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MSC Sustainable Fisheries Certification Programme

**Draft Public Comment Report for the
Scottish Pelagic Sustainability Group Ltd
(SPSG) North Sea Herring (*Clupea harengus*)**

APRIL 2008

prepared for:

Scottish Pelagic Sustainability Group Ltd

by:

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1. Introduction

This report details the results and justification of the assessment of the Scottish Pelagic Sustainability Group (SPSG) North Sea herring fishery to the standard of the Marine Stewardship Council (MSC) sustainable fishery programme. The assessment process was conducted over the period May 2007 to April 2008.

1.1 The fishery proposed for certification

The client for this certification is the Scottish Pelagic Sustainability Group Ltd (SPFG), a grouping of Scottish pelagic fishing, processing and trading interests. Membership includes some 22 large pelagic vessels landing in the order of £91m¹ worth of pelagic product, the two main pelagic Producer Organisations, and all the main pelagic processors and traders. It was established specifically to oversee the certification of North Sea herring and Western mackerel fisheries as sustainable to the Marine Stewardship Council (MSC) standard. The post of secretary of the SFSG is provided by the Scottish Pelagic Fishermen's Association (SFPA), and the secretariat function by Seafood Scotland, the main trade association for the Scottish seafood sector, which has significant pelagic representation on its board.

The Scottish Pelagic Sustainability Group (SPSG) was established in 2007. Further details about the SPSG are available at <http://www.scottishpelagicsg.org>. All vessels that are covered by this assessment are members of the SPSG and conform with its guidelines and policies.

The fishery assessed for MSC certification is defined as:

Species:	Herring (<i>Clupea harengus</i>)
Stock:	Autumn spawning stock in the North Sea and Eastern Channel
Geographical area:	ICES divisions IVa, IVb, IVc, VIId
Harvest method:	Scottish mid-water pelagic trawl

The **limit of identification** of landings from this fishery is therefore the landing of North Sea herring from ICES areas IVa, IVb, IVc, VIId, by Scottish Pelagic vessels that are members of the Scottish Pelagic Sustainability Group, into MSC chain of custody certified processing plants or trade channels.

1.2 Report structure

This report details the background and findings of the Marine Stewardship Council assessment of the Scottish Pelagic Sustainability Group (SPSG) North Sea herring fishery. The report details the Marine Stewardship Council's Principles and Criteria, and assesses the degree of compliance of this fishery with this standard.

In the early part of this document the report provides an explanation of the current fishery and its historical background – described from the perspective of the condition of the overall North Sea herring stock and the operation of the SPSG vessels that exploit this stock. The report also details the legal and administrative context of the fishery and reviews the management objectives and control processes. The assessment includes a review of the level of interaction of this fishery with other species and the wider ecosystem.

Early report sections provide the reader with a clear comprehension of the nature of the fishery, enabling a broader understanding of the issues debated by the team when scoring the fishery against Performance Indicators (PIs). These PIs are listed in the Assessment Tree and Scoring Guideposts for this fishery (available on the MSC website – www.msc.org) and incorporated with the scoring sheets shown as **Appendix 3** to this report.

¹ In 2006 £91m of pelagic product was landed by Scottish vessels – down from £114m in 2005; Scottish Sea Fisheries Statistics.

Scottish Pelagic Sustainability Group North Sea herring fishery

Later sections of the report explain the procedures used to score the fishery, give details of the assessment team, and present the outcome of the team's deliberations. Finally the report provides a statement of the team's recommendations as to whether or not this fishery should go forward for certification to the standard of the Marine Stewardship Council, together with any conditionality attaching to a positive recommendation.

2. The fishery

2.1 Target species biology

Distribution

Atlantic herring (*Clupea harangus*) is a pelagic species, widely distributed throughout the north-east Atlantic, ranging from the Arctic Ocean in the north to the English Channel in the south. This includes a widespread distribution throughout the North Sea. The North Sea autumn spawning herring stock is distinct from the inshore stocks - such as the Thames, and Wash herring - that spawn in the spring. Other spring-spawning herring stocks are found in the Baltic and along the Norwegian coast (the Norway spring-spawning herring or Atlanto-scandian herring).

Young herring are found close inshore, in estuaries or in sea lochs, whilst adult shoals generally occur further offshore. Herring often travel huge distances between spawning, nursery and feeding grounds – a significant factor when considering the management of the fishery.

In the North Sea juvenile herring move offshore to join the adult populations in feeding and spawning migration grounds in the northern and western areas of the North Sea. For example, some of the herring in the Skaggerak nurseries originate from the spawning grounds on the north and west coasts of Scotland, and some juvenile herring found in the eastern North Sea are from spawning of the western Baltic Spring-spawners. In another example, tagging experiments have shown that a proportion of the east coast population will return to spawning areas to the west of Scotland.

During daytime, as a generality herring shoals remain close to the sea bottom or in deep water – though this is not so in all cases. At dusk they move toward the surface and disperse over a wide area.

The herring is a very tender and fragile fish with large and delicate gill surfaces and scales. It has a low level of pollution tolerance and it has retreated from many heavily impacted estuaries worldwide. It is this characteristic that enables herring to serve as a bio-indicator of cleaner and more oxygenated waters.

Lifecycle

In the North Sea more than 60 per cent of two-year old herring² will be mature and able to spawn. At three, around 95 per cent are mature and able to spawn.

Herring are demersal spawners. Shoals of herring gather on the spawning grounds and spawn more or less simultaneously. The number, size and weight of eggs produced by an average sized female varies between stocks. Each female releases her eggs in a single batch. Eggs are laid on the sea bed, on stones, gravel or sand beds. A female herring may deposit from 20,000 up to 120,000 eggs, depending on age and size³. The eggs sink to the bottom, where a mucus coat enables them to form layers or clumps. Where layers are too thick, eggs on the bottom of the layer can suffer from oxygen depletion, but this is less likely in areas of higher water exchange. Individual eggs are 1 to 1.4 mm in diameter. Incubation time is about 40 days at 3°C, 15 days at 7°C or 11 days at 10°C.

The larvae are between 5 and 6mm in size at the time of hatching, and early nutrition is provided by a small yolk sac. Only the eyes are well pigmented and the rest of the body is semi-transparent - virtually

² Herring age is expressed as number of winter rings on the otolith rather than age in years as for most other teleost species where a nominal 1 January birth-date is applied. Autumn spawning herring do not lay down a winter otolith ring during their first winter and therefore remain as '0' winter ringers until the following winter. It should be noted, therefore, that autumn-spawning herring were spawned in the year prior to their classification as '0' winter ringers.

³ see *Fecundity studies on North Sea herring*. A.C.Burd and G.J.Howlett. (1974) *J.Cons. int. Explor. Mer.*, 35(2): 107-120.

invisible underwater. By the age of one-year herring have a typical length of 10cm, and first spawning occurs at 3 years old. Adult herring have been reported as old as 20 years, but this is very uncommon.

The newly hatched larvae drift with oceanic currents. Many autumn-spawned larvae in the North Sea spend their first winter drifting east towards the major North Sea nursery areas, although there are smaller nursery areas around the Moray Firth, the Firth of Forth and along the east coast of Scotland. Larvae from the west of Scotland spawning grounds may be retained on the west coast but a large proportion are carried through the Fair Isle Channel and penetrate well into the North Sea. The drift rate of the larvae is variable and it is probable that in some years many of them do not reach the nursery areas.

Diet

Clupea harengus play a major role in the food chain, consuming enormous quantities of zooplankton (copepods, larval snails, diatoms, mysids, euphausiids etc.) and juvenile sandeels⁴. There are no marked differences between the diets of small and large herring; only the proportions of the different food items change with size. Young herring typically capture prey individually, but where prey concentrations reach very high levels, such as micro-layers that occur at fronts, herring are able to swim forwards with open mouth and expanded opercula.

Although studies of the Norwegian spring spawning herring have shown a correlation between zooplankton biomass and stock condition and reproductive success, it is not known if there is a similar relationship for the North Sea autumn spawning herring.

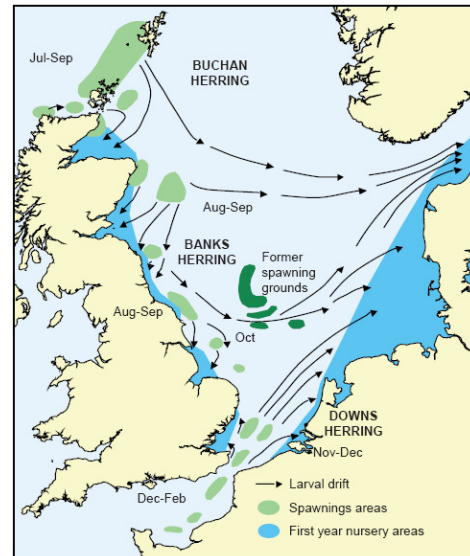
Stocks

Herring stocks can be categorised by their different spawning areas and times⁵. Different stocks tend to mix together for most of the year but during the spawning season they migrate to their separate spawning areas. Although herring can be found spawning in almost any month⁶, around Scotland the majority spawn in the autumn, between August and October.

There has been a reasonable understanding about the discrete locations of many of the North Sea spawning grounds for much of the 20th century. This has triggered widespread debate and research into the degree of separation in stock identities, and thus to determine if distinct stocks or races exist. This research, more recently coordinated by ICES, has been vital in determining management strategies for the North Sea. The work concluded that there are three main herring stocks in the North Sea, with distinct spawning grounds, migration routes and nursery grounds. The three stocks are illustrated in **Fig1**:

- **Buchan Herring:** Spawn July–September off Orkney, Shetland and Scottish east coast, with nursery grounds in the Skagerrak, Kattegat and Scottish east coast.

Fig 1 – The schematic showing the general dynamics of the North Sea herring stocks



⁴ see "The food of herring, *Clupea harengus*, in the North Sea 1983-1986. J.M. Last. (1989). *J. Fish. Biol.* (1989) 34, 489-501" for further details on stomach content analysis.

⁵ a useful overview of all aspects of North Sea herring management over the past 40 years is provided in Nichols, J.H. 2001. *Management of North Sea Herring and Prospects for the New Millennium.* (pp 645- 655 in 'Herring: Expectations for a new millennium.' University of Alaska Sea Grant, AK-SG-01-04, Fairbanks. 800 pp.)

⁶ FRS data sheet FM10 – herring stocks in the North Sea

Scottish Pelagic Sustainability Group North Sea herring fishery

- **Banks Herring:** Spawn August–September off English east coast and historically on Dogger Bank, nursery grounds on the English east coast and west coast of Denmark.
- **Downs Herring:** Spawn December–February in Southern Bight of the North Sea and Eastern English Channel.

2.2 The Scottish Pelagic Sustainability Group

As referred to in earlier sections, the Scottish Pelagic Sustainability Group was formed in 2007 for the specific purpose of commissioning and supporting the assessment of its fisheries to the MSC standard. The Scottish pelagic industry considers the following principles to be the underpinning basis of its sustainability policy (see www.scottishpelagicsg.org):

- SPSP members will ensure that the pelagic fisheries in which they operate are fished and managed responsibly.
- recognising that pelagic resources are shared at national and international levels, and SPSP members will cooperate with all industry stakeholders and regulatory authorities in their sustainable management.
- vessels will make all reasonable efforts to minimise unintended bycatch and discards.
- the industry promotes participation in an equitable implementation of the Common Fisheries Policy (CFP) as a means to apply and build upon the framework of the FAO Code of Conduct for Responsible Fisheries.
- the industry takes full note of the ICES advice as the basis of best scientific advice which will contribute to management measures governing pelagic fisheries.
- the industry is committed to the maximization of product quality through the application of best practice.

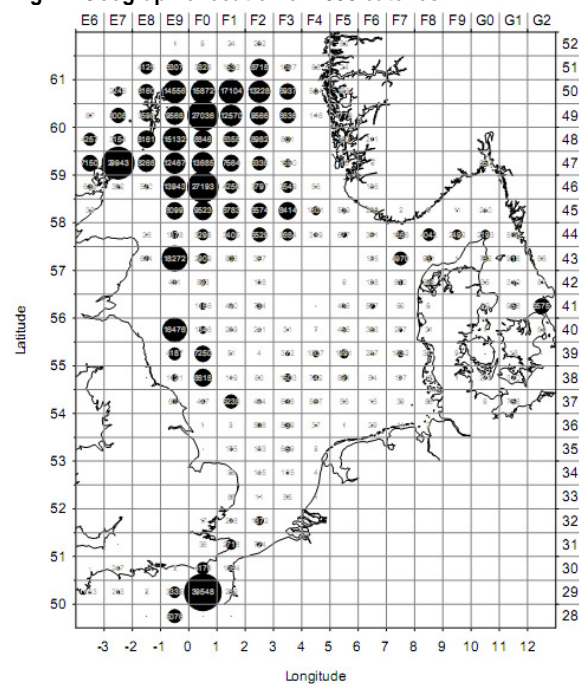
Table 1 - Herring caught in the North Sea (Sub-area IV and Division VIId) - tonnes

Country	2006
Norway	135,361
Denmark	102,322
Netherlands	76,315
France	49,475
UK (Scotland)	48,428
Germany	40,414
UK (England)	22,198
Sweden	10,529
UK (N.Ireland)	3,531
Faroe Islands	1,785
Belgium	3
Russia	
Poland	
Unallocated landings	18,764
Total landings	509,125
Discards	1,492
Total catch	510,617

note - these figures do not in all cases correspond to the official statistics and cannot be used for legal purposes.

Source: ICES HAWG Report 2007, p 73

Fig 2 – Geographic location of 2006 catches



Source: ICES HAWG Report 2007, p 73

- quality is at the forefront of the Scottish processing sector, and the Scottish pelagic processing factories are based near to the main fishing grounds, deploy modern technology, and are equipped with the latest machinery for receiving, grading, filleting, packing, and freezing herring and mackerel.

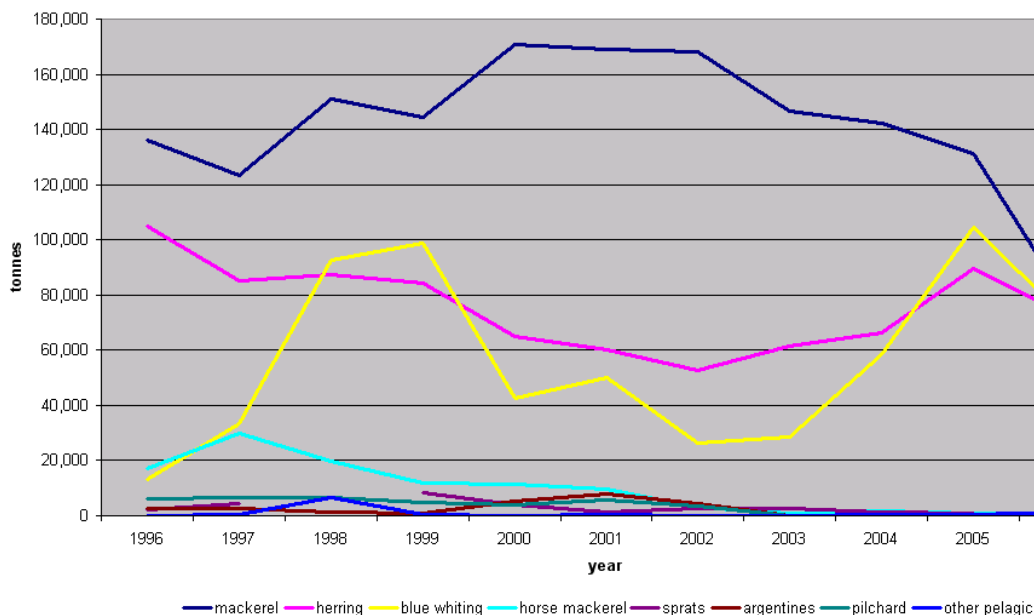
2.3 The fishery

Catches and landings

The herring fishery in the North East Atlantic and North Sea has a long tradition, stretching back many centuries. As an indication of this historical importance with respect to Scotland is that within ten months of the formation of the Scottish Herring Producers' Association on 9 February 1932, the Association had no fewer than 3,128 individual members grouped in 13 branches based in ports from East Fife northwards to Lerwick, across the north coast of Scotland and west as far as Stornoway. Four separate fisheries exploit North Sea autumn spawning herring - two located in the North Sea, and two located in ICES Division IIIa (Skagerrak and Kattegat). Of the North Sea fisheries, the distinction is made between the directed fishery for herring, and fisheries where herring is caught as a bycatch – referred to respectively as Fleet A and Fleet B. In 2006 the total catch of herring in the North Sea was estimated to be 510,600 t. This was caught by the fleets of a number of countries, the largest landings being made by the Norwegian, Danish and Dutch fleets (**Table 1**). Reported landings for Fleet A were 498,000t set against a Fleet A quota of 455,000t – an overshoot of 43,000t or 9%. For Fleet B bycatch landings, catches were barely a third of the TAC ceiling - 11,900t against a bycatch ceiling of 43,000t. For 2006 and 2007, it is the view of the competent authority in Scotland, also reflected in figures used by ICES, that the SPSG fleet has not contributed to the Fleet A overshoot – although this cannot be said of earlier years.

As can be seen from **Table 1**, 2006 landings of herring from ICES areas IV and VIId amounted to a little over half a million tonnes of fish, of which the Scottish component amounted to a little less than 10 per cent. The greater proportion of North Sea landings are made by the fleets of Norway and Denmark. As shown in **Fig 2**, the greater part of catches are taken in the area between the Shetland Isles, the north coast of mainland Scotland, and the Norwegian coast.

Fig 3a - Scottish pelagic landings (tonnes), 1996 - 2006

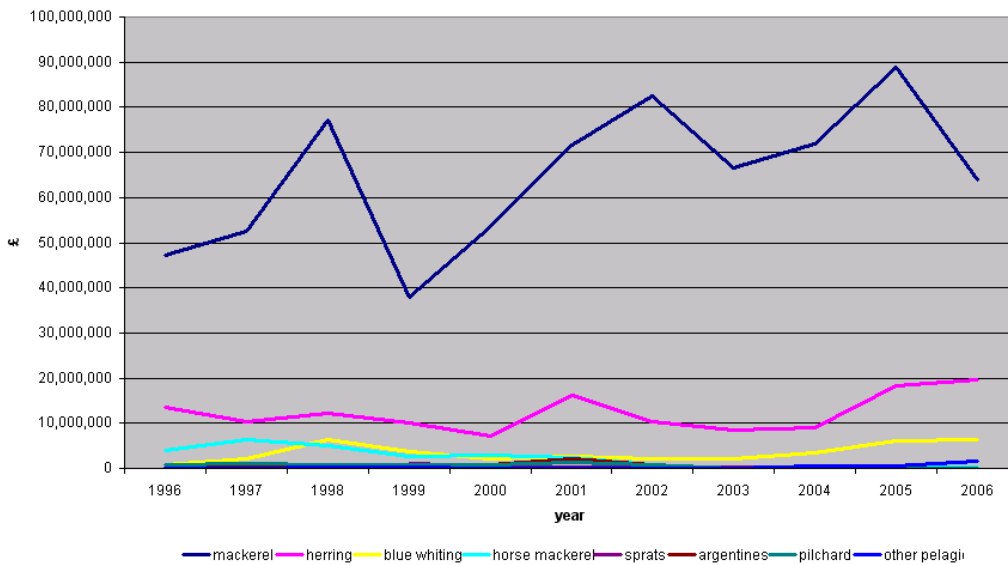


Source: Scottish Sea Fisheries Statistics

note – herring landings include both North Sea and Atlanto-scandian herring

Scottish Pelagic Sustainability Group North Sea herring fishery

Fig 3b - Value of Scottish pelagic landings (£), 1996-2006

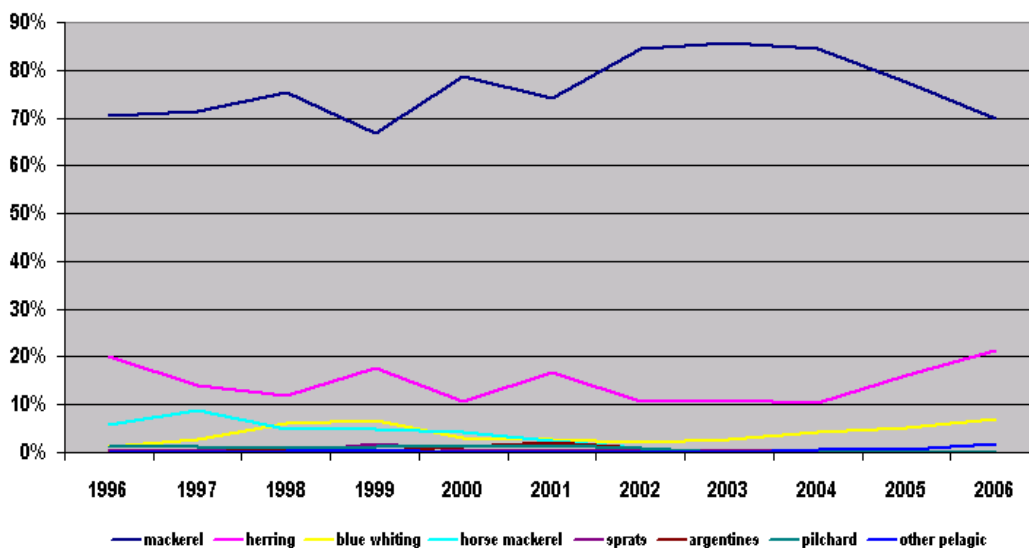


Source: Scottish Sea Fisheries Statistics

Taking all these matters into consideration, **Figs 3a, b & 4** show the relative importance of herring landings in the economics of the Scottish pelagic fleet over the eleven year period 1996 to 2006. Herring landings have varied in the range 50,000 to 100,000t per year, generating a landed value of between £8 and £20M per year, and contributing between 10 and 20% of overall vessel earnings from pelagic landings.

The pattern of Scottish herring fishing activity (catches) for the years 2003 to 2006 is shown in **Figs 5**, with most catches made to the east and west of the northern isles (Shetland and Orkney) and off the far north coast of Scotland. Most catches are concentrated into the third quarter of the year.

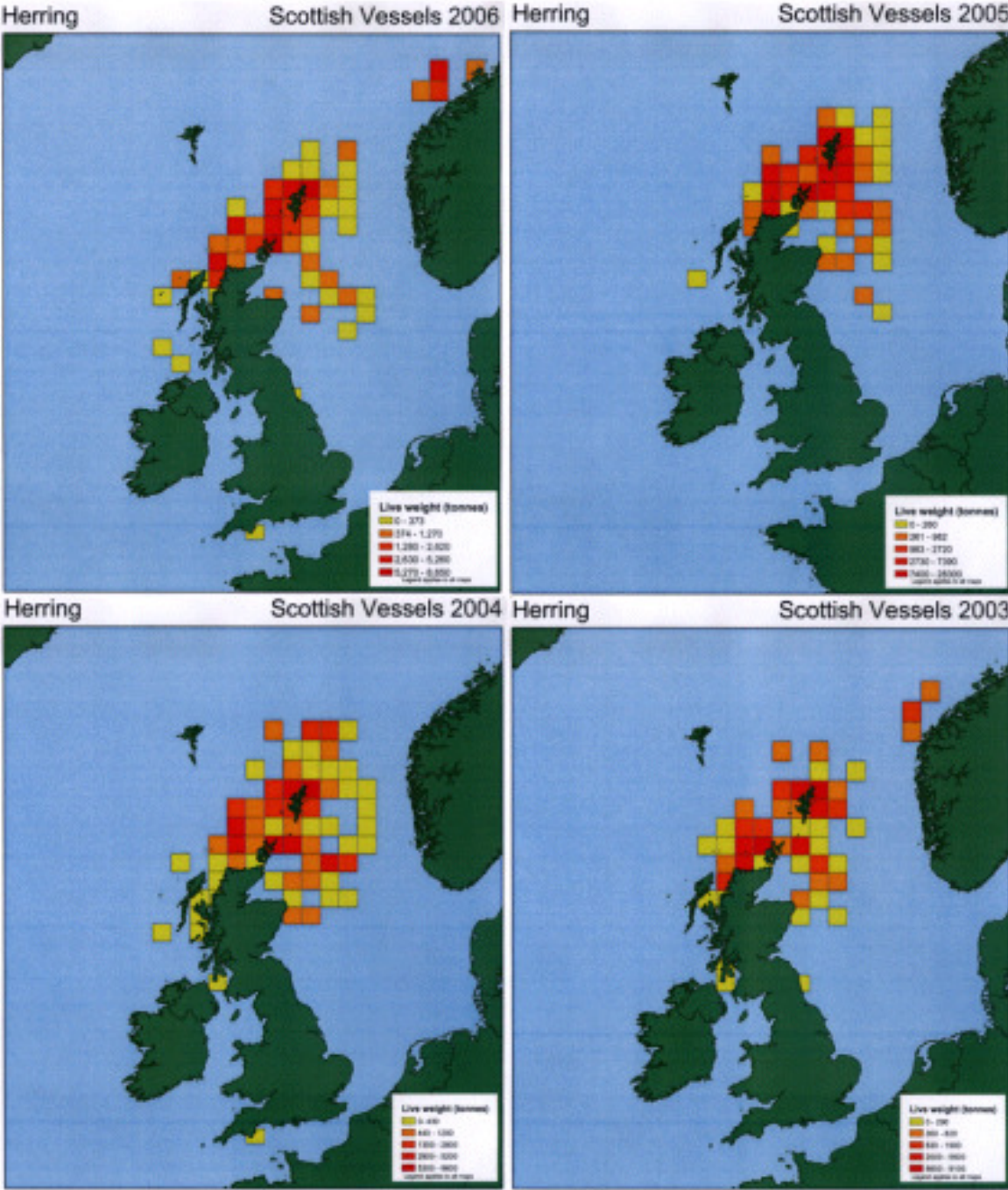
Fig 4 - Species contributions, by value, to overall value of landings



Source: Scottish Sea Fisheries Statistics

Scottish Pelagic Sustainability Group North Sea herring fishery

Fig 5 – Geography of herring catches – 2003 to 2006



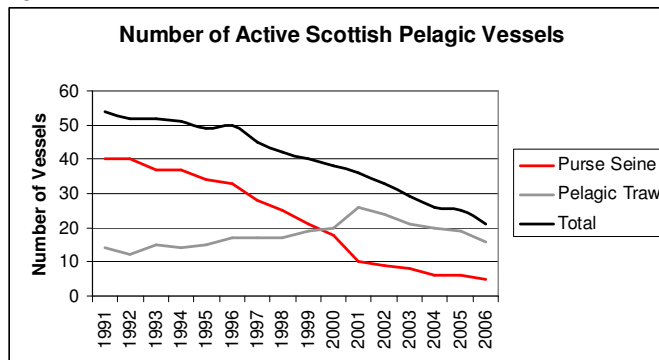
Source: Scottish Government

Fishing Fleet

The Scottish pelagic fishing fleet comprises 22 vessels fishing large mid-water trawl gear. Historically UK herring fisheries have focused on the deployment of gill nets (drifters), followed by ring nets (a form of purse seine). As moves towards concentration of the pelagic fleet have taken place, so too the size of vessels has increased dramatically, with a shift in technology towards storage of fish onboard in refrigerated seawater tanks, and the use of very large purse seine nets.

In the last fifteen years, however, further technological change (particularly in sonar, and three dimensional imaging of the relationship between vessel, net and fish shoal) has favoured the use of large mid-water trawls. The mid-water trawl is now the gear of choice in the Scottish fleet, though many vessels are still designed to retain dual capacity in both trawl and purse seine. This shift in gear preference is shown in **Fig 6**.

Fig 6



Source: Scottish Sea Fisheries Statistics

Today there is a total of 22 vessels (and a further 3 due to be delivered in 2008) under assessment for the SPSG North Sea Herring fishery – **Table 2**. These vessels fish out of Fraserburgh, Lerwick and Peterhead. All vessels are members of Producer Organisations (Scottish Fishermen’s Organisation, Shetland PO, Northern Ireland Fish Producers Organisation, Lunar⁷, Klondyke).

Table 2 - Vessels in membership of the SPSG

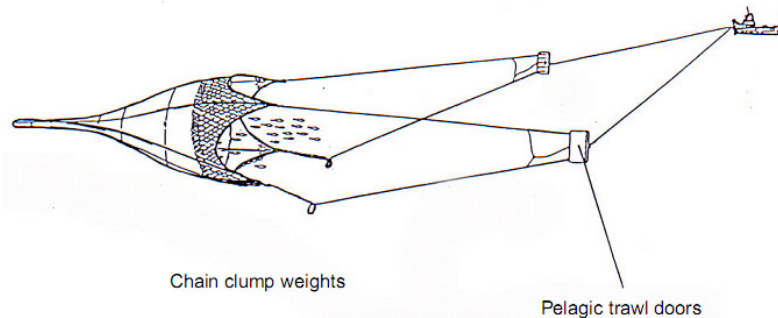
Vessel	Reg. No.	Home Port	Vessel	Reg. No.	Home Port
Challenge	FR 226	Fraserburgh	Taits	FR 227	Fraserburgh
Chris Andra	FR 228	Fraserburgh	Unity	FR 165	Fraserburgh
Enterprise	FR 365	Fraserburgh	Lunar Bow	PD 265	Peterhead
Forever Grateful	FR 249	Fraserburgh	Pathway	PD 165	Peterhead
Kings Cross	FR 380	Fraserburgh	Adenia	LK 193	Lerwick
Krossfjord	BF 70	Fraserburgh	Altaire	LK 429	Lerwick
Ocean Quest	BF 77	Fraserburgh	Antarctic	LK 145	Lerwick
Ocean Venture	FR 77	Fraserburgh	Antares	LK 419	Lerwick
Prowess	CY 720	Fraserburgh	Charisma	LK 362	Lerwick
Resolute	BF 50	Fraserburgh	Research	LK 62	Lerwick
Sunbeam	FR 487	Fraserburgh	Zephyr	LK 394	Lerwick
Vessels due to be delivered 2008/09					
Christina S	FR 224	Fraserburgh	Quantus	PD 379	Peterhead
Serene	LK 297	Lerwick			

⁷ Lunar is a private company, but is authorised by the UK Fisheries Administrations to manage the quota holdings of its fleet along the same lines as Producer Organisations.

Scottish mid-water pelagic trawl

The vessels are modern and technologically advanced with on-going investment in state of the art technology (Fig 7). Modern electronic equipment such as sonar, net and catch monitors has greatly improved the precision of this method of fishing. Pelagic trawls are towed at the appropriate level in the water column to intercept target shoals, with gear depth being controlled by altering towing speed

Fig 8 – Schematic showing operation of mid-water trawl



Source: Seafish basic fishing methods handbook

and/or warp length. As a result, there is no impact on bottom habitats and bottom structures. The mid-water trawl used by the Scottish pelagic fleet is designed and rigged to fish in midwater, including in the surface water (Fig 8). The large net (considerably larger than a demersal trawl net) consists of a cone shaped body, ending in a codend with lateral wings extending forward from the opening. The horizontal opening is maintained by mid-water otter boards whilst the vertical opening is maintained by chain on the groundline and floats on the headline – although these are not always required – depending on the way the net is rigged.

2.4 Environmental elements

Slipping

Information obtained from POs and vessel skippers, corroborated by consultations with Fisheries Research Services, Aberdeen (including their observer programme), and scientists from the North Atlantic Fisheries College in Shetland, indicated that slippage (i.e. opening the net and releasing the fish before they are pumped out of the water) is not a significant issue in the North Sea herring pelagic trawl fishery. This is principally as there is no significant price premium associated with larger herring so there is little incentive for high-grading.

In addition, recent investment in fishfinding equipment and sonar – such as ‘size discriminators’ which send out 18 echo beams - has also greatly improved the selectivity of the fishery, meaning that skippers now have greater knowledge about the size and species composition of shoals before nets are shot. In addition, there has also been investment in simpler technology – hook and line jiggers – used to test fish a shoal before the net is set. In spite of this there is still not absolute certainty about the composition of a shoal so some slipping does occasionally still occur.

Fig 7 - A typical Scottish pelagic trawler



There remains, however, an opportunity for slippage – as vessels are keen to only land herring, rather than mixed landings of herring and other species (such as mixed shoals of herring and mackerel, or herring and Norway pout). Communication between the fleet enables vessels to stay ‘on’ shoals, or to avoid particular areas. Some slippage may still occasionally occur if mackerel is in net – typically a condition experienced at the beginning of the season.

No accurate record is currently kept of slippage. As slippage does not entail bringing the catch aboard it would not be possible to accurately determine the proportions in terms of species, length / weight and sex. Reasonable estimates, based on information contained in net monitors, could be recorded.

As is common with many small pelagic species, shoals of fish tend to be of the same species, often incorporating fish of similar size, and this is a feature that is specifically exploited when these shoals are fished. Using a particularly modern fleet of vessels all fitted with a range of sophisticated electronic sonar equipment, skippers search for shoals of fish that are of the species, size and density that they are seeking. Whilst species recognition using sonar is not a perfect science, matters have improved significantly in recent years, and skippers are able to make realistic judgements as to whether shoals contain more than one species, and in roughly what proportions.

In the North Sea, herring shoals are most commonly found as single species shoals. Where they are mixed with other species, they tend to be mixed with mackerel. Close to shore they are sometimes mixed with sprat, and occasionally they can be mixed with Norway pout.

In both the slipping of herring and the slipping of mixed mackerel and herring shoals, skippers report that survival of the fish is high, with most being observed to swim away in intact shoals – although this has not been tested and scientists assume a positive mortality when factoring a slippage estimate into assessment models.

Fleet members are keen to avoid slippage as it is expensive and impacts negatively upon a precious commodity - one skipper referred to the practice as ‘sickening’. The Scottish fleet is tight-knit with good lines of communication. Where a vessel is forced to slip a haul, it will immediately alert the other vessels of the reason for the slippage via VHF radio, and all other vessels will then avoid that shoal.

Slippage is regrettable but not illegal. Vessels are not currently required to record the level of slippage, however, some within the fleet have suggested that recording the level of slippage in order to pass the information onto ICES scientists may help to reduce the level of ‘unaccounted mortality’ in the stock models – which may ultimately be beneficial to the fleet.

The SPSG policy also states that:

“The deliberate discarding of a haul in order to seek a more commercially viable catch in future fishing activity; or to discharge a catch overboard in order to free stowage capacity for fish of a higher marketable value, is unacceptable except where necessary to comply with minimum landings size regulations. The Scottish pelagic industry does not and will not condone this activity. Slippage or high grading contradicts the whole spirit of the sustainable policy under which the industry operates. Scottish pelagic vessels do not carry grading equipment”.

Discarding

There is essentially no discarding of fish to sea, as a direct consequence of the design and layout of deck and fish handling equipment and facilities that make this difficult though not impossible. When fish are pumped onboard from the net, they are fed into a system of sluiceways that allow the water to be separated from the fish, and the fish to be directed to Refrigerated Seawater (RSW) Tanks. There is no mechanism for sorting fish on deck, or for discarding fish through chutes or over the side.

Whilst it is theoretically possible to pump fish from the RSW tanks over the side whilst at sea (this is how fish is discharged to shore), there is limited operational or economic logic to such action, and it is said not to occur. The only situation where there might be an economic incentive to discard fish from the RSW tanks is where a mixed haul is brought aboard (unusual) or where fish quality has deteriorated to the point of unsaleable. This type of discarding is illegal; all by-catch is required to be landed and counted against the quota, and there are penalties for over quota fish.

At port fish are pumped directly from the vessels to lorries, or via a de-waterer and certified scales into the processing plant.

Habitat and ecosystem impacts

There is considerable knowledge of the habitats and ecosystem of the North Sea, drawing on more than one hundred years of regular monitoring and research, the intensity of which has accelerated in recent decades. The food web of the North Sea has been extensively studied over many years and is well understood, and there is a good level of information on the trophic position of the herring's key life stages within this web⁸.

Many studies are available on the community structure in the North Sea and herring is a key component of the wider marine ecosystem – both as prey and predator. The TAC ensures that the herring biomass in the ecosystem remains high and by-catch is low. There is no evidence that the pelagic herring fishery affects the biological diversity, community structure or productivity of the ecosystem. Working with this background information and the knowledge of the North Sea herring fisheries, in general it is thought that the impact of herring fishing is minimal.

In the North Sea the herring diet is mainly made up of copepods (*Calanus* spp. & *Temora* spp.), Euphausiids, and small fish. Fish eggs are unlikely to represent an important food resource for herring. In contrast, herring represent an important prey species for many predators, such as cod and large gadoids, sea birds, marine mammals, sharks and dogfish.

The North Sea herring population has suffered notable declines in spawning stock biomass in the past - most notably in the late 1970s, but Spawning Stock Biomass (SSB) also fell below B_{lim} in the mid 1990s. The subsequent recovery of the fishery after both of these events has provided considerable information to scientists about the potential of the stock to recover – without causing long-term consequences; this now provides the basis for the current precautionary management regime.

Whilst recent repeated poor recruitment to the North Sea herring stock may impact on the applicability of this historical information as a prediction for the future, the wider trophic impacts within the ecosystem from these dramatic declines in the herring population appear to have been limited. There is on-going research on the effects of fishing on the North Sea Ecosystem.

For the North Sea (ICES area IV) several multi-species models have been developed including multispecies Virtual Population Analysis (MSVPA). Herring is one of 12 key species in this assessment, with clear quantitative information. The multispecies models are not used for stock assessment directly, but are used to inform on natural mortality in the single species assessments.

The incidental non-target fish catch by directed North Sea herring fisheries appears to be low (ca. 2%), mainly consisting of mackerel when fishing mixed shoals. Mackerel is subject to a stock assessment and its status is closely monitored. The by-catch will be a negligible proportion of the total fishing mortality for mackerel. This infers that the ecosystem level implications of incidental fish catches are negligible.

Management of habitat and ecosystem impacts

In managing potential habitat and ecosystem impacts, industry and management authorities are guided by UK commitment to a number of relevant conventions and agreements, as follows:

- **The Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS)** was concluded in 1991 under the auspices of the Convention on Migratory Species (UNEP/CMS or Bonn Convention) and entered into force in 1994. The UK is a signatory to this agreement. This aims to promote close cooperation amongst Parties to maintain a favourable conservation status for small cetaceans. A Conservation and

⁸see *The food of herring, Clupea harengus, in the North Sea 1983-1986. J.M. Last. (1989). J. Fish. Biol. (1989) 34, 489-501.*

Management Plan obliges Parties to engage in habitat conservation and management, surveys and research, pollution mitigation and public information.

- The UK is also a signatory to the **OSPAR Biological Diversity and Ecosystems Strategy** which is concerned with all human activities which can have an adverse effect on the protection and conservation of the ecosystems and the biological diversity of the North East Atlantic. The Strategy (i) sets ecological quality objectives in support of the ecosystem approach to the management of human activities, (ii) requires assessments of species and habitats that are threatened or in decline, (iii) the development of an ecologically coherent network of marine protected areas and (iv) the assessment of human activities which may adversely affect ecosystems and the development of programmes and measures to safeguard against such harm.
- **Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora** came into force on 21 May 1992. The central aim of the Directive is to conserve biodiversity across the area of the European Union through a coherent network of Special Areas of Conservation (SACs). Seven marine habitat types are listed in the Directive and nine of the species listed are marine or spend part of their life in the sea and have breeding populations in the United Kingdom.
- The **Convention on Biological Diversity** was signed at the UN Rio Conference on Environment and Development (1992). This aims conserve biological diversity, encourage sustainable use of its components and the fair and equitable sharing of the benefits arising from the use of these resources. In response, a UK Biodiversity Action Plan (BAP) was published in 1995, which identified a list of Species of Conservation Concern, from which priority species were identified together with priority habitats. Action Plans were prepared for priority species and habitats.

Endangered, threatened and protected species (ETP)

In general, interactions between North Sea herring fisheries and ETP species are considered very limited on the basis of evidence from skippers and from various observer programmes. Skippers report sighting dolphins (mainly bottlenose - *Tursiops truncatus* – a species listed as data deficient on IUCN Red List) when fishing for herring close inshore – but that there is no direct interaction.

The Sea Mammal Research Unit (SMRU) at St. Andrews has undertaken extensive surveys to determine the level of bycatch of sea mammals in UK pelagic fisheries. To date no cetacean or seal bycatch has been seen by independent observers in the North Sea pelagic herring trawl fishery.

In general, populations of endangered, threatened and protected (ETP) species are highly studied and well understood in the North Sea, with considerable work undertaken in relation to the regular monitoring of fishing activity through the deployment of onboard scientific observers, capture of anecdotal information, and a wide range of monitoring activity associated with the planning and management.

Management of waste

Nets are extremely expensive and are treated with considerable care to avoid damage caused by impact with seabed structures (e.g. wrecks, large boulders, etc.). At the end of the net's working life all useful components (chains) are removed and kept, and a company in Fraserburgh ships nylon net off to be melted down and recycled. The fleet does not receive money for this, but all proceeds go to charity. 'Ghost fishing', caused by lost or discarded nets, is not therefore an issue with this fishery.

The SPSG policy states that vessels will:

“follow good fishing practices which minimise gear loss and make every effort to follow procedures / protocols to mark and report lost gear. Wherever possible vessels will make

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every effort to retrieve lost gear and to retrieve any redundant gear which may become apparent during fishing activity. All such gear will be taken to shore and disposed of through a safe and recognised route”.

3. Stock assessment

3.1 Management unit

The North Sea Autumn spawning herring comprise a complex of three separate stocks, the Buchan or Scottish group, the Banks or Central North Sea group and the Downs group, which spawns in the southern North Sea and the eastern English Channel. These stock units may mix and can be caught together as juveniles and adults. They cannot be separately identified in the catches, so the North Sea autumn spawning herring has to be managed as a single unit, although some separation can be achieved by area specific controls. The management area comprises ICES Divisions IVa,b,c and VIII.

Stock assessment and management is complicated by the fact that four separate fisheries exploit North Sea autumn spawning herring. Only two of these fisheries are in the North Sea; the others are in ICES Division IIIa (Skagerrak and Kattegat).

Mariani *et al* (2005) suggest that the current view of North Sea herring as a unit-stock is adequate, but also that there is a considerable degree of demographic independence of the herring populations in the English Channel. Despite major recent population collapses, genetic data indicated no evidence of bottlenecks affecting the genetic diversity of extant North Sea herring populations.

Prior to the second serious decline, in the 1990's, the only limitation on the by-catch of herring (mainly taken in the sprat fishery in the eastern North Sea) was a 10% by-catch limit. This resulted in some heavy mortality on juvenile herring which fluctuated with the size of the sprat fishery. The mortality on juvenile herring was not properly brought under control until the introduction of the by-catch limit in 1994 and some subsequent strong enforcement measures by the Danes.

The Downs stock in the southern North Sea and English Channel has always been considered to be a separate management unit within the North Sea because the population in this area is clearly separated from the other components for most of the year. Historically this component has always been subjected to a higher fishing mortality than the rest of the North Sea and is seen to develop independently of the other two stock units. As a consequence advice is now given separately for this stock in order to give it special protection in the form of a separately allocated sub-TAC within the overall North Sea TAC.

Fisheries

The four fisheries defined for the purposes of stock assessment are:

- A:** Directed fisheries for herring with purse seiners and trawlers (with 32mm minimum mesh size) in the North Sea. (By-catches of herring in industrial fisheries by Norway are included).
- B:** Herring taken as a by-catch in the small mesh fisheries in the North Sea (with mesh size less than 32mm).
- C:** Directed fisheries in the Skagerrak and Kattegat with purse seiners and trawlers (with a 32mm minimum mesh size).
- D:** By-catches of herring caught in the small mesh fisheries (with mesh size less than 32mm) in the Skagerrak and Kattegat.

The fishery to be certified belongs to Fleet A. Each fleet is subjected to the same system of monitoring and sampling, which should give a complete picture of the catch composition. All the landings, including estimates of their discards, are used in the assessment process.

It should be noted that the TAC constraint, which has been operating since 1981, is only applied to fleet A - the North Sea directed fisheries. There is, however, a by-catch limit for herring set for the fleet B - small mesh fisheries in the North Sea. The Downs stock in the southern North Sea and English Channel is managed separately and given special protection in the form of a separately allocated sub-TAC within the overall North Sea TAC.

For the spring spawning herrings (typically inshore stocks such as the Thames, and Wash herring), biological sampling can be used to separate the catches. For the autumn spawning stock, the sub-unit allocation is only based on the ICES area division and the catches cannot be separated out. Of the latter, the most vulnerable is the Downs component. An index of the Downs and the other components' abundance is available from the abundance surveys (HAWG07 Fig 2.11.3 and 2.11.4).

The TAC control has been operating since 1981, and is effectively only applied to fleet A. There is also by-catch limit for herring set for the fleet B, but the declared landings are usually below this limit.

Data Sources

Catch data

The fishery data consist of the total weight of catches of North Sea autumn spawning herring taken in the North Sea and outside the North Sea - in the eastern English Channel, and in the Skagerrak and Kattegat. The biological composition of the catches are sampled to provide data on the age composition, catch in numbers at age, maturity and weight. The sampling also provides the proportion of spring spawning herring in the catches.

The Working Group catch includes estimates of discards and misreported or unallocated catches (see HAWG07 Section 1.5). The Working Group catch was estimated to exceed the official catch by 3 %, although this figure is likely to be an underestimate as it only includes information from a fraction of the fleets fishing herring in the North Sea (ICES 2002/ACFM:12). This corroborates suggestions of the Study Group for Herring Assessment Procedures (ICES 2001/ACFM:22) that an important uncertainty of the total catch figure exists since the re-opening of the fishery in 1980.

Information on 2006 discards is poor, and the final figure for discards as used in the assessment was an underestimate. Discard data have not been consistently available for the whole time series and were only included in the assessment when reported. Estimates of discards in the Dutch fleet are in the order of 5,000 t per year. These were not included in the assessment as they have not been split between areas IV and VIaN.

The European Union implemented a new sampling regime in 2002, obliging member states to meet specified overall sampling levels. The sampling of commercial landings in 2006 for herring length and weight measured has, however, decreased by 25% when compared to 2005, while the number of age readings has increased by 50%.

Of more concern to the working group than the overall sampling level was the spread of sampling effort over the different combinations of fleet/nation/area and metiers. Of the 107 different reported metiers, only 39 were sampled in 2006. The recommended sampling level of more than 1 sample per 1,000 t catch has been met only for 19 metiers and recommended levels of age readings (recommended level is >25 fish aged per 1,000 t catch) met in 21 metiers. The catch of France, the UK (England and Wales), and Sweden from the North Sea has not been sampled (the catch of other countries is minor or insignificant in this respect - the Faroe Islands and Belgium). There is also a need to improve the spread of sampling by area and by fleet, an issue which is not satisfactorily addressed in the EU sampling regime. Because stock assessment methods require accurate catches-at-age, these will contribute significantly to the uncertainties in the stock assessment.

Information on catches landed abroad were not available or could not be used (which impacts on the sampling of UK (England and Wales) catches, most of which are landed to the Netherlands. While it is known that by-catches of herring in other than the directed human consumption fisheries occur, most countries have not implemented a sampling scheme for monitoring these fisheries. The working group recommended that all metiers with substantial catch should be sampled (including by-catches in the industrial fisheries), and that catches landed abroad should be sampled.

Abundance Indices

There are three types of survey which provide various age aggregated or disaggregated indices of abundance: the acoustic surveys, bottom trawl surveys and plankton surveys for herring larvae.

The acoustic surveys are carried out from late June through July in the northern and central North Sea from latitude 53°30'N to 62°N. The surveys provide data on numbers at age, maturity stage and mean weights at age. These data are combined to provide an overall estimate of abundance which is used as a relative index in the stock assessment for ages 1 to 8.

The international bottom trawl surveys cover the whole of the North Sea and are now carried out in the first and third quarters of the year. The bottom trawl survey provides age disaggregated indices of abundance of the 2 year old and the 3-6 year old herring. Simultaneous sampling with a coarse-meshed plankton net provides a recruitment index, the different quarters producing different quality indices.

The plankton surveys for herring larvae, which have been carried out in the North Sea since 1972, have generated a long time series of larval production estimates. These estimates, combined with retrospective estimates of SSB, have provided a valuable age aggregated index of abundance of the three separate spawning components.

Since 1994 the production estimate has been replaced by a multiplicative larval abundance index (MLAI) which can be calculated on the limited data set. This MLAI produces a good index of stock status and herring spawning abundance.

The surveys provide the only fishery independent estimate of the state of the Downs stock component.

The various survey indices described do not contribute equally to the assessment each year. After extensive research, the ICES Herring Assessment Working Group concluded that the inverse variance weighting is the best one to use for these surveys.

Assessment

The North Sea herring assessment is based on the "Integrated Catch-at-age Analysis" (ICA: Patterson, 1998), which combines a statistical separable model of fishing mortality for recent years with a conventional VPA for the more distant past. Population estimates are tuned by CPUE indices from commercial fisheries or research-vessel surveys, which may be age-structured or not as required. This model appears to behave well with the data on this stock.

The 2007 assessment was considered by the HAWG to be of sufficient quality to provide management advice. In 2006 the formulation of the assessment was supported by an extensive benchmark and it was judged a credible tool for management advice. There are still patterns in the residuals, although there is some improvement compared to previous years. The overall balance of index information appears useful and the retrospective analysis suggests that currently the assessment using the full data set performs the best.

3.2 Monitoring of stock status

The life history of herring is well understood. There is a good time series of recruitment estimates giving an accurate picture of past recruitments (HAWG07). There is a poorer understanding of why recent recruitment has been low (HAWG07, ICES 2006/LRC: 03), and these circumstances make prediction unreliable. Investigations are ongoing to interpret the situation (HAWG07, ICES 2007/OCC: 11). The ICES Herring Assessment Working Group monitors the status of the stock annually. The working group comprises a team of fisheries scientists drawn mainly but not exclusively from the member states with an interest in the fishery. The working group uses data derived from the fishery itself, and from survey data independent of the fishery.

The data from the fishery consists of the total weight of catches of North Sea autumn spawning herring taken in the North Sea and outside the North Sea, in the eastern English Channel, the Skagerrak and Kattegat. The biological composition of the catches is sampled to provide data on the age composition, catch in numbers at age, maturity and weight. The sampling also provides the proportion of spring spawning herring in the catches.

The fishery independent data consists of a series of surveys that provide various indices of abundance, which are either age aggregated, or age disaggregated. It should be noted, however, that there has

been considerable reduction in international effort on these surveys in recent years, and that the reduction in temporal and spatial coverage during the 1990's was such that new statistical methods (the multiplicative larval index) had to be devised in order to use the data in the assessment.

In this context there are three types of survey - the acoustic surveys, bottom trawl surveys and plankton surveys for herring larvae – are undertaken:

The acoustic surveys are carried out from late June through July in the northern and central North Sea from latitude 53° 30'N to 62° N. The surveys provide data on numbers at age, maturity stage and mean weights at age. These data are combined to provide an overall estimate of abundance which is used as a relative index in the stock assessment because the absolute abundance cannot be used. This survey now provides good information on ages 1 to 8 for the assessment. Scottish pelagic vessels have been employed to undertake the acoustic survey in recent years.

The international bottom trawl surveys cover the whole of the North Sea and are now carried out in the first and third quarters of the year. The bottom trawl hauls provide age disaggregated indices of abundance of the 1 winter ring group and the 2-5 winter ring group herring. Simultaneous sampling with a coarse-meshed plankton net provides a recruitment index of 0 winter ring fish. The bottom trawl survey now provides good information in quarter 1 on the abundance of 0-1 winter ring herring and useful, but 'noisy' information on the abundance of 2-5 winter ringers. The quarter 3 survey provides some useful information on the 0 winter ringers but information from the other age groups is inconsistent and unreliable.

The plankton surveys for herring larvae, which have been carried out in the North Sea since 1972, have generated a long time series of larval production estimates. These estimates, combined with retrospective estimates of SSB, have provided a valuable age aggregated index of abundance of the three separate spawning components. The larval surveys were the only indication of the recovery of the spawning stock during the period of the moratorium on fishing for North Sea herring from 1977 to 1981. Since 1994 the production estimate has been replaced by a multiplicative larval abundance index (MLAI) which can be calculated on the now severely limited data set. This MLAI produces a good index of stock status and the surveys continue to provide a valuable insight into herring spawning abundance. For example in 2002, in spite of poor coverage in the central North Sea, the one survey in October resulted in the highest estimate of abundance ever found there at that time. The surveys also continue to provide the only fishery independent estimate of the state of the Downs stock component. It is of some concern that in 2002 the index was half that of the previous year and more comparable with the lower abundances found in 1998 and 1999.

The various survey indices described do not contribute equally to the assessment each year. The method for determining the weightings has been extensively researched. After due consideration of the various alternatives, the ICES Herring Assessment Working Group has concluded that the inverse variance method out-performs other methods and is the best one to use for these surveys.

The Study Group on Recruitment Variability in North Sea Planktivorous Fish (SGRECVAP) met in 2007. The findings of SGRECVAP have influenced the choice of recruitment scenarios used for North Sea herring short and medium term projections (ICES 2007).

There is a large volume of information available on environmental influences in the North Sea. These are used qualitatively in assessing the herring stock, in, for example, developing projection scenarios (HAWG07). Research on integrating environmental information into stock assessments is on-going. The Workshop on the Integration of Environmental Information into Fisheries Management Strategies (WKEFA) has selected NS herring as a case study to include environmental variables in determining reference points and the population dynamics (ICES WKEFA Report 2007).

Catches are recorded adequately for stock assessment, although there are significant gaps in data provided on landings and discards. These gaps are corrected as far as possible by the working group. The Scottish industry and fishery laboratory cooperate fully in undertaking relevant sampling, but pressure still needs to be put on other industries to comply if remaining uncertainties in stock assessment are to be further reduced.

There is some misreporting, and information on unallocated catch and discards are thought to be under-reported, and there is no reporting of foreign landings (HAWG07 Section 2.2.4 Pg 53). By-catch information remains incomplete (only Denmark in Fleet B provided by-catch information) and discarding is underestimated. The working group corrects and estimates catches where data are poor or missing (HAWG07 Sect 2.1.2 Pg 50). There has also been an apparent improvement in catch data collection and recording, indicated by increasing correspondence between the working group catch estimates used in the stock assessment and “official” landings, and any remaining uncertainty does not critically undermine the stock assessment.

The spawning stock biomass (SSB) in 2006 is estimated at 1.2 million tonnes, below the B_{pa} (1.3 million tonnes), but above B_{lim} (0.8 million tonnes) (HAWG07). Therefore the stock is above the limit but below the precautionary level. The effective target fishing mortality is at or below 0.25. Actual F in 2006 was 0.35. A maximum F_{lim} is effectively not applied.

The failure to comply with the precautionary management rule in setting the TAC in 2007 has resulted in a fishing mortality that is higher than the target, which is of concern given the current low recruitment. It is likely that maintaining the present fishing mortality at around the current level will lead to a substantial reduction in SSB to a level below B_{lim} in the near future.

Under the current low recruitment regime the only scenario that is predicted to take SSB above B_{pa} in the short term is a total closure of the fishery. This would be a draconian measure and not justifiable in a stock where quite clearly there is a reasonable harvesting potential. Even if the rebuilding measures in the current harvest control rule are applied, it is unlikely that the stock will be rebuilt to above B_{pa} (HAWG07 Fig. 2.8.1) unless there is a substantial increase in recruitment.

It should be noted that continuing uncertainties associated with this stock in respect of poor recruitment and whether or not a new stock equilibrium is / has been established is prompting intense research. ICES scientists have been requested to re-assess the basis by which the reference points have been set for this stock, and to critically examine the relevance and effectiveness of the harvest control rule that forms the basis of the EU-Norway agreement. That these investigations will take place has been signalled in the Working Group's 2007 report, and it is of note that in February 2008 a workshop was convened to explore work and findings to date⁹.

The team has taken note of this work and that it may in time result to changes in both the setting of reference points and the harvest control rule for this stock and fishery. Nonetheless it would be premature to incorporate this into this assessment until such time as management decisions are made on the basis of this work. If this is captured within the Herring Assessment Working Group report for 2008 and reflected in the outcome of the 2008 EU-Norway Agreement, the consequences of these changes on this assessment will be reviewed at the time of the appropriate surveillance audit.

3.3 Modelling

From 1972 to 1995 the assessment of the total North Sea stock was done by means of a Virtual Population Analysis (VPA) with *ad hoc* tuning to the data series of larvae production estimates, acoustic surveys and bottom trawl surveys.

⁹ ICES Workshop on Herring Management Plans (WKHMP) – Feb 2008

In summary, the simulations undertaken in this study confirm the conclusion by ACFM in 2005 that the performance of the current harvest control rule is at best marginal in the present regime of reduced recruitment. The key issue is that even the relatively low fishing mortalities prescribed in the rule lead to an equilibrium biomass that is close to B_{lim} . A further reduction in recruitment, increased over-fishing of the quotas or less reliable assessments all lead to a risk of falling below B_{lim} which is incompatible with the precautionary approach. A better protection requires the realised F of 0.25 to be reduced to F of 0.2. This reduction could be achieved by a reduction in target F or less effectively by a higher trigger point or by reducing the fishing mortality on juveniles. None of these would lead to a substantial loss of catch for the A fleet in the longer term. The stability of TAC's may improve with lower fishing mortalities.

In 1992 the ICES Herring Assessment Working Group considered that the VPA estimates of stock size were rather uncertain, with an increasing tendency to overestimate SSB and to underestimate fishing mortality. The uncertainty was generated because of differences in the perception of stock size between, larval indices and the bottom trawl surveys on the one hand and acoustic surveys on the other. The serious reduction in the temporal and spatial coverage of the herring larval surveys was further exacerbating the problem. Furthermore, there was additional uncertainty surrounding the level of natural mortality caused by the observed effects of the Ichthyophonus fungal disease.

In 1995 the working group decided to change to an integrated catch analysis method (ICA). This method was adopted for the 1994 assessment and has been used since then. The method has the advantage of being able to use age aggregated indices of stock size and also to incorporate assumptions about errors, both in the survey indices and also in the catch at age data set. This model affords an improved estimate of uncertainty in the assessment and in the forward projections of stock size.

Integrated Catch-at-age Analysis (Patterson, 1998; Needle, 2000) is a robust stock assessment model that is suitable for the data available (catch-at-age and abundance indices for the different age groups). The model provides performance indices and projections for evaluating current management practice (HAWG07). Other assessment models are being concurrently evaluated through exploratory assessments (HAWG07 Section 4.6.2 Pg 273).

Most major uncertainties relating to data have been gradually reducing since 1996. The main remaining uncertainty relates to recruitment and the change in the stock-recruitment relationship, and the role of ecology and environment in the productivity of the stock (natural mortality, median recruitment etc.). The HAWG, with other working groups, is attempting to address the current most significant issue, low recruitment, although the process is slow (HAWG06, HAWG07, ICES CM 2006/LRC:03, ICES CM 2007/LRC:07).

Although major uncertainties and assumptions are addressed in the management advice through the text report (HAWG07 Section 2.1.1), decision tables or decision analysis are not presented. Simulations consider risks assuming that the decision rule is applied, which it clearly is not. There is no evidence to indicate whether decision makers understand the risks they have been taking in setting high fishing mortality TACs.

The working group conducts short and medium term projections that are credible (HAWG07 Section 2.7 and 2.8). Recent projections have been based on current lower levels of recruitment – an approach that is clearly precautionary. All projections and management advice is based upon the harvest control rule and reference points. Forecasts, considering the environment uncertainties, are currently tentative.

The assessment includes the consequences of current harvest strategies (HAWG07), although this is complicated by the fact that decision rules are not implemented precisely as written. Past harvests are fully taken into account and their impact on the stock is explained.

Retrospective estimates of mean fishing mortality (F), SSB and recruitment, by removing one year of data at a time (HAWG07 Figure 2.6.3) suggest that there has been little bias over the last 6 years in the estimates of fishing mortality. SSB is more variable in the last 6 years showing upward and downward revision, but no substantial problems. This retrospective analysis shows an improvement over the previous one presented in 2006 (ICES 2006), probably due to the revision of catch data back to 2001. Other retrospective analyses indicate the importance of using all abundance indices in the assessment.

3.4 Management Advice

According to the management scheme agreed between the EU and Norway, adopted in December 1997 and last amended in November 2004, efforts should be made to maintain the SSB of North Sea Autumn Spawning herring above 800,000 tonnes (B_{lim}). An SSB precautionary reference point of 1.3 million has been set (B_{pa}) above which the TACs should be based on an $F=0.25$ for adult herring and $F=0.12$ for juveniles. If the SSB falls below 1.3 million tonnes, the fishing mortality will have to be reduced proportionally. The plan intends that a TAC deviation of more than 15% between two

subsequent years should be avoided, but the TAC might be reduced by more than 15% if the parties consider this appropriate. Catches of herring in the Thames estuary are not included in the TAC.

After 2002, the SSB was considered to have been above B_{pa} . From then on, ACFM gave fleetwise catch option tables for fishing mortalities within the constraints of the EU-Norway management scheme. The advice for a sub-TAC on catches in IVc and VIId for 2004 to protect the Downs spawning component was that it should not increase faster than the TAC for the North Sea as a whole. ACFM agreed that a share of 11% on the total North Sea TAC (average share 1989-2002) would be an appropriate guide to distributing the harvesting of Downs herring.

The final TAC adopted by the management bodies for 2006 was 454,800 t for Area IV and Division VIId, whereof not more than 50,000 t should be caught in Divisions IVc and VIId. For 2007, the TAC was reduced by 25 % to 341,100 t (37,517 t in Divisions IVc and VIId). The by-catch ceiling set for fleet B in the North Sea was 42,500 t for 2006 and was decreased by 25% to 31,900 t for 2007. As North Sea autumn spawners are also caught in Division IIIa, regulations for the fleets operating in this area have to be taken into account for the management of the Western Baltic Spring Spawners stock. These TACs have resulted in fishing mortalities higher than the target.

It is perhaps worth noting that up to a 10% overshoot of TAC can occur legally because not all reported quantities on board are actually verified on landing. In the case of the Scottish fleet, however, measures introduced to close-out under-reporting (see control and enforcement section) including near hundred per cent inspection on landing, and tamper-proof weighing of a large proportion of landings as they enter processing plants, means that the overshoot margin is substantially less than this.

The ICES TAC advice for 2007 was for a 49% reduction based on an F of 0.17. The eventual TAC agreed at the EU-Norway negotiations was for a 25% reduction. The situation was very similar for the 2008 TAC.

HAWG recognises that to improve incorporating risk and uncertainty in advice:

- definitions and terminology will need to be clarified to improve communication
- a consistent risk assessment and management framework will need to be set up by ICES and others.

To address this a new ICES Study Group on Risk Assessment and Management Advice (SGRAMA) met the first time in Copenhagen 18-21 April 2006.

Other Anthropogenic Factors

Herring spawning and nursery areas, being near the coasts, are particularly sensitive and vulnerable to anthropogenic influences. The most serious of these is the ever increasing pressure for marine sand and gravel extraction, which has the potential to seriously damage and destroy the spawning habitat and disturb spawning shoals and destroy spawn if carried out during the spawning season. Similarly, trawling at or close to the bottom in known spawning areas can have the same detrimental effects. It is possible that the disappearance of spawning on the western edge of the Dogger bank could well be attributable to such anthropogenic influences.

The oil and gas exploration in the North Sea has represented a potential threat to herring spawning although great care has been taken by the industry to restrict their activities in areas and at times of known herring spawning activity. (HAWG07 Annex hawg-her47d3)

Environment and Recruitment

The production of herring has increased since the collapse caused by overfishing in the 1970s. Surplus production has been of the order of 700,000 tonnes for the last 25 years and the recent positive net production has led to an increase in available herring biomass in the system. Also, the biomass of sprat is considered high and fairly stable compared to the last decade (ICES 2005/ACFM:18).

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In terms of the impact of a high biomass of herring and sprat on the North Sea ecosystem, some studies are ongoing, but more resources are required to obtain new estimates of stomach contents, prey selectivity, stomach evacuation rates and behavioural interactions by herring and sprat.

Strong correlations have been found linking sea temperature to recruitment strength of clupeids in the area, but these do not provide any clear underlying mechanisms (HAWG07 for a review of studies). Some of the possible explanations behind the current run of poor recruitment are as follows:

- Density dependant factors such as high SSB leading to poor larval survival through cannibalism and/or competition for food. (This type of stock and recruitment relationship is known for some species but herring have produced big year classes at high SSB in the past including the 2000 year class).
- Changes in the composition of the plankton leading to a poor supply of suitable food items at key life history stages. (It is known that subtle changes have been occurring in the North Sea and that there has been a gradual change, over the past decade, to more southerly species of plankton occurring)
- Subtle changes in the physical processes in the North Sea leading to possible changes in speed and direction of residual currents affecting natatory drift to suitable nursery areas.
- Anthropogenic factors such as gravel dredging which could reduce the areas of suitable substrate on which herring depend for spawning. (However the larval surveys are still indicating a reasonable production of early stage larvae that suggests that the spawning area is not a problem).
- Nothing is known of the potential for disease in larval and juvenile stages to affect survival.
- Very little is known about the predation mortality on larval herring, therefore undetected changes in the distribution and abundance of potential predators, such as jellyfish could be having a significant effect on survival rates.

Ecology / Environment

The environmental variability in the ecosystem is an important driver of the herring and sprat stock dynamic and is considered when giving advice. The provision of the data by the ecosystem groups and the summaries they provide are still largely unsuitable for consideration and adoption by assessment working groups. This is partly due to their acting in isolation.

Although assessment working groups are generally populated by scientists with a “stock assessment” slant, HAWG has a history of using and investigating environmental drivers and changes in productivity, and such work has fed into and been used by groups such as SGPRISM, SGRESP, SPACC and other GLOBEC groups.

Examples of the use and interest of HAWG in the dynamics of the ecosystem and its impact of the fish stocks include:

- the use of shifts in recruitment productivity in North Sea herring in short and medium term projections
- the analysis of surplus and net productivity in herring stocks in relation to fishing mortality
- by incorporating, whenever possible, empirically derived annually variable weights and maturity ogives in stock assessments
- by accounting for cohort specific dramatic changes in weight and maturity in short term projections
- investigations of the dynamics of the timing of spawning and the temporal origin of fish in both the catch and surveys
- the investigations of the between year larval mortality in North Sea herring
- investigations of fecundity in herring
- the search for more robust indices of recruitment in all stocks
- initiating work on the interactions of multispecies catches of the fleets that target small pelagics

The North Sea herring will be a case study in the work shop on Workshop on the Integration of Environmental Information into Fisheries Management Strategies and Advice (WKEFA).

No specific environmental signals were identified specifically by WGRED (CM 2006/LRC:03) to be considered in assessment or management of herring and sprat in this area in 2006.

A possible link between ecosystem changes and the dynamic of North Sea herring might be the yearly variation of age specific natural mortality. HAWG (2007) has evaluated the effect of variable natural mortality (derived from multispecies stock assessment) on the historical dynamic of North Sea herring. Estimates of SSB made using variable natural mortality were similar to those using fixed natural mortality (used in the current assessment), but did affect the perception of recruitment and fishing mortality of the juveniles (age 0-1). Recruitment was smaller except for 1990 to 1995 year classes, while F (0-1) was slightly larger than with fixed natural mortality. The variable natural mortality also produced a clearer relationship between stock and recruitment.

Depletion of particular sub-populations could compromise the sustainability of the fishery in the area (Ruzzante et al. 2006).

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

Consultations indicate that Norway pout is an occasional bycatch in the North Sea herring fishery. It is therefore appropriate to consider the status of the stock in the assessment of the herring fishery. Based on the most recent estimate of SSB, ICES classifies the stock as having full reproductive capacity (SSB > B_{pa}) The stock has increased from a level where SSB at the beginning of 2006 was below B_{lim}. Fishing mortality has been very low in 2005 and the first half of 2006 due to closure of the targeted Norway pout fishery. The recruitment in 2005 has been estimated to slightly above the long-term average (67 billions), while recruitment in 2006 (41.5 billions) is below the long-term average.

EU-Norway agreement

All the advice is provided by ICES and is based on the principle of the precautionary approach. The state of the stock is always described in terms related to both a precautionary level biomass and fishing mortality rate. For herring, a biomass limit level below which the SSB must not be allowed to fall, has also been set. The fishing mortality rate related to this has not been defined. The precautionary principle and the related biomass and fishing mortality rates for adults and juveniles are now firmly embedded in the 1998 EU - Norway agreement.

This agreement sets adult fishing mortality rates of F₂₋₆ (0.25) and for juveniles F₀₋₁ (0.12) whilst the SSB remains above the biomass precautionary level of 1.3 million tonnes. Below that biomass level fishing mortality rates will be reduced to F₂₋₆ (0.2) for adults and for juveniles F₀₋₁ (0.1). If the stock falls below the biomass limit level of 800,000 t then fishing mortality must be further reduced.

Assessment of the North Sea autumn spawning herring stock is normally carried out by the ICES working group in March each year. It is subsequently reviewed by the ICES Advisory Committee for Fisheries Management (ACFM)¹⁰ in the following May. During the review, changes may be made to the assessment before ACFM go on to provide advice on the state of the stocks to the EU. The ICES advice always includes a series of options for fishery managers to consider in setting the TACs for the following year. Providing catch options for North Sea herring is complicated, not only by the existence of the separate stocks but also by the different fleets exploiting North Sea autumn spawning herring. As a consequence the options and advice have to be formulated by the four separate fleets, each exerting different fishing mortalities on the autumn spawning stocks.

The annual advice of the ACFM to the EU is subsequently considered at joint meetings between officials of Norway and the European Commission (for the member states of the EU) when the available

¹⁰ This committee has now, as of 2008, been superseded by the Advisory Committee (ACOM)

TAC is divided between the two parties. Using the options table catch levels for the four fleets can be decided and a TAC set for the fleet A, North Sea directed fishery. Since 1996 a by- catch limit has also been set for fleet B in the North Sea.

The southern North Sea and English Channel stock has always been considered to be a separate management unit within the North Sea because the population in this area is clearly separated from the other components for most of the year. Historically this component has always been subjected to a higher fishing mortality than the rest of the North Sea and is seen to develop independently of the other stocks. As a consequence advice is now given separately for this stock component in order to give it special protection in the form of a separately allocated sub-TAC within the overall North Sea TAC.

Reference Points

Precautionary and limit reference points are well established for the North Sea Herring fishery, have been in use for many years and relate directly to the harvest control rule.

Type	Value
B_{lim}	800,000t
B_{pa}	1.3 million t
F_{lim}	Not defined
F_{pa}	$F_{ages\ 0-1}$ 0.12
	$F_{ages\ 2-6}$ 0.25

Edwards et al. (2006) suggest planktonic changes in the North Sea which may be permanent. If this is the case, the new level of recruitment may be permanent and the productivity of the stock likewise will be lower – this may therefore require reference points for the stock to be re-examined.

A meeting of the Workshop on Limit and Target Reference Points WKREF in 2007 concluded that there is no basis for changing B_{lim} based on current analyses. However, research and SGRECVAP reviews could be basis for revisiting the reference point. The distance between a management reference point (trigger or B_{pa}) and B_{lim} defines a risk and should be evaluated in the context of harvest control rules in consultation with stakeholders and managers (HAWG07). The stock assessment projections show that the current harvest control rule is robust to the reduced recruitment.

To be consistent with MSC Principles and Criteria, the revision of B_{lim} and B_{pa} would have to be based on sound scientific advice, essentially recommended by the Herring Assessment Working Group. Note that the adjustment would be accompanied by a long term reduction in the TAC. The current reference points are based on the herring population dynamics observed since 1958. Based on the overall historical time series, all reference points are appropriate for this stock. However, recent unprecedented low recruitment suggests the long-term averages used to define reference points may no longer be valid if the change in the environment is permanent.

Hypotheses for current stock changes considered by SGRECVAP could provide the basis for proposing alternative reference points (ICES CM 2007/lrc:07). Reference points are regularly reviewed by HAWG as well as by the Workshop on Limit and Target Reference Points [WKREF]. In 2007, WKREF explored limit reference points for North Sea herring among a number of other stocks. WKREF concluded that there was no basis for changing B_{lim} based on this analysis. HAWG has decided not to propose any revision of the B_{lim} reference points at present for the following reasons:

- WKREF questioned the validity of the alternative procedure recently proposed.
- Currently there is no indication that the stock dynamics are changing.
- The role of regime shifts in determining limit reference points should be integrated in the process.
- HAWG would prefer to consider all reference points together, rather than revising just B_{lim} .

Harvest control rules

There are appropriate mechanisms in place to contain harvest (national management of quota uptake and 100% inspections on landing used to trigger controls). There is strong evidence that these mechanisms have succeeded in rebuilding the stock from past depletion (HAWG07).

The main mechanism is based on TAC allocation and control. The TAC is split among countries and vessels, and can be reallocated through purchase according to need. The system is administered by monitoring landings which are counted against the TAC. Landings are considered generally well monitored (see 1.1.2.1). The TAC allocated to bycatch has not been met, and discards (slippage) is not counted against the TAC.

While the mechanism exists, it has not always been effective. Although clear decision-making rules exist, these are not implemented in a completely transparent way. It is not clear that the rule is performing well under a reduced level of recruitment. ICES (2008) confirms that "... the performance of the current harvest rule is at best marginal in the present situation of reduced recruitment." However, there is clear evidence that the harvest control rule is being re-evaluated and changes are being considered.

Concerning the implementation of the TAC, from the simulations the HAWG07 found that (Section 2.8.3 Pg 66) "the current management rule is not robust to implementation error in terms of overfishing of the quotas beyond the level that is estimated at present. Hence, either the enforcement has to be stronger than in the past, or an even more conservative harvest rule has to be applied in order to safeguard against depleting the stock.

The EU-Norway negotiations have generally resulted in a departure from the rule, usually setting a fishing mortality higher than the target (HAWG07 Pg 537 Review); no explanation is given, although there is clear evidence that the rule is being used for guidance (EU-Norway, 2008, Table 1, Section 5.9.1).

While the management system to control harvest exists, the recent evidence suggests that the system will not be effective in ensuring the stock does not become depleted in future.

There are three causes:

- The harvest control rule (HCR) is not necessarily consistent with the current levels of recruitment. The projections show that the +/-15% TAC change rule (rule 6) in the harvest control rule is not precautionary when there is a prolonged downturn in recruitment (ICES 2005, ICES 2008) and that under this HCR the stock will not rebuild to a biomass above the precautionary level (HAWG07, Pg180, Figure 2.8.1, ICES 2008).
- The management decision-makers consider the rule as a guide rather than a robust method to set TACs. Consequently, this has led to setting the TAC above the target fishing mortality as biomass has declined. The way the HCR is used in practice cannot be subject to accurate simulations and therefore cannot be tested. (HAWG07 Annex 5: Technical Minutes (Pg 537) states that "The large overshoot of F is explained with the fact that managers have agreed on too high TACs in recent years. This should be interpreted as an implementation error of the Management Plan." The TAC overshoot is taken into account by HAWG in the advice options provided to ACOM in that the current year's assumed catch is the TAC + 10% likely overshoot.)
- The official landings have exceeded the TAC by between 2% and 6% during 2001-2006 overall, although the TAC overshoot by Fleet A has been much worse (HAWG07 Sect. 2.7.3.1 Pg 63). This overshoot of the TAC should be taken account of in the way the HCR is implemented and administered.

4. Administrative context

The UK is a Member State of the European Union, and its fisheries are subject to the principles and practices of the Common Fisheries Policy. The activities of the SPSG vessels, like similar vessels across the European Union, are tracked by satellite, and their catches and landings are monitored through logbook declarations, at-sea and on-shore inspections, and supply chain monitoring.

4.1 Legislation

The North Sea herring fishery is managed through the Common Fisheries Policy of the EU in accordance with the basic fisheries regulation (2371/2002) and the EU-Norway agreement – a negotiated international agreement setting boundary rules by which annual setting of TAC's and quotas may be achieved.

Details of the EU-Norway Agreement of December 1997 are shown at **Appendix 2**. This is an international fishery, and the majority of nations with a history in North Sea herring fisheries are represented in the EU-Norway agreement.

Key elements of the agreement are:

1. Every effort shall be made to maintain a level of Spawning Stock Biomass (SSB) greater than the Minimum Biological Acceptable level (MBAL) of 800,000 tonnes.
2. A medium-term management strategy, by which annual quotas shall be set for the directed fishery and for by-catches in other fisheries as defined by ICES, reflecting a fishing mortality rate of 0.25 for 2-ringers and older and 0.12 for 0-1-ringers, shall be implemented.
3. Should the SSB fall below a reference point of 1.3 million tonnes, the fishing mortality rates referred to under paragraph 2, will be adapted in the light of scientific estimates of precise conditions then prevailing to ensure rapid recovery of SSB to levels in excess of 1.3 million tonnes.
4. The recovery plan referred to above may, *inter alia*, include additional limitations on effort in the form of special licensing of vessels, restrictions on fishing days, closing of areas and/or seasons, special reporting requirements or appropriate control measures.
5. By catches of herring may only be landed in ports where adequate sampling schemes to effectively monitor the landings have been set up. All catches landed shall be deducted from the respective quotas set, and the fisheries shall be stopped immediately in the event that the quotas are exhausted.
6. The allocation of the TAC for the directed fishery for herring shall be 29% to Norway and 71% to the Community. The by-catch quota for herring shall be allocated to the Community.
7. The Parties shall, if appropriate, consult and adjust management measures and strategies on the basis of any new advice provided by ICES including that from the assessment of the abundance of the most recent year class.

This agreement is implemented in each member country of the EU and in Norway through EC Regulations or Norwegian management regulations.

In common with all other Member States, Scottish fisheries are managed through the EU Common Fisheries Policy (CFP). This policy came into being in the form we recognise today in 1983. It was reviewed thoroughly in 2002 and the current basic fisheries regulation (No.2731/2002) was adopted by the Council of Ministers on 20 December 2002.

This regulation is a 'chapeau' regulation setting out the strategic aims of the CFP and enabling the Council of Ministers, or in certain cases the Commission, to make more detailed Regulations. These include ones dealing with control requirements, fleet structure, technical conservation, marketing and annual total allowable catches (TAC) etc. The European Commission relies extensively on advice from

Scottish Pelagic Sustainability Group North Sea herring fishery

the International Council for the Exploration of the Seas (ICES) in preparing the TAC regulation. Outside the CFP framework other EU legislation dealing with habitats and species protection and is also relevant to fisheries management and to fishermen.

In order to protect spawning concentrations of herring from disturbance by fishing there are spawning ground closures off the east coast of the United Kingdom. There is also a closed area off the west coast of Denmark from 1 July to 31 October where fishing for herring is prohibited in order to protect juveniles.

The EC Regulations made to manage fisheries are directly applicable in each Member State. Elements of Member State compliance with EC Regulations are captured in the annual EC fisheries compliance scoreboard - http://ec.europa.eu/fisheries/cfp/control_enforcement/scoreboard_en.htm.

The Scottish Pelagic Sustainability Group North Sea herring fishery is consistent with EU and national legislation as affirmed in national and European fisheries policies and plans, and the monitoring and evaluation of data returns and management performance.

4.2 Management responsibilities and interactions

ICES

The core backdrop to the management of this fishery is the advice provided by the ICES Advisory Committee on Fisheries Management (ACFM) which draws on the on-going work of international scientists from relevant research laboratories and institutions on the stock biology and marine science through the Herring Assessment Working Group for the Area South of 62° N (HAWG).

Scientific research and assessment is carried out by ICES Working Groups. The assessments are reviewed and evaluated by the ICES Advisory Committee on Fisheries Management (ACFM) which then provides advice on the status of target and non-target stocks to the European Commission. Where relevant (as for herring) the advice is considered at a joint meeting between officials of the EU and Norway. ICES advice, via Commission proposals, informs the annual EU Council of Ministers regulation establishing management measures, in particular TACs and quotas. TACs and quotas for this fishery are set in this regulation for EC member states and recorded for Norway.

Stock assessment and data gathering methodologies are regularly reviewed - at ICES level and at the level of the contributing laboratories and research institutions. Within ICES, a methods working group keeps methods for fish stock assessment under regular review, and there is a specific "Study Group on the Revision of Data for North Sea Herring". In addition, other study and working groups exist to review, for example, herring surveys, the precautionary approach, discards, biological sampling, the "Life Cycle and Ecology of Small Pelagic Fish", the "Incorporation of Additional Information from the Fishing Industry into Fish Stock Assessments", and a "Study Group on Recruitment Variability in North Sea Planktivorous Fish".

National management

Implementation of the CFP at a national level is carried out through the individual Member States. Member States' fisheries enforcement authorities co-operate in policing the fishery (e.g. satellite monitoring, landing recording etc). National fisheries administrations are responsible for a range of management and regulatory duties, including management of fleet activity, management of national quota, monitoring and control of all fisheries occurring within national jurisdiction, collection, collation and transmitting of key fishery data, and undertaking at least a base range of scientific monitoring and development work.

Within EU member states, Fisheries Departments divide the national quota allocations agreed each year in the Council of Ministers in Brussels between their various fleets. It is up to these fleets, usually operating within a Producer Organisation, to allocate their quota share to individual vessels. In turn, fishers have to report landings to the National Authorities who in turn report aggregate national information to the European Commission. If the stage is reached when the aggregate Total Allowable

Catch is near to being taken the Commission will make a Regulation to close the fishery. There are also systems in place to monitor national uptake, and the facility exists to stop the fishery nationally once the quota is taken up.

On balance, management plans are modified on an annual basis, and the various review processes do ensure that systems adapt to changing circumstances, and are subject to critical inspection. There are various checks and balances of the management system in place, but it has to be said that this is not always a regular, rapid or formalised process. It should also be noted that there are recommendations emanating from ICES Working Group reports that are not always implemented.

Monitoring and review

The management system is subject to regular internal review (as required by the CFP). This occurs at every level of the system with policy documents formulated at a European Commission level as a result of initiatives at national, sub-national and European levels. These policies and resulting operational plans and practices are then subject to wide consultation before ratification, and prescribed monitoring and evaluation processes after ratification. These systems also include formal consultation and review processes involving all EC Member State fisheries administrations, and committees such as ACFM (the body through which ICES provides formal advice), STECF (the committee by which the European Commission seeks expert opinion on fisheries), the Advisory Committee on Fisheries and Aquaculture (ACFM) dealing with industry concerns at a European / "horizontal" level), and the Regional Advisory Councils (RACs) dealing with regionally specific technical issues (of which the body specifically incorporating herring industry interests is the Pelagic RAC).

A wide range of normative monitoring of fisheries practice and the work of the various management institutions takes place. This includes data collection on vessels (vessel register), fleet activity (days at sea, VMS), landings, catches (through scientific observer programmes), and operating economics (costs and earnings surveys). In terms of institutional performance, regular monitoring against performance targets is undertaken in respect of statistics collection, quota management, aerial, at sea, and on-shore inspections, checks across the audit trail, fisheries enforcement (including prosecutions), and the nature and extent of development support to the sector.

In terms of scale and intensity, this is an industrial scale fishery, and control, management and administration are designed accordingly. Specifically the management system, which includes complex and comprehensive MCS (Monitoring, Control, Surveillance), is appropriate to the scale of this consolidated, modern and large-scale industry.

5. Fishery management

5.1 Management objectives

Objectives for the North Sea herring fishery include clear targets to retain North Sea ecosystem functionality and to maintain North Sea herring biomass. Short and long term resource objectives have been established. Long-term objectives are set out in the EU-Norway agreement. Significant environmental objectives are included within fishery-related objectives, which are based on a precautionary approach. These objectives can and are measured by a range of performance indicators, but short and medium term objectives do not always include defined target reference points, and therefore objectives are not clearly attainable.

There are clear procedures that are regularly used for the measurement of SSB and F, and for measurement of performance relative to SSB and F. These are consolidated and reported upon by the relevant ICES Working Group - Herring Assessment Working Group for the Area South of 62° N.

The decision rules derived from the EU-Norway agreement seek to be precautionary to meet the objective of B_{pa} . TAC advised cuts, based on the harvest control rule (HCR), appear to be precautionary (certainly more than in previous years). However, there is considerable scope for increased precaution in the setting of F, and it should be noted that the TAC's agreed were higher than those recommended by ICES.

This has particular relevance in relation to the +/-15% rule, which does not follow best scientific advice and has been shown not to be precautionary, albeit the 15% change can and has been overridden. A more significant issue is the implementation of this rule, which often parts from the harvest control rule established under the EU-Norway agreement. The decision process lacks transparency and precise reasons for the departure from the HCR are not given, but are clearly not precautionary.

At an operational level short-term objectives are represented by annual TACs. Achievement against these annual targets is monitored at national level on a monthly basis. The ICES ACFM presents advice on stock management based on its current understanding of the state of stocks. It also advises on what TACs should be set for the coming year for those stocks that it has been requested to advise on – taking into consideration its knowledge of the stocks and any decision-control rules that have been adopted for these stocks.

For North Sea herring, the ICES ACFM TAC advice is based on application of the decision-control rules that underpin the EU-Norway agreement. Application of the decision-control rule forms the basis of negotiation between interested parties at the EU-Norway negotiations held towards the end of each year. The outcome of these negotiations for EU Member States is formally ratified at the Council of Ministers of the European Union meeting held in December.

5.2 Monitoring, Control and Surveillance (MCS)

There is a high degree of enforcement and control and in the North Sea herring fishery, which has increased recently in response to identification of substantial under-reporting, which recent changes and improvements in overall MCS have been designed to address. National Authorities enforce EC fisheries legislation and report on their activities annually to the Commission. Enforcement includes use of satellite VMS, patrol vessels and aerial surveillance.

This said, there is evidence of improving compliance across the wider industry, with a steady improvement in compliance with TACs limits; from 40% overfish in 1997 to 4% overfish in 2006 overall – though for fleet A the overshoot was 43,000t (9%) against 83,000t (16%) in 2005. The overshoot in IVc VIIId in 2006 was 6,600t (13%).

Misreporting or unattributable fishing mortality is also now much reduced. As reported in the 2007 report of the ICES Herring Working Group, current levels do not pose a risk of failing to achieve

conservation objectives. Improvements in monitoring and surveillance are also backed by designated ports of landing which has stopped the practice of 'black landings'.

In relation to TAC, there is a clear system of data collection, testing and clear feedback. There is regular inspection of landings. In the North Sea herring fishery there are regular inspections at sea, and fleet activity is monitored by aerial surveillance and through a satellite mediated VMS (Vessel Monitoring System). Where considered appropriate, more detailed and focused inspections and investigations are undertaken, combining information already collected with direct observation (off-loading and weighing of all catch) and inspection of further documentation. In relation to North Sea herring agreement has recently been reached for the secure weighing of all herring entering processing plants, allowing inspectors the opportunity to undertake mass-balance exercises (a complete audit of a product from one vessel going into a plant, and product coming out of a plant).

Such activity forms the backbone of the CFP Monitoring Control and Surveillance (MCS) system, and performance of this system against national and CFP targets, including details of infringements and prosecutions, is reported on an annual basis. These activities are coordinated through the new EU Fisheries Control Agency based now based in Vigo, Spain.

The machinery of this system (operational procedures) is well developed, is in place, and is applied in a clear and transparent way. National quota is sub-divided among fleets (and increasingly in the small pelagic sector by vessel), in Member States and Norway. Landings are recorded by logbook, and reported to the national authority. Consolidated data on uptake against allocation are reported to the Commission (and Norway).

The reporting process provides timely information to the Commission. This information allows the Commission to exercise the power vested in it to close the EU fishery immediately all quota allocations have been taken.

Non-compliance is dealt with by the relevant national authorities through their criminal justice systems, and using agreed and tested procedures. Much improved levels of compliance suggest that this system is becoming more effective.

Compliance

Compliance in the Scottish North Sea pelagic fishery has not always been exemplary and the activities of the pelagic fleet and processing sector were the subject of substantial scrutiny by the Scottish Fisheries Protection Agency (SFPA) in the mid to late 90s and in the early part of this century. This scrutiny revealed a large amount of under-reporting, mis-reporting and illegal landings. Strong punitive action has been undertaken by the SFPA with record fines imposed and fishers also being forced to payback illegal earnings. Ongoing court cases are still to finalise the full scale of the punitive costs.

The level of illegal operations which occurred has forced a substantial revision of SFPA monitoring and enforcement of the sector, both at sea and at port. As well as VMS, spotter planes and the regular use of inspections at sea, the amount of monitoring of landings at port has also been substantially increased. Vessels are now required to report the amount onboard the vessel 4 hours before landing and 100% of all landings are now inspected, and tanks dipped by SFPA inspectors to verify landing figures. All catch pumped ashore passes over a certified tamper-proof weigh bridge / scale and occasionally (at least once per boat and per factory per year) SFPA will undertake a whole process inspection (effectively a mass-balance audit).

The registration of buyers and sellers legislation, although not directly targeted at the pelagic sector, has also contributed to a major cultural shift within the industry, and there is now a sense of confidence on the part of the SFPA that strong systems, checks and balances are now in place to quickly identify and punish any illegal activity. As a result there is a widespread belief that compliance is now no longer a major problem in the Scottish pelagic industry.

Overall, these measures have resulted in a big improvement in the reliability of the landings data.

5.3 Consultative process

Extensive consultative processes are in place at national and European levels to debate policy, plans and management, and recent years have seen the introduction of more formal procedures to incorporate a wider stakeholder community within such consultations.

At a European level, key institutions are the Advisory Committee on Fisheries and Aquaculture (ACFA) - which comprises a contact group at the European level for all stakeholders at national and regional levels – and the recently formed Regional Advisory Councils (RACs) – which comprise a contact group dealing with particular fisheries at the regional level.

At a national level, administrations operate formal consultation procedures combining mailings on current issues and proposed changes to management systems and regular scheduled face-to-face meetings with key stakeholders.

At a local level, some management responsibilities are delegated to local government and subject to local legislation. In these cases, there are formal structures for seeking and incorporating stakeholder views into decision-making.

5.4 Dispute resolution

All member states have signed up to CFP, and are bound by European legislation. Disputes between Member States and the Commission are resolved in the Council of Ministers.

Where appropriate, European legislation is enacted at the national level through relevant primary and secondary legislation. Formal procedures apply for the resolution of disputes through the national court systems. Ultimately, any European citizen or organisation can take legal action against the Council of Ministers in the European Court of Justice. This is a system that is widely known and has been used when considered necessary.

Within the fisheries administrative structures of each member state there are also a wide range of bodies and committees through which problems can be raised and disputes debated and resolutions found. Local government and relevant planning committees also have a range of tools at their disposal to both inform and resolve relevant disputes.

Outside the machinery of government, there are a wide range of institutional solutions to dispute resolution – through trade organisations, professional associations, and a range of decision-making bodies (at local, regional and national levels).

6. Background to the evaluation

6.1 Evaluation team

Evaluation Leader: Crick Carleton

The evaluation was lead by Crick Carleton, chief fisheries assessor for FCI / Nautilus. Mr Carleton is an experienced industry analyst with some thirty years experience in fisheries management, policy and development, drawing on academic qualifications in both natural sciences and economics (zoology and technological economics), and work as a fishery officer and full-time consultant. He is the founder and Chief Executive of Nautilus Consultants and has actively supported the evolution of the MSC standard. He participated in the Airlie House revision of the MSC's Principles and Criteria to the current standard, and has contributed to debate on its application to small-scale fisheries and aquaculture. He is an experienced facilitator, works extensively with fishing communities and businesses, and regularly mediates in a range of sensitive management and development situations.

Expert Advisor: Martin Gill

Martin Gill, the Executive Director of FCI, coordinated the assessment process, and participated as a team member during the assessment as required. Martin is a marine biologist and fisheries specialist, a former staff member of the Copenhagen-based Eurofish international fishery development organisation, and is a shareholder and board member of Food Certification Scotland / Food Certification International.

Martin was appointed as Executive Director of Food Certification (Scotland) Ltd in June 2002 and led a successful management buyout in early 2007. He joined from a five year period with FAO EASTFISH, a Food and Agriculture Organisation of the United Nations project providing a fish marketing and investment service for Central and Eastern Europe based in Copenhagen. (This project is now known as Eurofish). Among other duties he acted as the founding editor of the organisation's Eurofish magazine.

A graduate in Marine Biology from University College, Swansea, he was also a former Editor of World Fishing magazine for 5 years and has contributed since 1992 to the Encyclopaedia Britannica Book of the Year with the commercial fisheries section.

Expert Advisor: Dr Paul Medley

Dr Medley is an experienced stock assessment specialist, will assist with analysis of the fishery management systems in place, assessment of stock health. He is a fishery biologist and population dynamicist with particular experience with respect to pelagic fisheries, shellfish and small-scale fisheries, and wide experience with MSC pre-assessment and full assessments. Dr Paul Medley is an experienced fishery scientist and population analyst and modeler, with wide knowledge and experience in the assessment of pelagic stocks (amongst a range of marine fish stocks and ecosystems). He has travelled widely and worked with a range of fishery systems and biological stocks, both as principal researcher and as evaluator. He is familiar with MSC assessment procedures, having participated in the first MSC full assessment – Thames herring – and is currently working with the MSC on the development of guidelines for certification of small scale, data poor fisheries. He has also participated in the full assessment of the South Georgia toothfish fishery, and with a number of pre-assessments. He is familiar with a wide range of fisheries in the North East Atlantic, and other parts of the world, and over the period 2000 to 2005 he has been serving with the Centre for Independent Experts, University of Miami, as an evaluator of various US fishery research programmes. He is based in York.

Expert Advisor: Tristan Southall

Tristan Southall is an experienced fishery industry analyst, with broad experience of industry structures, fishing and fisheries infrastructure, and the legal and fisheries management dimensions of the Common

Fisheries Policy. Tristan holds degrees in Marine Biology and Marine Resource Development and Protection, from Newcastle and Heriot-Watt Universities. Tristan's professional experience includes the planning, management and evaluation of aquaculture, fisheries, marine industry and rural development projects, from both socio-economic and environmental perspectives. In addition Tristan has coordinated EU fisheries training and promotion activities – covering all aspects of sustainable fisheries management and control.

6.2 The MSC Ps & Cs

The MSC is dedicated to promoting “well-managed” or “sustainable” fisheries, and the MSC initiative focuses on identifying such fisheries through means of independent third-party assessments and certification. Once certified, fisheries are awarded the opportunity to utilise an MSC promoted eco-label to gain economic advantages in the marketplace. Through certification and eco-labelling the MSC works to promote and encourage better management of world fisheries, many of which have been suggested to suffer from poor management.

The MSC Principles and Criteria for Sustainable Fisheries form the standard against which the fishery is assessed and are organised in terms of three principles:

MSC Principle 1 - Resource Sustainability

A fishery must be conducted in a manner that does not lead to over fishing or depletion of the exploited populations and for those populations that are depleted the fishery must be conducted in a manner that demonstrably leads to their recovery

MSC Principle 2 - Ecosystem Sustainability

Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

MSC Principle 3 - Management Systems

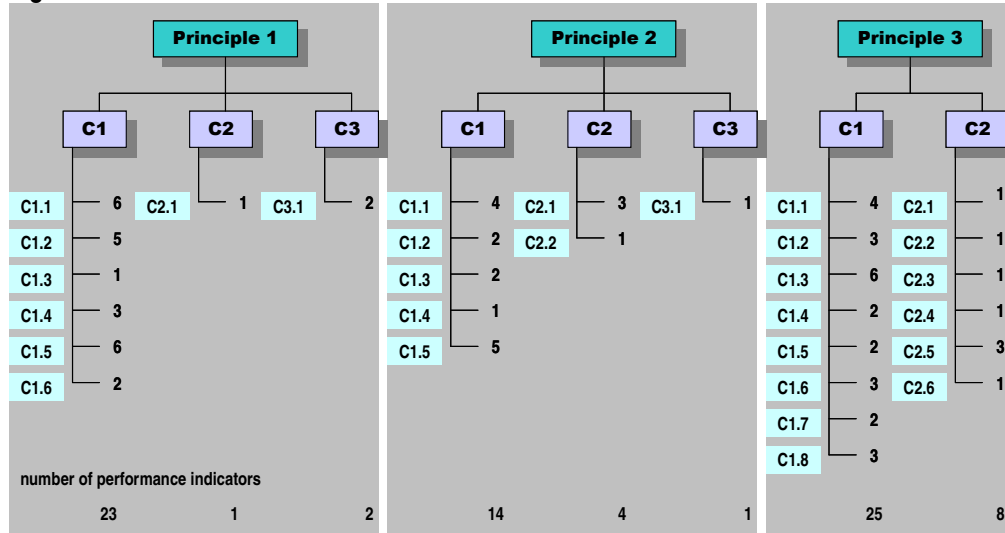
The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

A fuller description of the MSC Ps & Cs is presented as **Appendix 1** to this report.

The MSC Principles and Criteria provide the overall requirements necessary for certification of a sustainably managed fishery. To facilitate assessment of any given fishery against this standard, these criteria are further split into sub-criteria. Sub-criteria represent separate areas of important information (e.g. Sub-criterion 1.1.1.requires a sufficient level of information on the target species and stock, 1.1.2 requires information on the effects of the fishery on the stock and so on). These Sub-criteria, therefore, provide a detailed checklist of factors necessary to meet the MSC Criteria in the same way as the Criteria provide the factors necessary to meet each Principle.

Below each Sub-criterion, individual ‘Performance Indicators’ (PIs) are identified. It is at this level that the performance of the fishery is measured. The relationship between sub-criteria and performance indicators is shown schematically in **Fig 6** for this particular fishery. Altogether, assessment of this fishery against the MSC standard is achieved through measurement of 78 Performance Indicators. The Principles and their supporting Criteria, Sub-criteria and Performance Indicators that have been used by the assessment team to assess this fishery are incorporated into the scoring sheets (**Appendix 3**).

Fig 6 – Schematic of the Assessment Tree and Performance Indicators



6.3 Public consultation

Public announcements of the progression of the assessment were made as follows:

Date	Purpose	Media
30 May 2007	notification of commencement of assessment	notification on MSC website
26 June 2007	nomination of Assessment Team candidates	notification on MSC website
July – Nov 2007	solicitation of inputs to stakeholder consultation and assessment	email, phone and mail
13 Sep 2007	announcement of draft Assessment Tree and Scoring Guideposts	notification on MSC website
1 Nov 2007	posting of final Assessment Tree and Scoring Guideposts	notification on MSC website
26 Sept 2007	announcement of assessment visit and convening of stakeholder consultation meeting	direct email, notification on MSC website
2007	assessment visit	meetings
	notification of Proposed Peer Reviewers	
	notification of Draft Report	
	notification of Final Report	

6.4 Stakeholder consultation

Extent of available information

At the time this assessment was undertaken, three assessments of North Sea herring fisheries had already been completed (detailed below) and findings presented in published assessment reports. These formed an important background resource for the assessment team – collating and reporting on available stock and fishery information, as well as highlighting areas of stakeholder and assessment team concern.

A total of 35 stakeholder organisations and individuals having relevant interest in the SPSG NS herring assessment were identified and consulted during this assessment. The interest of others not appearing

on this list was solicited through the postings on the MSC website, and by advertising in the UK trade journal Fishing News.

Initial approaches were made by email and followed up by phone and questionnaire. Issues raised during correspondence and from questionnaire returns were investigated during research and information gathering activities, and during interviews.

Most stakeholders contacted during this exercise either indicated that they had no direct interest in this fishery assessment, or that they had no particular cause for concern with regard to its assessment to the MSC standard.

Stakeholder issues

Written and verbal representations were provided to the assessment team expressing a range of views, opinions and concerns. The team is of the view that matters raised have been adequately debated and addressed as a part of the scoring process for this fishery, and that none of the issues raised, therefore, require separate attention beyond that represented in this report.

6.5 Interview programme

Following the collation of general information on the fishery, a number of meetings with key stakeholders were scheduled by the team to fill in information gaps and to explore and discuss areas of concern. Meetings were held as follows:

- I1 Paul du Vivier – Chief Executive SFFA, Alastair Stewart – Director of Sea Fisheries Inspectorate(Coastal) – SFFA
- I2 Paul MacCarthy – Policy Manager – Stocks & Conservation – Scottish Government Marine Directorate
- I3 Ian McSween – Chief Executive SFO / Chairman Pelagic RAC
- I4 Drs. E Hatfield, B Turrel & P Fernandes – Fisheries Research Services
- I5 Derek Duthie – SPFA, Alex Wiseman – vice chair SPFA, Andrew Tait Jnr – “Taits”, George West – “Resolute” and Stephen Bellany – “Unity”
- I6 Jackie Tait – Caley Fisheries and Philip Nicol – P&J Johnstone Managing Director
- I7 David Terry – Area Manager SFFA and Stuart Kayte – Local Officer SFFA
- I8 Jess Sparks – Technical Manager Seafood Scotland
- I9 Brain Isbister – Shetland Fish Producers Organisation
- I10 Willie Williamson – “Research”, Davie Hutchison – “Charisma”, Bobby Polson – “Serene”
- I11 Dr Chevonne Laursen – Fisheries Biologist, NAFC
- I12 Duncan MacGregor – Shetland SFFA Officer

In addition telephone or e-mail consultations / specific queries were addressed to:

- I13 Simon Northridge – Sea Mammal Research Institute

6.6 Previous certification evaluations

North Sea herring assessments have been undertaken on four previous occasions:

An assessment of the Astrid Fiske North Sea Herring Swedish Purse Seine Fishery began in March 2007, is due for completion in May 2008, information can be found at http://www.msc.org/html/content_1330.htm. The Pelagic Freezer-Trawler Association North Sea Herring Fishery began in 2002 and the fishery was certified in May 2006. The full assessment report is available at http://www.msc.org/assets/docs/North_sea_herring/NSHerring_PubCertRep.pdf.

The Hastings Fleet Pelagic Fishery has also been assessed, including an assessment of North Sea Autumn Spawning herring in ICES areas IVc and VIId. The assessment began in 2003 and was completed in 2005. The full public assessment report can be viewed at: http://www.msc.org/assets/docs/Hastings_Pelagic/PubCertRep_Pelagic.pdf.

An assessment has also taken place of the Thames Blackwater herring Driftnet fishery, a localised spring-spawning stock that is subject to a separate UK TAC. As such it is not directly applicable to this assessment. Assessment of this fishery began in 1999 and was completed in 2000. It was subject to re-assessment in 2004/05 and a certificate awarded in 2005. The full public assessment report can be viewed at: http://www.msc.org/assets/docs/Thames_herring/TH_PubCertRep_Dec2005.pdf.

6.6 Information sources used

The principle sources of information used in this assessment process derive from information presented to the team by the client and fishery managers, by information derived as a result of interviews and consultations with members of the fishing industry, processors, regulators, and other stakeholders, and as a result of literature search.

The International Council for the Exploration of the Seas (ICES) coordinates and promotes marine research in the North Atlantic and adjacent seas such as the North Sea. ICES provides advice on the marine ecosystem to governments and international regulatory bodies that manage the North Atlantic Ocean and adjacent seas, including, of significance to the management of the North Sea herring stock, the EU and Norway. A key vehicle for the provision of this advice is the Annual Report of the Advisory Committee on Fisheries Management. This advice draws on the work of specialist Working Groups.

Throughout the assessment process, a key source of scientific information has been the ICES 2007 Report of 2007 report of the Herring Assessment Working Group for the Area South of 62°N. 13th – 22nd March 2007. ICES CM 2007/ACFM:11¹¹. This provides a clear consolidated view of the herring stock, the fisheries that exploit the stock, and the science behind advice on the management of the stock.

Source documents used in the assessment are as follows:

- R1. The ICES Advisory Committee - <http://www.ices.dk/iceswork/acom.asp>
- R2. International Council for the Exploration of the Sea (ICES) – www.ices.dk
- R3. ICES Advice 2007, Book 9 Section 9.4.2, Book 6 Section 6.4.22.
- R4. ICES 2007 Report of the Living Resources Committee (LRC)
- R5. ICES Working Group Reports - <http://www.ices.dk/iceswork/workinggroups.asp>
- R6. ICES 2007 report of the Herring Assessment Working Group for the Area South of 62°N. 13th – 22nd March 2007. ICES CM 2007/ACFM:11
<http://www.ices.dk/iceswork/wgdetailacfm.asp?wg=HAWG>
- R7. ICES 2006 report of the Herring Assessment Working Group for the Area South of 62°N. 13th – 22nd March 2007
- R8. ICES 2006 Report of the Herring Assessment Working Group for the Area South of 62°N. 14th – 23rd March 2007. ICES CM 2006/ACFM:20
- R9. ICES 2005. Herring Assessment Working Group for the Area South of 62°N (HAWG). ICES CM 2005/ACFM: 18.
- R10. ICES 2008. Report of the Ices Workshop on Herring Management Plans (WKHMP). 4-8 February 2008.
- R11. ICES 2007 Report of the Working Group on Recruitment Process (WGRP), ICES Oceanography Committee, ICES CM 2007/OCC:11
- R12. ICES (WKEFA) Report 2007

¹¹ <http://www.ices.dk/iceswork/wgdetailacfm.asp?wg=HAWG>

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- R13. ICES 2007 Report of the study group on recruitment variability in north sea planktivorous fish (SCRECVAP). 7-11 May 2007. WKREF ICES CM 2007/LRC:07
- R14. ICES 2006. Study Group on Recruitment Variability in North Sea Planktivorous Fish (SGRECVAP). CM 2006/LRC: 03.
- R15. ICES WKREF Report 2007. Report of the Workshop on Limit and Target Reference Points [WKREF] 29 January – 2 February 2007 Gdynia, Poland. ICES CM 2007/ACFM:05
- R16. ICES 2007 Report Of The Working Group On Multispecies Assessment Methods (WGSAM) 15–19 October 2007. ICES CM 2007/RMC:08.
- R17. ICES 2007 Working Group on the Assessment of Mackerel, Horse Mackerel, Sardine and Anchovy – (WGMHSA) Report 2007
- R18. ICES 2006. Report of working group for regional ecosystem description (WGRED). ICES CM 2006/ACE:03.
- R19. bathymetric map of the North Sea and Skagerrak Strait – in An Atlas of Oceanic Internal Solitary Waves (February 2004) by Global Ocean Associates, Prepared for Office of Naval Research – Code 322 PO
http://www.internalwaveatlas.com/Atlas2_PDF/IWAtlas2_Pg157_NorthSea.pdf
- R20. ICES 2007 www.ices.dk/marineworld/fishmap/ices/pdf/herring.pdf
- R21a. ICES Advice 2007. 6.4.22 – Norway Pout in ICES subarea IV (North Sea) and division IIIa (Skagerrak – Kattegat).
- R21b. ICES Advice 2007. 9.4.2 – North East Atlantic Mackerel (combined southern, western and North Sea spawning components).
- R22. EU-Norway 2008 agreement. Agreed Record of Conclusions between the European Community and Norway for 2008. Brussels, 28th November 2007. Negotiating Outcome.
<http://www.regjeringen.no/en/dep/fkd/Press-Centre/Press-releases/2007/Quota-agreement-between-Norway-and-the-E.html?id=491822>
- R23. EU Involvement –
http://ec.europa.eu/fisheries/cfp/external_relations/international_agreements_en.htm
- R24. The CFP - http://ec.europa.eu/fisheries/cfp_en.htm
- R25. ACFA - http://ec.europa.eu/fisheries/cfp/governance/acfa_en.htm
- R26. General Principles of the Common Fisheries Policy – MS PowerPoint presentation by Jorgen Holmquist, Director-General for Fisheries & Maritime Affairs DG of the European Union.
- R27. Common Fisheries Policy - http://ec.europa.eu/fisheries/cfp_en.htm
- R28. Reform of the CFP -
http://ec.europa.eu/fisheries/press_corner/press_releases/archives/com02/com02_60_en.htm
- R29. CFP Regulation – Reg2371/2002 –
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002R2371:EN:HTML>
- R30. Law of the Sea –
http://un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm#The%20United%20Nations%20Convention%20on%20the%20Law%20of%20the%20Sea
- R31. Scientific, Technical and Economic Committee for Fisheries (STECF) –
<http://stecf.jrc.ec.europa.eu>
- R32. Pelagic Regional Advisory Council (RAC) – <http://www.pelagic-rac.org/>
- R33. Control and enforcement under the CFP -
http://ec.europa.eu/fisheries/cfp/control_enforcement_en.htm
- R34. European Community Fisheries Control Agency -
http://ec.europa.eu/fisheries/cfp/control_enforcement/control_agency_en.htm
- R35. Annual Report of the Scottish Fishery Protection Agency - <http://www.sfpa.gov.uk/docs/2006-07%20annual%20report.pdf>

- R36. EU Fisheries Scoreboard –
http://ec.europa.eu/fisheries/cfp/control_enforcement/scoreboard_en.htm
- R37. European regional socio-economic studies – summary maps –
http://ec.europa.eu/fisheries/cfp/structural_measures/socio_economic/study_2003/regions_en.htm
- R38. SD Berrow, MO'Neill, D Brogan (1998). DISCARDING PRACTICES AND MARINE MAMMAL BY-CATCH IN THE CELTIC SEA HERRING FISHERY. Biology AND Environment: Proceedings OF THE Royal Irish Academy. Vol. 98B No. 1 (1-8).
- R39. DEFRA 2003. UK Small Cetacean Bycatch Response Strategy.
- R40. FAO – Gear Type Fact Sheet; Mid water trawl <http://www.fao.org/fishery/geartype/207>
- R41. Defra (2007) Charting progress: an integrated assessment of the state of UK seas – marine habitats and species.
<http://defra.gov.uk/environment/water/marine/uk/stateofsea/>
- R42. Mariani S, Hutchinson W.F, Hatfield E.M.C, Ruzzante D.F, Simmonds E.J, Dahlgren T.G, Andre C, Brigham E, Torstensen G.R, Carvalho G.R. 2005. North Sea herring population structure revealed by mircrosatellite analysis. Marine Ecological Progress Series 303: 245-257.
- R43. FSBI (2001) Marine protected areas in the North Sea. Briefing Paper 1, Fisheries Society of the British Isles, Granta Information Systems - <http://www.fsbi.org.uk/docs/brief-marine-protect-norefs.pdf>
- R44. Patterson, K.R. 1998. Integrated catch at age analysis version 1.4. Scottish Fisheries Research Report No. 38.
- R45. European state aid to the fisheries and aquaculture sectors –
http://ec.europa.eu/fisheries/legislation/state_aid_en.htm
- R46. Work conducted by IEEP and commissioned by WWF –
<http://www.wwf.fi/wwf/www/uploads.pdf/SUBSIDIESReport.pdf>
- R47. International Fuel Prices by GTZ - <http://www.international-fuel-prices.com>
- R48. National Marine Monitoring Programme (NMMP) [http://www.cefas.co.uk/data/marine-monitoring/national-marine-monitoring-programme-\(nmmp\).aspx](http://www.cefas.co.uk/data/marine-monitoring/national-marine-monitoring-programme-(nmmp).aspx)
- R49. Edwards, M. Johns, D.G., Licandro, P., John, A.W.G., Stevens, D.P. Ecological Status Report: results from the CPR Survey 2004/2005. (2006).
- R50. D. E. Ruzzante, S. Mariani, D. Bekkevold, C. Andre, H. Mosegaard, L. A. W. Clausen, T. G. Dahlgren, W. F. Hutchinson, E. M. C. Hatfield, E. Torstensen, J. Brigham, E. J. Simmonds, L. Laikre, L. C. Larsson, R. J. M. Stet, N. Ryman and G. R. Carvalho (2006) Biocomplexity in a highly migratory pelagic marine fish, Atlantic herring. Proc. R. Soc. B 273, 1459–1464

7. Scoring

7.1 Scoring Methodology

Process

Scoring of the attributes of this fishery against the MSC Ps & Cs involves a five-stage process:

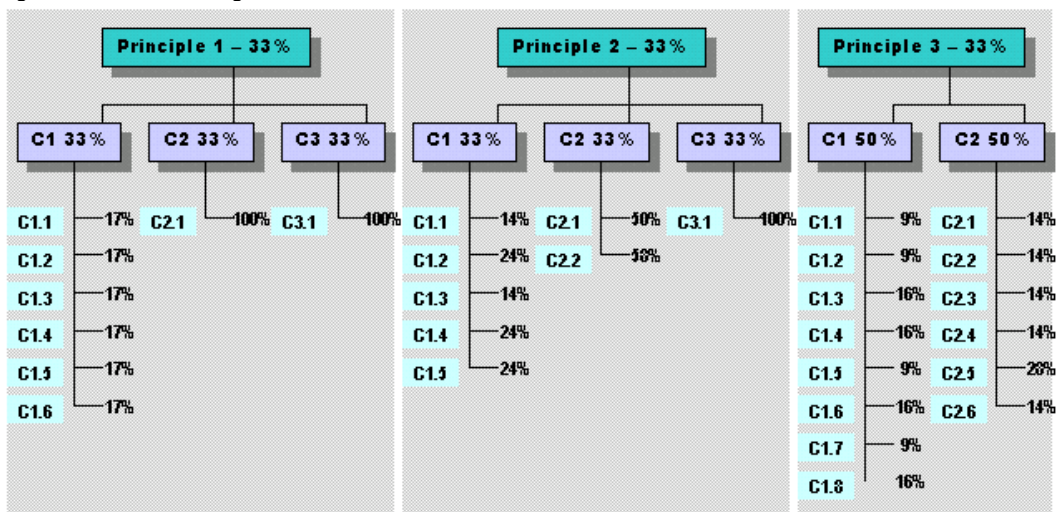
- drawing up of an appropriate assessment tree extending the MSC Ps & Cs to sub-criteria and performance indicator levels;
- describing how each Performance Indicator might be measured at 60 (minimum acceptable threshold), 80 (good industry practice), and 100 (best industry practice) – the scoring guideposts;
- allocation of weighting to criteria and sub-criteria using the process of pairwise comparison;
- description of the argument as to why a particular score has been given to each sub-criterion;
- allocation of a score (out of 100) to each sub-criterion.

In order to make the assessment process as clear and transparent as possible, the Scoring Guideposts are presented in the scoring table and describe the level of performance necessary to achieve **100** (represents the level of performance for a performance indicator that would be expected in a theoretically 'perfect' fishery), **80** (defines the unconditional pass mark for a performance indicator for that type of fishery), and **60** (defines the minimum, conditional pass mark for each performance indicator for that type of fishery). The Assessment Tree and Scoring Guideposts for the SPSG North Sea herring fishery is shown as **Appendix 3** to this report.

Weighting

Weighting was undertaken by team members, and consensus arrived at on the basis of debate. The basis of weight allocations is incorporated into the Scoring Sheets shown at **Appendix 3**. The actual allocation of weights is shown schematically in **Fig 7**.

Fig 7 – Allocation of weights to the Assessment Tree



Scoring outcomes

There are two, coupled, scoring requirements that constitute the Marine Stewardship Council's minimum threshold for a sustainable fishery:

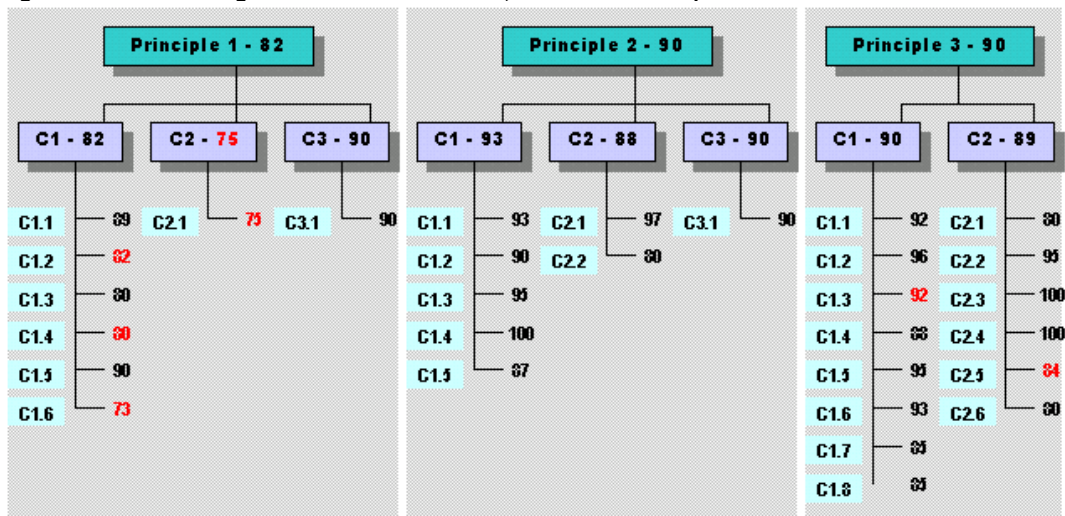
- The fishery must obtain a score of 80 or more for each of the MSC's three Principles, based on the weighted average score for all Criteria and sub-criteria under each Principle; and
- The fishery must obtain a score of 60 or more for each Performance Indicator.

A score below 60 for a Performance Indicator would represent a level of performance that causes the fishery to automatically fail the assessment, unless performance is improved as a pre-condition to certification.

7.2 Scoring

The assessment team convened a scoring meeting on 24th & 25th January 2008. The output of this meeting is shown in the scoring sheets forming **Appendix 3** to this report. The weighted scores allocated to the assessment tree at sub-criterion, Criterion and Principle levels are shown schematically in **Fig 8**. The weighted scores for those sub-criteria where a score of below 80 has been allocated at Performance Indicator level – and thus triggering the placing of a condition to bring that element up to good industry practice - are indicated in red.

Fig 8 – Allocation of weighted scores at sub-criteria, Criteria and Principle levels



The areas where current practices are considered to be below good industry practice relate to:

- failure to fully and consistently apply the Harvest Control Rule established under the EU-Norway Agreement
- recognition that the current Standing Stock Biomass (SSB) is below B_{pa} , though above B_{lim} , triggering an MSC requirement that an appropriate recovery plan is drafted and applied
- current fishing mortality is above target mortality, but if continued will result in a further drop in SSB
- in light of the above, the decision rules by which the fishery is managed cannot be considered to follow a precautionary approach

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Table 3 - Those Performance Indicators where a score of less than 80 has been allocated are:

PI	Sub-criterion	Performance Indicator	Basis of scoring	
1.1.2.1	There should be sufficient information on the target species and stock separation to allow the effects of the fishery on the stock to be evaluated.	Are all major sources of fishery related mortality recorded/ estimated, including landings, discards, incidental mortality and mortality of juveniles?	<p>Catches are recorded adequately for stock assessment. There are significant gaps in data provided on landings and discards, which are corrected as far as possible by the working group. The landings from the directed catches (Fleet A to which the fishery to be certified belongs) are well recorded and covered (national and EC sea fisheries statistics) but there is a continued level of under-reporting and mis-reporting attributable to fleet A. The stock assessment model requires catch-at-age data. Length, weight and age readings in 2006 decreased from 2005.</p> <p>Although more categories of fleet, nation, area and quarter were covered, the coverage of sampling does not meet levels specified by the EU. The catch of France, UK/England and Wales, Sweden, UK/Northern Ireland, the Faroe Islands and Belgium from the North Sea has not been sampled (HAWG07 Pg. 87 Table 2.2.12).</p>	75
1.1.2.4	There should be sufficient information on the target species and stock separation to allow the effects of the fishery on the stock to be evaluated.	Is the target species taken in other fisheries in the area that are not subject to this certification and are such catches recorded or estimated	<p>The current stock assessment divides the fleet into four categories:</p> <ul style="list-style-type: none"> • The North Sea directed fisheries with purse seiners and trawlers (mainly directed to human consumption) including by-catches in the Norwegian industrial fishery (Fleet A) • All other fisheries in the North Sea where herring are taken as a by-catch under EU regulations (Fleet B). • Directed fisheries for herring in ICES Division IIIa (Fleet C) • Small meshed fisheries in ICES Division IIIa, which take by-catches of herring (Fleet D). <p>The fishery to be certified belongs to Fleet A. Each fleet is subjected to the same system of monitoring and sampling, which should give a complete picture of the catch composition. All the landings, including estimates of their discards, are used in the assessment process.</p> <p>There is some misreporting, unallocated catch and discards are under-reported and there is no reporting of foreign landings (HAWG07 Section 2.2.4 Pg 53). By-catch information remains incomplete (only Denmark in Fleet B provided by-catch information) and discarding is underestimated. However, there is evidence that these problems have been decreasing (the difference between the Working Group catch and official landings have decreased) and they do not critically undermine the stock assessment.</p>	75

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			Based on the information the team have at the moment awarded a score of 75; should new data come to light the score may be reviewed. Currently herring catches in other relevant fisheries are not clearly recorded.	
1.1.4.3	There is a well-defined and effective harvest strategy to manage the target stock	Are appropriate management tools specified to implement decisions in terms of input and/or output controls?	<p>While the management system to control harvest exists, the recent evidence suggests that the system will not be effective in ensuring the stock does not become depleted in future.</p> <p>There are three causes:</p> <ul style="list-style-type: none"> • The harvest control rule (HCR) is not necessarily consistent with the current levels of recruitment. The projections show that the +/-15% TAC change rule (rule 6) in the harvest control rule is not precautionary when there is a prolonged downturn in recruitment (ICES 2005, ICES 2008) and that under this HCR the stock will not rebuild to a biomass above the precautionary level (HAWG07, Pg180, Figure 2.8.1, ICES 2008). • The management decision-makers consider the rule as a guide rather than a robust method to set TACs. Consequently, this has led to setting the TAC above the target fishing mortality as biomass has declined. The way the HCR is used in practice cannot be subject to accurate simulations and therefore cannot be tested. (HAWG07 Annex 5: Technical Minutes (Pg 537) states that “The large overshoot of F is explained with the fact that managers have agreed on too high TACs in recent years. This should be interpreted as an implementation error of the Management Plan.”) • The official landings have exceeded the TAC by between 2% and 6% during 2001-2006 overall, although the TAC overshoot by Fleet A has been much worse (HAWG07 Sect. 2.7.3.1 Pg 63). This overshoot of the TAC needs to be taken account of in the way the HCR is implemented and administered. <p>Concerning the implementation of the TAC, from the simulations the HAWG07 found that (Section 2.8.3 Pg 66) “the current management rule is not robust to implementation error in terms of overfishing of the quotas beyond the level that is estimated at present. Hence, either the enforcement has to be stronger than in the past, or an even more conservative harvest rule has to be applied in order to safeguard against depleting the stock.</p>	70
1.1.6.1	The stock(s) is/are at appropriate	Is the stock(s) at or above reference level for	The spawning stock biomass (SSB) in 2006 is estimated at 1.2 million tonnes, below the Bpa (1.3 million tonnes), but above Blim (0.8 million tonnes) (HAWG07). Therefore the stock is above the limit	75

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	precautionary reference level(s).	SSB? [If below SG80 then Criterion 2 must be scored; if SG80 or above, then Criterion 1 is complete]	but below the precautionary level.	
1.1.6.2	The stock(s) is/are at appropriate precautionary reference level(s).	Is the stock(s) at or above reference level for F? [If below SG80 then Criterion 2 must be scored; if SG80 or above, then Criterion 1 is complete]	<p>The effective target fishing mortality is at or below 0.25 (the actual F in 2006 was 0.35 which is well above Fpa for adults aged 2-6, although pressure on juveniles was well below target F). Whilst there is no specific Flim the specified target in the EU/Norway agreement is 0.25. A maximum Flim is effectively not applied.</p> <p>The failure to comply with the precautionary management rule in setting the TAC in 2007 has resulted in a fishing mortality that is higher than the target. This is a matter of concern with the current low recruitment.</p> <p>Although the result of maintaining the present fishing mortality at around the current level (0.35) has not been examined in detail, it is clear that if it is not reduced it will lead to a substantial reduction in SSB to a level below Blim in the near future.</p>	70
1.2.1	If the stock is below the precautionary reference point, are measures to rebuild the stock specified?		Although the rebuilding measures through reduction in exploitation exist in the current harvest control rule, even if they are applied, the medium term population projections suggest that the stock will not rebuild to above Bpa (HAWG07 Fig. 2.8.1) unless there is a substantial increase in recruitment or a complete ban on directed fishing for herring (although this is unrealistic in the present situation).	75
3A.3.4	Does the management system contain clear short and long-term objectives?	Do objectives and operational procedures follow the precautionary approach?	<p>The decision rules seek to be precautionary to meet the objective of Bpa. TAC advised cuts, based on the harvest control rule, appear to be precautionary (certainly more than in previous years). However, there is considerable scope for increased precaution in the setting of F.</p> <p>This has particular relevance in relation to the +/-15% rule, which does not follow best scientific advice and has been shown not to be precautionary, albeit the 15% change can and has been overridden. A more significant issue is the implementation, which often parts from the harvest control rule established under the EU-Norway agreement. The decision process lacks transparency and precise reasons for the</p>	70

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			departure from the HCR are not given, but have clearly not always been precautionary.	
3B.5.2	Fishing operations are conducted in compliance with the management system and legal and administrative requirements.	Do fishers comply with management system, legal and administrative requirements?	This fishery has had a history of non-compliance although major efforts have been made to improve MCS systems and SFPA are confident that this has improved compliance. Although there is a clear system in place which is implemented and incorporates legal and administrative requirements - this is not documented as a formalised code of conduct.	70

8. Certification recommendation

8.1 Certification recommendation

The Performance of the SPSG North Sea Herring Fishery in relation to MSC Principles 1, 2 and 3 is summarised below:

MSC Principle	Fishery Performance
Principle 1: Sustainability of Exploited Stock	Overall : 82
Principle 2: Maintenance of Ecosystem	Overall : 90
Principle 3: Effective Management System	Overall : 90

The fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any MSC Criteria. **It is therefore recommended that the Scottish Pelagic Sustainability Group North Sea herring fishery be certified according to the Marine Stewardship Council Principles and Criteria for Sustainable Fisheries.**

Following this recommendation of the assessment team, and review by stakeholders and peer-reviewers, the recommendation will be presented to the Governing Board of FCI to certify this fishery.

8.2 Scope of certification

This assessment relates only to the fishery defined in **Section 1.1** up to the point of landing as defined in **Section 8**.

Monitoring and control of fishing locations and methods is considered sufficient to ensure fish and fish products invoiced as such by the fishery originate from within the evaluated fishery. Accordingly, the assessment team recommends a joint fishery and chain of custody certificate. This would allow fish and fish products from this fishery to enter into further chains of custody subject to appropriate assessment and certification.

8.3 Pre-conditions, conditions or recommendations associated with certification

Pre-conditions

No pre-conditions have been set for this fishery.

The fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any MSC Criteria. No pre-conditions are therefore required prior to certification being granted.

Conditions

The fishery attained a score of below 80 against a number of Performance Indicators. The assessment team has therefore set a number of conditions for continuing certification that the Scottish Pelagic Sustainability Group, as the client for certification, is required to address. The conditions are applied to improve performance to at least the 80 level within a period set by the certification body but no longer than the term of the certification.

As a standard condition of certification, the client shall develop an 'Action Plan' for Meeting the Conditions for Continued Certification', to be approved by Food Certification International.

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The conditions are associated with five key areas of performance of the fishery, each of which addresses one or more Performance Indicators. Conditions, associated timescales and relevant Performance Indicators are set out below.

Condition 1: Provide slippage information.

Action Required: There are concerns about the possibility of higher mortality of both target and non target species. The SPSG vessels should record all slippage. Slippage may not recently have been a problem partly because of low recruitment so that smaller fish are rarely caught. This may change if recruitment improves. In addition, there is concern about the possibility that slippage related mortality in both target and non-target species may be higher than currently assessed by fishermen.

The SPSG should consult with the Scottish fisheries research services as to what information is required, but it is likely to include estimated quantity of fish by species, reason for slipping, and the condition of the school to give an indication of likely mortality.

Timescale: The condition should apply from the start of certification. Recording of slippage should be in place as from the start of certification, and evidence of this should be provided at the time of the first surveillance visit. Evidence of support for the study of slippage survival rates should be provided for the second surveillance visit.

Relevant Scoring Indicators: 1.1.2.1, 2.1.2.2, 3.B.1.1, 3.B.6.1

Condition 2: Support research into slippage survival rates.

Action Required: If research on slippage survival rates is undertaken, full co-operation and support should be given to researchers by the SPSG vessels. In addition, the SPSG should actively promote and support such initiatives, through the Scottish Government and the Pelagic RAC (Regional Advisory Council).

Timescale: Evidence of positive support by SPSG for research into the survival rates of slipped fish should be provided by the time of the first surveillance visit.

Relevant Scoring Indicators: 1.1.2.1, 2.1.2.2, 3.B.1.1, 3.B.6.1

Condition 3: Ensure that the fishery makes no contribution to the overshoot of the TAC.

Action Required: The SPSG member vessels must clearly demonstrate that they do not contribute to overshoot of the TAC. During the period of certification, the total landings should be equal to or lower than the quota allocated to the client (including additional or reduced allocations resulting from quota swaps), which can be checked during the surveillance, and this should be verified by monitoring and surveillance data from the Scottish Fishery Protection Agency.

Timescale: The condition should apply from the start of certification and be on-going until such time as overshoot of TAC is no longer a problem within the fishery as a whole.

Relevant Scoring Indicators: 1.1.4.3

Condition 4: Promote rebuilding of the stock to an agreed target reference point.

Action Required: The current harvest control rule has a number of problems and has been identified as only marginally effective in meeting management objectives. In particular, the current rule will not allow the stock to rebuild to above the trigger point, which is effectively the current target.

Any precautionary rebuilding plan (new harvest control rule) developed by scientists meeting management objectives (which specifically state that the TAC should be set at a precautionary level) should be supported by the SPSG. Their support can demonstrate support through the Pelagic RAC

minutes and through writing to managers – the Scottish vessels are a significant constituency of the overall fishery and therefore carry a strong influence at negotiations. This should be used to support this condition. The plan should be considered as compatible with the principles and criteria during the surveillance.

Timescale: A rebuilding plan is expected shortly within the period of certification. It should be implemented before the next surveillance audit.

Relevant Scoring Indicators: 1.1.4.2, 1.1.4.3, 1.1.6.1, 1.1.6.2, 1.2.1.1, 3.A.3.4

Condition 5: The overall TAC should not be set to override the harvest control rule with fishing mortalities set significantly above the target.

The decision makers have shown that they may not keep to the decision rule, but set the TAC such that the fishing mortality is significantly higher than the target. This is not consistent with the MSC Ps&Cs and has undermined confidence in the decision making process. Ongoing surveillance is required to ensure that the TAC is not set to override the harvest control rule with fishing mortalities set above the target, particularly as the SSB approaches the limit. In order to maintain MSC certification the SPSG should therefore actively canvas for TACs to be set at or below the agreed target.

Timescale: The SPSG should show evidence that it has canvassed for such action through correspondence with the Scottish Government and the Pelagic RAC. This condition applies throughout the period of certification.

Relevant Scoring Indicators: 1.1.4.2, 1.1.4.3, 1.1.6.1, 1.1.6.2, 1.2.1.1, 3.A.3.4

Recommendations

In addition to the above Conditions, it is also considered that there are areas of performance that the team would like to see improvements in, despite the fact that they relate to Performance Indicators where the client vessels scored 80 or better.

The assessment team has made a number of recommendations. These are not required to maintain certification but would improve the performance of the fishery against the MSC Principles and Criteria. Accordingly, the action taken and timescales are at the discretion of the client.

Recommendations are made in respect of:

- **Endangered, threatened and protected species** - SPSG vessels should record all vessel interactions with any seabirds and marine mammals. Contact should be made with SMRU to find out how such information may be recorded and what other help might be provided.
- **Written operating procedures** – SPSG should formally place on record current vessel operating guidelines in the form of a Vessel Operating Manual to incorporate, the founding principles of the SPSG as detailed at <http://www.scottishpelagicsg.org/>. This should also include procedures to be applied to address the conditions of certification, detailed above. This should include details in respect of the identification of herring shoals – and communication in event of slippage, the recording of the occurrence and nature of slipping, and the recording of any interaction with Protected, Endangered or Threatened species.

9. Agreement

9.1 Applicant's agreement to meet specified conditions

The agreed Action Plan of SPSG North Sea herring to meet the above Conditions of Certification is appended to this Public Certification Report.

Appendix 1 – MSC Ps & Cs

Principle 1

A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted; the fishery must be conducted in a manner that demonstrably leads to their recovery.

Intent:

The intent of this principle is to ensure that the productive capacities of resources are maintained at high levels and are not sacrificed in favour of short-term interests. Thus, exploited populations would be maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yields over the long term.

Criteria:

1. The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.
2. Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.
3. Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.

Principle 2

Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

Intent:

The intent of this principle is to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem.

Criteria:

1. The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.
2. The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimises mortality of, or injuries to endangered, threatened or protected species.
3. Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

Principle 3

The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

Intent:

The intent of this principle is to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery.

A. Management System Criteria:

1. The fishery shall not be conducted under a controversial unilateral exemption to an international agreement.

The management system shall:

2. Demonstrate clear long-term objectives consistent with MSC Principles and Criteria and contain a consultative process that is transparent and involves all interested and affected parties so as to consider all relevant information, including local knowledge. The impact of fishery management decisions on all those who depend on the fishery for their livelihoods, including, but not confined to subsistence, artisanal, and fishing-dependent communities shall be addressed as part of this process.
3. Be appropriate to the cultural context, scale and intensity of the fishery – reflecting specific objectives, incorporating operational criteria, containing procedures for implementation and a process for monitoring and evaluating performance and acting on findings.
4. Observe the legal and customary rights and long-term interests of people dependent on fishing for food and livelihood, in a manner consistent with ecological sustainability.
5. Incorporates an appropriate mechanism for the resolution of disputes arising within the system.
6. Provide economic and social incentives that contribute to sustainable fishing and shall not operate with subsidies that contribute to unsustainable fishing.
7. Act in a timely and adaptive fashion on the basis of the best available information using a precautionary approach particularly when dealing with scientific uncertainty.
8. Incorporate a research plan – appropriate to the scale and intensity of the fishery – that addresses the information needs of management and provides for the dissemination of research results to all interested parties in a timely fashion.
9. Require that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted.
10. Specify measures and strategies that demonstrably control the degree of exploitation of the resource, including, but not limited to:
 - a. setting catch levels that will maintain the target population and ecological community's high productivity relative to its potential productivity, and account for the non-target species (or size, age, sex) captured and landed in association with, or as a consequence of, fishing for target species;
 - b. identifying appropriate fishing methods that minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
 - c. providing for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames;
 - d. mechanisms in place to limit or close fisheries when designated catch limits are reached;
 - e. establishing no-take zones where appropriate.
11. Contains appropriate procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that established limits to exploitation are not exceeded and specifies corrective actions to be taken in the event that they are.

B. Operational Criteria

Scottish Pelagic Sustainability Group North Sea herring fishery

Fishing operation shall:

12. Make use of fishing gear and practices designed to avoid the capture of non-target species (and non-target size, age, and/or sex of the target species); minimise mortality of this catch where it cannot be avoided, and reduce discards of what cannot be released alive.
13. Implement appropriate fishing methods designed to minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas.
14. Not use destructive fishing practices such as fishing with poisons or explosives;
15. Minimise operational waste such as lost fishing gear, oil spills, on-board spoilage of catch etc.
16. Be conducted in compliance with the fishery management system and all legal and administrative requirements.
17. Assist and co-operate with management authorities in the collection of catch, discard, and other information of importance to effective management of the resources and the fishery.

Appendix 2 – The EU-Norway agreement

Annex IV to the “Agreed Record of Conclusions of Fisheries Consultations between the European Community and Norway for 2008 – Brussels, 26 November 2007”

Long-term management plan for herring of North Sea origin and allocation of catches

The Parties agreed to continue to implement the management system for North Sea herring, which entered into force on 1 January 1998 and which is consistent with a precautionary approach and designed to ensure a rational exploitation pattern and provide for stable and high yields. This system consists of the following:

1. Every effort shall be made to maintain a minimum level of Spawning Stock Biomass (SSB) greater than 800,000 tonnes (B_{lim}).
2. Where the SSB is estimated to be above 1.3 million tonnes the Parties agree to set quotas for the directed fishery and for by-catches in other fisheries, reflecting a fishing mortality rate of not more than 0.25 for 2 ringers and older and no more than 0.12 for 0-1 ringers.
3. Where SSB is estimated to be below 1.3 million tonnes but above 800,000 tonnes, the Parties agree to set quotas for the direct fishery and for by-catches in other fisheries, reflecting a fishing mortality rate equal to:
 $0.25 - (0.15 * (1,300,000 - SSB) / 500,000)$ for 2 ringers and older, and
 $0.12 - (0.08 * (1,300,000 - SSB) / 500,000)$ for 0-1 ringers
4. Where the SSB is estimated to be below 800,000 tonnes the Parties agree to set quotas for the directed fishery and for by-catches in other fisheries, reflecting a fishing mortality rate of less than 0.1 for 2 ringers and older and of less than 0.04 for 0-1 ringers.
5. Where the rules in paragraphs 2 and 3 would lead to a TAC which deviates by more than 15% from the TAC of the preceding year the Parties shall fix a TAC that is no more than 15% greater or 15% less than the TAC of the preceding year.
6. Notwithstanding paragraph 5 the Parties may, where considered appropriate, reduce the TAC by more than 15% compared to the TAC of the preceding year.
7. By-catches of herring may only be landed in ports where adequate sampling schemes to effectively monitor the landings have been set up. All catches landed shall be deducted from the respective quotas set, and the fisheries shall be stopped immediately in the event that the quotas are exhausted.
8. The allocation of the TAC for the directed fishery for herring shall be 29% to Norway and 71% to the Community. The by-catch quota for herring shall be allocated to the Community.
9. A review of this arrangement shall take place no later than 31 December 2008.
10. This arrangement entered into force on 1 January 2005.

Appendix 3 – Scoring sheets (Assessment Tree, Scoring Guideposts & Performance Indicators).

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NAME OF FISHERY	SCOTTISH PELAGIC SUSTAINABILITY GROUP - NORTH SEA HERRING FISHERY		
Principle 1	A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.	33.0	100
1.1 (MSC Criterion 1)	The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.	33.0	
Weighting commentary	Within MSC Principle 1 there is no clear basis for apportioning any differential weighting, and so all criteria and sub-criteria per criterion have been given equal weighting. The inter-relationship between the collection and availability of data and what is subsequently done with that data is too tight to apportion greater or lesser importance.		
1.1.1	There should be sufficient information on the target species and stock separation to allow the effects of the fishery on the stock to be evaluated.	17.0	
Weighting commentary	Equal weighting has been ascribed to each element of information on the species.		

1.1.1.1	Are the species readily identified as adults and juveniles?				
60	Misidentification is possible and increases recording errors of catches, but this does not compromise monitoring to unacceptable levels.	Herring is easily identified by fishermen and researchers. It schools separately at sea and can be sometimes identified by its behaviour and sonar trace. Fishers are able to identify and target schools with increasing accuracy. The documentation found in the ICES reports, log book entries, weight price, and official sampler records of fish catch weights are all able to clearly identify the species with a high degree of accuracy. The only issue in relation to identification is for juvenile due to the mixing with sprats, meaning that it is widely caught as a by-catch in the sprat fisheries (mainly off the coast of Denmark and East coast of England). However, once landed sprat and herring can be identified by data collectors and the proportion of the catch that is juvenile is estimated from sampling (HAWG07). High proportions of juvenile herring reduce the overall quality of the sprat catch so minimising the amount of herring is important to fishers and therefore they can generally differentiate between sprat and herring. Larval identification by scientists is simple and separation from sprat and pilchard is based on pre-anal myotome counts.	I4. R2.	17.0	100
80	The target species are unlikely to be confused with any other species; or, if target species are grouped, then life history or stock identification information exists to justify this grouping.				
100	The species is readily identified by fishers and by regulators and is recorded appropriately.				

1.1.1.2	Is the life history of the species understood and the spawning and nursery areas well described?				
60	There are gaps in information but the basis of the life history is understood. Information is adequate to support a general population model. There is some information on spawning and nursery areas.	Spawning and nursery areas well defined and documented (ICES), life history clearly documented and understood (see ICES FishMap for herring www.ices.dk/marineworld/fishmap/ices/pdf/herring.pdf for a summary and background references). Ecological interactions at the planktonic stage are not so well understood, as shown by the fact that the current high mortality of herring larvae was not predicted and has yet to have a full explanation (HAWG07 Section 1.8 Pg 25-31).	I4. R2. R3. R6	17.0	90
80	The life history of the species is clearly documented and understood. Information is adequate to support an appropriate population model. Spawning and nursery areas are well described				

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100	The life history of the species is clearly documented and understood including behaviour and ecological interactions. Spawning and nursery areas are sufficiently well documented to support closed area / seasons where this is deemed necessary.				
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1.1.1.3		Is the geographical range of the target stock known and its seasonal migration well described?			
60	An estimate of the geographical range of the target stock is available. A management unit approximating the stock is used with some biological justification.	The stock structure is well documented and the range of the autumn-spawning population subject to this certification well defined (HAWG07, p31). Mixing between stocks and with other species is more likely to occur in particular areas and at certain times of the year. In particular, there is some overlap in the stock distribution with spring spawning stocks on the periphery of the autumn spawning stock documentation, but the catch allocation and survey data takes account of this (the only problem area in this context is with western Baltic spring-spawners in the North Sea and North Sea autumn spawners in the western Baltic; the statistical method of apportioning the two stocks is based on otolith microstructure sampling). The current assumptions about stock structure are considered adequate for stock assessment (Mariani et al. 2005).	I4. R2. R4. R6. R43	17.0	95
80	A reliable estimate of the geographic range of the target stock is available including seasonal patterns of movement/availability Scientific research is used to support the stock identification.				
100	The complete geographic range of the stock, including seasonal patterns of movement/availability, is estimated and documented each year. Extensive scientific research is used to justify stock identification.				

1.1.1.4		Is life cycle information collected sufficient to populate an appropriate stock assessment model (1.1.5.1) – life cycle, geography, fecundity, growth, sources of natural mortality, stock size/density, relationship between stock size and abundance / density parameters?			
60	There is basic information available on all these parameters.	The life history of herring is well understood. Information on adult population dynamics is high, but there is less information on larvae and juvenile stages. Density dependent growth, geographical distribution and fecundity are well monitored. Significant uncertainties exist with understanding the impact of climate change on the larvae and natural mortality rates (HAWG07, ICES 2006/ACE:03, ICES 2006/LRC: 03).	I4. R2. R5. R6.	17.0	90
80	There is well developed information on all the parameters.				
100	There is comprehensive and reliable information on each of these parameters and their change over time.				

1.1.1.5		Is there evidence of the factors causing variability in recruitment and can they be used to predict recruitment?			
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60	There is some information on factors generating recruitment variability, including some time series data. Stock/recruit relationship may not be validated.	<p>There is a good time series of recruitment estimates giving an accurate picture of past recruitments (HAWG07). There is a poorer understanding of why recent recruitment has been low (HAWG07, ICES 2006/LRC: 03), and these circumstances make prediction unreliable. There is current speculation as to whether the whole historic S/R relationship, with values from when the stock was both very high and very low, should be used in the current S/R relationship for predictive purposes (see also 1.1.3.1). Investigations are ongoing to interpret the situation (HAWG07, ICES 2007/OCC: 11).</p> <p>The Study Group on Recruitment Variability in North Sea Planktivorous Fish (SGRECVAP) met in 2007. The findings of SGRECVAP have influenced the choice of recruitment scenarios used for North Sea herring short and medium term projections (ICES 2007).</p>	I4. R1. R2. R6. R7. R14	16.0	80
80	There is ongoing research into the factors generating recruitment variability. Good time series data are available but the S/R relationship is not sufficiently robust for prediction process.				
100	Strong evidence of ongoing research projects to study recruitment variability factors with some evidence of an understanding of those factors. A good S/R relationship, built up over a long time series exists and can be reliably used to predict recruitment for medium term stock projections.				

1.1.1.6		Is information available on environmental influences on the stock dynamics?			
60	Evidence of some research studies providing some understanding of the effects of environmental change. Research is encouraged and ongoing.	<p>There is a large volume of information available on environmental influences in the North Sea. These are used qualitatively not quantitatively in assessing the herring stock, in, for example, developing projection scenarios (HAWG07). Research is on-going on integrating environmental information into stock assessments. The Workshop on the Integration of Environmental Information into Fisheries Management Strategies (WKEFA) has selected NS herring as a case study to include environmental variables in determining reference points and the population dynamics (ICES WKEFA Report 2007).</p>	I4. R2. R6. R12. R13.	16.0	80
80	There is knowledge of physical and biological factors affecting distribution, survival and year class strength. Some information is sufficiently robust for use in the stock assessment process.				
100	Comprehensive knowledge of physical and biological factors affecting distribution, survival and year class strength. Key information is sufficiently robust for use in the stock assessment process.				

1.1.2	There should be sufficient information on the fishery to allow its effects on the target stock to be evaluated			17.0	
Weighting commentary	Equal weighting has been ascribed to each element of information on the fishery.				

1.1.2.1		Are all major sources of fishery related mortality recorded/ estimated, including landings, discards, incidental mortality and mortality of juveniles?			
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60	Sufficient information is available to allow accurate estimates to be made of landings broken down as required by the population model. Estimates of discards and incidental mortality are available.	Catches are recorded adequately for stock assessment. There are significant gaps in data provided on landings and discards, which are corrected as far as possible by the working group. The landings from the directed catches (Fleet A to which the fishery to be certified belongs) are well recorded and covered (national and EC sea fisheries statistics) but there is a continued level of under-reporting and mis-reporting attributable to fleet A. The stock assessment model requires catch-at-age data. Length, weight and age readings in 2006 decreased from 2005.	R2. R6	20.0	75
80	Landings are accurately recorded. Discards and incidental mortality are well estimated. Mortality on juveniles is monitored and recorded separately.				
100	Landings, discards and incidental mortality are accurately recorded and monitored. Mortality on juveniles is monitored and recorded separately				

1.1.2.2		Are fleet descriptions, fishing methods and gear types known throughout the fishery?			
60	Main fishing methods and gear types are known for the fishery. Information is available on the size and composition of the fleets, but is not regularly updated.	Knowledge of the fishing methods and gear type is well documented through the licensing system and updated, however there is less detailed information on small mesh vessels, which only take a relatively small catch	R8.	20.0	90
80	Main fishing methods and gear types are known and information is available on the geographical areas of use. Recorded information is available on the size and composition of the fleets. This is updated at irregular intervals.				
100	All fishing methods and gear types employed in the fishery are known. In-situ observations are made of fishing practices. Comprehensive knowledge is recorded and regularly updated, on the size and composition of the fleets.				

1.1.2.3		Is gear selectivity known for the fishery			
60	Information is available on selectivity and qualitative changes in selectivity.	Selectivity-at-age is well estimated by the stock assessment, by implication this gives good estimates by size, sex and maturity (HAWG07). However selectivity is estimated by broad fleet category rather than gear type and therefore cannot be linked directly to vessel activity. There are four fleet categories defined by vessel type and area of operation.	I11. R2. R6	20.0	85
80	Selectivities of gear types are well estimated by size, sex and maturity.				

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100	Full selectivities have been accurately estimated for all gears, locations and times of fishing over time.				
1.1.2.4		Is the target species taken in other fisheries in the area that are not subject to this certification and are such catches recorded or estimated			
60	There is some information relating to other fisheries in the area that are not subject to this certification, although these are not fully identified. The catches are estimated in the stock assessments.	<p>The current stock assessment divides the fleet into four categories:</p> <ul style="list-style-type: none"> • The North Sea directed fisheries with purse seiners and trawlers (mainly directed to human consumption) including by-catches in the Norwegian industrial fishery (Fleet A) • All other fisheries in the North Sea where herring are taken as a by-catch under EU regulations (Fleet B). • Directed fisheries for herring in ICES Division IIIa (Fleet C) • Small meshed fisheries in ICES Division IIIa, which take by-catches of herring (Fleet D). <p>The fishery to be certified belongs to Fleet A. Each fleet is subjected to the same system of monitoring and sampling, which should give a complete picture of the catch composition. All the landings, including estimates of their discards, are used in the assessment process.</p> <p>There is some misreporting, unallocated catch and discards are under-reported and there is no reporting of foreign landings (HAWG07 Section 2.2.4 Pg 53). By-catch information remains incomplete (only Denmark in Fleet B provided by-catch information) and discarding is underestimated. However, there is evidence that these problems have been decreasing (the difference between the Working Group catch and official landings have decreased) and they do not critically undermine the stock assessment.</p> <p>Based on the information the team have at the moment awarded a score of 75, should new data come to light the score may be reviewed. Currently herring catches in other relevant fisheries are not clearly recorded.</p>	R2. R6	20.0	75
80	The main fisheries not subject to certification are identified. The catches of the target species are either recorded or estimated in the stock assessments.				
100	All fisheries (and other sources of human-induced mortality) in the area that are not subject to this certification are identified and monitored. All the catches are recorded and used in the stock assessment.				
1.1.2.5		Are there robust systems to monitor any area and landings misreporting?			
60	There is information on area and landings misreporting. Estimates are included in the stock assessments.	<p>There are strong monitoring and disincentive systems in place (CFP framework and controls). The working group corrects and estimates catches where data are poor or missing (HAWG07 Sect 2.1.2 Pg 50). There has been an apparent improvement in catch data collection and recording, indicated by increasing correspondence between the working group catch estimates used in the stock assessment and "official" landings.</p>	I1. I7. R2. R6. R9. R10.	20.0	85
80	Disclosure and enforcement systems in place are able to detect and discourage misreporting Where it occurs; it is carefully evaluated and taken into account in the stock assessment.				
100	There is negligible misreporting in this fishery. Where it occurs, reliable estimates are made and used in the stock assessment.				
1.1.3		Appropriate reference levels have been developed for the stock.		16.0	
Weighting commentary		There is a single scoring point only.			

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1.1.3.1		Are there appropriate limit and precautionary reference points based on both biomass and fishing mortality?			
60	Limit and precautionary reference points have been chosen and are justified based on standard international practice.	The current reference points are based on the herring population dynamics observed since 1958. Based on historical evidence, all reference points are appropriate for this stock. However, recent unprecedented low recruitment suggests the long-term averages used to define reference points may no longer be valid.	I4. R14. R15.	100	80
80	Limit and precautionary reference points are justified based on stock biology (e.g. a stock-recruitment relationship) and take account of likely factors affecting abundance.	Hypotheses considered by SGRECVAP could provide the basis for proposing alternative reference points (ICES CM 2007/lrc:07). Reference points are regularly reviewed by HAWG as well as by the Workshop on Limit and Target Reference Points [WKREF].			
100	Limit and precautionary reference points are justified based on statistical and model structure uncertainty over a wide range of hypotheses of factors affecting changes in abundance.	In 2007 WKREF explored limit reference points for NSAS herring among a number of other stocks. WKREF concluded that there is no basis for changing B_{lim} based on this analysis. HAWG has decided not to propose any revision of the B_{lim} reference points at present for the following reasons: <ul style="list-style-type: none"> • WKREF questioned the validity of the alternative procedure recently proposed. • Currently there is no indication that the stock dynamics are changing. • The role of regime shifts in determining limit reference points should be integrated in the process. HAWG would prefer to consider all reference points together, rather than revising just B_{lim}			

1.1.4		There is a well-defined and effective harvest strategy to manage the target stock.		16.0	
	Weighting commentary	Equal weighting has been ascribed to each element dealing with the harvest control rule.			

1.1.4.1		Is there a mechanism in place to contain harvest as required?			
60	Mechanisms exist to monitor and (if necessary) contain harvest, but do not fully contain harvest, or have not been tested. Measures provide a reasonable degree of confidence in stock management.	There are appropriate mechanisms in place to contain harvest (national management of quota uptake and 100% inspections on landing used to trigger controls). There is strong evidence that these mechanisms have succeeded in rebuilding the stock from past depletion (HAWG07).	I2. I3. I9. R2. R8.	33.0	90
80	Appropriate mechanisms are in place to contain harvest as and when required to maintain, or allow the target stock to return to, productive levels. These have been tested if /as appropriate for robustness against uncertainties in the assessment and management process.	The main mechanism is based on TAC allocation and control. The TAC is split among countries and vessels, and can be reallocated through purchase according to need. The system is administered by monitoring landings which are counted against the TAC. Landings are considered generally well monitored (see 1.1.2.1). The TAC allocated to bycatch has not been met, and discards (slippage) is not counted against the TAC. While the mechanism exists, it has not always been effective (see also 1.1.4.3)			

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100	Mechanisms are in place to contain harvest as and when required to maintain (or allow the target stock to return to) productive levels. Measures are robust to uncertainty in data inputs or stock biology. Specific measures to demonstrate effectiveness are in place and their robustness has been examined against a wide range of uncertainties.				
1.1.4.2		Are clear, tested decision rules set out?			
60	It can be demonstrated that decision making, though not documented, is logical and appropriate. Decision-making rules exist, are consistent with the reference levels, but have not been tested.	Although clear decision-making rules exist, these are not implemented in a completely transparent way. It is not clear that the rule is performing well under a reduced level of recruitment. ICES (2008) confirms that "... the performance of the current harvest rule is at best marginal in the present situation of reduced recruitment. However, there is clear evidence that the harvest control rule is being re-evaluated and changes are being considered.	I2. R2. R6. R11. R22.	33.0	80
80	Clear decision-making rules are fully implemented and documented. Decision rules have been tested against likely future factors affecting abundance.	The harvest control rule is referred to by the HAWG (HAWG07) and the EU-Norway agreement (EU-Norway, 2008, Annex IV), and is used as the basis for carrying out short and long-term projections and for recommending the TAC (HAWG07, ICES 2008) as well as decision-making over the TAC (EU-Norway, 2008). The EU-Norway agreement is used in negotiations over the TAC.			
100	Decision rules have been fully evaluated and have been shown to be robust to the data and assessment limitations, and a wide range of projections covering all likely scenarios.	The EU-Norway negotiations have generally resulted in a departure from the rule, usually setting a fishing mortality higher than the target (HAWG07 Pg 537 Review); no explanation is given, although there is clear evidence that the rule is being used for guidance (EU-Norway, 2008, Table 1, Section 5.9.1).			
1.1.4.3		Are appropriate management tools specified to implement decisions in terms of input and/or output controls?			
60	Management tools exist to implement decisions of input and/or output controls specifically related to the fishery and consistent with attaining reference levels (1.1.3.1). Some evidence exists to show that tools can be effective in achieving management goals.	While the management system to control harvest exists, the recent evidence suggests that the system will not be effective in ensuring the stock does not become depleted in future. There are three causes: <ul style="list-style-type: none"> The harvest control rule (HCR) is not necessarily consistent with the current levels of recruitment. The projections show that the +/-15% TAC change rule (rule 6) in the harvest control rule is not precautionary when there is a prolonged downturn in recruitment (ICES 2005, ICES 2008) and that under this HCR the stock 	R2. R6. R10.	33.0	70

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80	Management tools, appropriate to the species and fishery, have been specified to implement decisions of input and/or output controls. The effectiveness of the management tools is actively monitored, and evidence exists to show that tools are effective.	<p>will not rebuild to a biomass above the precautionary level (HAWG07, Pg180, Figure 2.8.1, ICES 2008).</p> <ul style="list-style-type: none"> The management decision-makers consider the rule as a guide rather than a robust method to set TACs. Consequently, this has led to setting the TAC above the target fishing mortality as biomass has declined. The way the HCR is used in practice cannot be subject to accurate simulations and therefore cannot be tested. (HAWG07 Annex 5: Technical Minutes (Pg 537) states that "The large overshoot of F is explained with the fact that managers have agreed on too high TACs in recent years. This should be interpreted as an implementation error of the Management Plan.") The official landings have exceeded the TAC by between 2% and 6% during 2001-2006 overall, although the TAC overshoot by Fleet A has been much worse (HAWG07 Sect. 2.7.3.1 Pg 63). This overshoot of the TAC needs to be taken account of in the way the HCR is implemented and administered. 			
100	Management tools have been specified to implement decisions of input and/or output controls. Tools are responsive, relevant and timely. Performance of the tools has been evaluated and evidence exists to show clearly that tools achieve their objectives.	Concerning the implementation of the TAC, from the simulations the HAWG07 found that (Section 2.8.3 Pg 66) "the current management rule is not robust to implementation error in terms of overfishing of the quotas beyond the level that is estimated at present. Hence, either the enforcement has to be stronger than in the past, or an even more conservative harvest rule has to be applied in order to safeguard against depleting the stock.			

1.1.5	There is a robust assessment of stocks.				17.0
Weighting commentary	Equal weighting has been ascribed to each element dealing with the assessment of stocks.				

1.1.5.1		Are assessment models used and are they appropriate to the biology of the target species and the type of fishery?			
60	Robust assessment models are used. These are generic and do not account for specific characteristics of either the biology of the species or the nature of the fishery.	A robust stock assessment model, Integrated Catch-at-age Analysis (Patterson, 1998; Needle, 2000), is used. Although the population model structure is generic, it is suitable for the data available (catch-at-age and abundance indices for the different age groups).	I4. R2. R6. R12.	17.0	90
80	Assessment models are used. Major criteria are related to the species and/or the fishery, but there are some areas of the assessment that are generic.	The model provides performance indices and projections suitable for evaluating current management practice (HAWG07). Other assessment models are being concurrently evaluated through exploratory assessments (HAWG07 Section 4.6.2 Pg 273).			
100	Assessment models are used and capture all major features appropriate to the biology of the species and the nature of the fishery and the nature of the management questions being asked.				

1.1.5.2		Does the assessment take into account major uncertainties in data and have assumptions been evaluated?			
60	Major uncertainties are identified. Some attempt has been made to evaluate these in the assessment.	Most major uncertainties relating to data have been gradually reducing since 1996 (See section 1.1.2.1). There is still some uncertainty in the landings data although this problem is reducing. The remaining uncertainty relates to recruitment and the change in the stock-recruitment relationship, and the role of ecology and environment in the productivity of the	I4. R2. R6.R42.	17.0	85

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80	The assessment takes into account major uncertainties in the data and functional relationships. The most important assumptions have been evaluated and the consequences are known.	stock (natural mortality, median recruitment etc.). However, the HAWG, with other working groups, is attempting to address the current most significant issue, low recruitment, although the process is slow (HAWG06, HAWG07, ICES CM			
100	The assessment addresses all significant uncertainties in the data and functional relationships and evaluates the assumptions in terms of scope, direction and bias relative to management-related quantities.				

1.1.5.3		Are uncertainties and assumptions explored and reflected in management advice?			
60	Major uncertainties are recognised and are reported in management advice, as well as possible implications of those uncertainties on the management advice.	Although major uncertainties and assumptions are addressed in the management advice through the text report (HAWG07 Section 2.1.1), decision tables or decision analysis are not presented. Simulations consider risks assuming that the decision rule is applied, which it clearly is not. There is no evidence to indicate whether decision makers understand the risks they have been taking in setting high fishing mortality TACs.	R2. R6. R11.	17.0	80
80	Major uncertainties and assumptions are addressed in the management advice and through the appropriate decision rules to address those limitations.				
100	All significant uncertainties and assumptions are addressed and reflected in the management advice, including appropriate decision rules.				

1.1.5.4		Does the assessment evaluate current stock status relative to reference points and make forecasts for the future?			
60	The stock status is estimated relative to reference points.	The working group conducts short and medium term projections that are credible (HAWG07 Section 2.7 and 2.8). The range of projections is limited and no longer-term projections are carried out. Recent projections have been based on current lower levels of recruitment – an approach that is clearly precautionary.	R2. R6.	17.0	90
80	The assessment makes an evaluation of the stock status relative to the reference points. Data and methodology are applied to develop short and medium term forecasts that are credible and to which are attached expressions of the confidence that may be placed in them.	All projections and management advice is based upon the harvest control rule and reference points. Forecasts, considering the environment uncertainties, are currently tentative.			

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100	The assessment makes a reliable probabilistic evaluation of the stock status relative to the reference points and projects these into medium and longer term projections.				
1.1.5.5		Does the assessment include the consequences of current harvest strategies?			
60	The assessment makes an initial approximation of the consequences of current harvest strategies.	The assessment includes the consequences of current harvest strategies (HAWG07), although this is complicated by the fact that decision rules are not implemented precisely as written.	R2. R6	17.0	100
80	The assessment includes a robust approximation of the consequences of current harvest strategies.	Past harvests are fully taken into account and their impact on the stock is explained.			
100	The assessment includes the consequences of current harvest strategies, forecasts future consequences of these and evaluates stock trajectories under decision rules.				
1.1.5.6		How reliable has the stock assessment been historically using retrospective analysis?			
60	Annual estimates of SSB and F have been reviewed. Where estimates have been found to be unreliable, efforts have been made to improve the performance.	Retrospective estimates of mean F, SSB and recruitment, by removing one year of data at a time (HAWG07 Figure 2.6.3) suggest that there has been little bias over the last 6 years in the estimates of fishing mortality. SSB is more variable in the last 6 years showing upward and downward revision, but no substantial problems. This retrospective analysis shows an improvement over the previous one presented in 2006 HAWG06), probably due to the revision of catch data back to 2001. Other retrospective analyses indicate the importance of using all abundance indices in the	I4. R2. R6. R14.	17.0	95
80	Uncertainty in the estimates of SSB and F and known to occur and are regularly reviewed and corrected. Investigation of the associated problems has led to significant improvement.				
100	Retrospective analysis shows excellent agreement historically for the assessment of both SSB and F.				
1.1.6		The stock(s) is/are at appropriate precautionary reference level(s).		17.0	
Weighting commentary		Equal weighting has been ascribed to the setting of SSB and F reference points.			
1.1.6.1		Is the stock(s) at or above reference level for SSB? [If below SG80 then Criterion 2 must be scored; if SG80 or above, then Criterion 1 is complete]			
60	The stock is likely to be at or above the limit reference level.	The spawning stock biomass (SSB) in 2006 is estimated at 1.2 million tonnes, below the B_{pa} (1.3 million tonnes), but above B_{lim} (0.8 million tonnes) (HAWG07). Therefore the stock is above the limit but below the precautionary level.	I4. R2. R6	50.0	75

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80	The stock is above the precautionary reference level.				
100	The stock is significantly and consistently above appropriate reference level.				
1.1.6.2		Is the stock(s) at or above reference level for F? [If below SG80 then Criterion 2 must be scored; if SG80 or above, then Criterion 1 is complete]			
1.1.6.2		Is the stock(s) at or above reference level for F? [If below SG80 then Criterion 2 must be scored; if SG80 or above, then Criterion 1 is complete]			
60	Fishing mortality is at or below the limit reference level.	The effective target fishing mortality is at or below 0.25 (the actual F in 2006 was 0.35 which is well above F_{pa} for adults aged 2-6, although pressure on juveniles was well below target F). Whilst there is no specific F_{im} the specified target in the EU/Norway agreement is 0.25. A maximum F_{im} is effectively not applied. The failure to comply with the precautionary management rule in setting the TAC in 2007 has resulted in a fishing mortality that is higher than the target. This is a matter of concern with the current low recruitment. Although the result of maintaining the present fishing mortality at around the current level (0.35) has not been examined in detail, it is clear that if it is not reduced it will lead to a substantial reduction in SSB to a level below B_{lim} in the near future.	50.0	70	
80	Fishing mortality is below the precautionary reference level.				
100	Fishing mortality is significantly and consistently below the appropriate reference level.				
1.2 (MSC Criterion 2)		Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.	33.0		
weighting commentary		Assessment guidance in respect of Criterion 1.2 underpins the importance ascribed to this criterion, but there is no basis to ascribe a higher or lower weight than the other two criteria.			
1.2.1		If the stock is below the precautionary reference point, are measures to rebuild the stock specified?			
60	Appropriate rebuilding measures through reduction in exploitation exist and are being implemented. Rebuilding measures other than reduction in exploitation are being considered. Measures have not been tested. Although untested these measures have been shown to work in similar fisheries.	Although the rebuilding measures through reduction in exploitation exist in the current harvest control rule, even if they are applied, the medium term population projections suggest that the stock will not rebuild to above B_{pa} (HAWG07 Fig. 2.8.1) unless there is a substantial increase in recruitment or a complete ban on directed fishing for herring (although this is unrealistic in the present situation).	I4. R2. R6	100	75

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80	Appropriate rebuilding measures are being implemented to promote recovery within reasonable time frames. Measures have been tested and can be shown to be rebuilding the stock.				
100	Appropriate rebuilding measures are being implemented to promote recovery as quickly as is possible. Additional measures are being implemented to prevent problems in the future.				

1.3 (MSC Criterion 3)	Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.	34.0	
Weighting commentary	Equal weighting has been ascribed to the two elements associated with stock structure.		

1.3.1	Fishing activity maintains the age, genetic structure or sex composition of the stock to a degree that does not impair reproductive capacity.	100	
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1.3.1.1		Is the age/sex/genetic structure of the stock monitored so as to detect any impairment of reproductive capacity?			
60	There is information available on the sub-population / sex / age structure of the stock, and the relationship of these to reproductive capacity.	For the spring spawning herrings, biological sampling can be used to separate the catches. For the autumn spawning stock, the sub-unit allocation is only based on the ICES area division and the catches cannot be separated out.	R2. R6	50.0	90
80	Estimates are available of the sub-population / sex / age structure of the stock, and for the relationship of these to reproductive capacity.	Of the latter, the most vulnerable is the Downs component. An index of the Downs and the other components' abundance is available from the abundance surveys (HAWG07 Fig 2.11.3 and 2.11.4).			
100	There is comprehensive and reliable information on the sub-population /sex / age structure of the stock, and the relationship of these to reproductive capacity as well as evaluations of the implications of shifts in these parameters on productivity and management quantities.	The current larvae surveys show good production of the early larval stages over all survey areas which indicates that there is no impairment of reproductive capacity. Ideally there would also be higher degree of sampling.			

1.3.1.2		Does information indicate any changes in structure that would alter reproductive capacity?			
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60	Changes in stock structure have been detected but there is no evidence of negative effect on recruitment of the stock. Or potentially adverse changes in structure are identified and remedial measures are under consideration.	It is not possible to assess or fully manage individual spawning components separate from the wider population. The Downs component is thought to be most vulnerable, although abundance for this component is not considered currently low (HAWG07 2.11) though there is concern that at present the Downs spawning component is heavily dependant on one year class which could affect the reproductive capacity in the near future.	R2. R6.	50.0	90 ¹²
80	Evidence exists that the fishery had not caused changes in stock structure that would affect recruitment. Or potentially adverse changes in structure are clearly identified and effective remedial measures are in place.	An area TAC allocation (11% as a sub-TAC on catches in Divisions IVc and VIId) is applied to protect the Downs spawning component and contribute to its rebuilding. Population structure has been well managed, and fishery typically target larger fish.			
100	Data strongly indicate a robust age, sex and genetic structure in the stock, such as would maintain reproductive capacity.				

Principle 2	Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends	33.0	
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2.1 (MSC Criterion 1)	The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.	33.0	
Weighting commentary	Raised weighting has been given to those elements addressing the assessment of risk over those that deal with information and understanding.		

2.1.1	There is adequate understanding of ecosystem factors relevant to the distribution and life history strategy of the target species.	14.0	
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2.1.1.1		Are the nature, sensitivity and distribution of habitats relevant to the fishing operations known?			
60	Information exists but may not be comprehensive or up to date. The seasonal distribution of fishing operations is mapped.	Fishing for North Sea herring takes place within the upper and mid-water column, with little or no interaction with the seabed. Were contact between pelagic nets and the seabed to occur, this would likely to be in areas of demersal trawl activity – where the nature and sensitivity of habitats are well understood.	R8. R15. R39. R49	25.0	95
80	Nature, sensitivity and distribution of all main habitats are known in moderate detail. Information is recent. The distribution of fishing operations is monitored.	The pelagic habitat is made up of the physico-chemical characteristics, the plankton population and the nekton (all free swimming organisms). These characteristics are well understood, informed by recent and on-going studies, which typically benefit from extensive time series data such as the SAHFOS Continuous Plankton Recorder survey (http://www.sahfos.ac.uk/CPR_Survey.htm).			

This score has been reduced from 100 to 90 in response to Reviewer A's comments reference the fragility of the Downs spawning component, supported by reviewer B.

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100	The nature, sensitivity and the distribution of all habitats relevant to the fishing operations are known in detail. Information is recent. The distribution of fishing operations and their effort is monitored.	<p>The DEFRA funded National Marine Monitoring Programme was initiated in the late 1980s to co-ordinate UK marine monitoring in order to detect long-term trends in the quality of the marine environment and establish appropriate protective regulatory measures.</p> <p>In spite of this extensive monitoring and understanding of the marine ecosystem and habitat relevant to the herring fishery, the exact cause of recent poor recruitment, and the role of physico-chemical and oceanographic factors in this, remains uncertain.</p> <p>Interactions between fishing and the nekton are dealt with later with specific regard to non-target species and protected, threatened or endangered species. Herring fishing activities do not have a direct impact on the physico-chemical characteristics of pelagic habitats.</p> <p>Distribution of fishing effort is fully monitored through the use of logbooks, VMS, spotter planes and the activities of the Scottish Fisheries Protection Agency.</p>			
2.1.1.2		Is information available on non-target species directly affected by the fishery?			
60	The main non-target species affected have been identified.	The Scottish Pelagic Sustainability Group's policy states that "Vessels will make all reasonable efforts to minimise unintended bycatch and discards which have a detrimental effect to the fisheries in which they operate and on the wider ecosystems of the marine environment".	I4. I11. R2. R16. R39. R41	25.0	90
80	Information is available on non-target species directly affected by the fishery including their distribution and/or ecology.	The mid water pelagic fishery for herring in the North Sea has very limited interaction with non-target species. Onboard use of sophisticated electronics (dual frequency scanners) has increased the ability of crews to distinguish mixed shoals, which has led to a reduction in non-target species.			
100	Information is available on all non-target species directly affected by the fishery including the distribution and ecology.	<p>There remains some bycatch of mackerel and Norway Pout. All bycatch is landed and counts directly against TAC and is marketed. The distribution and ecology of the non-target species is well understood.</p> <p>FRS observer programmes have indicated that the overall levels of bycatch in the North Sea Herring, pelagic trawl fishery is very low.</p>			
2.1.1.3		Is information available on the trophic position, status and relationships of the target species within the food web?			
60	Key prey, predators and competitors are known.	The food web of the North Sea has been extensively studied over many years and is well understood. There is a good level of information on the trophic position of herring's key life stages within this web.	R20. R43.	25.0	90
80	Information is available on the position, relationships and importance of target species in the environment at key life stages.	In the North Sea the herring diet is mainly made up of copepods (<i>Calanus spp.</i> & <i>Temora spp.</i>), Euphausiids, and small fish. Fish eggs are unlikely to represent an important food resource for herring. In turn, herring represent an important prey for many predators, such as cod and large gadoids, sea birds, marine mammals, sharks and dogfish.			
100	Quantitative information is available on the position and importance of the target species and their relationships within the food web at key life stages.	For the North Sea (ICES area IV) a multi-species Virtual Population Analysis (VPA) has been developed. Herring is one of 12 key species in this model. With clear quantitative information.			
2.1.1.4		Is there information on the potential for the ecosystem to recover from fishery related impacts?			

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60	Key elements of the functioning of the ecosystem, relevant to the fishery, are identified and understood, allowing some position to be taken on the potential for recovery.	<p>The North Sea herring population has suffered notable declines in spawning stock biomass in the past. Most notably in the late 1970s, but SSB also fell well below Blim in the mid 1990s. The subsequent recovery of the fishery after both of these events has provided considerable information to scientists about the potential of the stock to recover – without causing long term consequences. This now provides the basis for the current precautionary management regime. The wider trophic impacts within the ecosystem from these dramatic declines in the herring population appear to have been limited.</p> <p>The recent repeated poor recruitment to the North Sea herring stock may impact on the applicability of this historical information as a prediction for the future.</p>	R43.	25.0	95
80	The main elements of the functioning of the ecosystem, relevant to the fishery, have been documented and are understood, allowing assessment of potential for recovery.				
100	Detailed information is available on the potential for affected elements of the ecosystem to recover from fishery related impacts.				

2.1.2	General risk factors are adequately determined.	24.0	
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2.1.2.1		Is information available on the nature and extent of the bycatch (capture of non-target species)?			
60	The main non-target species affected have been identified and qualitative information is available on species that form a significant proportion of by-catch.	<p>There is very limited by-catch taken in the North Sea herring pelagic trawl fishery – as explained in 2.1.1.2. This has been confirmed by the Fisheries Research Services in Aberdeen, and its observer programme. Where bycatch occurs, its nature and extent are well understood and detailed records are available as a result of 100% of landings being weighed at discharge. All bycatch comes directly off the relevant TAC, so impacts on non-target stocks are fully accounted for. Information on by-catch is also contained in log books.</p> <p>The incidental non-target fish catch by directed North Sea herring fisheries appears to be low (ca. 2%), mainly consisting of mackerel when fishing mixed shoals. Mackerel is subject to a stock assessment and its status is closely monitored.</p> <p>The bycatch will be a negligible proportion of the total fishing mortality for mackerel. This infers that the ecosystem level implications of incidental fish catches are negligible.</p>	I4. I11.	50.0	100
80	Information is available on non-target species directly affected by the fishery including distribution and/or ecology. Quantitative information is available on those species that form a significant proportion of by-catch. If obtained by sampling, this is considered sufficient to provide adequate information.				
100	Information is available on all non-target species directly affected by the fishery including the distribution and ecology. Accurate records are kept on the nature and extent of all by-catch species including species size and sex composition.				

2.1.2.2	Is information available on the extent of discard and slippage (the proportion of the catch not landed)?		
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60	Information is available on f the extent of discarding and slippage, including an assessment of the main species represented.	<p>Information contained from POs and vessel skippers has been corroborated by consultations with Fisheries Research Services (including their observer programme) and scientists from the North Atlantic Fisheries College in Shetland, indicated that slippage (i.e. opening the net and releasing the fish before they are pumped out of the water) is not a significant issues in the North Sea herring pelagic trawl fishery. This is principally as there is no significant price premium associated with larger herring so there is little incentive for high- grading.</p> <p>However there remains an opportunity for slippage – as vessels are keen to only land herring. Communication between the fleet enables vessels to stay ‘on’ shoals, or to avoid particular areas. Some slippage may still occasionally occur if mackerel in net – typically at the beginning of the season. Other than slippage there is no discarding. All fish which are pumped aboard into tanks are landed and verified. No onboard sorting of the catch takes place – and vessel design makes onboard sorting all but impossible.</p> <p>No accurate record is currently kept of slippage. As slippage does not entail bringing the catch aboard it would not be possible to accurately determine the proportions in terms of species, length/weight and sex. Reasonable estimates, based on information contained in net monitors could be recorded.</p>	I3. I5. I9.	50	80
80	Information is available to allow estimates of discard and slippage to be calculated and interpreted, sufficient to allow inclusion in stock modelling.				
100	Accurate and verifiable information (quantity and proportions in terms of species, length/weight and sex) is available on the extent of all discards and slippage, and consequences of these. Or the entire catch is landed.				

2.1.3	There is adequate knowledge of the effects of gear-use on the receiving ecosystem and extent and type of gear losses.	14.0	
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2.1.3.1		Is there adequate knowledge of the physical impacts on the habitat due to use of gear?			
60	Main impacts of gear use on the habitat are identified including extent, timing and location of use. Effects of habitat perturbations estimated and estimated to be stable.	<p>The pelagic trawl gear used generally affects the upper and mid-water layers. Impacts are negligible. Very occasionally net comes into contact with the seafloor although every effort is made to avoid this. Skippers report that contact with the seabed is far rarer than in the past – particularly when the fleet fished with purse seine gear.</p>	I5. R15. R41. R45.	50.0	90
80	All impacts of gear use on the habitat are adequately identified including extent, timing and location of use. Habitat perturbations appear shown to be stable.				
100	The physical impacts on the habitat due to use of gear have been studied and quantified, including details of any irreversible changes.				

2.1.3.2		Is any gear lost during fishing operations and can ‘ghost fishing’ occur?			
60	Some recording of gear losses takes place and an assessment can be made of possible ‘ghost fishing’.	<p>The comments of the vessel skippers have been corroborated by scientists of both Fisheries Research Services and the North Atlantic Fisheries College, indicating that gear losses or ‘ghost fishing’ that results from gear losses is not an issue in the SPSG North Sea herring pelagic fishery. Fishing is done in mid-water with efforts made to avoid contact between</p>	I5. I10. R41	50.0	100

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80	There is knowledge of the type, quantity and location of gear lost during fishing operations. Estimates made show that losses do not cause unacceptable effects on the ecosystem through for example 'ghost fishing'.	net and seafloor. Nets are also extremely expensive At the end of the nets working life all useful components (chains) are removed and kept and the nylon net is melted down and recycled – with proceeds going to charity.			
100	There is detailed knowledge of the type, quantity and location of gear types lost during fishing operations. The impact of gear loss on target and non-target species has been measured and shown to have negligible effects on habitats, ecosystems or species of concern through for example 'ghost fishing'.				

2.1.4	Strategies have been developed within the fisheries management system to address and restrain any significant negative impacts of the fishery on the ecosystem		24.0	
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2.1.4.1		Are management strategies in place to address impact identification and avoidance / reduction?			
60	Management strategies include some appropriate consideration of ecosystem impact identification, but may not be tested.	The main impact of the north sea herring pelagic trawl fishery is the depletion of the target stock biomass. This impact is assessed as part of P1. Detailed management strategies are in place to monitor and regulate this impact in the guise of ICES ACFM TAC recommendations. TACs are also set annually for the all species which are occasionally caught as bycatch in the herring fishery.	15. 18. 110.	100	100
80	Management strategies are in place to detect and reduce ecosystem impacts, although these may not have been fully tested. These are designed to adequately protect key aspects of the ecosystem within main fishing areas.	Habitat impacts are reasonably expected to be negligible as the fishery is conducted primarily in the water column. The biomass of herring is being studied in the context of its role in the ecosystem. This may lead to an adjustment in the management regime, but the current management is strategy likely to be adequately precautionary in properly implemented.			
100	Management strategies are in place to monitor, detect and reduce impacts These are designed to adequately protect ecosystems, habitats and populations of target and non-target species and keep impacts within determined acceptable limits.	As there are so few other impacts on the wider ecosystem, there are relatively few management strategies in place, however clear waste management protocols are in place on all vessels and vessels must maintain a waste oil logbook as part of the requirements of Lloyds registration. In addition all vessels in the SPSG are undergoing induction into the Seafood Responsible Fishing Scheme which seeks to ensure best practice of onboard operation and minimising environmental impact.			

2.1.5	Assessments of impacts associated with the fishery including the significance and risk of each impact show no unacceptable impacts on the ecosystem structure and/or function, on habitats or on the populations of associated species.		24.0	
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2.1.5.1		Does the removal of target stocks have unacceptable impacts on ecosystem structure and function?			
60	The removal of target stocks could lead to impacts upon ecological systems (applying the precautionary approach where necessary). A program is in place to identify these and, if appropriate, reduce these to acceptable, defined limits.	<p>Studies undertaken at the time of the substantial declines in spawning stock biomass in the mid 1970s and mid 1990s indicated that there were very limited impacts caused in the wider ecosystem caused by removal of target stocks.</p> <p>This information has been used to inform current ecosystem models such as the North Sea Multi-species VPA which now serves as the main tool used to assess the role of herring as a prey species in the wider ecosystem. This is informed by stomach analysis – typically of species that prey on herring. Sufficient information is therefore available on the removal of target stocks – and this currently appears to be negligible. The implications of future environmental change (and on-going low recruitment), may be less well understood.</p>	R43.	20.0	85
80	Sufficient information is available on consequences of current levels of removal of target species to suggest no unacceptable impacts of the fishery on ecological systems within major fishing areas.				
100	The ecological consequences of current levels of removal of target stocks has been quantified and documented to be within acceptable, pre-determined, limits.				
2.1.5.2		Does the removal of non-target stocks have unacceptable impacts on ecosystem structure and function?			
60	The removal of non-target stocks could lead to impacts on ecological systems (applying the precautionary approach where necessary). A program is in place to identify these and, if appropriate, reduce these to acceptable, defined limits.	<p>There are limited ecological consequences of current levels of removal of non-target stocks. The only non-target stock removed is a very limited amount of mackerel and Norway Pout. The ecological consequences of this small amount of removal of non-target stocks does not have a significant impact on other trophic levels within the North Sea ecosystem and is therefore acceptable.</p> <p>The ecological consequences of current levels of removal of non-target species are well understood and can also be informed by the recently developed ICES multi-species Virtual Population Analysis (VPA) for the North Sea.</p> <p>Acceptability of removal of non-target species within <i>pre-determined limits</i> has not been determined.</p>	R43.	20.0	85
80	Sufficient information is available on consequences of current levels of removal of non-target species to suggest no unacceptable impacts of the fishery on ecological systems within major fishing areas.				
100	The ecological consequences of current levels of removal of non-target stocks has been quantified and documented to be within acceptable, pre-determined, limits.				
2.1.5.3		Does the removal of target and non-target stocks have unacceptable impacts on the populations / stocks of non-target species?			

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60	Impacts of the fishery on the populations / stocks of non-target species have been considered assessed, and programs considered to mitigate such impacts, but may not have been tested.	The impact of the fishery on non-target populations can be quantified as all landings count against TAC (although uncertainly about the levels of slippage remains an issue), and can therefore be assessed as part of those species ICES stock management programme. The fishery has very limited direct impact on the populations of non-target species.	R16. R21a, R21b	20.0	95
80	Impacts of the fishery on the populations / stocks of non-target species have been considered, assessed, and programs in place and tested to mitigate such impacts.	Although the North Sea Norway Pout fishery is currently closed (remedial action enforced due to poor stock health), the spawning stock biomass has recovered substantially, to the point where it is expected to reach Bpa early in 2008. Due to the short life span of the species, variable recruitment causes rapid changes on SSB. It is thought that this variation in recruitment and variation in predation and other (natural) mortality has far greater impact on stock status than the fishery.			
100	Impacts of the fishery on the populations / stocks of non-target species have been considered, assessed, and tested remedial actions taken and their impact monitored.	Any mackerel landings are counted against TAC and are therefore considered in the mackerel stock assessment. The mackerel spawning stock biomass is currently thought to be around Bpa, although there are problems caused by unknown levels of underreporting. Until now it is not possible to fully quantify and therefore assess the impacts of the fishery on non-target species caused by occasional slippage of the catch. Although the scale of impact is thought to be small.			

2.1.5.4		Does the fishery have unacceptable impacts on habitat structure?			
60	There is no evidence that the fishery is having unacceptable impacts.	There is evidence of negligible impact on pelagic habitat structure and function and no unacceptable impacts have been demonstrated for the benthic habitats.	R2. R41	20.0	90
80	No unacceptable impacts of the fishery on habitat within major fishing areas.	Fishermen also report almost zero interaction with seabed – this is credible as it would cause expensive damage to pelagic fishing gear and is therefore avoided. Increased observer coverage			
100	Effects on habitat structure are within acceptable tested / justified limits.				

2.1.5.5		Are associated biological diversity, community structure and productivity affected to unacceptable levels?			
60	There is no evidence that the fishery is having unacceptable impacts, although the issue has not been directly studied.	Many studies are available of the complex community structure in the North Sea and herring is a key component of the wider marine ecosystem – both as prey and predator. There is still to be a fully quantified ecosystem model – which is acceptable to all parties, however the ICES multi species Virtual Population Analysis goes some way toward quantifying the key interactions in this complex ecosystem.	R2. R39. R43.	20.0	80
80	Information is available on the effects of the fishery on biological diversity, community structure and productivity. This does not indicate any unacceptable impacts.	The SPSG pelagic herring trawl fishery is highly targeted and effects of the fishery on the wider biological diversity and within acceptable limits. The interaction with protected, rare and endangered species is addressed separately in section 2.2.			
100	The effects of the fishery on biological diversity, community structure and productivity have been quantified and are within acceptable tested/justified limits				

2.2 (MSC Criterion 2)	The fishery is conducted in a manner that does not threaten biological diversity (at the genetic, species or population levels and avoids or			33.0	
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		minimises mortality of, or injuries to endangered, threatened or protected species.			
Weighting commentary		Equal weighting has been ascribed to each element.			
2.2.1		Fishing is conducted in a manner that does not have unacceptable impacts on recognised protected, endangered or threatened species.	50.0		
2.2.1.1		Is there information on the presence and populations of protected, endangered or threatened species?			
60	There is a program in place to identify protected, threatened and endangered species directly related to the fishery. There is periodic monitoring of the main population trends and status of protected, endangered and threatened species.	<p>In general populations of protected, endangered and threatened (PET) species are highly studied and well understood in the North Sea (HAWG07: Annex hawg-her47d3 pg 511-532).</p> <p>Under the Conservation of Seals Act 1970, the Natural Environment Research Council (NERC) has a duty to provide scientific advice to government on matters related to the management of seal populations. NERC's Special Committee on Seals (SCOS) provide advice annually which is informed by the latest scientific information provided by the Sea Mammal Research Unit (SMRU - St Andrews). In addition the Scottish Seals Forum (SSF) which was first convened in 2002, brings together a wide range of key stakeholders to exchange information and develop a co-ordinated approach to the management of Scottish seal populations.</p>	I4. I13. R2. R6	33.0	95
80	All protected, threatened and endangered species directly related to the fishery have been identified. The populations and health of all protected, threatened and endangered species directly related to the fishery are monitored on a regular basis.	<p>The SMRU carries out fundamental research into the biology of upper trophic level predators in the oceans - mainly seals and cetaceans although new research initiatives are being introduced for marine turtles and seabirds. SMRU research combines web-based visualization software with sophisticated biophysical modelling, informed by data coming from satellite tags on marine mammals, to provide unprecedented levels of insight into the lives of marine mammals in British waters – including those areas of SPSG herring fishing activity. This enables a high level of understanding marine mammal lifecycles, distribution and dynamics, to support conservation efforts and enable predictions of the effects of environmental change – caused by both natural and anthropogenic factors.</p>			
100	There is knowledge of all populations of protected species directly or indirectly related to the fishery including and their dynamics. Regular monitoring of protected, endangered and threatened species undertaken, supported by research programmes to assess threats and promote their conservation. The type and distribution of critical habitats have been identified.	<p>The SMRU also undertakes an extensive observer programme and there is a good history of cooperation with this programme by SPSG vessels. This observer programme has shown that there is no evidence of any interaction with protected, endangered or threatened species – corroborating the views of the SPSG skippers.</p> <p>The basking shark (<i>Cetorhinus maximus</i>) was included in the Wildlife & Countryside Act (1998) and more recently the Bonn Convention in Migratory Species (2005). Leading in 2006 to the prohibition of deliberate capture and landing in EC waters under CFP regulations.</p> <p>Recent years have seen a significant increase in sightings in Basking Sharks in waters off Scotland (65% increase from 2001, to 2004). These findings are backed up by effort-based transect surveys carried out by The Wildlife Trust</p> <p>Distribution of basking sharks in UK waters is closely linked to the availability of their main diet - <i>Calanus</i> copepods whose seasonal blooms are linked to increased light, nutrients and resulting phytoplankton. The Sir Alistair Hardy Foundation for Ocean Science have shown a northward shift in <i>Calanus</i> populations – perhaps correlated with changing sea temperatures, which is in turn likely to affect basking shark distribution.</p> <p>Although the vast majority of recent basking shark sightings have been concentrated on the West Coast of Scotland and Irish Sea, there have been isolated sightings off the Grampian and Moray coast, and in the coastal waters around Orkney and Shetland. As the Basking Shark shares its diet with herring, there is the possibility of interaction with the SPSG fleet. In spite of this there have been no reported interactions – despite extensive SMRU observer coverage.</p>			

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2.2.1.2		Are interactions of the fishery with such species adequately determined?			
60	The main interactions directly related to the fishery are known.	<p>In general, interactions between North Sea herring fisheries and PET species are considered very limited on the basis of evidence from skippers and from various observer programmes (HAWG07: Annex hawg-her47d3 pg 511-532).</p> <p>The SMRU has undertaken extensive surveys since 2000 to determine the level of bycatch of sea mammals in UK pelagic fisheries. To date no cetacean or seal bycatch has been seen by independent observers in the North Sea pelagic herring trawl fishery.</p> <p>Profesor Ian Boyd (Director of SMRU) is satisfied that interactions have been determined adequately and are thought to be negligible.</p> <p>Fishermen are not currently obliged to report any such interaction.</p>	I4. I13. R2. R6. R40	33.0	95
80	Reliable quantitative estimates are made of the effects of interactions directly related to the fishery.				
100	Reliable quantitative estimates are made of the interactions of all populations directly related to the fishery, and qualitative information is available on indirect impacts. Incidental mortalities are recorded and reported.				
2.2.1.3		Do interactions pose an unacceptable risk to such species?			
60	Known effects are within acceptable limits of national and international legislative requirements and are believed to create no biological threats to the species concerned.	<p>No known significant interactions based on observer coverage and anecdotal evidence. It can therefore be concluded that known direct and indirect effects of fishing on threatened and endangered species are within clearly defined and acceptable limits (HAWG07: Annex hawg-her47d3 pg 511-532).</p> <p>One study carried out on the Irish pelagic fleet in the Celtic Sea, quantified the number of grey seals caught as bycatch as 1 per 317.5 t of fish, and concluded that the fishery was 99.5% selective and that the level of seal bycatch was within acceptable limits.</p>	R2. R6. R39	33.0	100
80	Critical interactions, including direct and indirect effects that could pose an unacceptable risk, are well estimated and do not threaten protected species. Acceptable incidental take levels are clearly defined.				
100	It is known that the direct and indirect effects of fishing on threatened and endangered species are within clearly defined and acceptable limits.				
2.2.2		Strategies have been developed within the fisheries management system to address and restrain any significant impacts of the fishery on the ecosystem.		50.0	
2.2.2.1		Are management objectives and accompanying strategies in place to identify fishery impact on recognized protected, endangered and threatened species and to achieve avoidance / reduction?			
60	Management objectives are in place to address key areas of impact identification and avoidance / reduction.	The interaction between the SPSG herring fishery and protected, endangered or threatened species is not perceived to be a problem and the low level of monitoring is therefore appropriate. There is a management objective to have a continued low impact on protected, endangered and threatened species. A number of international conventions and agreements are also relevant to the SPSG herring fishery and ensure the continued favourable conservation status of	R2. R9. R40	100	80

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80	Management objectives are set to detect and reduce impacts. Accompanying strategies are designed to adequately protect recognised protected, endangered or threatened species.	rare, protected and endangered species in the North Sea.			
100	Tested management objectives are set to detect and reduce impacts. Accompanying strategies are designed to adequately protect recognised protected, endangered and threatened species.				
2.3 (MSC Criterion 3)		Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.		33.0	
Weighting commentary		Increasing weight has been given to those Performance Indicators dealing with action over information and system design.			
2.3.1		There are management measures in place that allow for the rebuilding of affected populations.		100	
2.3.1.1		Is there sufficient information to allow determination of necessary changes in fishery management to allow recovery of depleted populations?			
60	There is some information on functional relationships, sufficient to allow alterations to be made to fishing to recover and rebuild depleted species.	There are no depleted protected, endangered or threatened populations which are impacted by this fishery. The only other species impacted by the fishery are mackerel and Norway Pout. In both cases the functional relationships are well understood and intervention measures have been tested.	R2. R21a & b.	23.0	90
80	There is adequate information, combined with a precautionary approach wherever necessary, to allow alterations to be made to fishing to recover and rebuild depleted species.	Mackerel could be considered to be in a depleted state. However the stock is well understood and the necessary information for a precautionary intervention programme is sufficient to allow stock rebuilding.			
100	There is a clear understanding of functional relationships between the impacted population and the fishery. Intervention measures based on this understanding have been tested.	There are also strong management measures in place to allow the rebuilding of the North Sea Norway Pout stock – as indicated by the fact that the fishery is currently closed due to poor stock health (though it should be noted that the herring fishery is not responsible for the current state of the Norway pout stock). These measures have contributed to a recent recovery in spawning stock biomass, to the point where it is expected to reach Bpa early in 2008. Due to the short life span of the species, variable recruitment causes rapid changes on SSB. It is thought that this variation in recruitment and variation in predation and other (natural) mortality has far greater impact on stock status than the fishery.			
2.3.1.2		Are management measures in place to modify fishery practices in light of the identification of unacceptable impacts?			
60	A mechanism exists for the modification of fishing practices in light of the identification of unacceptable impacts.	The CFP core fisheries regulation (2371/2002) establishes a management framework which enables measures to be introduced to modify fishing practices, where deemed appropriate as a result of unacceptable impacts being identified.	R2. R27. R29	32.0	90
		Bycatch TACs, closed areas and seasons can all be applied. Enforcement is considered good, particularly since the			

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80	Effective management measures are in place to modify fishery practices in light of the identification of unacceptable impacts.	implementation of VMS. Occasional slippage of fish does occur. In addition, there continues to be some overshooting of TACs on the part of the entire North Sea herring fleet.			
100	Monitoring programs are in place within the management system to allow modification of fishery practices in light of the identification of unacceptable impacts. Objectives and limits for environmental change are used to guide operational practices. It is demonstrated that these are effective.				

2.3.1.3		Do management measures allow for recovery of affected populations?			
60	Rebuilding measures exist and are being implemented. Measures have not been tested.	Management measures include a strong interpretation of the precautionary principle and clearly state target SSB and fishing mortality for the target species (herring) and for the main bycatch species (mackerel and Norway Pout). In the case of both bycatch species appropriate precautionary rebuilding measures (namely the closure of the fishery) have been implemented in recent years to promote recovery. It is likely that more precautionary harvest rules will be applied in the future once the fisheries reopen. In the past similar rebuilding measures have proved effective for the rebuilding of the North Sea herring SSB.	R2.	44.0	90
80	Appropriate and targeted rebuilding measures are being implemented on a fixed timescale. Measures have been tested and can be shown to be promoting the rebuilding of the affected populations.				
100	Appropriate rebuilding measures are fully implemented to promote recovery as quickly as is possible. Additional measures are being implemented to prevent problems in the future.				

Principle 3	The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.	33.0	
3.A	Management System Criteria	50.0	
Weighting Commentary	Within MSC Principle 3, operational and management criteria were given equal ranking as there was considered little basis on which to favour the one over the other. Between the sub-criteria under Criterion 3A, some preference was given to those sub-criteria incorporating functional elements over process elements. Those sub-criteria dealing with the cultural context of the fishery were down-graded as having reduced relevance to this particular fishery, whilst those dealing with compliance, monitoring and control have been rated highly.		

3.A.1 (MSC Principle 3 Intent & Criterion 3)	A management system containing an institutional and operational framework exists with clear lines of responsibility.	9.00	
Weighting Commentary	Higher ranking has been afforded the clear allocation of management responsibilities to the management authorities, and having slightly greater significance to the well established review systems employed within European fisheries. A lesser weighting has been given to the indicators dealing with cultural context, scale and intensity as having less relevance to this particular fishery / industry sub-sector.		

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3.A.1.1		Are organisations with management responsibility clearly defined including areas of responsibility and interactions?			
60	Organisations with management responsibility are known. Responsibilities and interactions are to be determined.	There is clear and evident division of responsibility between EU, ICES (ACFM) and national institutions and authorities. On-going evolution of these structures can be seen as a result of the regular monitoring and revision of responsibilities and interactions, leading to improved clarity, but also to improved integration. Despite this, there remains room for some improvement in the coordination and integration of management responsibilities.	I2. R6. R8. R9. R17. R18. R29	40.0	95
80	Organisations with management responsibility have been defined including key areas of responsibility and interaction	The North Sea herring fishery is managed through the Common Fisheries Policy of the EU in accordance with the basic fisheries regulation (2371/2002) and the EU-Norway agreement – a negotiated international agreement setting boundary rules by which annual setting of TAC's and quotas may be achieved. The core backdrop to the management of this fishery is the advice provided by the ICES Advisory Committee on Fisheries Management (ACFM) which draws on the on-going work of international scientists from relevant research laboratories and institutions on the stock biology and marine science through the Herring Assessment Working Group for the Area South of 62° N (HAWG).			
100	Organisations with management responsibility are clearly defined including all areas of responsibility and interaction.	At the national level, national fisheries administrations are responsible for a range of management and regulatory duties, including management of fleet activity, management of national quota, monitoring and control of all fisheries occurring within national jurisdiction, collection, collation and transmitting of key fishery data, and undertaking at least a base range of scientific monitoring and development work. There is clear division of responsibility between EU, ICES ACFM & national organisations. MCS is tight, however scope for improvement in management decision-making processes.			
3.A.1.2		Is the system consistent with the cultural context, scale and intensity of the fishery?			
60	Inconsistencies arise in some key areas but a programme is in place to address these.	In terms of scale and intensity, this is a large scale human consumption fishery with average catch (fleet A) of 477,000t over the past five years (or 386,000t over the past 10yrs). Control, management and administration are designed accordingly. Specifically the management system, which includes complex and comprehensive MCS (Monitoring, Control, Surveillance), is appropriate to the scale of this consolidated, modern and large-scale industry.	R11. R19.	12.0	100
80	The system is consistent with key elements of the cultural context, scale and intensity of the fishery.	This is also an international fishery, and the majority of nations with a history in North Sea herring fisheries are represented in the EU-Norway agreement.			
100	The system is entirely consistent with the cultural context, scale and intensity of the fishery.	There has been major consolidation and industrialisation within the industry and much of the historical cultural context has been lost. The management system which includes complex and comprehensive MCS is therefore appropriate to the scale of the consolidated, modern and large scale fishery.			
3.A.1.3		Is the management system subject to internal review?			
60	There are mechanisms in place to allow for internal review.	The management system is subject to regular internal review (as required by the CFP). This occurs at every level of the system with policy documents formulated at a European Commission level as a result of initiatives at national, sub-national and European levels. These policies and resulting operational plans and practices are then subject to wide consultation before ratification, and prescribed monitoring and evaluation processes after ratification. These systems also include formal consultation and review processes involving all EC Member State fisheries administrations, and committees such as ACFM (the body through which ICES provides formal advice), STECF (the committee by which the European Commission seeks expert opinion on fisheries), the Advisory Committee on Fisheries and Aquaculture	R8. R10. R19. R20. R21.	24.0	90
80	The management system is subject to regular internal review. Recommended changes have been reviewed and implemented as appropriate.				

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100	<p>The management system is subject to regular and frequent internal review. This includes evidence that the assessment methodology has been evaluated extensively and that any recommended changes have been made. Monitoring and evaluation are ongoing and improvements quickly tested and implemented.</p>	<p>(ACFM) dealing with industry concerns at a European / "horizontal" level), and the Regional Advisory Councils (RACs) dealing with regionally specific technical issues (of which the body specifically incorporating herring industry interests is the Pelagic RAC).</p> <p>A wide range of normative monitoring of fisheries practice and the work of the various management institutions takes place. This includes data collection on vessels (vessel register), fleet activity (days at sea, VMS), landings, catches (through scientific observer programmes), and operating economics (costs and earnings surveys). In terms of institutional performance, regular monitoring against performance targets is undertaken in respect of statistics collection, quota management, aerial, at sea, and on-shore inspections, checks across the audit trail, fisheries enforcement (including prosecutions), and the nature and extent of development support to the sector.</p> <p>There is also on-going and extensive review of stock assessment and data gathering methodologies at ICES level and at the level of the contributing laboratories and research institutions. Within ICES, a methods working group keeps methods for fish stock assessment under regular review, and there is a specific "Study Group on the Revision of Data for North Sea Herring". In addition, other study and working groups exist to review, for example, herring surveys, the precautionary approach, discards, biological sampling, the "Life Cycle and Ecology of Small Pelagic Fish", the "Incorporation of Additional Information from the Fishing Industry into Fish Stock Assessments", and a "Study Group on Recruitment Variability in North Sea Planktivorous Fish".</p> <p>On balance, management plans are modified on an annual basis, and the various review processes do ensure that systems adapt to changing circumstances, and are subject to critical inspection. There are various checks and balances of the management system in place, but it has to be said that this is not always a regular, rapid or formalised process. It should also be noted that there are recommendations emanating from ICES Working Group reports that are not always implemented.</p>			
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3.A.1.4		Is the management system subject to external review?			
60	There are mechanisms in place to allow for external review.	The working group stock assessments are subject to external review (HAWG07 Annex 5: Technical Minutes). ICES can, and does, involve external scientists extensive review of its methodologies if considered necessary, but this has not been deemed necessary for the North Sea herring fishery.	R2. R6. R48, R22.	24.0	85
80	The management system is subject to external review at appropriate intervals. Recommended changes have been reviewed and implemented as appropriate.	The Pelagic Regional Advisory Council, where a range of interested stakeholders come together, also provides some element of review.			
100	The management system is subject to regular and frequent external review. Monitoring and evaluation are ongoing and improvements quickly tested and implemented.	<p>There is no clear external review of all management systems, although external audits do take place at CFP level (there is an obligation to review the basic regulation for the CFP before the end of 2012). The inclusion of review clauses in other CFP legislation is commonplace.</p> <p>There is an implicit and incidental level of on-going review as a result of regular discussion, meetings and negotiation between a wide range of stakeholders, but to make these process more transparent is not considered cost-effective. This notwithstanding, political pressure from the Member States on the European Commission, and the independence and international standing of ICES and other bodies, ensure CFP review processes are externalised.</p>			

3.A.2 (MSC Criteria 1,2,4)	The management system has a clear legal basis.	9.0		
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3.A.2.1		Is the fishery consistent with International Conventions and Agreements?			
60	An evaluation is being undertaken to show compliance with relevant international agreements. There is no evidence that the fishery is not consistent with agreements.	The basic EC fisheries regulation was elaborated in the full knowledge of the FAO Code of Conduct and all other international conventions dealing with fishing. The fishery is fundamentally managed under an international agreement between the EU and Norway.	I2. R23. R24.	38.0	95
80	An evaluation has been undertaken and fishing appears to comply with international agreements.	European Union Member States and Norway ratified the 1982 UN Convention of the Law of the Sea in the latter part of the 1990s; the European Union ratified the Convention in 1998. Since this date the European Union has played an active part in the development of three new instruments that supplement and add further detail to the provisions established by the Convention on the Law of the Sea, namely:			
100	An evaluation has been undertaken which clearly shows that the management system is compliant with all relevant international agreements.	<ul style="list-style-type: none"> • the Agreement to promote compliance with international conservation and management measures by fishing vessels on the high seas, adopted by the FAO in 1993, • the Code of Conduct for Responsible Fisheries, adopted by the FAO Conference in November 1995, following on from the Cancun Declaration of 1992, • the Agreement for the implementation of the provisions of the United Nations Convention on the Law of the Sea relating to the conservation and management of fish stocks found both inside and outside exclusive economic zones (straddling stocks) and highly migratory fish stocks, known as the "New York Agreement", adopted in 1995 <p>The European Union is also a member of a range of Regional Fisheries Organisations (RFOs), created to guarantee the conservation and sustainable exploitation of fish resources in the open seas, play a key role in combating illegal, unreported and unregulated fishing (IUU) and destructive fishing practices, which damage fragile habitats, in particular seamounts and cold water corals.</p>			
3.A.2.2		Is the fishery consistent with EU and national legislation?			
60	An evaluation is being undertaken to show compliance with relevant EU and national agreements. There is no evidence that the fishery is not consistent with EU and national legislation.	The fishery is consistent with EU and national legislation as affirmed in national and European fisheries policies and plans, and the monitoring and evaluation of data returns and management performance. Elements of compliance are captured in the annual fisheries compliance scoreboard.	R8. R25. R26.	38.0	95
80	An evaluation has been undertaken and fishing is shown to be fully compliant with EU and national legislation as it relates to Principles 1 & 2.				
100	An evaluation has been undertaken which clearly shows that the management system is compliant with all relevant EU and national legislation.				
3.A.2.3		Accepting the primacy of ecological sustainability in management, does the system also observe the legal and customary rights of people dependent upon fishing?			

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60	Accepting the primacy of ecological sustainability in management, the customary and legal rights of the people dependent upon fishing are known and no major conflicts have been recorded.	The rights of people dependent upon fishing are set out in EC and national law. In part to inform this process, fisheries dependency has been researched across European Union Member States, most particularly in studies undertaken in 1991 and 2001.	R27.	24.0	100
80	Accepting the primacy of ecological sustainability in management, the system observes the legal and customary rights of people dependent upon fishing but does not necessarily have a formal codified system.	National and fishery management plans are in part built around identified levels of dependency (accepting the primacy of ecological sustainability). There is a formalised codified system for planning development and exercised at a EU level.			
100	Accepting the primacy of ecological sustainability in management, the system observes all legal and customary rights of people dependent upon fishing under a formal codified system.	Fishery management, and indeed integrated marine management, relies on balancing the interests of a range of parties and activities. This is achieved through the combined forces of legislation, fisheries management, regular stakeholder consultation, and dispute facilitation and resolution. In this context, with regard to the North Sea herring fisheries no major conflicts have been recorded.			

3.A.3 (MSC Criteria 2,5,7)	The management system includes strategies to meet objectives including consultative procedures and dispute resolutions.			16.0	
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3.A.3.1		Does the management system contain clear short and long-term objectives?			
60	Short and long-term resource and environment objectives are implicit within the management system.	Objectives include clear targets to retain North Sea ecosystem functionality and to maintain North Sea herring biomass. These objectives can and are measured by a range of performance indicators.	R2. R11.	21.0	80
80	The management system contains short and long-term resource and environment objectives.	Short and long term resource objectives have been established. Long-term objectives are set out in the EU-Norway agreement. Significant environmental objectives are included within fishery-related objectives, which are based on a precautionary approach.			
100	The management system contains clear short and long-term resource and environment objectives that can be measured by performance indicators.	<p>Nonetheless, objectives could be clearer. Short and medium term objectives do not always include defined target reference points, and therefore objectives are not clearly attainable.</p> <p>At an operational level short-term objectives are represented by annual TAC's. Achievement against these annual targets is monitored at national level on a monthly basis. The ICES ACFM presents advice on stock management based on its current understanding of the state of stocks. It also advises on what TACs should be set for the coming year for those stocks that it has been requested to advise on – taking into consideration its knowledge of the stocks and any decision-control rules that have been adopted for these stocks.</p> <p>For North Sea herring, the ICES ACFM TAC advice is based on application of the decision-control rules that underpin the EU-Norway agreement. Application of the decision-control rule forms the basis of negotiation between interested parties at the EU-Norway negotiations held towards the end of each year. The outcome of these negotiations for EU Member States is formally ratified at the Council of Ministers of the European Union meeting held in December.</p>			

3.A.3.2		Do operational procedures exist for meeting objectives?			
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60	Operational procedures exist which are applied to the meeting of objectives.	<p>In relation to TAC, there is a clear system of data collection, testing and clear feedback. There is regular inspection of landings. In the North Sea herring fishery there are regular inspections at sea, and fleet activity is monitored by aerial surveillance and through a satellite mediated VMS (Vessel Monitoring System). Where considered appropriate, more detailed and focused inspections and investigations are undertaken, combining information already collected with direct observation (off-loading and weighing of all catch) and inspection of further documentation. In relation to North Sea herring agreement has recently been reached for the secure weighing of all herring entering processing plants, allowing inspectors the opportunity to undertake mass-balance exercises (a complete audit of a product from one vessel going into a plant, and product coming out of a plant).</p> <p>Such activity forms the backbone of the CFP Monitoring Control and Surveillance (MCS) system, and performance of this system against national and CFP targets, including details of infringements and prosecutions, is reported on an annual basis. These activities are coordinated through the EU Fisheries Control Agency based now based in Vigo, Spain.</p> <p>The machinery of this system (operational procedures) is well developed, is in place, and is applied in a clear and transparent way. National quota is sub-divided among fleets (and increasingly in the small pelagic sector by vessel), in Member States and Norway. Landings are recorded by logbook, and reported to the national authority. Consolidated data on uptake against allocation are reported to the Commission (and Norway).</p> <p>The reporting process provides timely information to the Commission. This information allows the Commission to exercise the power vested in it to close the EU fishery immediately all quota allocations have been taken.</p>	R25. R28. R29.	21.0	100
80	Transparent operational procedures are applied to the meeting of objectives. These procedures can be shown to support the objectives.				
100	Operational procedures are transparent and clearly applied. There is a feedback mechanism testing effective application.				
3.A.3.3		Are there procedures for measuring performance relative to the objectives?			
60	Operational procedures exist which can be used to measure performance relative to the objectives.	<p>There are clear procedures that are regularly used for the measurement of SSB and F, and for measurement of performance relative to SSB and F. These are consolidated and reported upon by the relevant ICES Working Group - Herring Assessment Working Group for the Area South of 62° N.</p> <p>At the national level performance is monitored by the national fisheries administration drawing on the range of data and monitoring tools prescribed under relevant national and EU legislation. Outputs and outcomes are published in annual reports to the EU Council of Ministers.</p>	R2. R25.	21.0	100
80	There are procedures used for measuring performance relative to the objectives.				
100	Tested procedures are used for regular measurement of performance relative to the objectives.				
3.A.3.4		Do objectives and operational procedures follow the precautionary approach?			
60	Some objectives and procedures implement a precautionary approach.	<p>The decision rules seek to be precautionary to meet the objective of Bpa. TAC advised cuts, based on the harvest control rule, appear to be precautionary (certainly more than in previous years). However, there is considerable scope for increased precaution in the setting of F.</p> <p>This has particular relevance in relation to the +/-15% rule, which does not follow best scientific advice and has been shown not to be precautionary, albeit the 15% change can and has been overridden. A more significant issue is the implementation, which often parts from the harvest control rule established under the EU-Norway agreement. The decision process lacks transparency and precise reasons for the departure from the HCR are not given, but have clearly not always been precautionary.</p>	R2. R11.	13.0	70
80	Key objectives and procedures explicitly implement a precautionary approach.				
100	All objectives and procedures explicitly implement a precautionary approach.				
3.A.3.5		Does the system include a consultative process including affected parties?			

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60	The system includes a consultative process including key stakeholders within the fishery.	<p>Extensive consultative processes are in place at national and European levels to debate policy, plans and management, and recent years have seen the introduction of more formal procedures to incorporate a wider stakeholder community within such consultations.</p> <p>At a European level, key institutions are the Advisory Committee on Fisheries and Aquaculture (ACFM) - which comprises a contact group at the European level for all stakeholders at national and regional levels – and the recently formed Regional Advisory Councils (RACs) – which comprise a contact group dealing with particular fisheries at the regional level.</p> <p>At a national level, administrations operate formal consultation procedures combining mailings on current issues and proposed changes to management systems and regular scheduled face-to-face meetings with key stakeholders. These issues are also specifically debated at the level of Producer Organisations and fishermen associations.</p> <p>At a local level, some management responsibilities are delegated to local government and subject to local legislation. In these cases, there are formal structures for seeking and incorporating stakeholder views into decision-making. Information gathering, and dissemination of results, takes place between ICES Working Group members and industry stakeholders.</p>	R10. R19.	13.0	100
80	The system includes a consultative process including all main stakeholders.				
100	The system includes a consultative process including all affected stakeholders.				
3.A.3.6		Is there an appropriate mechanism for the resolution of disputes within the system?			
60	A program is being developed to allow for resolution of disputes within the system, but has not been tested.	All member states have signed up to CFP, and are bound by European legislation. Disputes between Member States and the Commission are resolved in the Council of Ministers.	R8. R10. R30.	13.0	100
80	There is an appropriate mechanism for the resolution of disputes within the system.	Where appropriate, European legislation is enacted at the national level through relevant primary and secondary legislation. Formal procedures apply for the resolution of disputes through the national court systems. Ultimately, any European citizen or organisation can take legal action against the Council of Ministers in the European Court of Justice. This is a system that is widely known and has been used when considered necessary.			
100	There is an appropriate and tested mechanism for the resolution of disputes within the system.	<p>Within the fisheries administrative structures of each member state there are also a wide range of bodies and committees through which problems can be raised and disputes debated and resolutions found. Local government and relevant planning committees also have a range of tools at their disposal to both inform and resolve relevant disputes.</p> <p>Outside the machinery of government, there are a wide range of institutional solutions to dispute resolution – through trade organisations, professional associations, and a range of decision-making bodies (at local, regional and national levels).</p>			
3.A.4 (MSC Criteria 6)		The management system operates in a manner appropriate to the objectives of the fishery.		16.0	
3.A.4.1		Does the system include subsidies that contribute to unsustainable fishing?			
60	Subsidies exist that may contribute indirectly to unsustainable fishing. These are short-term and are in the process of being removed within acceptable timescales.	Since the 2002 revision of the CFP, subsidies that contribute to unsustainable fishing have stopped. There is no support to increase capacity, or to compensate for low catches. Any subsidies that were made available would have to be cleared with the European Commission under the EC State Aid rules. The industry does not pay directly for management or science, therefore there are possible sources of effective subsidy, albeit the fishery has passed in this case.	R31. R32. R33.	50.0	85
80	The system includes no subsidies that contribute to unsustainable fishing.	There remains concern amongst some environmental NGOs (amongst others) that development support through the			

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100	The system is not subsidised to any extent.	<p>EC's structural funding mechanisms to the fishery sector – the Financial Instrument for Financial Guidance (FIFG) and its replacement, the European Fisheries Fund (EFF) – constitutes continuing subsidy to the sector, but this interpretation is not supported by the EC and Member State governments.</p> <p>No subsidies are identified for this fishery.</p> <p>A preferential tax system is applied to diesel across all EU primary production sectors, which could be considered a subsidy relative to other economic sectors, but this is difficult to argue for fisheries as a whole as European countries apply a far higher level of taxation on fuel than any other economic block in the world (with the exception of Japan).</p>			
3.A.4.2		Does the system include economic/social incentives that contribute to sustainable fishing?			
60	A program is being developed to promote sustainable fishing practices.	<p>The freedoms to optimise catching opportunities facilitated through quota trading (leases, swaps and international swaps) enables the fleet to target more specifically, and therefore to fish in a more sustainable and economically efficient way. There is an economic disincentive against slippage (although there is no actual penalty in place), and the fleet is fined for landings over quota. Other than through TACs and quotas there is no other system to control fishing mortality (F). No subsidies are offered for purchase of vessels. There has been significant consolidation of licences and removal of spare capacity.</p>	11. I2. R8. R34.	50.0	90
80	The system has some economic and social incentives that contribute to sustainable fishing.				
100	The system has established economic and social incentives that contribute to sustainable fishing. No subsidies are offered for purchase of vessels or vessels targeting fully exploited or depleted resources (by FAO definitions).				
3.A.5 (MSC Criteria 8)		A research plan exists in line with the management system to address information needs.		9.0	
3.A.5.1		Have key research areas requiring further information been identified?			
60	Some major areas requiring further research have been identified.	<p>ICES establishes study groups based on information requirements identified by national delegates, including through industrial representations.</p> <p>Members of various ICES Working Groups focused on such elements as herring biology and stocks, climate change, plankton, multi-species fisheries (ecosystem), etc. all review research, identify research requirements and undertake appropriate work.</p> <p>There is good communication between Working Groups (via AFCM), and between researchers through their specialist interests.</p> <p>There are a number of targeted research projects on-going to examine poor recruitment, and larval survival over the first winter.</p>	14. R35. R47	50.0	100
80	The key areas requiring further research have been identified.				
100	A comprehensive review of information requirements has been undertaken, resulting in the identification of primary and secondary research requirements.				
3.A.5.2		Is research planned/undertaken by the scientific advisers to meet the specific requirements of the management plan?			
60	Research is planned for highest priority information needs.	Targeted research is planned and undertaken with demonstrable resources.	14. R2. R47.	50.0	90

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80	Research is planned and undertaken to provide necessary scientific support to the plan. There are demonstrable resources to allow implementation of the programme.	Research / investigation is undertaken in relation to specific requirements, which generally come from the recommendations of the Stock Assessment Working Group.			
100	There is an ongoing, funded, comprehensive and balanced research programme, linking research to the management plan.	<p>Members of the ICES community keep abreast of developments within the scientific community of relevance to the fishery under consideration. This ICES community is wider than Europe and includes relevant research elsewhere. Research contracts are let to other organisations, including Universities, (e.g. through the EC) to supplement scientific understanding relevant to the fishery and related ecosystem.</p> <p>Despite the above, research planning operates in a more <i>ad-hoc</i> fashion than this would suggest, without a clear overarching research strategy.</p>			

3.A.6 (MSC Criteria 7,9,10)	The management system includes measures to achieve objectives for the stock.				16.0
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3.A.6.1		Are the resource and effects of the fishery monitored?			
60	A monitoring programme is in place that addresses some aspects of resource and effects and which can be extended.	Comprehensive stock assessment surveys are undertaken of North Sea herring and associated fisheries.	R2. R35.	33.0	100
80	A monitoring programme is in place that addresses all key aspects of resource and effects at appropriate intervals and results are recorded.	<p>Landings data are recorded by all countries involved with this fishery.</p> <p>Such data incorporate comprehensive geographical and temporal coverage.</p> <p>Full records of these are available to members of the herring and other ICES Working Groups and others. These Working Groups provide a transparent forum for consideration of these data.</p>			
100	The resource and effects of the fishery are closely monitored over appropriate geographical areas and time periods. Full records are kept of monitoring results and these are made available to relevant research and management bodies.	Results of monitoring are made available to research and management bodies.			

3.A.6.2		Are results evaluated against precautionary target and limit reference points?			
60	Target, precautionary and limit reference points exist and some level of evaluation is possible.	Stock assessment allows regular monitoring of the indicators against reference points, such as target F and SSB. Spawning stock is regularly compared against precautionary target reference levels. The state of the stock from the results of monitoring are reviewed against the precautionary and limit reference points annually to provide advice on the fishery for the following year.	R2. R18. R35.	33.0	90
80	Results of monitoring are regularly interpreted in relation to precautionary, target and limit reference points	The target region set for biomass is arbitrary – without theoretical basis – but is considered to be precautionary in nature.			
100	Results of monitoring are quantitatively evaluated against precautionary, target and limit reference points on a regular basis.	Target fishing mortality is not completely consistent with the decision control rule expressed in the EU-Norway agreement – the rule that is used as the basis for establishment of annual TAC (see 1.1.3.1, 1.1.4.1 & 1.1.4.2). This has been evaluated and commented on by the HAWG.			

3.A.6.3		Do procedures exist for reductions in harvest in light of monitoring results and how quickly and effectively can			
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		these be implemented?			
60	Practical procedures exist to reduce harvest. Programmes to link these with monitoring results are underway.	High quality, well-documented procedures exist to reduce harvest in light of monitoring results. These can be quickly implemented (near real-time recording of catch levels and quota uptake – and annual review of stock status).	R2. R18.	33.0	90
80	Practical procedures exist to reduce harvest in the light of monitoring results and provide for stock recovery to specified levels. Measures can be implemented speedily	The CFP system allows the Commission to make a proposal to the Council for an immediate (in-year) reduction in quota. This system has been used previously for North Sea herring in 1996 and has allowed for rapid recovery to specified levels. In addition both the Commission and national administrations have fast track closure procedures available.			
100	Practical procedures exist to reduce harvest in light of monitoring results and provide for stock recovery to specified levels within specified time frames. There are well documented procedures to implement changes and these can be introduced with immediate effect.				

3.A.7 (MSC Criteria 10)	The management system includes measures to achieve objectives for the affected ecosystem.			9.0	
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3.A.7.1		Are measures in place to address (avoid or minimize) significant environmental impacts?			
60	Significant environmental impacts are known, and where known, measures are being applied to reduce key impacts.	At CFP level, the system allows for measures to be implemented to avoid significant environmental impacts. The key environmental impact is the removal of biomass. Measures to control stock status are in place and have been shown to be effective for both juveniles and adults and are under regular review.	R15. R44. R45.	50.0	80
80	Environmental impacts are known. Measures are being applied to minimise all significant ones and there is evidence that the measures are working.	There are no known significant environmental impacts of North Sea herring pelagic trawl.			
100	Measures are in place to avoid all significant environmental impacts and are subject to monitoring and periodic review.				

3.A.7.2		Are no take zones, or closed areas for specific periods appropriate and, if so, are these established and enforced?			
60	Suitability of no-take zones and closed areas / seasons has been reviewed against objective biological criteria. Plans are in place to implement some or all of these.	A strongly enforced and monitored closed season for the North Sea herring fishery is in place. Seasonally closed areas are established for spawning herring on the UK North Sea coast and for juvenile herring on the West Coast of Denmark. Similar closures for sprat fishing provide additional safeguards for the herring. These are enforced through patrol and satellite-based Vessel Monitoring Systems. The consequences of closed areas cannot be directly monitored, but their effect is expected to be reflected in the overall status of the stock, which is monitored.	R2. R46.	50.0	90

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80	Suitability of no-take zones and closed areas / seasons has been reviewed and these have been or are currently being implemented and enforced if and where appropriate.	In relation to the north-east coast of England spawning ground closures it would be possible to justify a similar closure to that established for the the spawning period in the Downs area.			
100	No-take zones and closed areas / seasons are established and enforced if and where appropriate and, if implemented, the consequences are being monitored.				

3.A.8 (MSC Criteria 11)	There are control measures in place to ensure the management system is effectively implemented.	0.16	
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3.A.8.1		Are information, instruction and/or training provided to fishery operatives in the aims and methods of the management system?			
60	Mechanisms exist for the dissemination of information, instruction and training of fishery operatives. Implementation of these mechanisms may not be universally implemented.	Strong mediation by PO's in the industry (in particular skippers) demonstrate a comprehensive knowledge of management information – insofar as appropriate – this is typically disseminated through close communication between fisheries board and operatives, and information in appropriate publications. Some training – through talks at port - is also available at specific times.	13. 15. 18. 110. 19. R36.	25.0	85
80	Information, instruction and training are provided to fishery operatives in the aims and methods of the management system allowing effective management of the system.	Information is made readily available to all fishing organisations within member states on the requirements, aims and methods of the management system.			
100	Information, instruction and training are provided to fishery operatives in the aims and methods of the management system allowing effective management of the fishery and operatives demonstrate comprehensive knowledge of this information.	Despite the availability of such sources of information and training, not all fishing personnel are equally informed on these matters. There is limited compulsion to take in this information, and no formal monitoring of training or uptake.			

3.A.8.2		Is surveillance and monitoring in place to ensure that requirements of the management system are complied with?			
60	An enforcement system has been implemented; however, its effectiveness and/or compliance pose a risk of failing to achieve conservation objectives.	There is a high degree of enforcement and control and in this fishery, which has increased recently in response to identification of substantial under-reporting, which recent changes and improvements in overall monitoring, control and surveillance (MCS) have been designed to address. National Authorities enforce EC fisheries legislation and report on their activities annually to the Commission. Enforcement includes use of satellite VMS, patrol vessels and aerial surveillance.	11. 17. 112. R2. R8. R36.	50.0	85

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80	An effective enforcement system has been implemented and there is an appropriate degree of control and compliance.	<p>This said, there is evidence of improving compliance across the wider industry, with a steady improvement in compliance with TACs limits; from 40% overfish in 1997 to 9% overfish in 2006. Misreporting or unattributable fishing mortality is also now much reduced. As reported in the 2007 report of the ICES Herring Working Group, current levels do not pose a risk of failing to achieve conservation objectives.</p> <p>Compliance in the Scottish North Sea herring fishery has been poor in recent years up to 2005, with clear examples of under-reporting and illegal landings. Since this has been uncovered the level of monitoring has substantially increased and the Scottish Fisheries Protection Agency is confident that there is now a high degree of compliance – See 3.B.5.2.</p>			
100	An effective enforcement system has been implemented and there is a high degree of control and compliance.				

3.A.8.3		Can corrective actions be applied in the event of non-compliance and is there evidence of their effectiveness?			
60	Mechanisms exist or are being developed which can be implemented or applied to deal with non-compliance, and are subject to evaluation as to their effectiveness.	<p>There are systems in place for the imposition of corrective actions and the application of increased enforcement. In two recent and well publicised cases of significant under-reporting of North Sea herring catches (Ireland and the UK) arrangements have been negotiated between the national authorities and the European Commission to allow an annual “payback” of a proportion of the fish formerly declared (i.e. a fixed quota volume is deducted from annual quota allocated to each country).</p> <p>A steady improvement in compliance across the wider herring fishery (as referred to above) indicates that corrective actions are having effect – though measures are still to reach full effectiveness.</p> <p>Non-compliance is dealt with by the relevant national authorities through their criminal justice systems, and using agreed and tested procedures. Much improved levels of compliance suggest that this system is effective. The UK courts have recently (2007) dealt effectively with a high profile case of illegal landings in the Scottish pelagic fishery.</p>	I1. I7. I10. R2. R8. R36.	25.0	85
80	There are set measures that can be applied in the event of non-compliance although these may not be included in a formal or codified system. These have been tested as to their appropriateness and effectiveness.				
100	Agreed and tested corrective actions can be applied in the event of non-compliance.				

3.B	Operational Criteria				50.0
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3.B.1 (MSC Criteria 12)	There are management measures that include practices to reduce impacts on non-target species and inadvertent impacts upon target species.				14.0
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3.B.1.1		Do management measures, principally through the use of gear and other fishing practices, include avoidance of impacts on non-target species and inadvertent impacts upon target species? These would include by-catch, discard, slippage and high grading.			
60	Measures have been implemented that are intended to reduce the major impacts on non-target species and inadvertent impacts on target species, but their effectiveness is not known.	<p>No meaningful bycatch (other than mackerel), discard or onboard high grading. There are no major impacts on non-target species. However some slippage does occasionally occur – although this is not recorded. There are clear on-board operational procedures in place to minimise slippage, including through investment in appropriate technology – although procedures are not necessarily documented. *Refer to 1.1.2.1. *</p>	I5. I10. R2. R36	100	80

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80	Measures have been implemented to reduce the major impacts on non-target species and inadvertent impacts on target species and there is some evidence that they are having the desired effect.	<p>Vessel design and on-board handling systems do not allow for discards to be made once fish has been pumped from the net. For this same reason (and bearing in mind that catcher-only vessels are not allowed to carry on-board grading equipment) high-grading of fish once it is brought on-board is not possible.</p> <p>Slippage is the one area where discarding does occur, but the extent of this practice is limited and not considered to be a significant issue in this fishery. A number of incentives act to minimise the practice of slipping, not least the cost of shooting and hauling nets, the wear on gear, and the detrimental impact on a valuable resource. Additionally, there is no particular price difference between small and large herring, so there is little or no economic incentive to high-grade.</p>			
100	Measures have been implemented to reduce the major impacts on non-target species and inadvertent impacts on target species, and their effectiveness is clearly demonstrated.	<p>Taking all the above into consideration, slipping of fish is to be avoided for a range of operational and economic reasons. Slipping is most likely to occur in the opening days of the fishery, when the vessels are searching for the “right” fish. Every effort is made to utilise to its fullest extent the discriminatory technology built into on-board sonar equipment, and substantial and on-going investment is made in up-grading this equipment.</p> <p>Slipping also takes place when a shoal is found to be mixed with a high proportion of mackerel (or still more rarely with out of specification herring). This is unusual in that a high degree of mixing with mackerel can usually be picked up on sonar.</p>			

3.B.2 (MSC Criteria 13)	There are management systems in place that encourage fishing methods that minimise adverse impacts on habitat.	14.0	
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3.B.2.1		Do fishing operations implement appropriate fishing methods designed to minimize adverse impacts on habitat, especially in critical or sensitive zones such as spawning or nursery areas?			
60	Fishing operations use measures that significantly reduce major impacts on habitat, especially in critical or sensitive zones such as spawning or nursery areas.	The exact areas where vessels fish are fully recorded and understood. There is therefore direct evidence that fishing practices do not have significant adverse impacts on all habitats as it is clear that there is no impact on pelagic habitats and no interaction with benthic habitats.	R37. R44. R45.	100	95
80	There is evidence that fishing operations are effective in avoiding significant adverse effects on the environment, especially in critical or sensitive zones such as spawning or nursery areas.				
100	There is direct evidence that fishing operations implement appropriate methods to avoid significant adverse impacts on all habitats.				

3.B.3 (MSC Criteria 14)	The management system incorporates measures that discourage destructive practices.	14.0	
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3.B.3.1		Does the fishery employ destructive fishing practices?			
60	The fishery does not allow any destructive fishing practices.	No destructive practices are used, and there is tight enforcement. There is, however, no formalised code of conduct.		100	100

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80	The fishery does not employ any destructive fishing practices and enforcement is considered sufficient to prevent their use.	The EC technical conservation regulation prohibits use of explosives, poisonous or stupefying substances or electric current.			
100	The fishery does not employ any destructive fishing practices. There is a code of conduct for responsible fishing that is fully supported by fishers.				

3.B.4 (MSC Criteria 15)	The management system incorporates measures that reduce operational waste.	14.0	
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3.B.4.1		Do measures exist to reduce operational waste?			
60	Measures/facilities are in place to reduce sources of operational waste that are known to have detrimental environmental consequences, but further reductions may be possible.	<p>Waste fuel and oil is stored onboard for discharge through regulated channels when the vessel is docked. Disposal is recorded in a fuel log as a part of compliance with Lloyds vessel certification. Vessels collect all material fishing related waste in a container on deck for disposal ashore through regulated disposal channels. No waste is disposed overboard. All ports that are used by the vessels provide appropriate waste facilities, and the servicing of these waste facilities comply with appropriate international waste management protocols.</p> <p>It is illegal to dispose of waste, other than food waste, into the sea.</p> <p>The SPSG policy stated on management of gear could be improved by a requirement that any incidents should be recorded together with the resultant action.</p> <p>An often over-looked aspect of fishing is the wastewater used to pump fish from the vessel into the plant. In many areas, this water is simply released into the harbour with short-term yet obvious affects. Mechanism are in place on these vessels to de-water fish during the discharge process, and disposal of such water is subject to discharge controls. Nevertheless, care needs to be taken to discharge such water in an appropriate manner.</p>	15. 18. 110	100	100
80	Measures/facilities are in place to reduce all sources of operational waste that are known to have detrimental environmental consequences, and there is evidence they are effective.				
100	Measures/facilities are in place to reduce all sources of operational waste that are known to have detrimental environmental consequences, and there is evidence they are effective and these measures are supported by the fishers.				

3.B.5 (MSC Criteria 16)	Fishing operations are conducted in compliance with the management system and legal and administrative requirements.	26.0	
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3.B.5.1		Are fishers aware of management system, legal and administrative requirements			
60	Fishers are aware of key management and legal requirements.	<p>All vessels are fully informed of changes to management and legal measures, direct from the government or via the Producer Organisation. Crew are well informed of the legal requirements that affect their operation. No formal protocols are in place with respect to information provision and awareness-raising although this is an aspect covered by the Responsible Fishing Scheme which all vessels are currently undertaking.</p>	15. 18. 110. R44.	22.0	90
80	Fishers are aware of management and legal requirements upon them and are kept up to date with new developments.				

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100	All fishers are aware of management legal requirements through a clearly documented code of conduct.				
3.B.5.2		Do fishers comply with management system, legal and administrative requirements?			
60	Fishers comply with some, but not all, requirements.	This fishery has had a history of non-compliance although major efforts have been made to improve MCS systems and SFPA are confident that this has improved compliance. Although there is a clear system in place which is implemented and incorporates legal and administrative requirements - this is not documented as a formalised code of conduct.	11. 17. 112. R44.	32.0	70
80	Fishers are fully compliant with relevant management and legal requirements.				
100	Fishers are fully compliant with, and fully supportive of, a code of conduct which incorporates legal, and administrative requirements				
3.B.5.3		What is the record of enforcement of regulations in the fishery: quota control, by-catch limits, MLS, mesh regulations and closed areas?			
60	There is information on breaches of regulations and on corrective action to prevent or curtail.	There is almost 100% monitoring of landings with all landings into the processing plant going via a certified weigh bridge. Quota control, mesh regs and closed areas are fully enforced – including use of VMS, registration of buyers and sellers, designated landing ports. There is also an onboard observer programme in this fishery. Overall the herring quota is still consistently over fished, although the SPSP vessels are not now thought to contribute to this overshoot.	11. 17. 112. R2. R8. R44.	46.0	90
80	Evidence of rigorous monitoring of all the enforcement measures and evidence of actions taken in the event of breaches.				
100	Strong evidence of rigorous monitoring and control of the enforcement measures through for example satellite monitoring, shipboard observers and nominated landing ports. Strong evidence of firm action taken in the event of breaches				
3.B.6 (MSC Criteria 17)		The management system involves fishers in data collection.		14.0	
3.B.6.1		Do fishery operatives assist in the collection of catch, discard and other relevant data?			
60	Fishery operatives are occasionally involved in the collection of catch, discard and other information.	There is a good level of willing cooperation with the collection of necessary data. Fisheries board are satisfied with the data coming from vessels. Slippage information is not provided – although this has not yet been requested. Whilst slipping fish is not contrary to fishery regulations, no record of the occurrence and scale of slippage is kept – information that could assist in better quantifying non-allocated fishery mortality. There has been no attempt to look at other data that the industry might supply to support the scientific monitoring.	15. 110.	100	80
80	Fishery operatives are regularly involved in the collection and recording of catch, discard and other information.				

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100	Fishery operatives assist significantly in the collection and recording of catch, discard and other information.				
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Appendix 4 – Peer review reports

Peer Reviewer A

Main Report Review:

General.

This is a well presented and clearly constructed report which has identified and addressed all the important issues in relation to this big fishery. There is very little that I can take major issue with in the report but I do hope that the constructive comments which I have to make will prove helpful.

Section 2.1

Distribution

Para 3. It is appropriate here that you should also mention that some juvenile herring found in the eastern North Sea are from spawning of the western Baltic Spring-spawners. *[done]*

Para 5. You rightly note that herring are very tender and fragile fish with large and delicate gill surfaces and scales. This conflicts with suggestions later in the report that they may survive slippage from a pelagic trawl. Whilst I can reluctantly accept the possibility that carefully pursed fish may survive early slippage, I cannot accept that trawled pelagic fish stand any chance at all of living after capture. The assessment working group rightly considers this to be mortality and you have later addressed the issue of obtaining accurate information on the extent of the practice. *[we note this, and recognise that survival rates need to be considered as low to negligible until such time as evidence to the contrary is presented]*

Lifecycle.

There is some very good information on fecundity which should be quoted and referred to: Fecundity studies on North Sea herring. A.C.Burd and G.J.Howlett. (1974) J.Cons. int. Explor. Mer., 35(2): 107-120. *[footnote added]*

In paragraph 3 you state that first spawning is at 3 years old but in the first paragraph you state that 60% of two year old fish are mature. The most recent HAWG report records 66% of the 2 winter ringers (wr) and 88% of 3 wr. as mature. It is appropriate here to talk about ageing of autumn spawning herring and differentiate between age in years and the concept of winter rings which you mention later in the report (section 3.2) without explanation. *[footnote added]*

Diet

There is a good reference to the feeding of herring in the North Sea based on the examination of 5,762 stomachs back in the 1980's and it should be referred to here. The food of herring, *Clupea harengus*, in the North Sea 1983-1986. J.M. Last. (1989). J. Fish. Biol. (1989) 34, 489-501. *[footnote added]*

Stock

A useful summary of North Sea herring and its management over the past 40 years is presented in Nichols, J.H. 2001. Management of North Sea Herring and Prospects for the New Millennium. (pp 645-655 in 'Herring: Expectations for a new millennium.' University of Alaska Sea Grant, AK-SG-01-04, Fairbanks. 800 pp.). *[footnote added]*

Section 2.2

I feel that the opening paragraph should be expanded with a bit more of the history. *[this section, now 2.3, substantially added to]*

Section 2.3

Scottish mid-water pelagic trawl

You have a good description of trawl and a nice picture of a pelagic trawler. It would be good to have a diagram of the trawl for the less well informed. A picture paints a thousand words and it applies equally to a diagram. This would really improve the section and most importantly will clearly show how light the ground rope is on this type of pelagic trawl. There is often concern about the potential for seabed contact and damage to, for example, herring spawning beds. The diagram would clearly show that any contact would result in serious damage to the groundrope rather than the seabed. *[done]*

In relation to lost gear the policy should also state that any incidents should be recorded together with the resultant action. *[this comment added to commentary on PI 3B.4.1]*

If at all possible it would be good to see a picture of a multi frequency echo record which showed some identifiable differences between species. I appreciate that the displays are on screens rather than paper records but someone should have an appropriate screen view which you could use. *[not immediately available]*

Slipping

You note that this is probably not a significant issue as high grading does not occur these days. However there is the potential for slipping particularly when mackerel are taken accidentally. I cannot accept the skippers' assertion that 'survival of fish is high' (see my earlier comments). This is a common misconception, even on the pursers, that fish which appear to swim away are OK. I accept that all the relevant research has been with mackerel and purse seining but I see little prospect of the chances of herring in a trawl fairing any better. I tend to agree with and prefer the description by another skipper of a slippage as a 'sickening practice'. I will make further comment on this in relation to Scoring and Conditions. *[this comment is noted, and we recognise that the onus should be on the industry to provide evidence of the higher levels of survival of slipped fish than this comment suggests]*

Discarding

From your description it would appear to be very difficult to discharge unwanted fish once taken on board. However there must be occasions when this is necessary, for example non-marketable by-catch, so perhaps a description of how that is achieved would be appropriate here. *[relevant sentence inserted]*

Habitat and ecosystem impacts

Re the diet a further reference to Last (1989) would be appropriate here. *[done]*

3 Stock Assessment

Section 3.1 Management unit

Fisheries

You should explain here that prior to the second serious decline, in the 1990's, that the only limitation on the by-catch of herring (mainly taken in the sprat fishery in the eastern North Sea) was a 10% by-catch limit. This resulted in some heavy mortality on juvenile herring which fluctuated with the size of the

sprat fishery. The mortality on juvenile herring was not properly brought under control until the introduction of the by-catch limit in 1994 and some subsequent strong enforcement measures by the Danes. *[done]*

Data Sources

You are right to point out the inadequacy of some of the sampling but it should be noted that some countries landings are very small. In that context Belgium with just 3t in 2006 should not be mentioned and the Faroese only took 1785t. Of equal concern is the level of 'foreign' landings that are still not sampled. I suspect that most of the UK (England and Wales) catch of 22,198t was actually landed through the PFA in either the Netherlands or Germany. *[appropriate notes added]*

Assessment

A good succinct description.

Section 3.2 Monitoring of stock status

As mentioned earlier you use the winter ring concept in this section and it should be explained in section 2.1. *[done]*

In paragraph 11 you have repeated all the information about poor sampling from the previous section. Yes it needs to be mentioned here but not in so much detail again. *[done]*

In paragraph 12 you state that the 'effective target fishing mortality is at or below $F_{0.25}$ '. I am not sure what point you are making here. Is it that the advice is based on an F at or below 0.25? In any case it would be helpful if you mentioned the actual F in 2006 of 0.35 in this paragraph. *[done]*

It should be noted in the penultimate paragraph that, under the current low recruitment regime (early indications are that the 2007 year class is also poor), the only scenario which is predicted to take SSB above Bpa in the short term is a total closure of the fishery. This would of course be a draconian measure and not justifiable in a stock where quite clearly there is a reasonable harvesting potential. *[done]*

In the final paragraph you have mentioned the February 2008 ICES workshop report (WKHMP). I think that you need to summarise the important contents of this report in greater detail in this section. It is an important report in the current situation, it is now in the public domain and is under consideration by the HAWG and ACOM whose reports are due in early June. The contents of the workshop report are relevant to this assessment. *[footnote added]*

Section 3.3 Modelling

This section is clearly explained and is easily referred to in the context of the scoring guidelines. The strengths and weaknesses are all fully covered.

Section 3.4 Management Advice

You should mention here that the TAC advice for 2007 was for a 49% reduction based on an F of 0.17. The eventual TAC agreed after EU/Norway meeting was for a 25% reduction. The situation was very similar for the 2008 TAC. *[done]*

Environment and Recruitment

There is an opportunity here to discuss the ongoing problem of poor recruitment which appears to be continuing with the 2007 year class. It would be useful to list some of the possibilities to make this section a bit more informative and interesting for the reader. I have listed some of the possible causes of poor recruitment in North Sea herring below. The list is not exhaustive and of course the true cause may never be known. *[added]*

- Density dependant factors such as high SSB leading to poor larval survival through cannibalism and/or competition for food. (This type of stock and recruitment relationship is

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known for some species but herring have produced big year classes at high SSB in the past including the 2000 year class).

- Changes in the composition of the plankton leading to a poor supply of suitable food items at key life history stages. (It is known that subtle changes have been occurring in the North Sea and that there has been a gradual change, over the past decade, to more southerly species of plankton occurring)
- Subtle changes in the physical processes in the North Sea leading to possible changes in speed and direction of residual currents affecting natatory drift to suitable nursery areas.
- Anthropogenic factors such as gravel dredging which could reduce the areas of suitable substrate on which herring depend for spawning. (However the larval surveys are still indicating a reasonable production of early stage larvae that suggests that the spawning area is not a problem).
- Nothing is known of the potential for disease in larval and juvenile stages to affect survival.
- Very little is known about the predation mortality on larval herring, therefore undetected changes in the distribution and abundance of potential predators, such as jellyfish could be having a significant effect on survival rates.

EU Norway Agreement

This may be an appropriate place to mention that the ICES advisory committee for fish management (ACFM) has now changed to the advisory committee on management (ACOM) and now includes all the ICES advisory committees. *[done]*

Harvest control rule

Your conclusion that the managers only use the harvest control rule as guidance rather than as a robust method to set TAC's is right. Much of the pressure in relation to this comes from the Pelagic RAC and the Scottish pelagic industry need to be seen to be doing more to combat this within the RAC. This point is addressed under condition 6 but it is rather weak. *[noted]*

In relation to bullet point 3 in this section, you should note that the TAC overshoot is taken into account by HAWG in the advice options provided to ACOM in that the current year's assumed catch is the TAC + 10% likely overshoot. *[noted and added]*

Whilst on the topic of the overshoot of the TAC it should be pointed out that up to a 10% overshoot can occur legally because not all reported quantities on board are actually verified on landing. (Is this now different for the Scottish fleet with the introduction of more sophisticated monitoring / weighing systems at the major ports?). *[noted and added]*

4 Administrative Context

Section 4.1 Legislation

This is very well explained and presented and easily interpreted in relation to the PI's.

Section 4.2 Management responsibilities

National management

You should mention here that there are systems in place to monitor national uptake and the facility to stop the fishery nationally once the quota is taken up. *[done]*

Monitoring and review

There is a very good section here on the reviewing process that rightly mentions all the relevant ICES working groups, workshops and study groups involved.

5. Fishery Management

Section 5.1 Management objectives

Re. paragraph 3 you should note that the TAC's agreed were higher than those recommended by ICES. *[done]*

Section 5.2 Monitoring control and surveillance

In paragraph 2 you note a 4% overfish of the quota in 2006. In fact the overshoot for fleet A was 43,000t (9%) as against 83,000t (16%) in 2005. The overshoot in IVc VIIId in 2006 was 6,600t (13%). *[done]*

Improvements in monitoring and surveillance are also backed by designated ports of landing which has stopped the practice of 'black landings'. *[done]*

Compliance

This is a very good section with an honest assessment of all the past problems and the strong measures now in force to combat them. You could mention at the end the resultant big improvement in the reliability of the landings data. *[done]*

Section 5.3 Consultative process

Paragraph 2 must be ACFA not ACFM. *[done]*

Scoring Commentary and Scoring Review

Summary

Generally I found the scoring comments and scoring satisfactorily in line with the Guideposts and with a few exceptions I have no major disagreements with the individual scores. The scoring comments are mainly comprehensive, relevant and supported in the main report. There are a few criteria where I have felt it necessary to suggest a change to the scoring and/or additional comments. There are three criteria where I felt that the score should be reduced to 75, all of them in support of the condition regarding slippage and unrecorded mortality in the fishery. For ease of reference they are: 1.1.4.2; 2.1.2.2; 3.B.1.1. *[These comments are noted. The team has been careful not to double score elements or characteristics in more than one PI, as indicated in MSC Assessment Guidelines, and it is for this reason that the team has considered it fair not to allocate scores below 80 in two out of these three PIs.]*

Specific comments

- 1.1.1.1 You should say the 'sometimes' it can be identified by its sonar trace.
Larval identification by scientists is simple and separation from sprat and pilchard is based on pre-anal myotome counts. Score OK. *[text added]*
- 1.1.1.3 You should mention that the only problem area in this context is with western Baltic spring-spawners in the North Sea and North Sea autumn spawners in the western Baltic. The statistical method of apportioning the two stocks is based on otolith microstructure sampling. Reduce score 95 to 90. *[noted – score of 95 retained]*
- 1.1.1.5 There is current speculation as to whether the whole historic S/R relationship, with values from when the stock was both very high and very low, should be used in the current S/R relationship for predictive purposes. See also 1.1.3.1. Score OK. *[text added]*
- 1.1.2.1 Good supportive comments in relation to the Guideposts and subsequent low score.

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- 1.1.2.2 It seems a bit harsh to reduce the score to 90 and I would score this at 95. *[noted – score of 90 retained]*
- 1.1.2.3 I think that gear selectivity is well known for herring and the comments should be more in line with a score of 90 not 85. *[noted – score of 85 retained]*
- 1.1.2.4 Foreign landings are reported and accurately recorded at the point of landing. The problem area still seems to be that they are not sampled which is the clear responsibility of the receiving country. I also note that the geographical area for the certification does not cover ICES Division IIIa but this is an area where North Sea autumn spawners are taken and should be mentioned here. Score OK. *[noted]*
- 1.1.2.5 You could actually say that there is an appropriate legal system through which offenders are prosecuted, rather than your rather vague ‘disincentive system’. Score OK. *[done]*
- 1.1.3.1 I do not think that the comments, or for that matter the reality of the situation, support a score at the rock bottom of the 80 Guidepost. Compared with many species the reference points are robust, justified, have worked well and are under constant review. Score increased to 85. *[point taken – but score of 80 retained]*
- 1.1.4.1 Comments and score are OK but you could mention that up to 10% overshoot of the TAC can occur legally within current legislation even though it may not be relevant to the Scottish fleet. *[done]* Your TAC overshoot figures here are again misleading and are based on the official statistics. You should be using the more realistic WG landings data. *[noted]*
- 1.1.4.2 The comments and the facts do not support guidepost 80. In the current situation in terms of the advice and ongoing debate about possible changes to the rules, this must be scored at 75 and quoted in support of Condition 5. *[noted – the team have scored on the basis of the existence of tested HCR rather than its application – score of 80 retained]*
- 1.1.4.3 This is linked to 1.1.4.2 above and correctly scored.
- 1.1.5.1 Retrospective analysis now indicates that the ICA assessment model itself is performing well (note that ICA or some version of it is being successfully used in other pelagic assessments). The problems tend to be associated with the continuing uncertainty in the catch data. A score of 95 could be justified in line with 1.1.5.6. *[noted, but score of 90 retained]*
- 1.1.6.2 The comments here are confusing, in fact the wording of Guidepost 60 does not help. Whilst there is no specific F_{im} the specified target in the EU/Norway agreement is 0.25. The actual F in 2006 was 0.35 which is well above F_{pa} for adults aged 2-6. You could mention the well below target F on juveniles although it would not change the score. *[notes added]*
- 1.2 At the end of your comments, after ‘substantial increase in recruitment’ you must add ‘or a complete ban on directed fishing for herring which is unrealistic in the present situation’. Score OK. *[done]*
- 1.3.1.1 You should mention here that the current larvae surveys show good production of the early larval stages over all survey areas which indicates that there is no impairment of reproductive capacity. *[done]*
- 1.3.1.2 You should mention here the concern that at present the Downs spawning component is heavily dependant on one year class which could affect the reproductive capacity in the near future. In that context the score should perhaps be cut to 85. *[the basis of the argument is accepted – a note added, and the score reduced from 100 to 90]*
- 2.1.1.1 The score is OK but you could mention the possibility of sea bed contact by large pelagic trawls in shallow areas such as the Downs spawning areas at spawning time. This has the potential to damage spawn and the spawning bed although I recognise that occurrences are likely to be infrequent and that this is not an area frequented by the Scottish fleet. *[noted - but the Scottish fishery is focused further north, no change made]*
- 2.1.1.2 Mention here that ALL the by-catch is landed and counted against the quota and that there

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- are penalties for over quota fish. This should also be made clear in the report section. Score of 95 is OK. *[note added to main text]*
- 2.1.2.1** Reduce the score to 95 because the extent of mackerel mortality through slippage is not known. *[the bycatch of mackerel is reported to be limited, but the extent of slippage is covered elsewhere (1.1.2.1) – score of 100 retained]*
- 2.1.2.2** The comments do not fit Guidepost 80 and the score should be reduced to 75 and used to support the condition on slippage. *[noted – the team has taken the position that the issue of slippage has been scored at 75 for PI 1.1.2.1 and that it should not be re-scored here; Pls 2.1.2.2, 3.B.1.1 and 3.B.6.1 are, however, referred to as linked to the raising of the re-numbered Condition 1)*
- 2.1.3.1** Score OK but mention the potential for some physical impact particularly in the Downs spawning area. *[point noted, but the Scottish fleet does not exploit the Downs stock]*
- 2.1.5.1** Take out the last sentence of the comments as it relates to non target stock covered in the next section. *[done]*
- 2.1.5.3** In the first paragraph you say that landing of non target species count against the TAC but the catch of non target species will not count if they are discarded by slippage (note your earlier comments about unwanted catches of mackerel in the early part of the herring season). I note that slippage is mentioned in the last paragraph. The score should be reduced to 90. *[noted, but score retained at 95]*
- 2.2.2.1** The comprehensive comments do support a better score than 80. Whilst the current strategy may not fully support all aspects of Guidepost 100 I still think that a score of 90 can be justified. *[much of detailed explanation moved to main text – approach to scoring is complicated by the fact that because there is so little habitat and ecosystem impact, there is limited management focus on this issue – it is this that has been scored at 80, though this is recognised as an aberration of the scoring process]*
- 2.3.1.1** Score is OK but it should be noted somewhere that the herring fishery is not responsible for the current state of the Norway pout stock. *[done]*
- 3.A.1.2** Take out use of ‘industrial scale fishery’ which has connotations of an ‘industrial fishery’ which it is clearly not. Instead, I suggest that you call it a large scale human consumption fishery with average catch (fleet A) of 477,000t over the past five years (or 386,000t over the past 10yrs). *[done]*
- 3.A.1.4** Could mention the Pelagic RAC again here as it does function as a kind of review body. *[done]*
- 3.A.2.1** Quite clearly the fishery is consistent with international conventions and agreements but the Guideposts all mention an ‘evaluation’ which makes scoring difficult! *[noted]*
- 3.A.2.2** OK but why not 100? *[the shadow of past under-reporting gives cause for some reservations about future behaviour; not that there is a belief that there is anything untoward, but rather that the industry needs to positively show a clean bill of health for some years to come]*
- 3.A.3.5** Score OK but you could also mention the producer organisations here. *[done]*
- 3.A.4.1** A good defence of the current EFF not being a subsidy as such. You could justify a score of 90 here rather than 85. *[noted, but score retained]*
- 3.A.7.1** The score appears to be low in relation to Guidepost 80, please review. *[see note for 2.2.2.1]*
- 3.A.7.2** In relation to the north-east coast of England spawning ground closures it would be possible to justify a similar closure during the spawning period in the Downs area at present. This is never considered or reviewed but should be mentioned. *[done]*

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- 3.A.8.2** The score is OK but the overshoot should be quoted as 9% for 2006 based on the WG estimate of catch not the official statistics which everyone accepts are not correct. *[done]*
- 3.B.1.1** The comments suggest a lower score. The potential impact of slippage is purely speculative. Mackerel if caught can and should be landed against the quota yet it is suggested that they are likely to be slipped particularly if abundant in the early herring season. The score should be reduced to 75. *[unchanged – see note for 2.2.2.1]*
- 3.B.4.1** You could mention that it is illegal to dispose of waste, other than food waste, into the sea. Score OK. *[done]*
- 3.B.5.3** SPSG vessels are only 'thought' not to be contributing to the overshoot of the TAC. It seems to me that's what they all claim but quite clearly someone is. Because of the uncertainty the score should be reduced to 90. *[evidence collected suggests statement of not contributing to overshoot to be true, but concerns still exist with regard to slippage – score of 90 entered]*

Conditions of Certification

Condition 1. I have problems with this condition in that, whilst the intention is laudable, it is not supported by a relevant score below 80. The only relevant criterion regarding fishermen helping in the collection of data is 3.B.6.1 which has a score of 80. In relation to the specified EU sampling levels, failure to achieve these is the responsibility of the national monitoring bodies not the industry itself, but they can offer help. I suggest that this condition becomes a recommendation in relation to the offer of help to achieve a better sampling coverage. The alternative is to score 3.B.6.1 at 75. *[point taken; the team has decided to remove the condition altogether on the basis that Scottish landings are currently sampled at an appropriate level]*

Condition 2. The time scale for this condition should be for immediate action and evidence of such action at the first surveillance visit. (see also comments on research requirement below). *[agreed]* As already noted the scores for 2.1.2.2 and 3.B.1.1 should be reduced to 75 and are rightly referred to in relation to this condition. *[not agreed, see note attached to summary paragraph above]*

Condition 3. I see little point in encouraging any research into survival of trawl caught slipped fish. The WG rightly assume 100% mortality and it is better to concentrate on getting a better estimate of the extent of the practice and the quantities of target and non-target species involved. At a time of limited fisheries research funds there are many better projects on which to target available resources. It would be better for the SPSG to more strongly discourage the practice of slippage, under condition 2, other than for reasons of safety e.g. the inadvertent catch of a quantity of fish that cannot be safely brought on board. *[point taken; given that the team has received mixed messages on this matter, and that considerable emphasis is being placed on the recording of slippage it is thought appropriate to leave this condition in – if together the industry and scientists do not consider this a worthwhile area of research, this can be verified at the time of the first surveillance visit]*

Condition 4. OK

Condition 5. This condition is OK.

Condition 6. OK.

Recommendations

I am quite happy with the two suggested recommendations and have no comments to make.

Peer Reviewer B

Overview

The report provides a relatively comprehensive and detailed overview of the stock and the fishery as it pertains to the SPSG application for MSC certification. The authors are to be commended for a well-written document that addresses both positive and negative aspects of the fishery associated with this review. There were a number of repetitive subject areas in the report, but this is seen as being necessary given the nature of the material *[some such repetition has now been removed]*. Generally speaking I found the report to provide a realistic view of the situation related to the three guiding principles and agree with the recommendations for certification and the conditions for certification. The sub-criteria and performance indicators of the MSC P and C's are broad in scope and the interpretation well documented.

There are, however, several areas in the report where I do not fully concur with what was stated or the weighting that was applied. This is particularly true for the equal weighting of the criteria under Principles 1 and 2 and the unequal sub-criteria weighting under P2 and 3. *[weighing at the level of Principle is a given; that at criterion and sub-criterion levels is at the discretion of the assessment team]* However since I was not part of the decision making team and expect a fair amount of discussion occurred in the evolution of the Assessment Tree, I will not dwell on the matter. I also found it difficult to justify the scoring of 100 for so many performance indicators. In most cases the performance was likely less than that which would occur in a theoretically "perfect" fishery and there was room for improvement. A more appropriate score in such instances would be 95. *[point noted]* I have structured my comments such that I will briefly touch upon subjects related to the background information, followed by comments only on the small percentage of specific performance indicators that I disagree with the scoring or have a comment, and finally the report's conclusion and recommendations.

Background Information: - The Fishery

Under Distribution (Page 3 Section 2.1) the paragraph beginning "During daytime..." needs a bit more detail. Herring demonstrate a wide variety of behavioural patterns that may or may not conform to this general statement. Juvenile herring may not be near bottom or in deep water during the day and adults don't always disperse at night especially on the spawning grounds. *[a noted added to this effect]*

A bit more clarification in Catches and Landings (Page 5) would be helpful. *[this section has been substantially expanded]* The report states that the TAC was exceeded by only <3% in 2006, but the overshoot by the directed fishery (Fleet A), of which the SPSG was a part, was 9%. There is no indication or comment on the amount of the overshoot, if any, attributed to the SPSG fleet, although they take about 10% of the catch. It is implied to be minimal in the scoring table as SPSG are "thought" not to contribute to the overshoot, yet in the past they were less than forthcoming about their landings. An estimate of how the SPSG rates relative to the rest of the North Sea fleet would be enlightening. *[the competent authority in Scotland, the Scottish Fisheries Protection Agency, is of the view, based on its close monitoring of fleet activity, that the SPSG fleet did not contribute to the overshoot for the years 2006 and 2007]*

Regarding the fishing fleet, it is true that fleet rationalization has been occurring over the past several years for both purse seiners and pelagic trawlers, but there will be a greater than 10 % increase in the number of vessels from the SPSG perusing herring in 2008. This represents a potential significant increase in fishing capacity at a time when the stock is below the precautionary biomass level and TAC allocations are unlikely to increase. *[there are fixed capacity limits for this fleet segment fixed at the level of the UK and EC, and any new capacity brought into the segment needs to be balanced by capacity removed from the segment]*

The SPSG policy cited on page 7 is a positive move on behalf of the group to address a potentially serious environmental issue. I would like to commend the SPSG for their initiative on gear loss and disposal. *[moved to a section on the management of waste]*

Slipping is an area where additional information is required. The logic presented regarding the minimizing of slipping is reasonable, but the report acknowledges that the practice persists, and that the extent is unknown. The supposition that survival when released is high because fish are seen swimming away may be a bit optimistic and dependent upon how long the fish have been in the trawl. *[various adjustments to text and scoring commentary have been made to better emphasise continuing concern about the extent of slippage, and the onus on the industry to positively demonstrate that survival rates of slipped fish is high]*

Habitat and Ecosystem Impacts: one obvious oversight in the review appears to be the direct and indirect interaction of the fishery and fishing with seabirds. Many seabirds depend upon the larvae and juveniles of herring as a food source, but I haven't been able to locate any information on this in the report. Also, where there is fishing activity there are seabirds, and inevitably some mortality. Is there any information on the fisheries interaction with seabirds and does the fishery operate in an area where ETP species of seabirds occur. Are there

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any mitigative measures in place minimize interactions with birds. *[throughout the team's consultation with industry, managers, scientists and observers, there was no mention of seabird mortality associated with this fishery, and we have found no reference to this in the available literature; on this basis we have assessed this issue as of minor significance]*

In the mid-1990's there was concern about the amount of juvenile herring by-catch taken in the IIIa industrial sprat fishery and the possibility that some portion of the sprat landings was being incorrectly identified. It appears that sufficient quantities of herring (presumably juvenile) are still being reported (8,000t) but the amount is declining. Has the situation changed or is there still some uncertainty about the amount of herring being landed? *[significant improvements in monitoring, inspection and reporting have been achieved with regard to these and related fisheries in recent years, though mis-reporting, under-reporting and indeterminate discard mortalities through slipping remain areas of uncertainty, and are reflected as such in modelling and the setting of reference points]*

The main concerns with the North Sea herring stock status are that the biomass is below B_{pa} , there have been an unusual number of continuous years of poor recruitment, and the recommended F or TAC has been, and continues to be, exceeded annually. It has also been predicted that continuing to fish at the current F will cause the stock to decline even further and that the biomass may drop below B_{lim} , requiring an even more dramatic decline in the future. The uncertainty associated with recruitment and the possible shift in annual level is cause for concern and needs to be given serious consideration. Furthermore, disregarding the signs that the stock is approaching established reference point boundaries and recommendations for returning to above the precautionary approach limits, has potential implications on the future sustainability of the stock and must to be addressed. This has been picked up in the scoring of the appropriate sub-criteria.

Regarding compliance, it is good to see that there have been improvements in DSM and misreporting. This is particularly true for the Scottish fleet which is acknowledged as having been somewhat less than factual with respect their reported landings.

Scoring

Principle 1

- 1.1.1.1 The score of 100 is a bit high given that in the past there was some concern about the difficulty in identifying small herring and sprat catches. I am however uncertain if this is still a concern or an issue. *[noted, but not considered significant issue]*
- 1.1.2.1 There is a definite need to document all sources of mortality and to meet the minimum level of sampling. Age based assessments require accurate information of the age structure of the catch. Small errors can also have an effect on the estimate of F. While the working group takes these deficiencies into account, without real information there will always be uncertainty regarding the level. I would suggest an even lower score may be appropriate. *[noted, but score retained at 75]*
- 1.1.4.1 While I agree with the justifications presented, I find it difficult to assign such a high rating. The fact that the mechanism exists provides a passing grade, however, if it is not adhered to or modified it, then the score should be less than 80 regardless of the fact that it has permitted the recovery in the past. I also believe the rules were not strictly adhered to in the mid-1990's. *[the focus of this PI is the existence of the mechanism – score retained]*
- 1.1.5.3 Again I find it difficult to justify the score of 80 based on the reference performance indicators provided. The fact that the uncertainties are recognized and reported in the management advice gets a score of 60 but because the decision tables are not provided and there is no evidence that risk is used in the decision for high F's, implies a rating of below 80. *[point taken - decision tables are being developed, but are not routinely utilised in the provision of advice; in addition, the Harvest Control Rule in relation to Reference Points is currently under review – on this basis the team has scored this PI at the 80 level, and this is retained]*
- 1.1.5.5 This is one of the few cases where I agree with the score of 100.
- 1.1.6.1 The stock is above the B_{lim} but below B_{pa} justifying a score of less than 80. However, there are indications that at the current fishing and recruitment (poor) level the stock biomass may drop below the B_{lim} . This should account for more than a 5 point reduction in the rating. *[point taken – the team took the view that this PI reflected an absolute measure, rather than change over time – score retained]*
- 1.3.1.2 This score is too high, and should be reduced – perhaps to 90. *[done]*

Principle 2

- 2.1.2.1 Overall the by-catch for this fishery and fleet is well defined and appears to be negligible for mackerel when expressed in terms of percent of the catch. My main concern is that for high volume

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- fisheries such as herring small, apparently negligible, amounts of a low biomass species can go undetected and have an impact on the stock or local spawning components. A score of 95 would be more appropriate. *[noted – but score retained]*
- 2.1.3.2 Given the efforts recommended by the SPSG to recover lost gear and the process implemented for the disposal of old gear I agree with the score of 100.
- 2.1.4.1 Suggest a score of 95 or 98 would be more appropriate. *[noted – but score retained]*

In general I was in agreement with most of the justification and scoring for Principle 2.

Principle 3

- 3.A.1.2 Over the years there has been consolidation and industrialisation of the industry, but I believe there are still some cultural differences that are not accounted for at the local level. As such I agree with lower score of 90.
- 3.A.2.3 On the whole the system does observe the legal and customary rights of people dependent upon fishing. However, given the number of countries and cultures involved in the North Sea herring fishery I can't imagine that it is perfect – some minor conflicts must be occurring thus 95 would be a more appropriate score. *[noted – but score retained]*
- 3.A.3.2 Operationally functional procedures are in place to meet the objectives, but they are not perfect as the score of 100 implies. There are still overruns of the TAC by some fleets suggesting a score of 95 might be more appropriate. *[noted – but score retained]*
- 3.A.5.1 and 3.A.5.2 These scores allocated are inconsistent. If research operates in an *ad hoc* way how can 5.1 be rated as 100 and 5.2 as 90. The former should be consistent with the latter. I also noted that there was no mention of social or economic issues in the management section. These can have almost as much influence on sustainability of a fishery as the biological characteristics. *[noted - research priorities are clearly identified, but the mechanisms for actioning such work are not straightforward, and thus timing of research (and the allocation of the relevant resources) can lag behind the identification of priorities, hence the difference in scoring; as to the monitoring of social and economic issues, these are increasingly undertaken at EC and national levels and reflected to some extent in management decisions – but do not as yet have a formal role in formation of ICES advice – scores retained]*
- 3.A.8.2 Regarding surveillance and monitoring there are still situations where there is inappropriate control through enforcement. The fact that there are serious (>5%) annual overruns of the TAC in some fleets implies there is a lack of control and compliance and that a ranking of below 80 should be assigned. *[noted – scoring of these PIs relates specifically to the activities of the fishery / fleet under assessment; given that the SPSG fleet has been identified as not contributing to such overruns, the higher score is retained]*
- 3.B.4 An often over-looked aspect of fishing is the wastewater used to pump fish from the vessel into the plant. In many areas, this water is simply released into the harbour with short-term yet obvious affects. While I have no idea of the procedures used in Scotland, if this is the practice, then consideration should be given to reducing the score slightly below 100. *[noted – whilst the discharge of catches in Scotland does allow for the dewatering of fish, this is nevertheless a relevant area of vigilance; a note has been added to the commentary for this PI, but the score of 100 has been retained]*
- 3.B.5.2 The fact that the SPSG are only "thought" not to contribute to the overshoot is a bit disconcerting. This should be verified and if true, the score of 95 is valid. However, if it is not true in the last couple of year then the score should be reduced. *[evidence collected suggests statement of not contributing to overshoot to be true, but concerns still exist with regard to slippage – score of 90 entered]*

The main concern I have with Principle 3 is the scoring of so many of the sub-criteria performance indicators with 100. In many cases mechanisms are good and well founded, but they are not perfect and as such should be ranked at slightly below 100. The perfect score should be reserved for special cases where there is no need for additional information or improvement required. *[the team has considerable sympathy with this position, and debated many of these issues during two days of intense deliberation; the team is, however, of the view that on balance a fair reflection of the fishery has been captured under the agreed scoring regime, and that there are no glaring or significant anomalies in the scores allocated, though there are some small aberrations resulting from how the Sub-criteria have been drafted and/or the Scoring Guideposts defined]*

Performance indicators and conditions for certification:

The report identifies 8 performance indicators that scored below 80 that represent activities not conducive to good fishing practices and the subsequently long term sustainability of the stock. In addition, after completing my review I would argue that several other indicators should be put in the same category. *[this is a valid argument; the team is of the view that the main substance of this argument relates to the team's adherence to the MSC Guidelines to avoid double scoring various characteristics of a fishery - a matter that has particular relevance to the uncertainty associated with the scale and related mortality of the practice of slipping]* That being said the conditions for certification, combined with the recommendations of the assessment team encompass the additional concerns I have expressed in my review.

Summary:

In summary the report captures the essence of the fish, the fishery, the ecosystem and their interactions. Deficiencies in the fishery, the assessment, and the management are identified in the report. Furthermore, corrective measures specifically associated with the SPSG for sustainability are identified in the conditions of certification. Where the responsibility for the deficiency / concern rests with the regulatory or external authority, the SPSG is requested to lobby for change or corrective measures. Assuming these condition are implemented I fully agree with the recommendation for certification.

Appendix 5 – Client action plan

The SPSG has drawn up the following action plan in response to the points raised in this assessment, and paying particular attention to requirements laid down as conditions of this assessment, as well as the recommendations shown in Section 9 of the report.

At such time as a North Sea herring recovery plan is prepared and presented for implementation (this is a condition of certification applying to the Pelagic Freezer Trawler Association (PFA), and this body is expected / required to provide such a plan within the next twelve months), the SPSG will provide the Certification Body with a copy of a letter from the SPSG to the PFA, the Scottish Government Marine Directorate, and the Chair of the Pelagic RAC giving full support to implementation of this plan.

During the first year of application of this certificate, the SPSG, on behalf of its participating vessel owners / skippers, will enter into discussions with research staff of the Fisheries Research Services of the Scottish Government Marine Directorate for the purpose of:

- drawing up and agreeing reporting formats for the recording of information on the nature and incidence of the slipping of catches;
- drawing up and agreeing reporting formats for recording any and all interaction with endangered, threatened and protected species.

By the time of the first surveillance audit, the SPSG will present to the Certification Body evidence that fishing members are recording all occurrences of slipping. By the time of the second surveillance visit the SPSG will demonstrate that the nature and incidence of the slipping of catches is being routinely recorded by the skippers, and that the nature and incidence of any and all interaction with endangered, threatened and protected species is also being routinely recorded by the skippers.

By the time of the first surveillance audit the SPSG will also provide to the Certification Body a copy of letters to the Scottish Government Marine Directorate, and to the Chair of the Pelagic RAC, encouraging both bodies to:

- promote the setting of the annual TAC for North Sea herring at or below the level advised by the ICES Herring Assessment Working Group as both precautionary and likely to support a stock size at or above the precautionary reference level;
- promote the regular sampling of North Sea herring catches by all national fleets, and provision of such information to national fisheries laboratories.

The SPSG will also provide the Certification Body at the time of each surveillance audit with evidence that its catches of North Sea herring are at or below the level of its catches entitlements – relevant national quota entitlement and any additional quota added through international swaps.

By the time of the second surveillance audit, the SPSG will also provide the Certification Body with a copy of a Vessel Operating Manual to incorporate, amongst others, procedures to be applied in respect of the identification herring shoals, catch handling, the process of slipping, the recording of the occurrence and nature of slipping, and the recording of any interaction with, Endangered, Threatened or Protected species.

Agreed by Derek Duthie / John Goodlad on behalf of the SPSG