

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
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.		33.3	89	
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.		61.5	90	
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.		16.7		
Weighting Commentary	<p>No weighting is applied to the MSC Principles – these are equally weighted and each must attain a weighted score of 80 or more for certification to be granted.</p> <p>As the stock is considered to be above appropriate reference levels (see below), MSC Criterion 2 is not currently applicable to this fishery. Given the importance of MSC Criterion 1 (1.1 here) in determining the health of the stock, this criterion is weighted more heavily than MSC Criterion 3 (1.3).</p> <p>Within MSC Criterion 1, each element at the next level of the scoring hierarchy (1.1.1 to 1.1.6) is considered to be of equal importance. Within the 1.1.1 group of indicators, (1.1.1.1 to 1.1.1.6), abundance of the stock and environmental influences (1.1.1.5 and 1.1.1.6) are considered to be particularly important.</p>				
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.	<p>Herring</p> <p>Larval identification is straightforward – important as stock assessment uses information from larval surveys.</p> <p>Herring are easily identified at one year old. Potential misidentification (e.g. with sprat) is not a problem in the Hastings area as the fishery is based on adults only.</p>	R32, R33	12.5	100
80	The target species are unlikely to be significantly confused with any other species; or if target species are grouped, then life history or stock identification information exists to justify this grouping.	<p>Mackerel</p> <p>Mackerel - <i>Scomber scombrus</i>, is easily identified throughout its life history by fishers, regulators and buyers.</p>			
100	The species is readily identified by fishers and by regulators and is recorded appropriately.				

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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.	<p>Herring</p> <p>The life history and the spawning and nursery areas are well described and understood, based on research and monitoring going back over more than a hundred years.</p> <p>Life history information is comprehensive and there are no serious gaps in relation to population modelling for stock assessment.</p>	R37, R41	12.5	95
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	<p>The general spawning areas are known, as are the distribution of the gravel banks in the Eastern Channel on which spawning takes place. This knowledge of the spawning and nursery areas was used to establish and support the continuing seasonal closures of the fishery along the east coast of England at spawning times and in the nursery area off the west coast of Denmark. This information is also used to limit and control aggregate extraction, the timing of seismic surveys in relation to oil and gas exploration in the North Sea and the placement of structures on the sea bed in and around the widespread but discrete spawning grounds.</p>			
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.	<p>This is an issue discussed further in relation to Indicator 2.1.1.1</p> <p>Mackerel</p> <p>Life history is documented and well understood including different life stages. The triennial mackerel egg surveys carried out since 1977 have led to an extensive knowledge of the temporal and spatial distribution of spawning and changes that have occurred over time. There is surprisingly little information on the distribution and habits of the '0' group fish but the subsequent distributions of juveniles (1yr group +) are well documented from survey data. These data are updated annually and used to support the continuing 'mackerel box' closed area and also to review the appropriateness of recommending other closed areas.</p> <p>Adult fish sampling in relation to the egg surveys has provided a considerable amount of information on the spawning behaviour and physiology of spawning.</p>	R32, R33, R41		

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1.1.1.3	Is the geographical range of the target stock known and any seasonal migration 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.	<p>Herring</p> <p>This is an important issue in terms of stock management. There are quite clearly three separate spawning stocks within the North Sea herring population, the ‘Downs’ stock in the southern North Sea and eastern English Channel, the ‘Banks’ stock in the central North Sea and the ‘Buchan’ stock in the northern North Sea. The geographical ranges and seasonal migrations of these three stocks are well known and described although individuals cannot be separated.</p> <p>At certain times of the year fish from the three stocks may mix and be caught together as juveniles and adults. Because they cannot be readily separated in the commercial catches, or by subsequent catch sampling, North Sea herring has to be assessed and managed as a single unit. Also known for this species is that North Sea autumn spawning herring move into the Skagerrak and Kattegat, mainly as 0, 1 and 2 ringers, and are taken commercially, together with Baltic spring spawning herring. Both for management and assessment purposes these have to be apportioned. To date this has been done on an unsatisfactory morphometric basis. However extensive research in recent years on otolith based separation techniques has greatly improved the precision of this apportioning process. Similarly Baltic spring spawners and Norwegian coastal spring spawners are also taken in the North Sea.</p> <p>The spawning fishery in the southern North Sea and eastern English Channel is, however, a discrete one on the Downs stock. It is known that this stock shows trends in both exploitation rate and recruitment which are independent of the other two stocks. Similarly, it is not showing the same pattern of recovery from the low SSB levels of the mid 1990’s. As a consequence a separate area TAC is set for ICES Divisions IV c and VIIId in an attempt to aid recovery. The Hastings herring fishery targets the Downs component of the North Sea stock</p> <p>Annual availability is estimated and documented</p> <p>Mackerel</p> <p>The geographical range of the three components of the North East Atlantic Mackerel Stock is clearly documented (The Western Component -spawning in ICES Divisions VI, VII, VIIIA, b, d, e, the Southern Component spawning in ICES Divisions VIIIC, IXa and the North Sea Component spawning in ICES Divisions IV, IIIa. Migratory patterns are understood and research including tagging studies continues to further differentiate stocks.</p>	R10, R37	12.5	100
80	A reliable estimate of the geographic range of the target stock is available including seasonal patterns of movement/availability.				
100	The complete geographic range of the stock, including seasonal patterns of movement/availability, is estimated and documented each year.		R10, R31, R32		

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1.1.1.4		Is there information on fecundity and growth?				
60	There is some information available on fecundity and growth.	<p>Herring</p> <p>Basic fecundity information is available, but whilst fecundity <i>per se</i> is not an important issue in terms of management of the stock, the related maturity rate is a crucial element. This is clearly linked to growth and periodic changes in growth rate have been noted for North Sea herring. This has a direct effect on the proportion mature within each age group which translates directly into spawning stock biomass via abundance at age in the stock</p> <p>Research vessel surveys, and in particular the acoustic surveys, are used to keep a careful check on both growth rate changes and proportion mature at age and weight at age. These data are reviewed annually and when necessary revisions made to the maturity ogive. The mean weight at age relationship, used in the stock assessment process for the predictions, is based on a three year running mean.</p> <p>Key factors in relation to growth and weight at age are regularly monitored, which allows significant trends and shifts to be detected. But fecundity is not being monitored for short and long term changes.</p> <p>Mackerel</p> <p>Egg production is measured triennially by international sampling programmes as a measure of stock size. As a basis for this, fecundity (average egg production per female) is measured. Stock size is then modelled from the egg production. Commissioned research has been targeted at whether or not mackerel are determinate spawners, which has now concluded that these are determinate. This has provided an extensive knowledge of the factors controlling fecundity, including atresia, and annual changes in fecundity. Specific information on the relative importance of factors causing natural mortality is not available, but is modelled based on the life-span of the species (20-30 yrs) and is taken to be a constant of 0.15.</p> <p>There is a long time series of information allowing determination of trends and shifts.</p>	R16, R17, R18, R24, R25	12.5	95	
80	Estimates are available of fecundity at size and growth rates.					
100	There is comprehensive and reliable information on the fecundity at size, growth rates, and length and weight at age, and these are monitored over time to detect trends and shifts.			R19, R26, R32, R33		

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1.1.1.5		Is information collected on the abundance/density/composition of the stock?			
60	Either fishery dependent or fishery independent indices are available on the abundance of the stock biomass. Qualitative information exists on the appropriateness of the indices as proportional indicators of stock size.	<p>Herring</p> <p>Fishery dependent indices are generally not appropriate for a pelagic fishery of this type. Instead, the most reliable fishery independent estimates of abundance / stock density currently come from the acoustic and trawl surveys carried out mainly in the northern and central North Sea.</p> <p>There have been some problems with the consistency of these indices in the past and, as a consequence, they have been subjected to very close scrutiny, inter-calibration exercises and general quality control. This has led to significant improvements in their reliability. As recently as last year some technical problems with the acoustic survey data were identified and the resultant corrections backdated in the historic database. International bottom trawl surveys of the whole of the North Sea are used to provide separate estimates/ indices of '0' ringers, '1' ringers and '2' – '5'+ ringers.</p>	R16, R17, R18, R24, R25	25.0	90
80	Fishery dependent and/or fishery independent indices are available on the abundance of the stock. Uncertainties have been analysed and those uncertainties have been reduced so as to allow trends to be determined from indices.	<p>Historically, larvae surveys were the most reliable fishery independent index of stock abundance and were particularly valuable in monitoring the recovery of the stock from the collapse in 1977. These surveys were extensive and covered the spawning areas and periods of all three stocks, including the IVc and VIId stock in the Eastern Channel. In the North Sea these surveys have reduced in intensity and geographical coverage and their value has been considerably reduced as an index, but survey intensity has reduced less in the Eastern Channel. The data series, back to 1979, has now been statistically analysed to produce a multiplicative larval abundance index of total biomass. Currently, only the Netherlands and Germany participate but the surveys do still provide the only reliable estimate of the development of the 'Downs' stock.</p>			
100	Fishery dependent and fishery independent indices are available on the abundance, density and composition of the stock. Indices are consistent and there is clear evidence that they are proportional to the stock size.	<p>Survey data reliability in determining stock size is considered by ICES to be good. Indices are subject to analysis and interpretation and, in the stock assessment model, the various indices are now subjected to an inverse variance weighting scheme. Inconsistent and/or noisy indices are then also excluded.</p>			

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	<p>Mackerel</p> <p>Relevant fishery dependent data is collected by all countries participating in the fishery. In 2003 it was reported that 87% of the commercial catch was covered by the biological sampling programme. This satisfactory level has been sustained over recent years. There are however some national and regional differences and England achieves only a 15% sampling level. Catches in ICES sub-area VII are not considered to be adequately sampled. This whole question is now addressed by an EU Data Directive scheme which stipulates sampling levels based on the quantity of mackerel landed in each member state.</p> <p>The only fishery independent index of stock abundance is measured via the robust triennial egg survey. This provides an estimate of the daily production of stage 1 eggs on each of the surveys Fecundity is expressed as viable oocytes per gram female and so the early stage egg production in the plankton can be extrapolated to the spawning (female) biomass. The total fishable biomass is then twice the female biomass. Although landing figures are collected on an annual basis and provide the basis for the annual stock assessment, egg surveys are carried out only triennially (due to the costs involved in such extensive surveys) the accuracy of this fishery independent information declines in the second and third years post survey.</p>	R19, R26, R31, R32, R33		

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1.1.1.6		Is information available on environmental influences on the stock dynamics?			
60	Evidence is available of studies on the effects of biological and physical influences on the stock (including natural mortality). Research is encouraged and ongoing.	<p>Herring</p> <p>Distribution of spawning areas is governed by the availability of gravel beds and their local physical conditions, the locations of these are generally known. Eggs are laid in a carpet 1-2 cm thick in established areas of up to 1.5 km² each, usually on well oxygenated coarse gravel ridges that benefit from tidal currents. They are laid in late November through to January and remain for 2-3 weeks before the eggs hatch and the larvae drift into the water column. Egg viability may be affected by direct trauma as well as changes to substrate structure (e.g. compaction and loss of aeration).</p> <p>Previously, research and monitoring on secondary productivity (zooplankton – prey of herring) was carried out, but is not ongoing. Distributional changes in relation to subtle changes in, for example temperature, have not yet been observed for this species.</p>	R16, R17, R18, R24, R25, R37	25.0	90
80	There is knowledge of physical and biological factors affecting distribution, survival and year class strength (including natural mortality). Some information is sufficiently robust for use in the stock assessment process.	<p>Significantly, time series data on year class strength suggests a robustness to environmental change. North Sea herring have also demonstrated a robustness in relation to recovery from very low SSB levels once fishing mortality is either removed (1977 – 1981) or severely reduced and controlled (1996 to date). Research in this context is ongoing and is most often incorporated into the general studies on recruitment variability. All such studies are normally regularly reported to the ICES community either through specific study groups set up by ICES, working documents to the assessment WG, or papers to the annual conference. In this way the significance of research findings, in relation to the stock assessment process, can be reviewed at an early stage.</p>			
100	There is extensive knowledge of biological and physical factors affecting distribution, survival and year class strength (including natural mortality). Key information is sufficiently robust for use in the stock assessment process.	<p>Mackerel</p> <p>The over exploitation and eventual demise of the North Sea mackerel stock, followed by the advent of a large fishery on the western stock, has generated extensive research and monitoring of all the related factors. Much of that research and monitoring has been targeted at the immediate practical issues of improving the quality of the stock assessment procedures. There has also been a body of funded research targeted at improving the basic knowledge on factors affecting mackerel distribution. For example, the EU funded programmes: Shelf Edge Fisheries and Oceanographic Studies (SEFOS); Spatial Pattern of Migration and Recruitment of Northeast Atlantic mackerel project; Shelf Edge Advection, Mortality and Recruitment (SEAMAR). This information will feed, as appropriate, into the stock assessment process.</p>	R19, R26, R32, R33		

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1.1.2		There should be sufficient information on the fishery to allow its effects on the target stock to be evaluated			16.7		
Weighting Commentary		At this level, the recording/estimation of fishery related mortality from other, larger fisheries, is considered of greatest significance, followed by the recording of catches in this fishery and the issue of misreporting and discarding - factors which contribute to total fishing mortality. Knowledge of gear and selectivity were considered of lower significance for this fishery.					
1.1.2.1		Are all major sources of fishery related mortality recorded/estimated, including landings, discards, incidental mortality and mortality of juveniles?					
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.	<p>Herring</p> <p>Herring landings are recorded at fleet level and for fishing techniques (gear, metiers) and annual discard is estimated (for Areas IV and VIIId)</p> <p>For management purposes, the official landings statistics are used. These rarely agree with the independent information supplied by individual members of the ICES working group for assessment purposes. The discrepancy level (27,000t to 75,000t) has shown little improvement over the past eight years and did deteriorate in 2002 and 2003 (53,000t and 50,000t discrepancy) after showing an improvement in 2001 (27,000t).</p> <p>Since by-catch regulations to control the fishing mortality on juveniles came into force in 1996, there has been very strict and reliable monitoring of juvenile herring catches by Denmark and Norway in their small meshed fisheries. This is evidenced by the fact that the by-catch ceiling has never been exceeded over the period of regulation and monitoring. The herring by-catch regulation is mainly targeted at the small mesh fisheries for sprat and in effect operates as a quota on juvenile herring.</p> <p>Landings are therefore considered sufficiently well recorded by the assessment Working Group to provide an estimate of fishing mortality.</p> <p>Discarding within the fishery (which may not include slippage of catches prior to landing on vessels) is not regarded as a problem but there is strong evidence of discarding of herring in the North Sea mackerel fishery. The assessment working group therefore has some additional information on both discards and misreported landings and uses these confidential data in the assessment. Misreporting of catching locations is also an issue in terms of estimating mortality. Discarding/misreporting information is therefore estimated, but the values used are not considered robust.</p>			R16, R17, R18, R24, R25	22.1	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						

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	<p>Mackerel</p> <p>Landings of NE Atlantic mackerel within Europe are recorded by all countries participating in the fishery. For England and Wales DEFRA fishery officers in each main port record and report the landings. Landings are also reported by processors and PO's etc for stock assessment purposes. Landings are also made in International Waters beyond 200 miles by non EU/Norway countries, e.g. Russian vessels. These are reported to ICES but may be underreported. Catch estimates for stock assessment purposes are based on the official landing statistics augmented by national information on misreporting and discarding. Reliability of the information on discarding in this fishery is considered to be a problem. In 2002 some information was available on the age structure of discards in one fleet. Some information has been obtained on mackerel discarding in the North Sea herring fishery.</p> <p>Discarding of small mackerel has historically been a major problem in the mackerel fishery and was largely responsible for the introduction of the south west mackerel box. In the years prior to 1994 there was evidence of large-scale discarding and slipping of small mackerel in the fisheries in Division IIa and Sub-area IV, mainly because of the very high prices paid for larger mackerel (>600 g) for the Japanese market. This factor was put forward as a possible reason for the very low abundance of the 1991 year class in the 1993 catches in numbers at age. The difference in prices has decreased since 1994 and the Working Group assumed that discarding may have been reduced in these areas.</p> <p>Area misreporting continues to be a problem particularly between ICES Divisions IVa and VIa. In 2002 an estimated 50,000t was misreported but this is taken into account in the assessment process.</p> <p>Any deviations in actual vs. estimated stock is, however, picked up by triennial egg surveys of stock size. As landings in international waters are generally outside of the recording system, the accuracy of stock size estimates degrades each year following the triennial egg survey.</p> <p>For both species, landings are well recorded. Discards and other mortality are well estimated. Information on juvenile mortality is not well estimated. There is no evidence of discarding or misreporting in the small Hastings fishery.</p>	R19, R26		

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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.	Hastings vessels fishing for both species, and gear used, is well known. All vessels are licensed and mesh size is controlled as appropriate, including <i>in-situ</i> observations. More general information on fleets fishing for the two species is also available as follows. Herring	I1, I4, I5	19.3	100
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.	Also, knowledge of fleet type and size is good for the major North Sea and Eastern Channel herring fisheries. The ICES assessment working group attempts to regularly up-date its detailed knowledge of participating fleets, by vessel type and mesh size, mainly for historical purposes. It recognises that these data do not represent an important element of the assessment process. Similarly, the types of gear in use are all well known and described. Access to and reliability of these data are now greatly enhanced by the presence of observers on many vessels in the various fleets.	R16, R17, R18, R24, R25		
100	All fishing methods and gear types employed in the fishery are known. <i>In-situ</i> observations are made of fishing practices. Comprehensive knowledge is recorded and regularly updated on the size and composition of the fleets.	Mackerel Knowledge of the national pelagic fleets participating in the mackerel fishery is extensive. The information is monitored and reviewed by the ICES working group. The bulk of the catches are taken by large midwater trawlers or purse seiners operating mainly in the offshore fisheries. There are also some handline fisheries, the best known and monitored of these being the one operating within the mackerel box off south-west England. There are also a few inshore drift net fisheries around the coast of the UK taking insignificant catches. The Hastings mackerel fishery is one such fishery and operates very much on a seasonal basis.	I1, I4, I5 R19, R26, R32, R33,		

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1.1.2.3		Is gear selectivity known for the fishery?			
60	Information is available on selectivity and qualitative changes in selectivity.	<p>Herring</p> <p>This is not an important element in relation to the management and protection of the stocks. and so has not been well studied. Also juvenile fish tend not to occur in the area of these fisheries. There is a minimum landing size of 20cm for herring in the North Sea and Eastern Channel, and also minimum mesh sizes are specified to control selectivity.</p> <p>Mackerel</p> <p>As for herring this is not a major issue in relation to mackerel fisheries. There are no small meshed fisheries which impact on mackerel. There is a minimum landing size for mackerel of 20cm other than in the North Sea where it is 30cm.</p> <p>Although not a regulatory issue for both species, operationally, selectivities are well known by fishers.</p>	15	12.7	85
80	Selectivity of gear types has been well estimated by size, sex and maturity.				
100	Full selectivities have been accurately estimated for all gears, locations and seasonality of fishing over time.				
			13, I4, I5		

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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.	Herring At a management level, there is a broad-scale division of the fisheries on North Sea and Eastern Channel autumn spawning herring into four fleets –	R25, R37	29.2	80
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.	<ul style="list-style-type: none"> • The North Sea directed fisheries with purse seiners and trawlers (mainly 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. • Directed fisheries for herring in ICES Division IIIa • Small meshed fisheries in ICES Division IIIa which take by-catches of herring. 			
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.	<p>The present fishery is considered to be a part of Fleet A. For each fleet, however, vessels are subjected to the same degree of monitoring and sampling. All the landings, including estimates of their discards are used in the assessment process.</p> <p>The target species is taken as a by-catch, mainly as juveniles, in various sprat fisheries both in the North Sea and in the Skaggerak and Kattegat. The quantities are accurately monitored by rigorous sampling regimes at specified landing ports but in 2002 only Denmark and Norway provided information on these landings. The landings are subject to a by-catch quota and the data are all included in the assessment.</p> <p>Herring are also taken as a by-catch in other North Sea fisheries in particular the mackerel fishery. It was noted by on board observers (from Scotland and Germany) in the 2002 North Sea mackerel fishery that there was considerable discarding of herring after the herring fishery had closed. An estimate of 17,000t of discarded herring was made for inclusion in the catch statistics for the assessment. This was based on the Scottish discard estimates being raised to the whole of their fleet in the area at the same time, whilst the German estimate reflected only the herring discards observed on the one vessel. It was recognised that this was a very conservative estimate and that the actual figure could have been as high as 50,000t, representing a 13% underestimate of the catch. Increased observer coverage in the mackerel fishery is underway to determine the full extent of this.</p>			

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	<p>Mackerel</p> <p>The North East Atlantic mackerel stock is also fished over its entire distribution, from the coast of Spain to the Northern North Sea (ICES Areas IIa to IXa). Mackerel fishing over this area is predominantly by purse seiners (Norway, Scotland, Iberia) and trawlers (Scotland, Germany, France, Holland, Ireland).</p> <p>For both herring and mackerel other sources of fishing mortality are known and recorded and used by the Assessment Working Groups in the Stock Assessments process.</p>	R19, R26, R32, R33		

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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>Herring</p> <p>Misreporting is an element of the North Sea herring fishery and continues in spite of regulatory attempts to curtail it. Through the continued vigilance of working group members and their collective knowledge of their own fleets, the effect of misreporting on the robustness of the assessment is minimised. The working groups confidential estimates of misreporting are included in the landings data for use in the assessment. From time to time, retrospective changes to the assessment have been made. The major problem has been catches taken in ICES Division IVa and misreported into Division VIa although there are other examples. In 2002 the working group estimate of the catch (which includes an estimate of discards) exceeded the official landings by 20%. The element of misreported catch was 32,000t. A recent analysis by an ICES Study group has suggested that this figure could be much higher.</p> <p>Interception of vessels by patrol vessels takes place on a regular basis within the North Sea and allows for controls on misreporting. Satellite monitoring allows tracking of vessel locations (currently for vessels over 20m overall length - approximately 20% of fleet, to be expanded to include smaller vessels) which would help to deter misreporting and allow interception of vessels by patrol vessels.</p> <p>Misreporting is therefore a recognised problem which is subject to monitoring and control. It remains, however, a source of uncertainty but is factored into the stock assessment at a satisfactory level.</p> <p>Mackerel</p> <p>Area misreporting across the boundary line from ICES Division IVa into VIa has been occurring for many years. The practice is well known and is related to western stock mackerel remaining in the North Sea after its closure to mackerel fishing. In spite of the vessel monitoring system (VMS) and an extension of the North Sea fishing period the practice appears to have continued in 2002. However, the practice does not affect the assessment process.</p> <p>Misreporting is not an issue for the Hastings fishery.</p>	R16, R17, R18, R24, R25, I3	16.8	80
80	Enforcement systems include measures to control misreporting Where it occurs, it is carefully evaluated and taken into account in the stock assessment.				
100	Robust enforcement systems are in place to control misreporting. Where it occurs, reliable estimates are made and used in the stock assessment.		R19, R26, I3		

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1.1.3	Appropriate reference levels have been developed for the stock		16.7	
Weighting Commentary	The two indicators at this level were considered to be of equal significance.			
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.	R20, R21, R27	50.0	95
80	Limit and precautionary reference points are justified based on stock biology (e.g. a stock-recruitment relationship) and are measurable given data and assessment limitations.			
100	Limit and precautionary reference points are justified based on stock biology, uncertainty, variability, data limitations and statistical simulations of these factors.			
<p>Herring</p> <p>Appropriate limit and precautionary reference points have been set for the complex of stocks for both biomass and fishing mortality. The precautionary fishing mortality reference points are specified and monitored separately for juveniles and adults. With the exception of the biomass limit point, all points are based on a well functioning harvest control regime in place for this stock. All reference point are clearly integrated into a management regime which sets to ensure the sustainability of the fishery.</p> <p>The biomass limit reference points are strongly based on the stock and recruitment model and recent attempts to lower the MBAL from 800,000t to 560,000t, based solely on historic recovery levels for the stock have been resisted.</p> <p>All reference points have been rigorously tested statistically to support their validity and to quantify uncertainty. The information is made widely available through working group and ACFM reports.</p> <p>Mackerel</p> <p>Target reference points are set based on a precautionary approach. Precautionary biomass (B_{pa}) is set at 2.3 M tonnes, F_{pa} is set at 0.17. F provides a 95% probability that SSB will remain above B_{pa} in the medium term.</p> <p>ICES limit reference points are set as biomass limits (B_{lim}) and fishing mortality limits (F_{lim}). There is no biological basis for defining F_{lim} or B_{lim} for mackerel, but these are based on historical information on the performance of the stock. F_{lim} is set at 0.26.</p>		R24		

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
1.1.3.2		Do reference points meet acceptable international standards?			
60	Reference points recognise appropriate international standards and are being developed to meet these.	<p>Herring</p> <p>The whole process is a model of the ICES precautionary approach to fisheries stock management. It combines levels of both fishing mortality and biomass into a harvest control strategy designed to ensure stock recovery and subsequent sustainability. The fishing mortality points are further specified separately for juveniles and adults.</p> <p>Mackerel</p> <p>ICES defines the appropriate international standard reference points.</p>	R20, R24, R28	50.0	95
80	Reference points recognise, and are in line with, acceptable international standards.				
100	Reference points meet or exceed international standards.				
			R25		

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score	
1.1.4		There is a well-defined and effective harvest strategy to manage the target stock.			16.7	
Weighting Commentary		The three indicators at this level were considered to be of equal significance.				
1.1.4.1		Is there a mechanism in place to contain harvest as required?				
60	Mechanisms exist to monitor and (if necessary) reduce harvest, but do not fully contain harvest, or have not been tested.	<p>Herring</p> <p>As stated in 1.1.3.2 above, the reference points are used to describe the current state of the stock and projected levels. They are an integral part of a harvest control strategy which is being used successfully in the stock recovery and rebuilding programme.</p> <p>Whilst the biomass limit point (MBAL) has been in place since the end of the moratorium on herring fishing in the North Sea in 1981, fishing mortality reference points are more recent in origin. They have been in place for both adults and juveniles, together with an upper precautionary approach biomass target point, since the collapse of the spawning biomass below MBAL in 1995 and the emergency measures to counteract that collapse, taken in 1996.</p> <p>The advice on the state of this stock complex is now very firmly based on all the reference points. The machinery is in place via the ICES ACFM advice, the EU and the EU / Norway agreement to quickly implement measures to reduce the harvest as and when required. Strong evidence for its effectiveness is in the speed with which action was taken in 1996 to halve the agreed TAC for North Sea herring, mid-way through the year, when it became apparent that the SSB had fallen well below MBAL.</p> <p>Mackerel</p> <p>For mackerel fisheries within UK, other than the south-western handline fishery, POs monitor landings and determine monthly allocations for vessels. Non-sector vessels (i.e. non PO) would have monthly allocations determined in liaison with DEFRA via licence variations. The Hastings fleet would fish against the UK national quota and arrangements are in place to close the fishery should the national quota become exhausted.</p> <p>The advice on the Northeast Atlantic mackerel stock is firmly based on the precautionary approach with reference points for biomass and fishing mortality. The mechanisms exist through international agreements between EU and Norway, Faroe Islands and NEAFC to implement measures to ensure that the SSB remains above 2.3 million tonnes. The SSB has remained above that level since the measures were put in place, indicating their effectiveness.</p> <p>However, although both herring and mackerel stocks are above B_{pa}, and for mackerel F remains above F_{pa}, indicating some issues in terms of reducing harvest for all fisheries targeting the stock.</p>	R21, R17, R27	33.3	95	
80	Mechanisms are in place to reduce harvest as and when required to maintain, or allow the target stock to return to, productive levels.					
100	Mechanisms are in place to reduce harvest as and when required to maintain (or allow the target stock to return to) productive levels. Measures to demonstrate effectiveness are in place.					
			R24			

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score	
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. Rules have not been tested.	<p>Herring</p> <p>Clear harvest control rules are specified by ACFM in the advice given to the EU and for the EU / Norway agreements. Various catch options are provided in relation to fishing mortality on adults and juveniles within the four specified fleets. The validity of these advice options are rigorously tested and evaluated and the uncertainty spelled out to managers. Increasing confidence in the system is based on the continuing recovery of the stock since rigorous imposition of the harvest control rules since 1996.</p> <p>The only negative aspect of this is the failure of the managers to heed the advice and warnings regarding the Downs stock. As a consequence the area TAC for IV c/VIIId has been increased against the advice of ICES assessment scientists (including ACFM) who believe that this will slow the recovery of this stock.</p>	R20, R21, R27 I3	33.3	85
80	Clear decision making rules exist, are fully documented, but have not been fully tested. Decision rules are reconciled with reference points and with data and assessment limitations.				
100	Clear, documented and tested decision rules are fully implemented and have been fully reconciled with reference points, and the data and assessment limitations, and have been periodically evaluated.				
	<p>Mackerel</p> <p>All UK landings are carefully monitored on a daily basis and the mechanisms are in place to close the fishery should the quota become exhausted, although the rapidity of implementation has not required testing.</p>	R24, I3			

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score	
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 although these are not developed for the specific fishery, or management tools are not fully developed, but are specifically related to the fishery. Some evidence exists to show that tools can be effective.	<p>Hastings Fishery</p> <p>For vessels >10m, output controls are specified in terms of monthly catches.</p> <p>Vessels <10m, input controls through closure of fishery when the non-sector quota has been reached.</p> <p>For both species, input controls also exist in terms of the number of vessels licensed to operate from the Stade at Hastings.</p>	R20, R21, R27	33.3	95
80	Management tools have been specified to implement decisions of input and/or output controls. These are generic although some attempt has been made to relate them to the specific fishery OR tools are lacking in some details but are specifically related to the fishery. Evidence exists to show clearly that tools are effective.	<p>Herring</p> <p>The option table provided in the advice to managers quite clearly takes account of the complexity of managing the various fisheries and the fact that juvenile herring are taken as a by-catch in other fisheries. There are the four separate fleets which take North Sea autumn spawning herring and two of those fleets operate outside of the North Sea control area. Considering the complexity of this situation the management tools appear to be appropriate and effective, as evidenced by the recent rebuilding of the stock since 1996. Both input (fishing mortality rates) and output (catch /TACs) controls are specified in the advice.</p>	R24		
100	Management tools, appropriate to the species and fishery, 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.	Presentation of options, however, represents a highly complex situation for managers to evaluate.			

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score
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1.1.5		There is a robust assessment of stocks.		16.7	
Weighing Commentary		The applicability of the assessment models used was considered to be of greatest significance, followed by the evaluation and consideration of uncertainties in providing management advice.			
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.	<p>Herring</p> <p>Prior to 1994 the assessment was carried out by means of a conventional VPA with <i>ad hoc</i> tuning to a series of fishery independent data sets. It was noted that from the early 1990's this method regularly tended to overestimate SSB and to underestimate fishing mortality. This was a particular problem in 1992 and 1993 when retrospective analysis showed that the SSB had fallen below the MBAL. The problem was generated in part by the conflicts in the perception of stock size from the fishery independent surveys and the high juvenile mortality. As a result, the assessment working group changed the model in 1995 to an integrated catch at age analysis (ICA) method for the 1994 assessment. This method has the benefits of being able to use age-aggregated indices of stock size and to incorporate assumptions about errors in all the data sets. This assessment model better fits the biology of the species, the fishery, the survey data and the forward projections required for management of the stock complex.</p>	R16, R17, R18, R24, R25, R40	28.2	85
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.	<p>Nevertheless SSB continues to be overestimated although the extent of that overestimation has reduced in recent years (including with additional information on misreporting and discarding).</p>			
100	Assessment models are used and capture all major features appropriate to the biology of the species, the nature of the fishery and the nature of the management questions being asked.	<p>Mackerel</p> <p>The model used is ICA (Integrated Catch Analysis) applied by ICES to pelagic stocks and regarded as the most suitable model available. The key model parameters for mackerel are; natural mortality, vulnerability, fishing mortality and catchability. The model incorporates an evaluation of uncertainty but no retrospective evaluation is directly available within ICA. Major deficiencies are recognised and listed.</p>			

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
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.	Herring	R16, R17, R18, R24, R25, R40	19.7	90
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.	The ICA model has the advantage of being able to incorporate assumptions about errors both in the survey data and in the catch at age data set. These data sets are known not to be error free but the most important sources of error and assumptions are well documented and evaluated. For example:- area and catch misreporting; recruitment; acoustic surveys; larvae survey coverage; quality of the catch and biological sampling data; separation of autumn and spring spawners in the catch data; weight at age data. Mackerel			
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.	The assessment takes account of natural mortality and fishing mortality. Maximum likelihood estimates of parameters and 95% confidence limits are given. Total variance for the model and model components given, both weighted and unweighted. Several test statistics given (skewness, kurtosis, partial chi-square). Historic uncertainty analysis based on Monte-Carlo evaluation of the parameter distribution. The major deficiencies are also listed.			

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score	
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.	<p>Herring</p> <p>There continues to be some uncertainty in terms of both the current SSB and predicted levels in the short and medium term. This uncertainty continues to be reinforced by the ongoing problems of area misreporting and over-fishing of the quota. Furthermore, the management advice is always complicated by the nature and geography of the fisheries exploiting North Sea autumn spawning herring. As a result it is given separately for each of the four management fleets in a series of linked management options. In that way managers are provided with choices when considering the uncertainties in the assessment and the short and medium term projections. Information on weaknesses and uncertainties is also provided to managers.</p> <p>The management advice and continued recovery of the stock complex is now firmly embedded in the 2001 EU/Norway agreement which sets levels of fishing mortality on both adults and juveniles for spawning stock biomass levels above and below the precautionary level (Bpa) of 1.3million tonnes.</p> <p>Mackerel</p> <p>Management advice is based on the stock assessment and interpretation by advisers familiar with the species and fisheries. Uncertainties are identified and account taken.</p> <p>Although the ICA model does not provide retrospective analysis, the historic realisations of the assessment are routinely presented and provide an overview of the changes in the perception of the state of the stock in relation to SSB, fishing mortality and recruitment. The estimation and short term predictions for this fishery have been good over the past 25 years and have generated no major management problems. ICES are now considering a multi annual TAC for this stock which confirms confidence in the assessment process.</p>	R20, R21, R27	19.7	85
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.		R24, R40		

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score	
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.	Herring	R20, R21, R27	13.0	95
80	The assessment makes an approximated evaluation of the stock status relative to the reference points. Both short and medium term forecasts are made.	Upper and lower biomass reference points are established and are used to evaluate the status of the stock, including short and medium term projections. The lower biomass reference point, MBAL or B_{lim} , was established following the moratorium on fishing for North sea herring from 1977 to 1981. This SSB level of 800,000t was set at one-third the SSB in an unexploited phase. It is strongly supported by the stock and recruitment model which indicates the likelihood of poor recruitment at SSB levels below this. This lower SSB level has been the driving force in the management of this stock over the past twenty years and has been instrumental in dictating the management advice and action. A recent attempt to lower this point to 560,000t has been resisted following doubts about the robustness of the advice from an ICES study group.			
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.	<p>As an integral part of the most recent recovery plan, an upper SSB reference point of 1.3million tonnes was established. At SSB levels above this a different harvest strategy can be employed based on increased fishing mortality rates (input control) for both juveniles and adults. This is in keeping with the ICES precautionary approach and represents the target level above which SSB should be maintained. These biomass reference points are strongly supported within the EU/Norway agreement by fishing mortality reference levels for both adults and juveniles.</p> <p>All advice is given in relation to these biomass and fishing mortality reference points and rigorous evaluation of the probability of success against the various options is made for the short and medium term.</p> <p>Mackerel</p> <p>Stock status is currently above the biomass reference point but is also above the fishing mortality reference point. The current advice takes account of that and recommends a harvest strategy based on reducing fishing mortality to the precautionary level or below. The harvest strategies take account of short and medium term predictions and the estimation of the size of year classes coming into the fishery.</p>			

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
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.	<p>Herring</p> <p>The forecast tables provide options for each of the fleets, which always include an F <i>status quo</i> option. They clearly indicate the consequences of different levels of fishing mortality, on adults and juveniles, applied to the different fleets. The catch predictions for each of the options all go on to indicate the consequences for the stock in the short term.</p> <p>Mackerel</p> <p>Models used are based on predicted future stock status incorporating current harvest strategies. Uncertainties are identified and the consequences of management options according to standard ACFM practice.</p>	R20, R24, R21, R25, R27	13.0	100
80	The assessment includes a robust approximation of the consequences of current harvest strategies.				
100	The assessment includes the consequences of current harvest strategies, forecasts future consequences of these and evaluates stock trajectories under decision rules.				

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score	
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.	<p>Herring</p> <p>Retrospective analysis of the assessment shows a major deterioration in the quality of the assessment and predictions of SSB levels, from 1991 onwards. The causes of this decline were complex and generally outside the control and perception of the assessment working group. The major contributory factors were that a) the TAC, which is set only against the North Sea human consumption fishery (fleet A), was regularly exceeded; b) there was no effective control of fishing mortality on the juveniles other than the sprat TAC and c) some catches taken in the North Sea were being misreported into other areas. Other factors were a change in the growth rate and the proportion mature at age and uncertainties in the fishery independent survey data used for <i>ad hoc</i> tuning in the assessment. All of these issues have now been identified and are being addressed with varying degrees of success. This is indicated by an improvement in the performance, viewed retrospectively, of both SSB and F.</p> <p>However SSB still continues to be revised downwards annually with the latest assessment 100,000t lower than the forecast, one year earlier. Similarly the two previous years 2001 and 2000 have both been revised downwards by over 100,000t. It is still a major cause for concern, acknowledged by the Stock Assessment Working Group that the TAC for North Sea autumn spawned herring (targeted by Fleet A) is always exceeded. In 2003 the estimated catch was 438,000t against a TAC of 400,000t.</p> <p>Mackerel</p> <p>There have been no major problems with the quality of the assessment in terms of the estimation of current SSB, F and the prediction of future trends. The SSB has remained above the precautionary level since it was set at 2.3 million tonnes for the combined stock. The triennial egg survey has provided a robust and reliable age aggregated index of SSB since it started in 1977.</p>	R21, R25, R27	6.5	85
80	Uncertainty in the estimates of SSB and F are 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.		R24, R28		

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score		
1.1.6	The stock(s) is/are at appropriate reference level(s).			16.7		
1.1.6.1	Is the stock(s) at or above reference levels? [YES - Criteria 1 is complete. NO - Answer Criteria 2]					
60	The stock is likely to be above the limit reference point and trends in the stock are positive.	<p>Herring</p> <p>The spawning stock biomass has increased gradually since the low levels of the mid 1990's. This has been in response to reduced catches, strong recruitment and management measures to reduce fishing mortality on juveniles. The SSB in 2002 is now considered to be above the precautionary approach level (Bpa) of 1.3 million tonnes. Based on past performance it is probable that the SSB of 1.59 million tonnes, for 2002, could be reduced retrospectively but it is still unlikely to fall below Bpa.</p> <p>Strong recruitment continues to be a major factor in the recovery with the 1998 year class constituting 41% of the SSB in 2002. The 2001 year class is predicted to be 20% above average and early estimates of the 2000 year class suggest that it could be the third highest on record. Current short-term predictions for the SSB at spawning time in 2003 indicate a biomass of 2.1million tonnes compared with 2.2tonnes predicted last year. Medium term predictions (based on F status quo) indicate an SSB of 2.5tonnes in 2004 falling to 2.3tonnes in 2005 because of a poor 2002 year class. The SSB should stabilise at around 2.5 tonnes in 10 years. Long term predictions are heavily dependant on the type of stock recruitment relationship used (Ockham razor) and would be different if a Beverton and Holt or Ricker relationship were used.</p> <p>The harvest strategy is firmly based on the two reference levels of Blim (800,000t) and Bpa (1.3tonnes). The 2001 EU/Norway agreement sets to maintain F on adults at 0.25 and juvenile F at 0.12 whilst SSB remains above 1.3tonnes. If it falls below that point then these rates will be reviewed. The Blim threshold is the lower level below which there is the threat and likelihood of a complete closure of the fishery for North Sea autumn spawned herring. As stated in 1.1.6.1 above, the target fishing mortality rates for 2003 have now increased in line with the EU/Norway agreement.</p>		R21, R25, R27	100	90
80	The stock is likely to be above the target reference levels					
100	The stock is highly likely to be consistently above target reference levels.					

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score
	<p>Mackerel</p> <p>Over the period 1995 to the present, F has declined so that in 1999 the estimated F was approximately F_{pa} i.e.0.17. ACFM advice has been to reduce F and this is being done. The F_{pa} should also be viewed in the light of the historical development of the Spawning Stock Biomass (SSB) and its relationship to B_{pa} (2.3×10^6 t).</p> <p>However, the SSB has always been above B_{pa} and has been remarkably stable between 1984 and 1994. Thereafter, SSB slowly increased (currently approximately 3.2×10^6 t). Recruitment has fluctuated and in recent years recruitment has been average or above average. This may be responsible for the increasing trend in the SSB. In summary, SSB is rising and above B_{pa}, and fishing mortality is declining and is currently at F_{pa}. Landings have been reasonably stable over the last four years which, with an increasing SSB has lead to a reduction in F. It is, therefore, considered that this stock is being fished in a sustainable manner.</p>	R24, R26		

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
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.		38.5	87
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	
Weighting Commentary		The three indicators at this level were considered to be of equal significance.			
1.3.1.1		Is there adequate information on the nature and dynamics of sub-populations/sex/age structure?			
60	There is information available on the sex, age and genetic structure of the stock, and the relationship of these factors to reproductive capacity.	Herring Information on the fecundity/recruitment/sex/age structure and natural mortality is adequately studied and sampled, as reflected in the comments in section 1.1.1.4, 1.1.1.5 and 1.1.1.6. This information is collected for North Sea herring as a single stock, not for separate spawning stocks.	R16, R17, R18, R24, R25	33.3	90
80	Estimates are available of the sex, age and genetic structure of the stock, and the relationship of these to reproductive capacity.	Mackerel Age and stock structure information is gained primarily from samples and size frequency data collected by fisheries departments nationally (including scales and otoliths for ageing of fish). This information is collated annually. Information is also available on spawning stock size from the triennial surveys. The Northeast Atlantic stock currently has a large number of year classes present and in that context is considered to be in a healthy state. Genetic research to date has shown no detectable differences between the three spawning components.	R19, R26, R31		
100	There is comprehensive and reliable information on the sex, age and genetic 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.				

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score	
1.3.1.2		Is the age/sex/genetic structure of the stock monitored so as to detect any impairment of reproductive capacity?			
60	Population structure is based on some sampling and verification. Some genetic information is available as necessary.	Herring The age and sex structure of the three stock components are reasonably well sampled both from the fishery and from research vessel surveys. However, target sampling levels from the fishery are still not fully met by all the countries participating in the fishery. Sampling is, however, considered to be adequate.	R16, R17, R18, R24, R25	33.3	85
80	Population structure is based on adequate sampling and verification for this stock. Ageing errors are estimated and included in the stock assessment. Genetic studies have been carried out as appropriate.	An ICES study group is investigating genetic composition with the aim of establishing temporal variability in sub-stocks and so differentiate separate spawning stocks.			
100	Population structure is well estimated with only insignificant errors. Genetic studies have been conducted at appropriate time intervals.	Ageing techniques, based on otoliths, are well established and tested and checked through cross country calibration. There is a considerable amount of ongoing research to attempt to improve the separation of autumn and spring spawners, using otolith microstructure techniques. These techniques are still experimental and separation still relies on a tenuous statistical separation based on vertebral counts (mean vs autumn spawners, 56.5; spring spawners 55.8). Mackerel The age, sex and maturity structure of the stock is well sampled from the commercial catch and ICES are generally satisfied with the level of sampling. Additional sampling every three years provides an extensive additional data base on age, sex, maturity and fecundity. In relation to fecundity, the research over the past twenty five years has been extensive and has led to a huge increase in the knowledge of the behaviour, biology and physiology of spawning in mackerel. Current research is investigating area differences in fecundity and atresia and relating this fish condition.	R19, R26		

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score	
1.3.1.3		Does information from stock assessment indicate any changes in structure that would alter reproductive capacity?			
60	Changes in stock structure have been detected but there is no evidence of negative effect on recruitment of the stock.	<p>Herring</p> <p>The stock and recruitment relationship does indicate that intense fishing pressure, affecting the age composition of the stock (i.e. reducing the number of year classes present), will eventually reduce recruitment. The current management strategy is targeted at improving the age structure of all three components in order to maintain a stable abundance of older year classes well beyond the age of first maturity. The current assessment indicates that generally this is happening with up to 8 year old fish well represented in the main North Sea fishery.</p> <p>However, although not genetically discrete, the Downs component is not showing the same recovery pattern as the Banks and Buchan stocks and the age structure has not improved to the same degree. It is known that the Downs component of the stock complex is subject to a different development and did not recover from the low levels of the late 1970's and mid 1990's in the same way as the central and northern North Sea components. The most recent ICES Working Group report shows encouraging signs of a recovery in 2002 which resulted in an increased TAC for the area. However this area TAC which has been set at 25,000t since 1996 has been regularly overshot since 1987. The Working group have recognised a need for a reassessment of the methods used to investigate the size of the Downs stock.</p> <p>Similarly, although not genetically discrete, there has still been no real recovery in the central North Sea of spawning on the former grounds around the western edge of the Dogger Bank</p> <p>Mackerel</p> <p>As a result of the extensive monitoring and research, changes in the reproductive capacity of mackerel have been noted. These are well documented in the reports of the ICES Mackerel and Horse Mackerel Working Group. There is no evidence that the changes in fecundity have affected the overall reproductive capacity in terms of affecting year class strength.</p>	R16, R17, R18, R24, R25	33.3	85
80	There is evidence of no fishery-related changes in stock structure that would affect recruitment.				
100	Data and assessments strongly indicate a robust age, sex and genetic structure in the stock, such as would maintain reproductive capacity.		R19, R26, R32, R27		

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
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			33.3	85
2.1 (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.			60.0	85
2.1.1	There is adequate determination of ecosystem factors relevant to the geographical scale and life history strategy of the target species.			22.7	
Weighting Commentary		<p>Within Principle 2, MSC Criterion 1 (2.1) is considered to be of greatest significance, reflecting the importance of removal of biomass of the target species in maintaining ecosystem relations. Criteria 2 and 3 are considered to be of approximately equal significance.</p> <p>Within Criterion 2.1, the groups of indicators are considered to be of equal significance except 2.1.3 (relating to effects of gear use and loss) which is considered to be of lesser significance for a pelagic fishery with little opportunity for gear loss.</p> <p>Within the 2.1.1 level of the hierarchy, greatest weighting is given to the potential for by-catch and the importance of the target species in the food web. Information on the potential for ecosystem recovery and knowledge of habitats and by-catch, although important, are considered less significant for a relatively selective pelagic fishery.</p>			
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.	Catching operations take place within the upper and mid water column and are thus essentially pelagic in nature. The pelagic habitat can be characterised by the nature of (i) the physico-chemical (i.e. water movement, mixing, temperature, salinity and nutrient content), the (ii) non-motile plankton component and (iii) the nekton component (i.e. free-swimming organisms). Of these, (i) and (ii) are highly variable and their dynamics within the North Sea well understood. Impacts of fishing activities on these two components of the pelagic habitat are negligible and in any case transient. Impacts on the nekton component may be more profound and are considered further as both (a) non-target species (see 2.1.1.2) and (b) where the species are protected and/or considered threatened or endangered, under 2.2.1.	R1, R2, R5, R23	16.9	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.				
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.				
		One habitat type critical to the herring stock are the gravel spawning beds. The distribution of these are well known from larval surveys and increasingly from direct observations targeted towards marine aggregate extraction. For the Eastern English Channel these have been surveyed recently (1996-2001). However the distribution of larvae is not a direct indication of herring spawning sites as larvae move and drift with water movements (e.g. tide and residual currents) and the surveys are conducted some time after spawning.			
		Distribution of fishing vessels and effort is monitored by log books, although effort in relation to specific habitat types (in relation to gravel substrates) is not recorded.			

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
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.	Non-target species affected by the fishery may include the occasional catch of other pelagic fish mixing with herring and mackerel shoals, notably grey mullet and rarely red mullet if fishing near the sea bed. Supporting this, observer programmes on pelagic fisheries and information from other inshore herring drift-net fisheries have indicated that by-catch of non-target pelagic fish is very low. No direct information is available, however, for this fishery. The ecology of these species is generally known in inshore waters.	R3, R34, R35, R42	33.8	80
80	Information is available on non-target species directly affected by the fishery including their distribution and/or ecology.				
100	Information is available on all non-target species directly affected by the fishery including their distribution and ecology.				
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.	Herring	R4, R12, R23, R39, R44	28.8	90
80	Information is available on the position, relationships and importance of target species in the environment at key life stages.	The prey of herring has been well described. The studies show that, with some variations, the food of herring in the North Sea has remained consistent over a long period, being dominated by the copepods <i>Calanus</i> spp. and <i>Temora</i> spp. with Euphausiacea and the post-larval stages of <i>Ammodytes</i> spp. and clupeids contributing to a large percentage by weight. Fish eggs are also eaten, especially those of plaice <i>Pleuronectes platessa</i> , but not in large numbers. The consumption of larvae and post-larvae of other fish have not been found, indicating selective feeding by herring.			
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.	The food web (primarily predator prey relationships) related to herring has been well described and herring has been considered as one of 12 key species within a multi-species Virtual Population Analysis (MSVPA) for the North Sea (ICES Area IV). This includes quantitative information on herring as a prey (predominantly by cod, saithe and seabirds) at different life stages, including spawn. While the MSVPA is still under development, it is considered to be robust. Mackerel The prey of mackerel has been well described (Daan, 1989; Hislop, 1997). North Sea mackerel was originally included as a full MSVPA species, and has been shown to be an important predator in the North Sea system (ICES, 2003). Although mackerel was later dropped as a VPA species from the 4M model as the size of its population declined markedly in the 1970's, the two stocks (Western Mackerel and North Sea mackerel) are being reintroduced, especially due to their predation of 0-class fish.			

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score
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2.1.1.4		Is there information on the potential for the ecosystem to recover from fishery related impacts?			
60	Key elements of the functioning of the ecosystem, relevant to the fishery, are identified.	<p>Herring</p> <p>The ability of the herring stocks to recover from fishery-related impacts (i.e. over-depletion) are well documented, especially following the formation of the ICES Assessment Group on North Sea herring in 1969. In particular, two stock-depletion (mid-1960s – c. 1980 and mid-1990s) events have been extensively studied and now provide the basis for the current, more precautionary fisheries management regime. It is noteworthy that few changes in predator populations were identified following these population collapses. Further information on the potential trophic impacts of stock biomass removal is also available from the MSVPA analysis. Any impacts on habitat would principally affect gravel beds which form spawning areas. However, these are not considered particularly sensitive to pelagic trawl impacts.</p> <p>Mackerel:</p> <p>Information on the potential trophic impacts of stock biomass removal is available from the MSVPA analysis, especially its predation of 0 class fish.</p>	R15, R25	20.5	85
80	The main elements of the functioning of the ecosystem, relevant to the fishery, have been documented and are understood.				
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.			22.7	
Weighting Commentary		These two indicators were considered of equal importance.			
2.1.2.1		Is information available on the nature and extent of the by-catch (capture of non-target species)?			
60	Qualitative information is available on significant by-catch species.	<p>The level of bycatch from the drift net fishery have not been recorded in detail but are considered to be very low as catches of commercial species are retained.</p>	I1, R35, R39, I5	50.0	70
80	Quantitative information is available on significant by-catch. If obtained by sampling, this is considered sufficient to provide adequate information				
100	Accurate records are kept on the nature and extent of all by-catch species including species, size and sex composition.				

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
2.1.2.2		Is information available on the extent of discard (the proportion of the catch not landed)?			
60	Information is available of the extent of discarding, including an assessment of the main species represented.	The level of discards from the drift net fishery have not been recorded in detail but are considered to be very low as selectivity is high and catches of commercial species are retained and landed.	I1, R35, R39, I5	50.0	75
80	Information is available to allow estimates of discard to be calculated and interpreted.				
100	Accurate and verifiable information is available on the extent of all discards, and the 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.			9.3	
Weighting Commentary		Within this section, the potential for lost gear/ghost fishing is considered more significant than impacts upon habitat.			
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 are estimated and appear stable.	The gear used only affects the upper and middle water column. Impacts are therefore considered incidental and negligible.	I1, R30	33.3	100
80	Impacts of gear use on the habitat are identified including extent, timing and location of use. Habitat perturbations appear sustainable.				
100	The physical impacts on the habitat due to use of gear have been studied and quantified, including details of any irreversible changes.				

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
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'.	Gear loss is highly unusual in this fishery as nets remain attached to fishing vessels and are closely monitored.	I1	66.7	95
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'.				
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'.				

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score	
2.1.4		Strategies have been developed within the fisheries management system to address and restrain any significant impacts of the fishery on the ecosystem.			22.7	
Weighting Commentary		The two indicators at this level were considered to be of equal significance.				
2.1.4.1		Are levels of acceptable impact determined and reviewed?				
60	There is sufficient information to determine acceptable impacts for significant target and non-target species and habitats.	<p>Herring</p> <p>Fishing mortality, the key impact, is reassessed on an annual basis by ICES who's ACFM recommend TAC's for the North Sea stocks (ICES Area IV and Division VIIId) to maintain stocks in line with the EU Norway agreement. These TAC's are based upon the biological information of catches (numbers, weight, length, catch at age and relative age composition) obtained through commercial catch sampling and fisheries independent information. Information gathering is developed by the ICES Planning Group for Herring Surveys. Herring is one of 10 species included in a multi-species VPA conducted for the North Sea (whose database is updated on a quarterly basis) since 1984. This MSVPA has been constantly updated and subjected to sensitivity analyses as well as other tests to refine the model. The model is considered to represent a reasonable tool for predicting trends in stock levels and herring assessments are considered to be in the top half of quality appraisals. MSVPA includes key predator species of herring.</p> <p>Mackerel</p> <p>North Sea mackerel was originally included as a full MSVPA species, and has been shown to be an important predator in the North Sea system (ICES, 2003). Although mackerel was later dropped as a VPA species from the 4M model as the size of its population declined markedly in the 1970's, the two replenished stocks (Western Mackerel and North Sea mackerel) are being reintroduced, especially due to their predation of 0-class fish.</p> <p>Non target species: TAC's are also set annually for most potential by-catch species. Such stock assessments are annually reviewed through relevant ICES working groups.</p> <p>Habitat impacts are reasonably expected to be negligible as the fishery is conducted primarily in the water column.</p>	R22, R23	50.0	90	
80	Levels of acceptable impacts (e.g. biological reference points) for key aspects of the ecosystem within main fishing areas have been estimated and are regularly reviewed.					
100	Levels of acceptable impact for key populations (such as of indicator species) and habitats have been estimated and are subject to frequent review.					

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
2.1.4.2		Are management objectives set in terms of impact identification and avoidance/reduction?			
60	Management systems include some impact identification and avoidance/reduction.	Herring Objectives for herring biomass are implemented through a TAC system. Under advice from the ICES ACFM, a precautionary management regime has resulted in the spawning stock biomass exceeding a precautionary level. As past assessments have tended to overestimate stock size and underestimate fishing mortality, the ICES Herring Assessment Working Group are revising projection methods to provide a more realist assessment.	R26, R27, R28	50.0	90
80	Management objectives are set to detect and reduce impacts, although these have not been fully tested. These are designed to adequately protect key aspects of the ecosystem within main fishing areas.	EC Regulations require high target species percentages. In the case of herring, these are 90% where there are two or more pelagic target species and 60% where there is a single pelagic target species but in that case there must be no more than 5% of any mixture of cod, haddock and saithe and no more than 15% of any mixture of a range of mostly demersal species identified in the Regulations. However, as discussed under Indicator 2.1.2.1, the fishery is easily expected to exceed these requirements. ICES's Herring Assessment Working Group (HAWG) is currently investigating the impact of aggregate dredging on the spawning beds in VIII and have firmly recommended that, under the precautionary principle, aggregate extraction activities do not take place over the spawning period of November to February. No other management objectives have been considered necessary for other impacts, e.g. that of fishing gear.			
100	Tested management objectives are set to detect and reduce impacts These are designed to adequately protect ecosystems, habitats and populations of target and non-target species.	Mackerel Objectives for mackerel biomass are also implemented through a TAC system. Drift net gear mesh size restrictions and gear use restrictions are imposed to maximise selectivity, prevent gear loss and minimise impacts upon migratory salmonids.			

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
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.			22.7	
Weighting Commentary		The key factor here was considered to be the removal of target species biomass, greatest weighting was therefore given to indicator 2.1.5.1 dealing with knowledge of fishery impacts. Impacts of target stock removal and overall impacts on community structure, productivity and diversity were highly weighted, followed by by-catch and finally impacts upon habitat (reflecting the pelagic nature of the fishery).			
2.1.5.1	Have all the significant effects of the fishery on the ecosystem been identified?				
60	Main impacts of the fishery on the ecosystem are known from existing information.	<p>Herring</p> <p>Ecosystem impacts stem from biomass removal and resultant changes in predator prey relationships, in particular the importance of herring as a prey of key North Sea species such as cod, whiting and saithe. The key impact is considered to be the removal of target species biomass. Stock assessment and management measures (TAC's) are in place for the target and main by-catch species. Impacts on predators are further considered in the ICES multi-species VPA model for the North Sea and are considered to be reasonably well understood. Impacts on seabed habitat in spawning grounds in Area VIId may occur but has not been identified as a potentially significant impact.</p> <p>Mackerel</p> <p>Ecosystem impacts also stem from biomass removal and resultant changes in predator prey relationships. The role of mackerel as a key predator of 0-class fish has been considered by the ICES multi-species VPA model and the implications for other species included in this assessment.</p>	R22	29.1	90
80	There is a comprehensive evaluation of the effects of the fishery on the ecosystem based on existing information.				
100	The effects of the fishery on the ecosystem have been identified by appropriate comparative and/or experimental studies.				

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
2.1.5.2		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 development to reduce these to acceptable, defined limits.	<p>Herring</p> <p>Herring larvae provide an important food component for cod, whiting and saithe – thus the relative abundance of young herring may influence the recruitment of their main predators. This has been modelled as part of the ICES multi-species VPA model for the North Sea and the current improving status of the stock is likely to benefit these predators. However, the level of coupling between predator-prey-relationships, and opportunities for prey-switching, is less well known and are likely to increase uncertainty over the response of predators to diminished prey availability. Further development of the MSVPA model, including incorporation of new stomach content data, should allow the interrelationships between herring and other key North Sea species to be better established.</p>	R22, R29	22.0	95
80	Some information is available on consequences of current levels of removal of target species. These suggest no unacceptable impacts of the fishery on ecological systems within major fishing areas.	<p>Mackerel</p>			
100	The ecological consequences of current levels of removal of target stocks has been quantified and documented to be within acceptable, pre-determined, limits.	The role of mackerel, particularly as a key predator of 0-class fish, has been considered by the ICES multi-species VPA model and the implications for other key species included in this assessment.			

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
2.1.5.3		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 upon ecological systems (applying the precautionary approach where necessary). A program is in development to reduce these to acceptable, defined limits.	No unacceptable impacts have been identified due to the highly selective nature of the fishery. Capture of non-target species is at a very low level and, in light of the scale of this fishery, are not considered likely to interfere with ecosystem structure or function in any way.	I1, R39	14.6	80
80	Some information is available on consequences of current levels of removal of non-target species. These 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.				

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
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, although the issue has not been directly studied.	The fishery will have a negligible impact upon the structure and function of the pelagic habitat and no unacceptable impacts have been demonstrated for the benthic habitats (as discussed under Indicator 2.1.5.1).	R22, R39	12.4	95
80	No unacceptable impacts of the fishery on habitat within major fishing areas have been demonstrated.				
100	Effects on habitat structure are well documented and 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.	Biological diversity, in terms of rare, protected or threatened species is considered in Section 2.2.	I10, R22, R39	22.0	90
80	The effects of the fishery on biological diversity, community structure and productivity have been considered and no unacceptable impacts have been found.	Since rebuilding of the herring stock, biomass has increased. For both species, there is no evidence to suggest that productivity of the pelagic system has been impaired due to fishing mortality. Similarly, the pelagic community structure would not be expected to be adversely affected as a result of fishing activity, and for key fish species this is modelled through the MSVPA.			
100	The effects of the fishery on biological diversity, community structure and productivity have been quantified and are within acceptable tested/justified limits	As discussed under Indicator 2.1.3.1, no significant impacts of the fishery upon benthic habitats or communities have been identified.			

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
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 minimises mortality of, or injuries to endangered, threatened or protected species.		18.8	89
2.2.1		Fishing is conducted in a manner, which does not have unacceptable impacts on recognised protected, endangered or threatened species.		56.5	
Weighting Commentary		The two indicators within MSC Criterion 2.2 were considered to be of roughly equal significance. Slightly greater weighting was given to the identification of potential impacts as the area in which attention is most warranted.			
		The three indicators within the 2.2.1 level were considered to be of equal significance.			
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.	Seals. The populations of seals in the North Sea are monitored by a number of organisations including NERC's Special Committee on Seals (SCOS) and the Sea Mammal Research Unit. In addition to these studies, harbour seals are surveyed annually in the Kattegat/Skagerrak by Swedish scientists and in the Wadden Sea by Dutch scientists. Elsewhere surveys are less frequent but data are relatively complete for most harbour seal populations in the region of the North Sea. Grey seals are also surveyed intermittently along the Norwegian coast and in the Baltic but there are no systematic surveys of abundance.	R1, R6, R42	33.3	95
80	Key protected, threatened and endangered species directly related to the fishery have been identified. The populations and health of key protected, threatened and endangered species directly related to the fishery are monitored on a regular basis.	Cetaceans. A major international survey was conducted in 1994 (known as SCANS) to estimate the abundance of harbour porpoises and other small cetaceans in the North Sea and adjacent waters. The current plan is to repeat the survey in the North Sea and to extend the survey area to include shelf waters to the west of the British Isles where there are not yet any robust estimates of cetacean abundance. Cetacean populations in the English Channel are very low, although there are signs of some recovery with increasing regulation on fishing mortality in prey stocks in North Sea waters in particular (Northridge, pers. comm.). Therefore some caution needs to be applied to ensure that recovery of these populations is not hindered by this fishery.			
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.	Fish. Basking shark are not typical of the North Sea or Eastern Channel waters but sightings off the Isle of Wight (Fowler, 1995) are recorded. The twaite and allis shads are herring family members that are listed as threatened (OSPAR, 2003) but are known to occur in Kent and Sussex coastal waters. The common skate (<i>Raja batis</i>) is now extremely rare in Area IVc. Migratory salmonids (particularly sea trout) are also known to be present. Seabirds. Seabirds at sea are monitored by the seabirds at sea unit of JNCC.			

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score	
	<p>Benthos. Areas of strong tidal currents are associated with coarse sediments characterised by sessile epibenthic communities dominated by suspension-feeders. Such gravel substrates in Area VIIId support the main spawning grounds of the Down's herring. EC Habitats Directive Annex I reef areas (including bedrock, cobble and boulder substrates) are known in the Eastern English Channel basin which is dominated by a large expanse of potential reef habitats which stretches 142 km in length and 32 km wide. Shallow inshore areas are better known due to greater survey area, such as the SeaSearch programme.</p>				
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>Sea mammals. Observations made on two small driftnet fisheries in the UK (with relatively low proportionate effort) showed no bycatch of cetaceans (EC, 2002).</p> <p>Fish. Elasmobranchs (sharks, skates and rays) bycatch is not considered to be an issue in this fishery. Basking shark are not typical of the North Sea or Eastern Channel waters but sightings off the Isle of Wight (Fowler, 1995) are recorded. Twait and Allis shads (herring family members) and sea trout may be intercepted by these gears. However, timing of fishing and mesh size constraints would reduce or avoid impacts on these species.</p> <p>Seabirds. Interactions of seabirds are rarely reported for these gears, although some incidental catch when fishing close to rocks. However mortality rates are considered low.</p>	R7	33.3	80
80	Quantitative estimates are made of the effects of interactions directly related to the fishery. There is a requirement to record and report all incidental mortalities.				
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.				

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
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.	Cetaceans The very low rates of interactions with the species discussed above indicate that the fishery does not pose a risk to protected, endangered or threatened species. The Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS) has adopted 1.7% as the maximum allowed removal rate for harbour porpoises and this was also adopted by EC (2001) and ICES. However, potential impacts with this fishery are such that a requirement to set specific mandatory levels has not yet been identified.	R45	33.3	90
80	Critical interactions are well estimated and do not threaten protected species.				
100	It is known that the direct and indirect effects of fishing on threatened and endangered species are within acceptable limits.	Fish Due to seasonal fishing times, by-catches of shad are unlikely in this fishery. Potential risks to sea trout are reduced through mesh size restrictions.			

2.2.2	Strategies have been developed within the fisheries management system to address and restrain any significant impacts of the fishery on protected, endangered or threatened species.			43.5	
2.2.2.1		Are management objectives set in terms of impact identification and avoidance/reduction?			
60	Some management systems exist in terms of impact identification and avoidance/reduction.	The extremely low incidence of interactions with such species has meant that no specific management objectives other than mesh sizes and gear setting restrictions have either been set or are reasonably considered to be required.	R6, R7, R14	100	90
80	Management objectives are set to detect and reduce impacts. These are designed to adequately protect key aspects of the ecosystem within main fishing areas.	If issues relating to protected, endangered or threatened species are identified, various mechanisms have been developed to detect and reduce their impact. This includes i) the ASCOBANS Agreement that sets the 1.7% maximum allowed removal rate for harbour porpoises; (ii) the EC Habitats Directive that provides protection for key habitats and species; (iii) Biodiversity Action Plans that provides protection for the protection of key and threatened species and habitats; (iv) the OSPAR Strategy on the Protection and Conservation of the Ecosystems and Biological Diversity of the Maritime Area that has identified a number of key species and habitats in the North Sea and Eastern Channel considered as 'threatened or declining'.			
100	Tested management objectives are set to detect and reduce impacts These are designed to adequately protect ecosystems, habitats and populations of target and non-target species.				

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score	
2.3 (MSC Criterion 3)		Where exploited populations (of non-target species) 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.			21.2	83
2.3.1		There are management measures in place that allow for the rebuilding of affected populations.			100	
Weighting Commentary		The three indicators under MSC Criterion 2.3 were considered to be of equal significance.				
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.	Minor interactions could occur with two uncommon species – shad and sea trout. Interactions with shads will be minimised by the timing of fishing operations and small mesh sizes used. Interactions with sea trout are also minimised by specified mesh size restrictions and the setting of the nets around 4m below the water surface.	R42, I11	33.3	80	
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.					
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.					

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score	
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.	Monitoring of by-catch species occurs under the auspices of ICES working Groups. Objectives and limits are set for each species as discussed in 2.3.1.1 – biomass and fishing mortality reference points.	R20, R22, R25	33.3	90
80	Effective management measures are in place to modify fishery practices in light of the identification of unacceptable impacts.	The CFP basic fisheries regulation (2371/2002) provides the framework within which management measures can be introduced to modify fishery practices in the light of the identification of unacceptable impacts. For Hastings fishermen, regulations may also be implemented or augmented in the form of SSFC by-laws.			
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.	Interactions with shads will be minimised by the timing of fishing operations. Interactions with sea trout are minimised by specified mesh size restrictions.			

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
2.3.1.3		Do management measures allow for recovery of affected populations?			
60	Rebuilding measures exist and are fully implemented. Measures have not been tested.	Management measures for shad and sea trout are implemented to assist in rebuilding of populations, primarily focussed on spawning areas in rivers. This is not a significant issue for this particular fishery.	R14, I11	33.3	80
80	Appropriate rebuilding measures are being implemented. Measures have been tested and can be shown to be rebuilding the affected populations.				
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.				

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
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		33.3	89
3.A		Management System Criteria		41.7	90
Weighting Commentary		<p>Within MSC Principle 3, 3B (operational criteria) were weighted slightly higher than 3A (management system criteria) as the actual implementation of management measures was considered highly important.</p> <p>Under 3A, the greatest weighting was given to issues of compliance, monitoring and control (3A.8), followed by the establishment of appropriate objectives etc (3A.3) and control of impacts on the stock (3A.6).</p>			
3A.1 (MSC Principle 3 Intent and Criterion 3)		A management system containing an institutional and operational framework exists with clear lines of responsibility.		11.2	95
Weighting Commentary		The four indicators at this level were considered to be of equal significance except the requirement for external review which, given the existing levels of scrutiny and control, was considered less significant for a fishery within the CFP.			
3A.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 require clarification.	Fisheries are managed through the Common Fisheries Policy of the EU in accordance with the basic fisheries regulation (2371/2002) and additionally, these fisheries are managed according to EU-Norway agreements.	R20, R21, R24, R27 I3, I4	31.3	100
80	Organisations with management responsibility have been defined including key areas of responsibility and interaction	Scientific research and assessment is carried out by ICES. Advice is provided through the Advisory Committee on Fisheries Management (ACFM) on the status of target and non-target stocks to the European Commission. ICES advice, via Commission proposals, informs the annual EU Council of Ministers regulation establishing management measures, in particular TAC's and quotas. TAC's and quotas for the herring and mackerel fisheries are set in this regulation for EC member states and recorded for Norway.			
100	Organisations with management responsibility are clearly defined including all areas of responsibility and interaction. Interactions are demonstrably effective.	<p>Implementation of the CFP (and implementation of Habitats Directive etc) at a national level is carried out through DEFRA.</p> <p>In addition, local by-laws may be implemented by the Sussex Sea Fisheries Committee (within 6 nm). Other agencies such as English Nature, Environment Agency and Local Authorities are represented on the committee, as is the Hastings Fishermen's Protection Society. These agencies also have specific advisory positions in relation to rare species, diadromous fish species etc.</p>			

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
3A.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.	The majority of nations with a history in North Sea herring fisheries are represented in the EU-Norway agreement. Similarly for mackerel there are agreements between the EU, Norway and the Faroe Islands and agreements with NEAFC in relation to mackerel taken in International waters. These systems are considered to be entirely consistent with the multi-national nature, scale and intensity of these fisheries. Locally, the Hastings fishery is regulated by a well established framework consistent with traditional regional practices.	R21, R24, R27	31.3	100
80	The system is consistent with key elements of the cultural context, scale and intensity of the fishery.				
100	The system is entirely consistent with the cultural context, scale and intensity of the fishery.				
3A.1.3		Is the management system subject to internal review?			
60	There are mechanisms in place to allow for internal review.	EC management systems allow ICES, National Governments, the fishing industry and other groups to make a case to the Commission for review and change. In practice, the Commission may well bring forward a proposal for change on its own initiative. Within ICES, a Methods Working Group keeps methods for fish stock assessment under regular review and there is a specific Study Group on Evaluation of Current Assessment Procedures for North Sea Herring. In addition, other study groups exist to review, for example, Revision of Data, Herring Surveys, Precautionary Approach Preliminary Limits and Discards and Biological Sampling Each member state must also report annually on control matters. EC fishery inspectors monitor National enforcement activity. EC data collection requirements, carried out by member states, are reviewed each year. Quota allocations within the UK are administered by DEFRA, which is subject to internal audits to review the nature and efficacy of control measures. Within SFC's, regular meetings allow for representations by member organisations. A number of systems are involved in these various review programmes operating on varying timescales of review and implementation and to meet varying priorities.	I3, I4	31.3	90
80	The management system is subject to internal review. This includes the performance of the assessment methods and improvements to the method have been tested and made.				
100	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.				

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
3A.1.4		Is the management system subject to external review?			
60	There are mechanisms in place to allow for external review.	<p>ICES can, and do, involve external scientists in review of its methodologies if considered necessary. However, this has not been deemed necessary for the North Sea herring or western stock mackerel fisheries.</p> <p>Political pressure from the Member States on the Commission and the independence and international standing of ICES and other bodies ensure CFP review processes are externalised. A recent review of the CFP, in particular, involved extensive stakeholder input (including representatives of the fishing industry, NGO's, independent scientists etc).</p> <p>DEFRA management measures, such as enforcement and FIG effectiveness, are reviewed by the European Commission. The structure and effectiveness of SFC's has also been recently reviewed within England and Wales.</p> <p>Although various (and more urgent) elements of the management system are subject to review, there is no systematic review of the system as a whole.</p>	R28, I3, I4	6.3	80
80	The management system is subject to regular external review.				
100	The management system is subject to regular and frequent external review.				

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score
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3 A.2 (MSC Criteria 1, 2, 4)		The management system has a clear legal basis.	5.4	100	
Weighting Commentary		The three indicators at this level were considered to be of equal significance.			
3A.2.1		Is the fishery consistent with International Conventions and Agreements?			
60	The management system operates under relevant international conventions and agreements, but some management actions may be questionable in relation to the terms of these.	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 herring fishery is fundamentally managed under an international agreement between the EU and Norway. The Northeast Atlantic mackerel fishery is basically managed under agreements between the EU, Norway and the Faroe Islands plus an agreement with NEAFC regarding the catch levels to be taken in International waters.	R21, R24, R27	33.3	100
80	The management system appears to be in full compliance with international conventions and agreements.	The Habitats Directive is also relevant in terms of protected habitats and species and is implemented in the UK through the Habitats &c Regulations.			
100	The management system is demonstrably compliant with all relevant international conventions and agreements.				

3A.2.2		Is the system consistent with national legislation?			
60	The management system operates under relevant EU and national legislation, but some management actions may be questionable in relation to the terms of these.	The management system is in accord with EC regulations implemented in the UK and UK fishery and nature conservation legislation. As detailed in Section 3.A.1.3, EC fishery inspectors monitor National enforcement activity and action can be taken if appropriate.	I3, I4, I5	33.3	100
80	The management system appears to be in full compliance with EU and national legislation.				
100	The management system is demonstrably compliant with all relevant EU and national legislation.				

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
3A.2.3		Does the system observe the legal and customary rights of people dependent upon fishing?			
60	The customary and legal rights of people dependent upon fishing are known and no major conflicts have occurred.	Rights are set out in EC and Nation State law. In particular, Hastings Fisher's have historic protected rights to access to the Stade for fishing activities.	I1, I4, I8	33.3	100
80	The system observes the legal and customary rights of people dependent upon fishing but does not necessarily have a formal codified system.				
100	The system observes all legal and customary rights of people dependent upon fishing under a formal codified system.				

3A.3 (MSC Criteria 2, 5, 7)	The management system includes strategies to meet objectives including consultative procedures and dispute resolutions.			17.7	92
Weighting Commentary		The greatest weighting at this level of the hierarchy was given to the adoption of a precautionary approach to management measures. Lower weightings were given to consultative and dispute resolution mechanisms. The setting of objectives, adoption of procedures to meet objectives and measurement of performance in doing so, were considered to be of high, and roughly equal, significance.			
3A.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.	Long-term objectives are set out in the EU/Norway agreement for herring. The long term objectives for Northeast Atlantic mackerel are set out in the agreement between the EU, Norway, the Faroe Islands and NEAFC. Short-term objectives are represented by annual TAC's, achievement of which is measured at sub-annual levels. These objectives are based on a precautionary approach. Total Allowable Catches are set by the Council of Ministers each December for the following year in the light of ICES advice. There is an intention, for mackerel, to move to multi-annual TACs after the 2004 egg survey results become available. All objectives are firmly based on the precautionary approach. Significant environmental objectives are included within fishery-related objectives and separate conservation objectives.	R21, R24, R27	16.8	90
80	The management system contains short and long-term resource and environment objectives.				
100	The management system contains clear and explicit short and long-term resource and environment objectives that can be measured by performance indicators.				

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score
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3A.3.2		Do operational procedures exist for meeting objectives?			
60	Operational procedures exist which are applied to the meeting of objectives.	National quota is sub divided among fleets in member states and Norway for herring. For mackerel the quota is divided among the fleets of member states, Norway and the Faroe Islands. Account is also taken of catches in International waters via an agreement through NEAFC Landings are recorded by logbook, reported to the national authority, which in turn reports uptake to the Commission (and Norway). The reporting process provides timely information to the commission and DEFRA. The Commission and DEFRA has power to close the fishery (including the non-sector) immediately once quota is taken. Procedures exist within the SFC and other agencies for the meeting of relevant conservation objectives. However, procedures are dependent upon accurate reporting of catch areas. Area misreporting, as detailed in section 1.1.2.6, is an ongoing issue for the North Sea and Eastern Channel herring fishery.	R21, R24, R27 I3	17.6	85
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.				

3A.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.	Performance relative to objectives is monitored at Regional and National level. Performance at national government level within the EU is monitored by the Commission (as described in Section 3.A.3.2). National results are published in annual reports to the Council of Ministers, SFC results are reported publicly on an annual basis.	I3, I4	17.6	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.				

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
3A.3.4		Do objectives and operational procedures follow the precautionary approach?			
60	Some objectives and procedures implement a precautionary approach.	The EC sets Total Allowable Catches in the light of ICES (ACFM) advice, which is firmly geared towards following the precautionary approach.	R21, R24, R27	31.4	95
80	Key objectives and procedures explicitly implement a precautionary approach.	However, it is noted that quotas for Down's herring stocks appear less than precautionary in view of the much slower recovery of this component of the overall North Sea/Eastern Channel stock.			
100	All relevant objectives and procedures explicitly implement a precautionary approach.				

3A.3.5		Does the system include a consultative process including affected parties?			
60	The system includes a consultative process including key stakeholders within the fishery.	The recent review of the CFP included consultation with all relevant stakeholders, including industry, NGO's etc. Further consultation processes exist between fishing industry and National authorities and often between National fishing associations, NGO's etc and the Commission, particularly the Advisory Committee and Working Groups (such as the Conservation Working Group) within the Directorate General of Fisheries (DG Fish).	I1, I2, I3, I4, I8	8.6	90
80	The system includes a consultative process including all main public and private stakeholders and can demonstrate consideration of representations made.	Information gathering, and dissemination of results, takes place between DEFRA and industry stakeholders. Local relevant parties are afforded representation on the SFC, including industry and regulatory bodies. Local issues are specifically addressed at the SFC.			
100	The system includes a consultative process including all affected stakeholders. Decisions specifically discuss and/or address stakeholder concerns				

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score
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3A.3.6		Is there an appropriate mechanism for the resolution of disputes within the system?			
60	Mechanisms are theoretically adequate but have not been consistently applied or tested.	There are mechanisms at National level for issues to be raised with National Governments and resolved where possible by them. This has been implemented by the HFPS (possibly including NFFO assistance) and DEFRA. The HFPS constitution allows for disputes within the society to be considered and resolved at an AGM or Special General Meeting. 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 which is widely known and has been used when considered necessary.	I3, I4	8.0	90
80	There is an appropriate and established mechanism for the resolution of disputes within the system.				
100	There is an appropriate and tested mechanism within the system for the documentation and resolution of disputes of varying magnitude.				

3A.4 (MSC Criterion 6)	The management system operates in a manner appropriate to the objectives of the fishery.			4.3	92
Weighting Commentary		The two indicators at this level were considered to be of equal significance.			
3A.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.	No subsidies that would contribute to unsustainable fishing are identified for these fisheries. Any subsidies that were made available would have to be cleared with the European Commission under the EC State Aid rules.	I3	50.0	100
80	The system is essentially free from subsidies that contribute to unsustainable fishing or ecosystem degradation.				
100	The system has no subsidies that contribute to unsustainable fishing or ecosystem degradation.				

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
3A.4.2		Does the system include economic/social incentives that contribute to sustainable fishing?			
60	Measures to allocate fishing opportunities and/or entry to the fishery, or other incentives, are generally supportive of achieving fishery objectives	Contravention of conservation regulations results in economic penalties and negative publicity. There is evidence of imposition of such penalties for non-compliance in the North Sea herring fishery and in the mackerel fishery	I3	50.0	85
80	Allocations of fishing opportunities, and/or other incentives, promote fishery and ecosystem management goals.	FIFG funding is made available to measures that would support sustainable fishing.			
100	The system has established economic and social incentives that contribute to sustainable fishing and ecosystem management				

3A.5 (MSC Criterion 8)	A research plan exists in line with the management system to address information needs.			7.8	87
Weighting Commentary		The three indicators at this level were considered to be of equal significance.			
3A.5.1		Have key research areas requiring further information been identified?			
60	Major areas requiring further research have been identified.	ICES establishes study groups based on information requirements identified by national delegates, including through industrial representations. These include, for example, a study on effects of aggregate extraction on herring spawning and egg survival in the English Channel and genetics of stock separation in North Sea herring.	R25, R26	33.3	85
80	Key areas requiring further research have been identified.				
100	A comprehensive review of information requirements has been undertaken.	Areas requiring further research have been identified including further investigation of the state of the Downs Stock, discards monitoring and the performance of the sampling programme generally. Key research areas in relation to the mackerel egg surveys and assessment have also been identified, including biology, distribution of 0 group juvenile stages etc. Fundamental research, for example on recruitment variability and environmental influences on stock dynamics, however, seems to be left to individual scientists and the priorities and financial constraints of their parent organisations as funding is not made available from ICES. Such work is undertaken, for example, by UK, Dutch, Danish, German and Norwegian institutes.			

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score	
3A.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.	Herring		33.3	85
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. For example in their 2003 report the WG considered the reports and recommendations of four ICES study groups, two planning groups and a Methods Working group (ICES CM 2003/ACFM:17). Resources are made available by the EU or member states directly.	R8, R13, R14, R30, R36, R38, R41		
100	There is an ongoing, funded, comprehensive and balanced research programme, linking research to the management plan.	<p>In the recent past ‘cutting edge’ research into otolith microstructure has been carried out in an attempt to improve the discrimination of autumn and spring spawning herring.</p> <p>At their most recent working group meeting members, from various Institutes, have developed an informal agreement to carry out research into Downs herring. This has been instigated to move the management of the separate quota for Downs herring within the North Sea herring TAC to a more scientific basis. The proposed informal programme takes two main approaches to address the trends in the population; firstly a re-analysis of the larvae surveys of the English Channel and southern North Sea and secondly an investigation of the proportion of winter spawners in the summer catches from the North Sea (the spawning-origin of herring).</p> <p>Mackerel</p> <p>Specific research requirements identified by the working group in recent years have been targeted at further improving the precision of the SSB estimate from the triennial mackerel egg surveys. This has proved particularly successful in relation to estimation of fecundity, survey design and estimation of variance. Other funded research has been targeted at recruitment and an understanding of variability and also environmental effects on changes in distribution.</p>	R19, R26, R32, R27		

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score	
3A.5.3	Is relevant research carried out by other organizations (e.g. Universities) and is this taken into consideration?				
60	The management system is aware of research carried out by other organisations and elements of this are taken into consideration.	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. In the North Sea herring some sectors of the industry have given strong indications that they are keen to fund and become involved in aspects of North Sea herring research. Research on Northeast Atlantic mackerel has benefited enormously from EU funded research carried out at Universities. In particular, much of the early research on fecundity and atresia was carried out at the University of Aberdeen. The Irish fishing industry have also sponsored research and monitoring surveys in relation to the distribution and spawning of mackerel. These are all co-ordinated programmes targeted at improving the precision of the stock assessment process.	R26	33.3	90
80	Appropriate research carried out by other organisations is taken into consideration, although there is not necessarily any proactive co-ordination between organisations.				
100	Relevant research carried out by other organisations is taken into account for management considerations. This research is often co-ordinated with existing research plans of the management system.				

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score
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3A.6 (MSC Criteria 7, 9, 10)	The management system includes measures to pursue objectives for the stock.			15.5	89
Weighting Commentary	The three indicators at this level were considered to be of equal significance.				
3A.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.	<p>Herring</p> <p>The resource (the stock status) is monitored as described in Section 1.1.1 and is considered good. The extent of fishery-related mortality was considered in Section 1.1.2.1 and a number of deficiencies were noted however.</p>	R25	33.3	80
80	A monitoring programme is in place that addresses all key aspects of resource and effects at appropriate intervals and results are recorded.	<p>These data are collected virtually in real time as the fishery proceeds and full records are kept at member state level. Results of monitoring are made available to research and management bodies.</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.	<p>Mackerel</p> <p>Landings data are collected and available on a daily basis at all designated landing ports. For some countries individual vessel catches are monitored on a daily basis and quota uptake controlled accordingly. Actual catches for stock assessment purposes use the official landings data augmented by national information on misreporting and discarding.</p> <p>The stock status of the western and southern components is well monitored and there is now a concerted effort to try to monitor the recovery of the North Sea spawning component by a regular egg survey.</p>	R26		

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
3A.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 against these is possible. These take account of the precautionary approach, but this may not be explicit	<p>Herring</p> <p>Precautionary target and limit biomass and target fishing mortality reference points do exist and the management of the fishery is firmly based on these (see under Indicator 1.1.3.1).</p> <p>Mackerel</p> <p>Precautionary biomass target and fishing mortality target and limit reference points have been established and the management of the fishery is firmly based on these. Because of the severely depleted nature of the North Sea spawning component the target fishing mortality on this part of the stock is zero.</p>	R21, R25, R27	33.3	100
80	Results of monitoring are regularly interpreted in relation to precautionary, target and limit reference points.	<p>Precautionary biomass target and fishing mortality target and limit reference points have been established and the management of the fishery is firmly based on these. Because of the severely depleted nature of the North Sea spawning component the target fishing mortality on this part of the stock is zero.</p>	R24, R26		
100	Results of monitoring are quantitatively evaluated against precautionary, target and limit reference points on a regular and timely basis.	Evaluations are regular and timely.			

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score	
3A.6.3		Do procedures exist for reductions in harvest in light of monitoring results and how quickly and effectively can these be implemented?			
60	Practical procedures exist to reduce harvest. Programmes to link these with monitoring results are underway.	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 DEFRA have fast track closure procedures available for any fishery.	I3	33.3	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				
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.				

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score
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3A.7(MSC Criterion 10)		The management system includes measures to pursue objectives for the affected ecosystem.	7.9	85	
Weighting Commentary		The two indicators at this level were considered to be of equal significance.			
3A.7.1		Are measures in place to address (avoid or minimise) significant environmental impacts?			
60	Significant environmental impacts are known and measures are being applied to reduce key 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 of both species and are under regular review. Other impacts include a minimal non-target species by-catch. Catches and status of by-catch species is also regularly reviewed.	R26, R27, R28	50.0	90
80	Environmental impacts are known. Measures are being applied to minimise all significant ones and there is evidence that the measures are working.				
100	Measures are in place to avoid all significant environmental impacts and are subject to monitoring and periodic review.				

3A.7.2		Are no take zones, Marine Protected Areas 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 as appropriate.	No closed areas have been established in Areas IV c and VIId (Downs area) and this area has not been subject to any restriction (other than the Sub-area TAC), despite this fishery targeting spawning aggregations. It is also noted that this spawning stock has not shown the same rate of recovery as the other spawning stocks. 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.	R14, I7	50.0	80
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.	A joint East and West Sussex Marine Habitat Action Plan (inc. the intertidal) has also been proposed, but this is still at an embryonic stage with a possible delivery date of end 2004 (Kate Cole, pers. comm.). This will be based upon Seasearch data (essentially information derived from voluntary recreational divers, see http://www.seasearch.org.uk). This will limit information to about 6-12 miles from the coast and 30 m depth but will provide a high level of ground truthing.			
100	No-take zones and closed areas / seasons are established and enforced if and where appropriate and, if implemented, the consequences are being monitored.	A 'Mackerel box' has been established to protect known juvenile areas in SW England – excluding targeted mackerel fishing other than by handlining.			

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score
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3 A.8 (MSC Criterion 11)	There are control measures in place to ensure the management system is effectively implemented.			30.1	89
Weighting Commentary	The monitoring of fishing activities and availability of corrective mechanisms were considered to be of equal significance. The provision of information to fishers was considered of slightly lower importance.				
3A.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.	Information is made readily available to all fishing organisation within member states on the requirements, aims and methods of the management system. The Hastings fleet members are part of a small, close knit local community. Through the Hastings Fishermen's Protection Society, of which they are all members, there is an exchange of relevant knowledge. Through the Society, very good relationships have been built up with DEFRA and with the Local Sea Fisheries Committee and in that way the aims and changes in the methods of the management system are promulgated. However, the dissemination of information to individual fishermen is often unstructured and irregular, although this does not appear to compromise the management of the fishery or compliance.	I1	23.8	80
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.				
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.				

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score
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3A.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.	National Authorities enforce EC fisheries legislation and report on their activities annually to the Commission. Surveillance of the wider fleet includes use of satellite VMS, patrol vessels and overflights. Inshore vessels are subject to surveillance by SFC patrol vessels. DEFRA and the SSFC follow up shortcomings as appropriate. Compliance appears generally good, and no records of enforcement action have been determined against any Hastings vessels within this fishery.	I3, I4	38.1	90
80	An effective enforcement system has been implemented and there is an appropriate degree of control and compliance.				
100	An effective enforcement system has been implemented and there is a high degree of control and compliance.				

3A.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.	Non-compliance is dealt with by DEFRA or the SFC through the UK criminal justice systems using agreed and tested procedures. High levels of compliance within this fishery suggests that this system is effective although evidence suggests issues around DEFRA's enforcement record.	I3, I4	38.1	95
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.				
100	Agreed and tested corrective actions can be applied in the event of non-compliance.				

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score
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3 B		Operational Criteria	58.3	88	
Weighting Commentary		Within Criterion 3B, Compliance with the requirements of the management system (3B.5) was given the highest weighting, followed by the adoption of appropriate fishing methods (3B.1) and the provision of data from the fishers to management bodies (3B.6).			
3B.1(MSC Criterion 12)		There are management measures that include practices to reduce impacts on non-target species and inadvertent impacts upon target species.	24.8	90	
3B.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 uncertain.	Gear specifications ensure high selectivity. Accordingly, by-catch levels are very low and catches are landed and marketed under the non-sector quota. Sussex SFC by-laws mean that drift nets must be set over 1.5 m below the surface over May to September to prevent by-catch of surface-swimming migrants such as sea trout.	I1, I3, I4, I5	100	90
80	Measures have been implemented to reduce the major impacts on non-target species and inadvertent impacts on target species and there is evidence that they are having the desired effect.				
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.				

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score
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3B.2 (MSC Criterion 13)	There are management systems in place that encourage fishing methods that minimise adverse impacts on habitat.		8.5	95
3B.2.1		Do fishing operations implement appropriate fishing methods designed to minimise 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.	Fishing operations are undertaken to fish in the water column and to avoid contact with the sea bed, although this may occur intermittently and accidentally.	I1, I3, I4	10
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.			

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score
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3B.3 (MSC Criterion 14)		The management system incorporates measures that discourage destructive practices.		2.0	100
3B.3.1			Does the fishery employ destructive fishing practices (such as poisons or explosives)?		
60	The fishery does not allow any such destructive fishing practices.	The EC technical conservation regulation prohibits use of explosives, poisonous or stupefying substances or electric current.	13	100	100
80	The fishery does not employ any such destructive fishing practices and enforcement is considered sufficient to prevent their use.				
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.				

3B.4 (MSC Criterion 15)		The management system incorporate measures that reduce operational waste.		5.5	90
3B.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.	The drift net fishery is a 'day fishery' with all operational waste being landed at Hastings. Also, all boats are dry-berthed on the Stade.	18	100	90
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 that 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 that they are effective and these measures are supported by the fishers.				

SCORING INDICATORS	Comments	Audit Trace Ref.	Weight	Score
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3B.5 (MSC Criterion 16)		Fishing operations are conducted in compliance with the management system and legal and administrative requirements.	43.0	88	
Weighting Commentary		The three indicators at this level were considered to be of equal significance.			
3B.5.1		Are fishers aware of management system, legal and administrative requirements			
60	Fishers are aware of key management and legal requirements.	Hastings fishermen are made aware of the management system and any changes in the legal and administrative requirements through their 'umbrella' organisation, the Hastings Fishermen's Protection Society. HFPS has good relations built up locally with DEFRA and SFC.	I1, I3, I4	33.3	85
80	Fishers are aware of management and legal requirements upon them and are kept up to date with new developments.	Whilst this provides sufficient information to allow functioning of the management system, knowledge of all relevant information by fishers appears lacking.			
100	All fishers are aware of management legal requirements through a clearly documented and communicated mechanism such as a code of conduct.				

3B.5.2		Do fishers comply with management system, legal and administrative requirements?			
60	Fishers appear generally compliant with requirements, but there is incomplete information on the actual extent of compliance.	The records show general compliance with all quota, gear and minimum landing size regulations in force.	I3	33.3	90
80	Fishers appear compliant with relevant management and legal requirements and there are no indications of consistent violations.				
100	Fishers are fully compliant with, and fully supportive of, legal and administrative requirements, such as through a code of conduct.				

SCORING INDICATORS		Comments	Audit Trace Ref.	Weight	Score
3B.5.3		What is the record of enforcement of regulations in the fishery: e.g. 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 these.	There is no information suggesting any breaches of regulation within the Hastings fleet despite active monitoring by DEFRA and SSFC officers.	I3, I4	33.3	90
80	Evidence of rigorous monitoring of all the enforcement measures and evidence of actions taken in the event of breaches is available.				
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 is available.				

3B.6 (MSC Criterion 17)	The management system involves fishers in data collection.			16.2	80
3B.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.	Hastings fishermen have been generally co-operative with regulatory bodies, although specific information requests have not been made in relation to this fishery.	I1, I8	100	80
80	Fishery operatives are regularly involved in the collection and recording of catch, discard and other information.				
100	Fishery operatives assist significantly in the collection and recording of catch, discard and other information.				