plan.
- ◆ In **June 2010** ICES herring in the **North Sea** has produced eight poor year classes in a row. Indications suggest the 2009 year class is within the range of recent low recruitment and it is expected recruitment will remain low. The survival of the larvae has been poor. Productivity appears to be linked to climatic changes in the North Sea. A management plan was agreed in November 2008.
- ◆ In **June 2010** the **Icelandic summer spawning herring** spawning stock biomass is below precautionary levels and fishing mortality is also currently below precautionary levels. A high *Ichthyophonus* infection was observed in the stock in the winter 2008/2009 and again in 2009/2010 causing additional natural mortality (estimated at 40%). In early autumn 2010 new information on the *Ichthyophonus* infection and the stock size will be available from survey monitoring. No TAC is to be set until this information is available.

Herring management and control measures

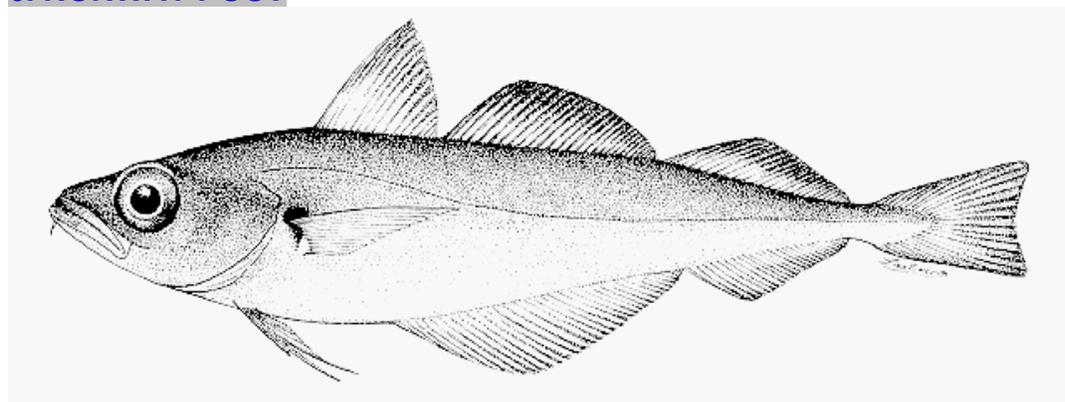
TACs – Herring fishing quotas for 2010

A TAC of 1,483,000 t was agreed for Atlanto-Scandian herring (NE Atlantic or Norwegian spring spawning) for 2010, slightly down on 2009. The North Sea autumn spawning TAC was reduced again to 164,300 t and a TAC of 40,000 t has been agreed for the 2010/11 Icelandic spring spawning fishery subject to in season review. (Four Baltic herring fisheries have a total quota of 288,000 tonnes for 2010. The proportion used in reduction to fishmeal and fish oil is not known.)

TAC history 2004 to 2010

<i>Tonnes</i>	2004	2005	2006	2007	2008	2009	2010
NE Atlantic	825,000	890,000	732,000	1,280,000	1,518,009	1,643,000	1,483,000
North Sea	326,000	379,850	322,874	341,000	201,227	171,000	164,300
Icelandic	110,000	110,000	110,000	117,000	130,000	ISR	40,000
By-catch: North Sea	43,200	50,000	42,500	31,875	18,806	15,985	10,390
By-catch S&K	21,000	24,150	20,528	15,396	11,470	8,373	5,442

6. NORWAY POUT



Scientific name *Trisopterus esmarkii*

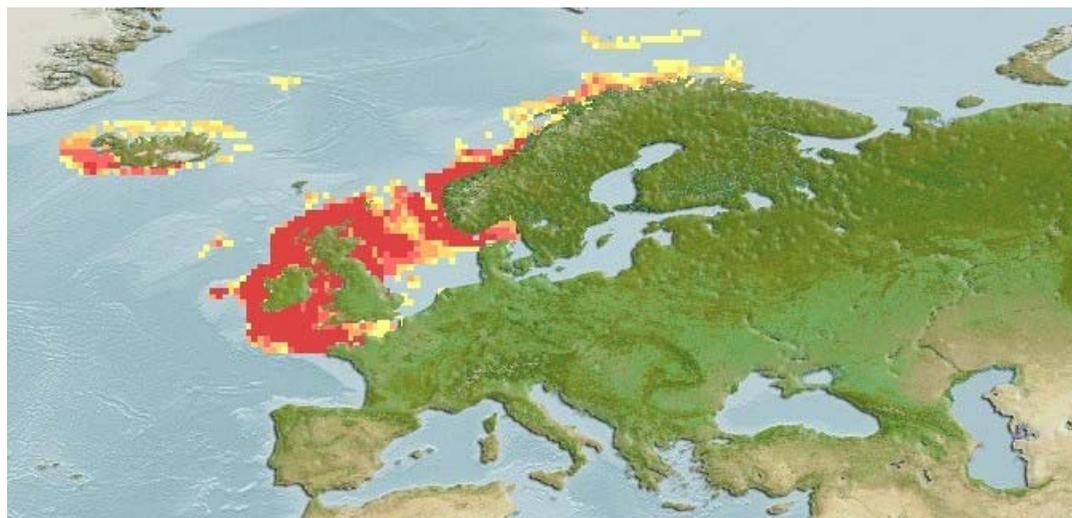
Description A small short-lived gadoid which rarely gets older than five years

Resilience: Medium, minimum population doubling time 1.4 - 4.4 years

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 but fishing effort and catches have been relatively low in 2008 and 2009.
- ◆ In **June 2010** the stock size has increased recently and is considered to be above maximum sustainable yield. Fishing mortality has generally been lower than the natural mortality for this stock and has decreased in recent years well below the long term average. Recruitment in 2007/08 was around the long term average and well above average in 2009. With present fishing mortality levels, the status of the stock is mainly determined by natural processes. 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.

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.

<i>Tonnes</i>	2004	2005	2006	2007	2008	2009	2010
	173,000	NIL	NIL	NIL	50,000 + IYM	53,476 + IYM	75,888 +IYM

IYM = in year management

OVERVIEW - SOUTH EAST PACIFIC AND GULF FEED GRADE FISH STOCKS

Southeast Pacific

The status of south east Pacific feed fish stocks 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:

- Anchovy - the Northern-Central Peruvian stock, managed by Peru; the Southern Peru/Chilean Regions XV-I-II stock, managed separately by both Peru and Chile; the Chilean Regions III-IV stock, managed by Chile; and the Chilean Regions V-X stock, also managed by Chile.
- Jack mackerel
- South American pilchard (sardine)

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

El Niño and La Niña

The whole of the Southeast Pacific is under the influence of two phases of the El Niño Southern Oscillation (El Niño and La Niña), generally on a ten-year cycle. As a consequence large catch fluctuations are common in the area. The NOAA climate prediction centre monitors this phenomenon. From August 2009 there was an El Niño present across the equatorial Pacific Ocean during winter 2009 - 2010. This weakened during April 2010 and a transition to neutral conditions by June 2010.

Fishmeal production in Peru and Chile

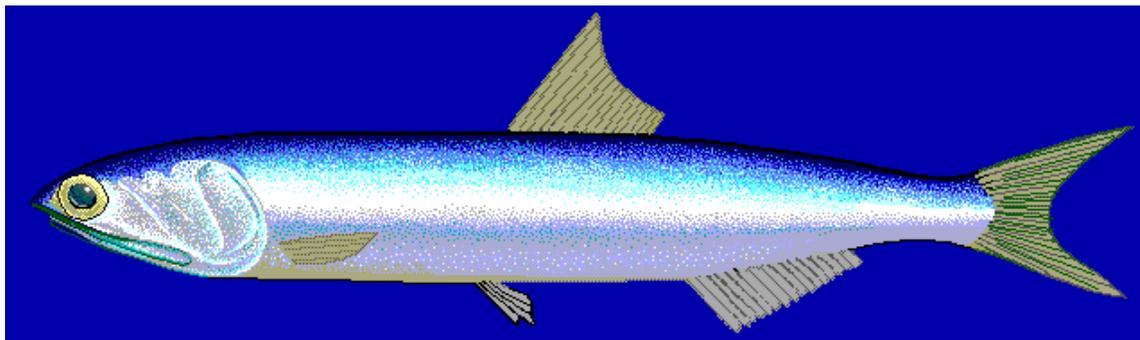
Fishmeal production tonnes								
Tonnes	2003	2004	2005	2006	2007	2008	2009	2010
Peru	1.2M	1.9M	2.0M	1.4M	1.4M	1.4M	1.39M	1.4M*
Chile	664,000	933,000	789,000	758,000	713,000	668,000		

*Estimate Source: <http://www.globefish.org/fishmeal-market-report-march-2010.html>

Gulf fisheries

The status of Gulf menhaden stocks are assessed and monitored by the USA National Oceanic and Atmospheric Administration (NOAA). The menhaden fishery in the Gulf of Mexico is primarily a single-species reduction fishery for fishmeal and fish oil. Landings comprise around 11% of all US landings, making this the second largest commercial fishery in the US.

1. 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

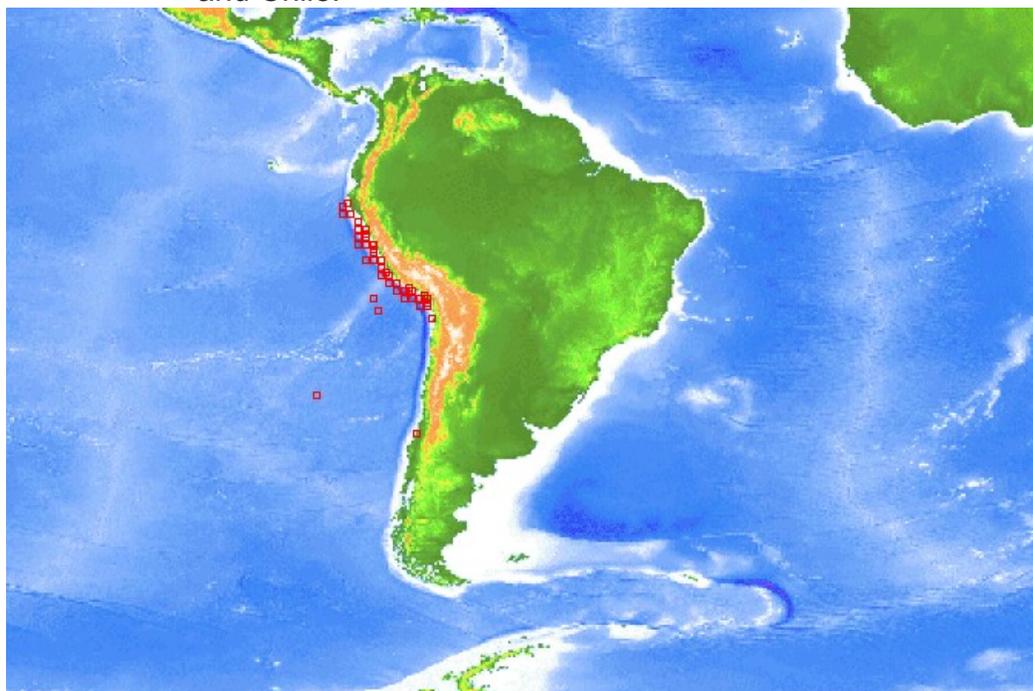
High. Minimum population doubling time is less than 15 months. Short-lived species. Maximum age 3 years. Maximum size 18.5cm.

% 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 Peruvian anchovy stocks

- ◆ **Northern-Central Peruvian stock, managed by Peru:** In 2009, IMARPE recommended 3.5 million tonnes for the first fishing season from April to July, and 2 million tonnes for the second fishing season from November to December. This totaled 5.5 million tonnes for 2009. For **2010** IMARPE recommended 2.5 million tonnes for the first fishing season from April to July. There is uncertainty surrounding the status of the stock and fishing mortality levels are not disclosed, however compliance is high - during the period 2006-2009, only in 2008 have landings surpassed the TAC both in the first and the second fishing seasons, by 6% (284,000 t over 5 million tonnes).

<http://www.fishsource.org/fishery/summary?fishery=anchoveta+-peruvian+northern-central+stock>

Total landings for Peruvian anchovy stocks

- ◆ Total Peruvian landings were 7 million tonnes in **2009**, a 6% decline from 2008. Capture production for reduction was 5.8 million tonnes, which compares with 6.2 million tonnes in 2008. Lower landings resulted in lower fishmeal output: some 1.34 million tonnes of fishmeal were produced in Peru during 2009, which was 5% less than in the previous year. Exports were relatively stable at 1.54 million tonnes, as some stocks from 2008 were exported only in early 2009, when demand in China was strong.
- ◆ Peru's fishmeal production for **2010** has been estimated at 1.40 million tonnes, about the same as 2009, while exports are expected to decline slightly to 1.3 million tonnes.

Total landings for capture production									
Tonnes mt	2001	2002	2003	2004	2005	2006	2007	2008	2009
Anchoveta	7.2	8	5.3	8.6	9.4	6.0	6.1	6.2	5.8

Source: IFFO, Ministerio de la Producción del Perú and Globefish.

Anchovy management and control measures by the Peruvian Government

- ◆ 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 hydro-acoustic evaluation of pelagic resources along the entire Peruvian coastline two to three times every year to assess environmental status of fish stocks.
- ◆ 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.
- ◆ 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 retiring 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 PERUVIAN ANCHOVY STOCK

2007 Peruvian Open Season - 3 million tonnes is taken in three steps	
Fishing stops in Jan, Feb and Mar.	Subject to: <ul style="list-style-type: none"> 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.
Three-phase fishing authorised as follows:	
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	
Fishing closure Jul/Aug – Oct.	

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

Current status of the Chilean anchovy stocks

- ◆ **Chilean Regions III-IV stock, managed by Chile:** Spawning biomass is well above the precautionary limit and fishing mortality well below target levels. Protective measures for spawning zones have been introduced. However managers regularly set TACs well above advised TAC levels, although these are rarely fully harvested. IFOP produces scientific reports with assessment results and recommendations. Scientific advice concerning the TAC is handed out once a year. For **2009**, IFOP advised a TAC of 88,000 tonnes but a TAC of 106,000 tonnes was established. A quota of 106,000 tonnes has also been established for 2010 (this has been set since 2006 and is referred to as the 'status quo' level'). In 2008, 47% of the quota was unfished and in 2009, 63%.

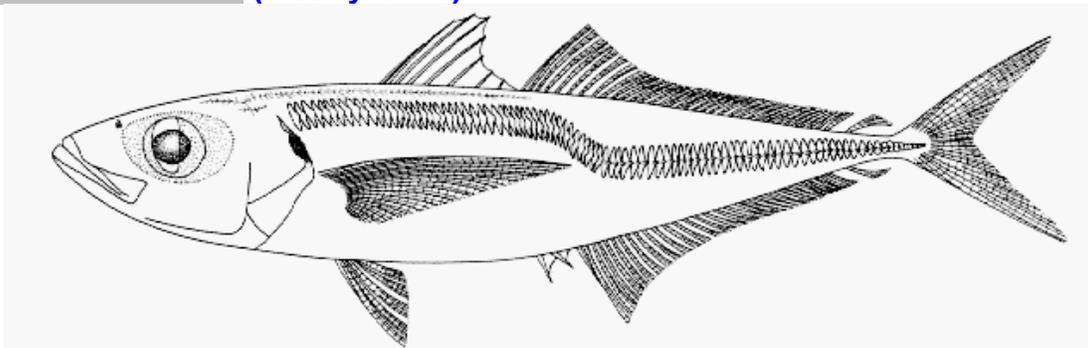
<http://www.fishsource.org/fishery/summary?fishery=anchoveta+-+chilean+regions+iii-iv+stock>

- ◆ **Chilean Regions V-X stock, managed by Chile:** Depleted spawning biomass and very weak recent recruitment (in 2009 estimated spawning biomass fell below its absolute lower limit). No recovery plan is in place. Re-estimated fishing mortality from the 2009 assessment indicates rates considerably higher than advised targets. The industrial pelagic fishery lands a high ratio of jack mackerel, which is currently depleted in the region. A recovery plan is required for the stock. Greater compliance of quotas by the artisanal sector must be encouraged. For **2009** the Undersecretariat of Fisheries recommended a final TAC of 435,000 tonnes and for 2010, 283,000 tonnes.

<http://www.fishsource.org/fishery/summary?fishery=Anchoveta+-+Chilean+regions+V-X>

For information on management and control measures for Chilean stocks look under jack mackerel.

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

- ◆ There is evidence for the existence of two populations off the coasts of South America: one off the Peruvian coast and the other in Chilean waters, however the Chilean stock assessment model used by IFOP assumes a single stock of jack mackerel inside and outside the EEZ off Chile.

- ◆ Jack mackerel is currently in a vulnerable state and has been showing signs of overexploitation since 1997. It is considered near its limit reference point. For 2009, the TAC was set at 1,400,000 tonnes, against a Sernapesca (National Fisheries Service) recommended quota of 1,250,000 tonnes and an IFOP recommendation of 750,000 tonnes. For 2010, the TAC was set at 1,300,000 tonnes. The TAC oscillated around 1,500,000 t during the period 2001-2008. There has been a decline in the TAC in recent years but it continually exceeds scientific advice: in 2008 by 28%, and in 2009 by 87%. Landings have shown a sharp decline and since 2007 the TAC has not been reached. In 2007, 19% was not fished, in 2008, 44% and in 2009, 41%. <http://www.fishsource.org/fishery/summary?fishery=Chilean+jack+mackerel+-+Chilean>
- ◆ The earthquake in Chile at the beginning of 2010 has had a significant effect on the fishmeal industry in Chile. As most of the industry is based around Concepción, the epicentre of the earthquake, damage to the industry is substantial.

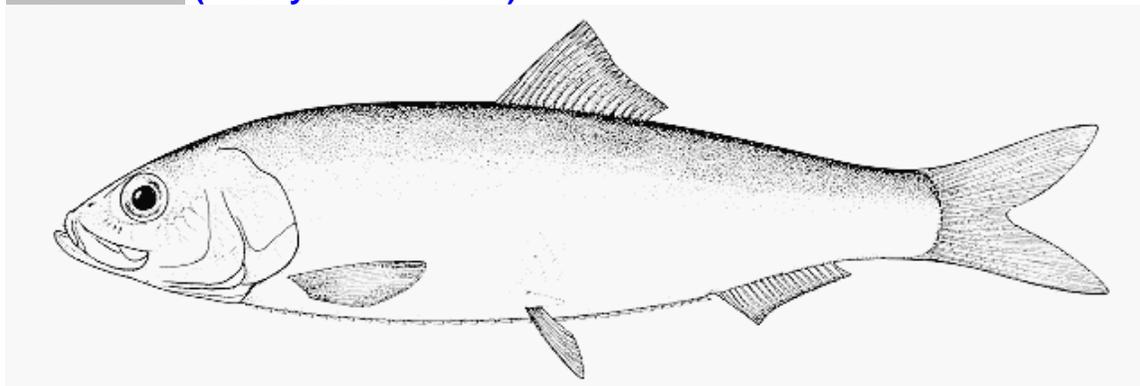
Annual catches in Chile for fishmeal production Mt								
Tonnes	2000	2001	2002	2003	2004	2005	2006	2007
Anchoveta		0.85	1.5	0.75	1.7	1.5	0.9	1.4
J mackerel		1.65	1.44	1.38	1.36	0.9	0.7	0.7
Tot Pelagic	3.7	3.2	3.7	2.9	3.9	3.5	3.4	3.1

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 is the Governmental body that watches over the whole system.

- ◆ All three Chilean jack mackerel fishery units have been declared under a full exploitation regime, so new access is prohibited.
- ◆ 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 per vessel owner (LMCA)). A stringent unloading certification system is carried out by independent companies.
- ◆ 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. MLS for jack mackerel, *Trachurus murphyi*, in the EU (the Northeast Bay of Biscay, the Cadiz Gulf, and Canary Islands) is 15 cm. Mediterranean Sea: 12 cm. Chilean jack mackerel: 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.



Map: www.fishbase.org

Current status of the sardine stocks

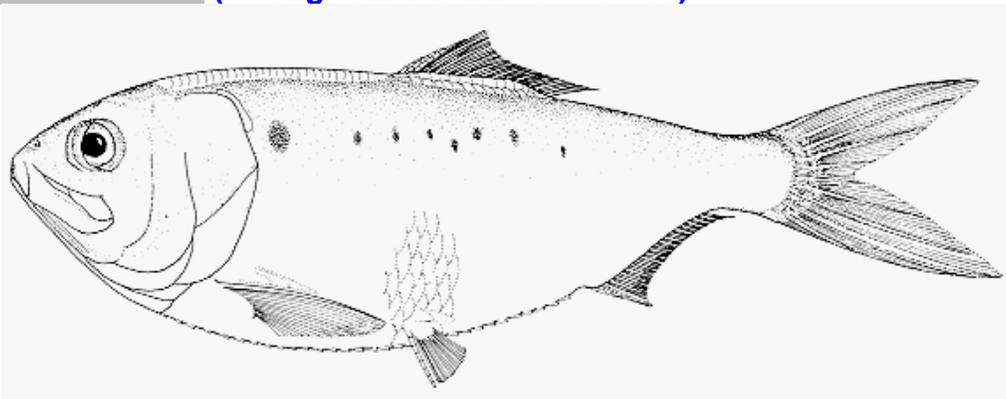
- ◆ In the Southeast Pacific, the FAO report for 2008 stated that the South American pilchard remains in a decadal cycle of natural low abundance, producing a fraction of the record catches observed between the mid-1980s and mid-1990s.

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.

4. GULF MENHADEN (throughout the Gulf of Mexico)



Scientific Name

Brevoortia patronus

Description

Occur inshore in summer with at least some moving into deeper waters from October. Feeds in dense schools, filtering phytoplankton. Breed in winter, with a peak in January.

Fishery

Pelagic species. Primarily used for fish oil and fishmeal production. Highly commercial.

Resilience

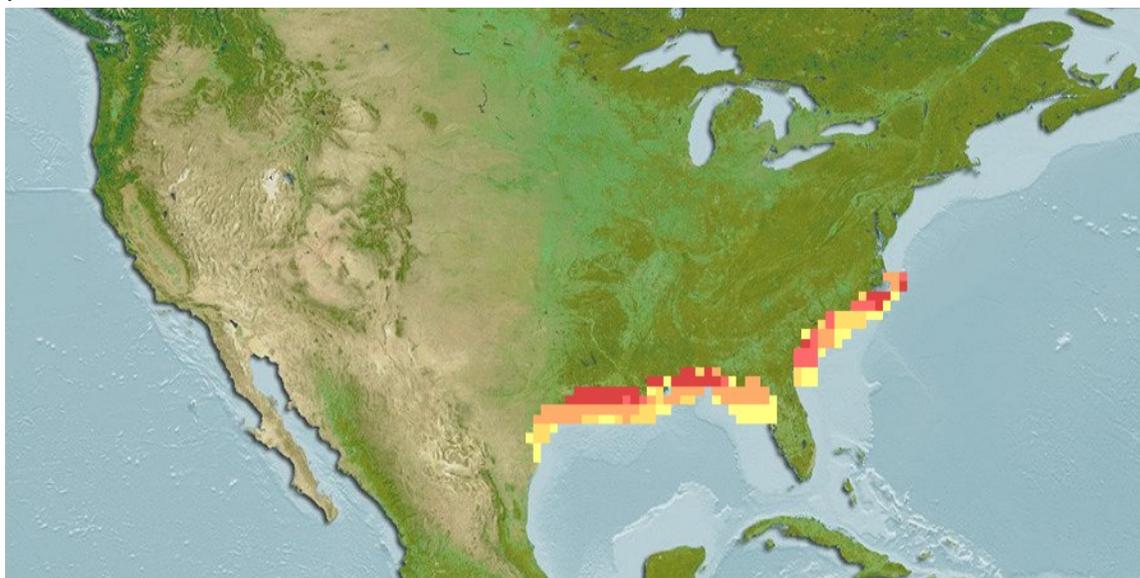
High. Minimum population doubling time is 15 months. Maximum length is 35 cm.

% use in UK

It is uncertain how much menhaden is used in fishmeal used in the UK.

Distribution

Throughout the Gulf of Mexico from the Yucatan Peninsula to Tampa Bay, Florida.



Map shows both Gulf and Atlantic menhaden. Map: www.fishbase.org

Current status of the Gulf menhaden stock

- ◆ Final purse-seine landings of Gulf menhaden for reduction in **2009** amounted to 457,457 metric tons (1,505 million standard fish). This is up 8% from total landings in 2008 (425,442 t), and up 2% from the previous 5-year mean (449,237 t). For 2010 Gulf menhaden landings of 463,000 t are forecast.
- ◆ Data from the **2009** fishing season shows low representation for age-1 Gulf menhaden, following the same trend as 2007 and 2008. Reasons for the decline of age-1 fish is not well understood. Thus, the strength of the 2008 year class of Gulf menhaden, and its relative abundance as age-2 fish in 2010, remains uncertain. If the 2008 year class of Gulf menhaden is a weak one (representing only 13% of the catch-at-age matrix in 2009), then the harvest of age-2 fish in 2010 may be down from recent years and landings may suffer. However there are also indications the 2009 year class may be above the long-term average.

http://www.st.nmfs.noaa.gov/st1/market_news/menhaden%20forecast%202010.pdf

Gulf menhaden management and control measures

- ◆ Statutory seasons/closures – the fishing season for gulf menhaden is from the third Monday in April until 1st November each year, approximately 140 days per year.
- ◆ Summary list of statutory management controls for gulf menhaden – closed areas; seasonal bans; by-catch limits; vessel registration.
- ◆ Mesh size regulations are in place (7/8" bar, 1.75" stretch mesh, knitted and knotted twine), which are designed to minimise the harvest of juvenile age-0 menhaden.
- ◆ Regulatory oversight – the gulf menhaden fishery is closely monitored and controlled at both the Federal and State level. The NMFS and its predecessor have monitored the gulf menhaden fishery since 1964, collecting information on: daily landings, nominal fishing effort, size and age compositions of the catch and tagging (mark and recapture) is also used to monitor stock health.
- ◆ A Government sampling programme is in place at all landing sites as input to its assessment modelling. Additionally, the NMFS conducts an annual review of the stock and fishery status to ensure a consistent approach to the evaluation of existing menhaden management measures.
- ◆ At the State level all fisheries agencies take regular trawl samples to assist with population assessments of menhaden. The menhaden industry itself has kept records of every set made since 1979, and provides this data directly to the NMFS.
- ◆ Stock rebuilding programs – in the event that the gulf menhaden stocks become overfished or depleted, the State/Federal Fisheries Gulf Menhaden Advisory Committee of the Gulf States Marine Fisheries Commission will recommend measures to rebuild the stock in a time frame not to exceed 10 years.
- ◆ Voluntary codes – fishing takes place only during daylight hours from Monday to Friday throughout the statutory fishing season.

For more about Gulf menhaden see:

<http://www.iffonet.com/intranet/content/archivos/63.pdf>

FISHMEAL FACTS AND FIGURES

Fishmeal production

UK fishmeal summary 2007 (tonnes)		Fishmeal imports into the UK 2008 (tonnes)		World fishmeal production 2008 (tonnes)	
UK consumption	134,800	Peru	24,600	Peru	1,396,100
Imports from EU	44,500	Denmark	22,000	Chile	673,000
Imports from non-EU	46,300	Iceland	10,300	Thailand	468,000
UK production	44,000	Ireland	9,700	USA	216,200
		Germany (Peru)	8,400	Japan	202,900
		Faroe Islands	7,900	Denmark	161,300
		Norway	3,900	China	141,000
		Chile	200	Iceland	140,900
		Spain	100	Norway	135,000
		Others	5,000	Mexico	105,800
				South Africa	83,800

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

** Includes others

Fishmeal in the UK

- ◆ UK fishmeal consumption in 2008 was 134,000 tonnes – about the same as 2007, although this was significantly down on 2006 (189,000 tonnes). Of the 2008 consumption 92,100 tonnes were imported and 42,000 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 2008 were Peru, Denmark, Iceland, Ireland, Germany, the Faroe Islands and Norway (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.

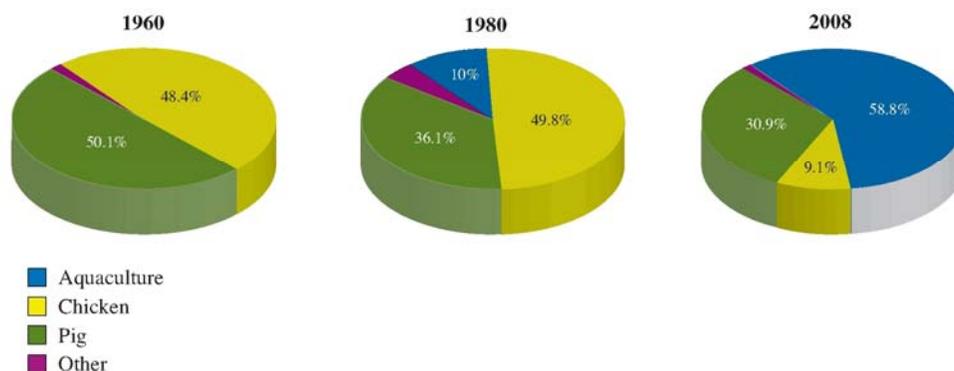
Fishmeal in the EU

- ◆ 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 has been about 5 to 6 million tonnes for many years. It has just dropped below 5 million tonnes in 2008.
- ◆ In order of output the main fishmeal producing countries in 2007 were Peru, Chile, Thailand, USA, Japan, Denmark, China, Iceland and Norway.

Fishmeal production by top 16 countries 1998 to 2008

(ranked according to 2008 figures)

'000 tonnes	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Peru	815	1904	2309	1844	1941	1251	1983	2,019	1,378	1,407	1,396
Chile	642	957	842	699	839	664	933	794	759	770	673
Thailand	410	398	387	381	387	397	403	410	461	428	468
USA	294	355	335	342	337	318	353	268	232	251	212
Japan	379	409	387	227	225	230	295	230	219	200	202
Denmark	324	311	318	299	311	246	259	213	209	166	161
China	693	707	806	723	460	420	400	305	297	204	141
Iceland	220	234	272	286	304	279	204	188	144	152	140
Norway	301	241	264	216	241	212	215	154	169	172	135
Mexico	45	48	65	61	65	65	55	55	80	73	105
S Africa	94	84	109	111	93	113	114	108	73	88	83
Morocco	55	59	53	55	61	64	63	66	28	60	78
Russian Fed	163	155	126	98	95	68	70	60	65	66	71
Pakistan						46	47	48	51	56	56
Panama							43	42	48	45	55
Argentina							47	43	50	40	50
UK (23)	52	53	50	47	48	52	51	53	44	44	42

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2009. Figures rounded up or down. Only new 2008 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. EU implementing legislation** setting TACs and Quotas for **2010** in the North Sea and surrounding area.
- B. Reports of the ICES Advisory Committee on Fishery Management, October 2009 and June 2010.** Extracts from ICES latest assessment of North Sea industrial stocks and by-catch levels.
- C. 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.

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 (all 2010)

Implementing legislation

26/01/10 EU/Norway bilateral agreement 26 January 2010

Herring in Subarea IV, Division VIIId and Division IIIa are now managed under an adjusted EU-Norway management plan which was agreed upon in November 2008. One of the main elements of the plan is to maintain SSB above 800,000 tonnes (Blim).

<http://www.regjeringen.no/upload/FKD/Vedlegg/Kvoteavtaler/2010/EU/fiskeriavtale%20Norge%20EU.pdf>

19/01/10 EU and Faroe Islands agree on fishing possibilities for 2010

http://ec.europa.eu/fisheries/press_corner/press_releases/2010/com10_01_en.htm

14/01/10 Council Regulation (EC) No 23/2010 of 14 January 2010

fixing for 2010 the fishing opportunities for certain fish stocks and groups of fish stocks, applicable in EU waters and, for EU vessels, in waters where catch limitations are required and amending Regulations (EC) No 1359/2008, (EC) No 754/2009, (EC) No 1226/2009 and (EC) No 1287/2009.

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:021:0001:0120:EN:PDF>

Catch limits for the stock of **Norway pout** in EU waters of ICES zones IIa, IIIa and IV and for the stock of **sprat** in EU waters of ICES zones IIa and IV may be revised by the Commissionin the light of scientific information collected during the first half of 2010.

There are special provisions for fishing opportunities for vessels fishing for **sandeel** in ICES IIa, IIIa and IV. The conditions shall apply to EU vessels fishing with demersal trawl, seine or similar towed gears with a mesh size of less than 16 mm Exploratory fishery relating to sandeel abundance shall start no earlier than 1 April 2010 and end no later than 6 May 2010. The TAC and quotas for sandeel shall be revised by the Commission as early as possible based on advice from ICES and the STECF on the size of the 2009 year class of North Sea sandeel ...Commercial fishing with demersal trawl, seine or similar towed gears with a mesh size of less than 16 mm shall be prohibited from 1 August 2010 until 31 December 2010.

20/11/09 Council Regulation (EC) No 1226/2009 of 20 November 2009

fixing the fishing opportunities and associated conditions for certain fish stocks and groups of fish stocks applicable in the Baltic Sea for 2010.

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:330:0001:0009:EN:PDF>
<http://faolex.fao.org/docs/pdf/eur91630.pdf>

17/11/09 North East Atlantic Fisheries Commission reaches quota agreement on blue whiting and Atlanto-Scandian herring

- 1,483,000 tonnes for Norwegian spring spawning (Atlanto-Scandian) herring
- 540,000 tonnes for blue whiting according to the EU (the NEAFC statement stipulates a limitation of 497,000 tonnes)

<http://www.regjeringen.no/upload/FKD/Vedlegg/Kvoteavtaler/2010/Kolmule/Kolmuleavtale%20for%202010.pdf>

<http://www.neafc.org/>

http://www.ec.europa.eu/fisheries/press_corner/press_releases/2009/com09_60_en.htm

19/10/09 Agreement on Norwegian-Russian capelin quota for 2010

<http://www.regjeringen.no/en/dep/fkd/Press-Centre/Press-releases/2009/agreement-on-norwegian-russian-fisheries.html?id=579383&epslanguage=en-GB>

Oct 2009 Icelandic Ministry of Fisheries and Agriculture Regulation

26/2009 allocating Total Allowable Catches for the fishing year September 1 2009 to August 31 2010.

<http://www.fisheries.is/management/total-allowable-catch/>

Extract B

ICES STOCK BY STOCK ASSESSMENT

Reports of the ICES Advisory Committee on Fishery Management, October 2009 and June 2010: extracts from ICES latest assessment of North Sea industrial stocks and by-catch levels looking forward to prospects for 2010. ICES now generally publishes advice on fish stocks twice a year in June and October.

- New advice in June: Icelandic capelin, sprat, Norway pout, North Sea and Icelandic herring, and ISR for sandeel.
- New advice in October: sandeel, blue whiting, Barents Sea capelin and North East Atlantic herring.

ICES: BLUE WHITING

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

State of the stock October 2009

Based on the most recent estimates of fishing mortality and SSB, ICES classifies the stock as having full reproductive capacity, and being harvested sustainably. Year classes 2005-2008 are among the lowest observed. Due to recent low recruitment, SSB has declined from its historical peak in 2003-2004 of more than 7 million tonnes to 3.6 million tonnes at the beginning of 2009, and the decline is expected to continue in the short-term.

A new management plan was agreed in November 2008.... As a priority, the long term plan shall ensure with high probability that the size of the stock is maintained above 1.5 million tonnes (B_{lim})....The Parties shall aim to exploit the

stock with a fishing mortality of 0.18 on relevant age groups as defined by ICES.... The parties agree to establish the TAC consistent with reductions in fishing mortality of 35% each year until the fishing mortality has been reached. This shall apply only during 2009 and 2010. ICES has evaluated the agreed management plan and considers it precautionary.

Management considerations

All models show a deep decline in SSB, such that SSB is only half of what it was in the period 2003-2006. All the available information shows that the recruitment (age 1 fish) has been at a low level since 2006. The advice is based on the management plan, which gives a TAC of 540,000 tonnes in 2010, based on a fishing mortality of 0.18. Even such a low fishing mortality will lead to a decrease in SSB by 14% in one year, and the decline is expected to continue if recruitment remains at the recent low level.

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 2010

There should be no fishery until new information on stock size becomes available after the planned survey in November 2010. The TAC should be set so that at least 400 000 t is left to spawn in March 2011. The 2008 year class was estimated acoustically as the third lowest age-1 abundance estimate in the time series and not sufficient for a fishery in 2010/11.

Advice on Management June 2010

Preliminary TAC of no fishery in 2011 set according to the results of a preliminary assessment.

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

State of stock October 2009

Based on the most recent estimates of SSB and recruitment ICES classifies the stock as having full reproductive capacity. The maturing component in autumn 2009 was estimated to be 2.3 million tonnes. The spawning stock in 2010 will consist of fish from the 2006 and 2007 year classes, but the 2006 year class will dominate. The survey estimate at age 1 of the 2008 year class is below the long-term average..... but there are indications the 2009 year class is strong.

Advice on management October 2009

Following the agreed management plan would imply catches of 360,000 tonnes from January to April 2010.

ICES: HERRING

9.4.5 Norwegian spring-spawning herring (AKA NE Atlantic)

State of stocks October 2009

Based on the most recent estimates of SSB (in 2009), ICES classifies the stock as having full reproductive capacity. Based on the most recent estimate of fishing mortality (in 2008) ICES classifies the stock as being harvested sustainably. Spawning stock biomass in 2009 is well above precautionary levels and is estimated as one of the highest in the time-series. The stock contains a number of good year classes. In the last 10 years, four large year classes have been produced (1998, 1999, 2002 and 2004). However, the available information indicates that year classes after 2004 have been of low abundance.

Historically, the size of the stock has shown large variations and dependency on the irregular occurrence of very strong year classes. In 2009, SSB is estimated to be at its highest level in the last 60 years. In recent years, catches have also increased but fishing mortality has remained low and close to that agreed in the management plan. The management plan is considered precautionary. In the absence of strong year classes after 2004, the stock is expected to decline in the near future even when fished according to the management plan. This is normal behaviour of stocks which show spasmodic recruitment dynamics. The decline of the stock will result in a reduction in the projected catches in incoming years.

Advice on management October 2009

The management plan implies maximum catches of 1,483,000 t in 2010, which is expected to leave a spawning stock of 10.8 million tonnes in 2011. The long-term management plan is considered to be consistent with the precautionary approach. Advice is not to exceed the harvest control rule.

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

State of the stock June 2010

The year classes from 2002 onwards are estimated to be among the weakest since the late 1970s. A management plan was agreed by EU and Norway in 2008. ICES has evaluated this management plan and concluded that the plan is consistent with the precautionary approach. North Sea herring has recently produced eight poor year classes in a row, which was never been observed when spawning stock biomass was above 800 000 t. The survival of the larvae has been poor. The productivity of the stock appears linked to climatic changes in the North Atlantic. The 2009 year class is estimated to be within the range of recent low recruitment. Therefore ICES assumes that the recruitment will remain at the lower level. The management plan has proved to be an effective tool for maintaining exploitation and conserving the North Sea herring stock. Thus the management plan should be followed and the TAC adhered to. Various scenarios ranging from 188,900 t (under the management plan) to 371,200 t under maximum sustainable yield or precautionary approach for main fleet.

2.4.12 Icelandic summer-spawning herring (Division Va)

State of the stock June 2010

The spawning stock biomass has been declining the past 3 to 4 years and is now below precautionary levels. A high *Ichthyophonus* infection was observed in the stock in the winter 2008/2009 and again in 2009/2010 causing additional natural mortality. Fishing mortality is currently below precautionary levels. Recruitment in the last decade has been at or above the long-term average, with occurrence of strong year classes in 1999, 2000 and 2002. In early autumn 2010 new information on the *Ichthyophonus* infection and the stock size will be available from survey monitoring. ICES recommends no TAC be set until this information is available. Because the level of *Ichthyophonus* infection is not known in 2010 a forecast cannot be provided.

ICES: NORWAY POUT

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

State of stock June 2010

The stock size has increased recently and is considered to be above maximum sustainable yield. Fishing mortality has generally been lower than the natural mortality for this stock and has decreased in recent years well below the long term average. Recruitment in 2007/08 was around the long term average and well above average in 2009. With present fishing mortality levels, the status of the stock is mainly determined by natural processes. No specific management objectives are known to ICES for this stock. 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.

ICES: SANDEEL

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

Advice on management June 2010:

Based on real-time monitoring data available from weeks 15 to 18 in 2010, the estimated stock size of age 1 sandeels in 2010 is approximately 159 billion individuals and the estimated mean weight of an age 1 sandeel in 2010 is 3.12 g. Using these estimates, the calculated 2010 TAC value based on the formula above is 253,000 t.

State of the stock October 2009

According to the most recent estimate of SSB (2009), ICES classifies the stock as being at risk of reduced reproductive capacity. Fishing mortality decreased between 2001 and 2007 and increased in 2008 and 2009, 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 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, while at non-depleted fishing grounds fishing should only be allowed in 2010 if analysis of real-time monitoring indicates that the stock can be rebuilt to Bpa by 2011.

6.4.23 Sandeel in Skagerrak Kattegat (Division IIIa)

State of the stock October 2009

The available information is inadequate to evaluate stock trends relative to risk, so the state of the stock is unknown. Recent data available are official landings statistics which have been variable and provide only a limited basis for scientific advice. Exploratory work is taking place in order to be able to present an assessment for this stock.

5.4.32 Sandeel in Division VIa (West of Scotland)

State of stock October 2009

The available information is inadequate to evaluate stock trends relative to risk, so the state of the stock is unknown. The only recent data available are official landing statistics which have been highly variable and do not provide an adequate basis for scientific advice. The stock was last assessed in 1996.

6.4.25 Sandeel (Shetland area)

State of the stock October 2009

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 2010

The available information is inadequate to evaluate stock status and therefore the state of the stock is unknown. Advice will be revisited in 2011.

6.4.19 Sprat in Division IIIa (Skagerrak & Kattegat)

State of the stock June 2010

The available survey results are not reliable indicators of sprat abundance. The new data available for this stock, i.e landings and survey indices, do not change the perception of the stock. There is no management advice.

8.4.8 Sprat in Subdivisions 22 - 32 (Baltic)

State of the stock June 2010

Spawning stock biomass has declined from a historic high level in the late 1990s and was estimated around the long term average. Fishing mortality in 2009 increased to 0.54, which is the second highest value recorded for that stock. The 2008 year class is estimated to be strong, and the 2009 year class is predicted to be slightly below average.

Advice on management June 2010

Various scenarios ranging from a TAC of 242,000 to 288,000 tonnes.

Extract C

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). THIS IS STILL THE LATEST EDITION

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 Nino 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 tones 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 Nino 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>

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}	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)
	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	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.iffco.net	IFFO - International Fishmeal and Oil Organisation



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